U.S. Department of Transportation
Federal Highway Administration

Tennessee Division

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November 15, 2017

In Reply Refer To:
HFO-TN

Mr. Steve Allen
Director of Strategic Transportation Improvements
Tennessee Department of Transportation
James K. Polk Building, Suite 1000
Nashville, TN 37243-0349

Subject: Interchange Access Request for Interstate 40 at SR-265 (Central Pike), Wilson County

Dear Mr. Allen:

The Federal Highway Administration (FHWA) has received the Tennessee Department of Transportation's (TDOT) Interchange Access Request (IAR) for the proposed modification of Interstate 40 at SR-265 (Central Pike), in Wilson County. After reviewing the request in accordance with FHWA's Policy on Access to the Interstate System, the Division has determined the alternatives presented in your submittal are both engineering and operationally acceptable. Therefore the alternatives, as presented are conceptually approved and may now proceed into the National Environmental Policy Act (NEPA) phase for environmental review and analysis. If significant engineering and operational changes occur during the course of the NEPA process, then further review will be warranted by FHWA.

To receive approval to proceed with Final Design, TDOT will need to notify FHWA once the NEPA process is complete, that the design studied and approved in the NEPA document is consistent with the recommended alternative from the IAR, and the project is in the current TIP/STIP and LRTP.

If you or your staff needs additional assistance, please contact Thor Steffen at 615-781-5763.

Sincerely,

Gerald Varney, P.E.
Field Operations Team Leader

cc: Ms. Pamela Kordenbrock, Division Administrator, FHWA Tennessee Division
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Mr. Joe Deering, Region 3 Director of Project Development, TDOT
Mr. Shaun Armstrong, Transportation Manager 1, Strategic Transportation Investments, TDOT

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265 (CENTRAL PIKE)
MT. JULIET, WILSON COUNTY
PIN 124884.00

PREPARED BY
GRESHAM, SMITH AND PARTNERS
FOR THE
TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.

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EXECUTIVE SUMMARY

The City of Mt. Juliet, Wilson County, and Nashville Metropolitan Organization (MPO) request an evaluation of providing new access to Interstate 40 (I-40) at State Route (SR) 265 (Central Pike) near Mile Marker 225 (MM 225) in the City of Mt. Juliet in Wilson County. **Figure ES-1** provides a Vicinity Map of the area.

Several studies have been completed along this section of I-40, including:

- *Interchange Justification Study for I-40 at SR 265* (completed in 2000)
- *Interchange Modification Study at Exit 226 (SR 171)* (completed in 2006)
- *I-40/I-81 Corridor Feasibility Study* (completed in 2008)
- *Nashville Area MPO's 2040 Regional Transportation Plan* (adopted in 2016)
- *Mt. Juliet Comprehensive Transportation Plan 2017*
- *Central Pike Subarea Study* (2017)

On June 20, 2000, FHWA provided engineering and operational approval for an Interchange Justification Study (IJS) for a new interchange at this location. FHWA's Policy on Access to the Interstate System states that if a project has not progressed to construction within eight (8) years of receiving an affirmative determination of engineering and operational acceptability (23 CFR 625.2(a)), then an updated study based on current and projected future conditions must be resubmitted to FHWA for review and approval.

The primary purpose and need for providing access along I-40 at SR 265 is to address high volumes of traffic, poor levels of service, and projected ramp queues at the adjacent Exit 226 (SR 171) Interchange. FHWA approved the Exit 226 (SR 171) Interchange Modification Study (IMS) in 2006 with the understanding that a new interchange would need to be constructed along I-40 at SR 265 to alleviate traffic demand at SR 171 beyond the IMS's 2016 Design Year. SR 171 is known locally as Mt. Juliet Road.

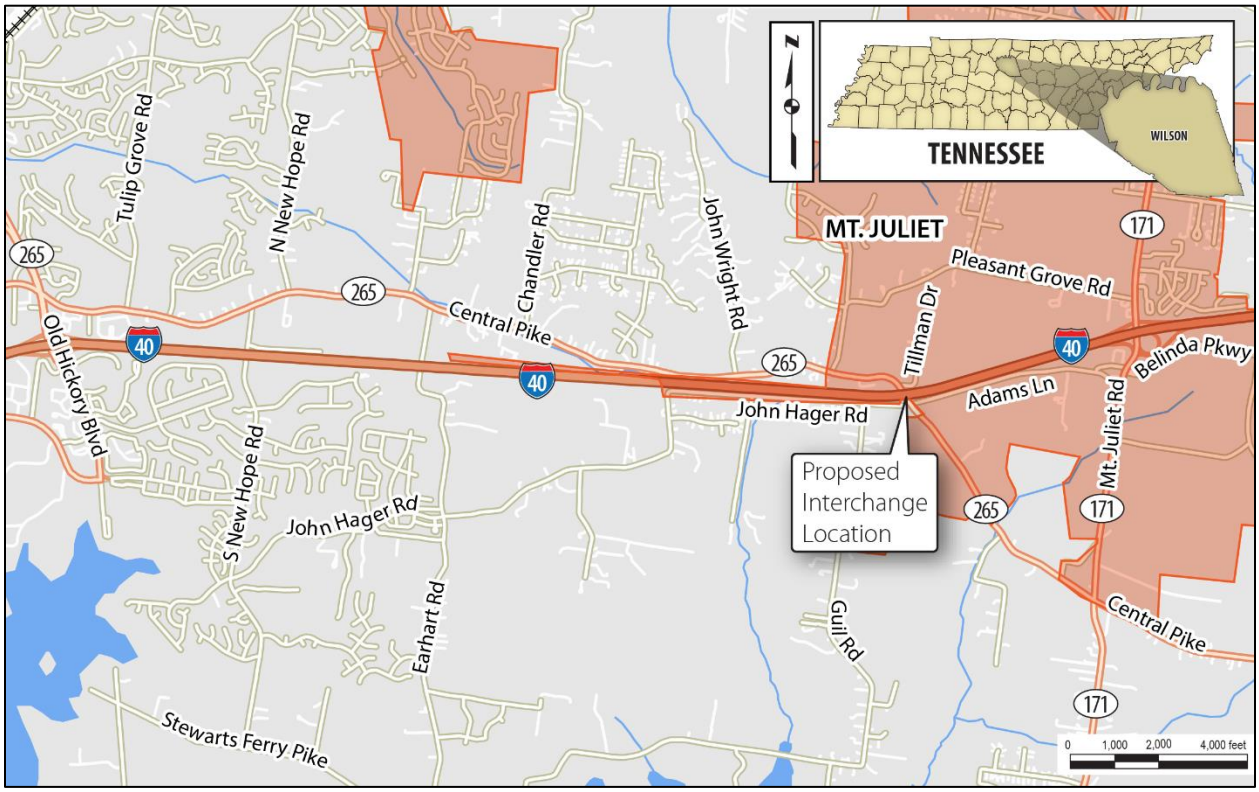
Three alternatives are proposed in this IAR: a No-Build Alternative, a Diamond Interchange, and a Diverging Diamond Interchange. The No-Build Alternative results in poor Levels of Service (LOS) and queues along the westbound I-40 Off-Ramp at SR 171 that reach the mainline of I-40, creating safety and operational concerns.

The Diamond Interchange Alternative provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have levels of service of C or better at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange. The estimated project cost is $19.8 million.

The Diverging Diamond Interchange (DDI) Alternative provides many of the same advantages as the Diamond Interchange Alternative. It also provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have levels of service of B at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange. The estimated project cost is $20.9 million.

Both interchange build alternative configurations meet the purpose and need for the new interchange access along I-40. The construction of an interchange at SR 265, along with other planned and associated roadway improvement projects within the area of influence, is calculated to reduce crashes within the study area by 9%. Data from the HSM CMF Clearinghouse website indicates the DDI Build Alternative will operate more safely than the Diamond Interchange Build Alternative. Both Build Alternatives are recommended for consideration.

This study analyzes the proposed I-40/SR 265 Interchange's engineering feasibility and defines the required improvements best suited to meet the current and future regional needs. This report will be submitted by the Tennessee Department of Transportation (TDOT) for a determination of Engineering and Operational Acceptability to the Federal Highway Administration (FHWA). Receipt of this determination does not guarantee approval of any new access or changes to current access. Final approval of the Interstate Access Request will be requested once all National Environmental Policy Act (NEPA) requirements have been met and a determination that this document and any potential changes from the NEPA process have been addressed, and that the project is in the appropriate Long Range Transportation Plan (LRTP), Transportation Improvement Program (TIP) or State Transportation Improvement Program (STIP).



ES-1: VICINITY MAP

1.0 INTRODUCTION

1.1 STUDY BACKGROUND

The Tennessee Department of Transportation (TDOT) initiated study of a request for new interchange access on I-40 at State Route (SR) 265 (Central Pike) in Wilson County, Tennessee at the request of the Nashville Area Metropolitan Planning Organization (MPO), the City of Mt. Juliet, and Wilson County. The purpose of the new interchange access is to accommodate future traffic demands and relieve existing and anticipated capacity deficiencies at the Exit 226 (SR 171) Interchange. As shown in **Figure 1**, the proposed access point is located in Wilson County, Tennessee within the City of Mt. Juliet.

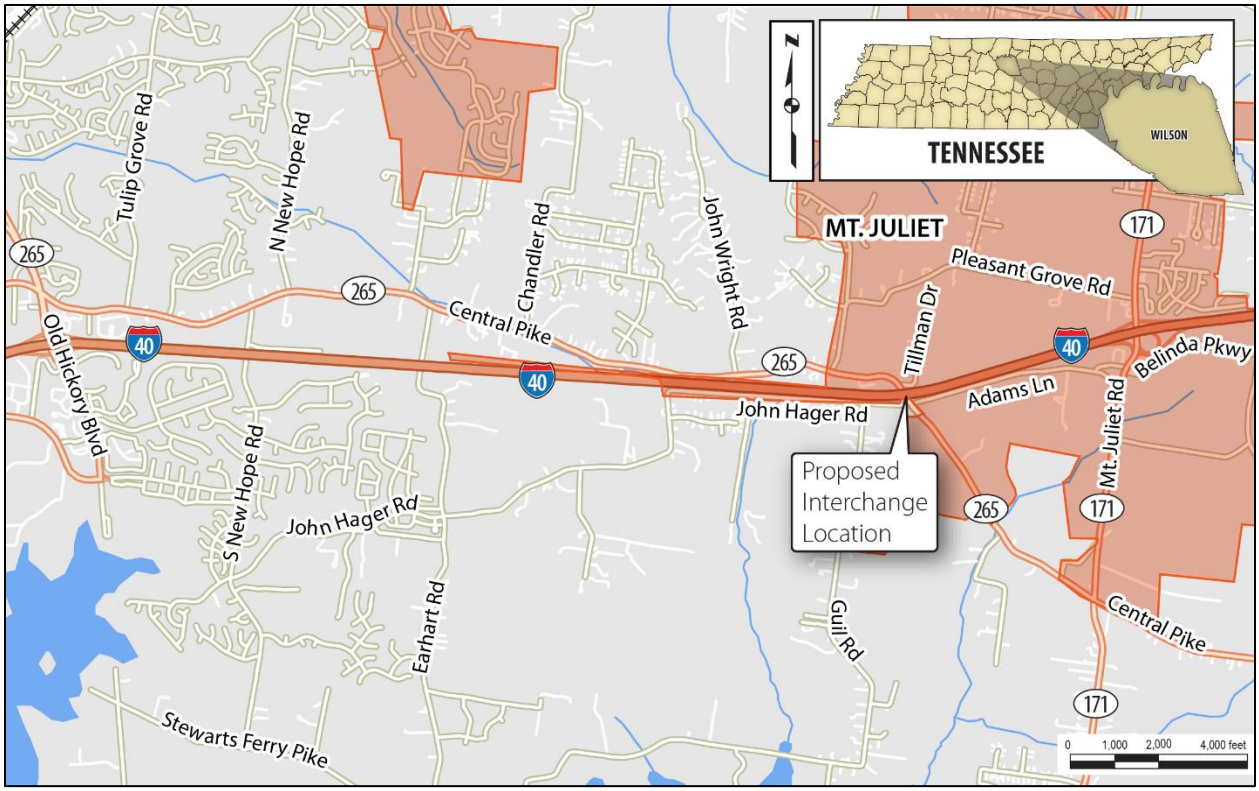


FIGURE 1: VICINITY MAP

On June 20, 2000, FHWA provided engineering and operational approval for an Interchange Justification Study (IJS) for a new interchange at this location. The proposed improvements included a new diamond interchange with auxiliary lanes along both directions of I-40 connecting to the Exit 226 (SR 171) (Mt. Juliet Road) Interchange. FHWA's Policy on Access to the Interstate System states that if a project has not progressed to construction within eight (8) years of receiving an affirmative determination of engineering and operational acceptability (23 CFR 625.2(a)), then an updated study based on current and projected future conditions must be resubmitted to FHWA for review and approval.

The proposed interchange is located along I-40, near Mile Marker 225, 1.1 miles west of the Exit 226 (SR 171) Interchange and 3.9 miles east of the Exit 221 (SR 45) (Old Hickory Boulevard)

Interchange. No other interchange studies are currently underway within the study area. FHWA approved an Interchange Modification Study in 2006 for the Exit 226 (SR 171) Interchange. The study recommended:

1. Addition of combined ramp behind barrier along eastbound I-40: to provide access to the SR 171 South directional ramp, SR 171 North loop-ramp, and the slip ramp that connects to Belinda Parkway,
2. Geometric improvements to ramps to meet design speed,
3. Realignment of the eastbound I-40 On-Ramp and bridge it over the Belinda Parkway slip ramp,
4. Widening the westbound I-40 Off-Ramp for dual left turn lanes and a single right turn lane,
5. Provide a two-lane westbound I-40 On-Ramp,
6. Increased storage lane lengths at all signalized intersections to reduce disruption of flow to the mainline traffic on I-40 and SR 171.

The recommended improvements were constructed in 2009. The Design Year for the SR 171 Interchange Modification Study (IMS) was compressed to 10 years (2016) in anticipation of a new interchange being constructed along I-40 at SR 265 to alleviate traffic demand at the existing SR 171 Interchange. The 2016 Design Year analysis identified that the intersection of the westbound I-40 Ramps with SR 171 would operate at LOS F and the intersection of the eastbound I-40 Ramps with SR 171 Intersection to operate at LOS E (southbound) and F (northbound). The IMS was approved by FHWA with the understanding that a new interchange would need to be constructed along I-40 at SR 265 to alleviate traffic demand at SR 171 beyond the 2016 Design Year.

In February 2006, the Exit 229 (Beckwith Road) Interchange was let to construction. It is located 3.2 miles east of SR 171. The traffic analysis from the SR 171 Interchange Modification Study included the Beckwith Road interchange in its analysis. As predicted in the 2006 SR 171 IMS, SR 171 currently experiences congestion and poor traffic operations.

The City of Mt. Juliet supports the proposed interchange (see **Attachment A**). The city has committed to access management along SR 265 within the functional area of the interchange to help preserve traffic operations into the future (see **Attachment B**). TDOT's Design Division supports the Build Alternatives presented in this Interstate Access Request (IAR) (see **Attachment C**). The proposed project is included in the current Nashville Area MPO Regional Transportation Plan (See **Attachment D**).

1.2 PROJECT LOCATION AND DESCRIPTION OF STUDY AREA

The proposed interchange location along I-40, near Mile Marker 225, at SR 265 is located in Wilson County, Tennessee, within the city limits of City of Mt. Juliet and within the Nashville Urbanized Area Boundary. The proposed interchange location lies approximately 1.1 miles west of the existing Exit 226 (SR 171) Interchange and 3.9 miles east of the existing Exit 221 (SR 45) Interchange. SR 265 is the only state route that crosses I-40 between these two interchanges. Construction to widen I-40 within the study area from six (6) lanes to eight (8) lanes was completed in 2015. The interstate consists of four (4) twelve (12)-foot travel lanes in each direction with a center concrete median barrier, a six (6)-foot paved inside shoulder and six (6)-foot paved outside shoulder.

I-40 serves as a major east-west traffic artery, ultimately connecting southern California to the Atlantic Ocean in Wilmington, North Carolina. In the immediate proximity of the proposed interchange, I-40 serves as the major traffic corridor connecting Nashville, Tennessee and Knoxville, Tennessee. The study area's five-mile distance along I-40 between Exit 221 (SR 45) and Exit 226 (SR 171) is the longest segment along I-40 without an interchange within the 57-mile corridor from Exit 188 (SR 249 in Kingston Springs) and Exit 245 (Linwood Road in Wilson County). This area is shown in **Figure 2**.

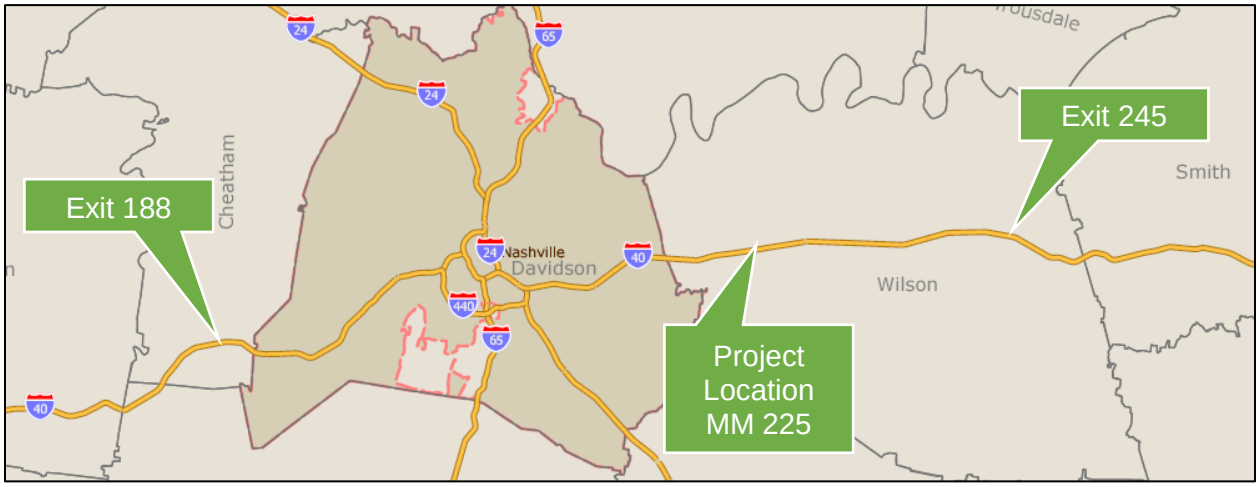


FIGURE 2: INTERCHANGE SPACING ALONG I-40

SR 265, locally known as Central Pike, is functionally classified as an urban minor arterial on the State's Surface Transportation System. The roadway section on SR 265 consists of a two (2)-lane ditch section with eleven (11)-foot travel lanes and three (3)-foot shoulders in Davidson County and ten (10)-foot travel lanes and minimal shoulders in Wilson County.

The area of influence along I-40 evaluated in this request includes the adjacent interchanges of Exit 221 (SR 45) and Exit 226 (SR 171) and is 5.0 miles in length. Additionally, the area of influence includes SR 265 from Pleasant Grove Road to SR 171, which is 1.7 miles. The area of influence for the study area is shown in **Figure 3**. The study boundary was selected to incorporate the proposed build alternative limits, future development, and the adjacent interchanges and intersections.



FIGURE 3: AREA OF INFLUENCE

1.3 PURPOSE AND NEED

The purpose of this IAR is to determine the feasibility of providing access along I-40 at SR 265, and to evaluate traffic operations over the area of influence including the adjacent interchanges along I-40 and intersections along SR 265. The City of Mt. Juliet, Wilson County and the Nashville Area MPO initiated the request for a new interchange to accommodate future traffic demands and relieve existing and anticipated capacity deficiencies at the Exit 226 (SR 171) Interchange. The following key points were identified to be studied:

- Capacity deficiencies within the area of influence;
- Interchange improvements to provide the desired level of service for the Design Year of 2040;
- Evaluate operational characteristics of the proposed improvements to improve capacity;
- Evaluate Transportation System Management options;
- Ensure pedestrian and bicycle traffic is accommodated along SR 265;
- Develop a planning-level construction cost estimate; and
- Address any additional right-of-way requirements.

The City of Mt. Juliet has experienced rapid growth in the last decade and has the potential for additional development both north and south of the I-40 corridor, particularly in close proximity to SR 265. This rapid growth and associated increase in traffic volumes support the need for transportation network improvements in order to maintain acceptable operations on existing facilities, as well as provide additional connectivity in the area.

Table 1 provides the operational measures for the Exit 226 (SR 171) Interchange. The measures reported are for SR 171 with a planned project to add an additional northbound lane. Even with the planned improvement, the interchange is still calculated to fail and queue vehicles to the interstate mainline.

TABLE 1: OPERATIONAL MEASURES (NO BUILD ALTERNATIVE)

Operational Measure	**2020**	**2040**
AADT on I-40	92,950 vpd	111,725 vpd
AADT on SR 171	26,015 – 51,400 vpd	30,875 – 71,150 vpd
SR 171 at I-40 WB Ramps		
	2020 LOS (AM/PM)	**2040 LOS (AM/PM)**
Northbound Approach	D / D	F / F
Southbound Approach	D / E	F / F
Westbound Approach[A]	F / F	F / F
Overall Intersection LOS	**D / E**	**F / F**

[A] Traffic simulation demonstrates queues will reach I-40 mainline by 2040.

Source: Gresham, Smith and Partners

2.0 EXISTING CONDITIONS

2.1 EXISTING NETWORK

Within the study area, I-40 is an eight (8)-lane barrier divided interstate with four (4) lanes in each direction and has a posted speed of 70 miles per hour (mph). SR 265 consists of a two (2)-lane ditch section with one (1) ten (10)-foot travel lane in each direction in the vicinity of I-40. The posted speed limit on SR 265 is 35 mph. SR 265 runs east-west within the study area connecting to SR 45 to the west and SR 171 to the east. SR 265 is the only state route crossing I-40 between the Exit 221 (SR 45) and Exit 226 (SR 171) Interchanges. SR 265 is functionally classified as an Urban Minor Arterial. The majority of traffic accessing SR 265 utilizes the Exit 226 (SR 171) Interchange. **Figure 4** illustrates the existing interchange ramp geometry at the Exit 226 (SR 171) Interchange.

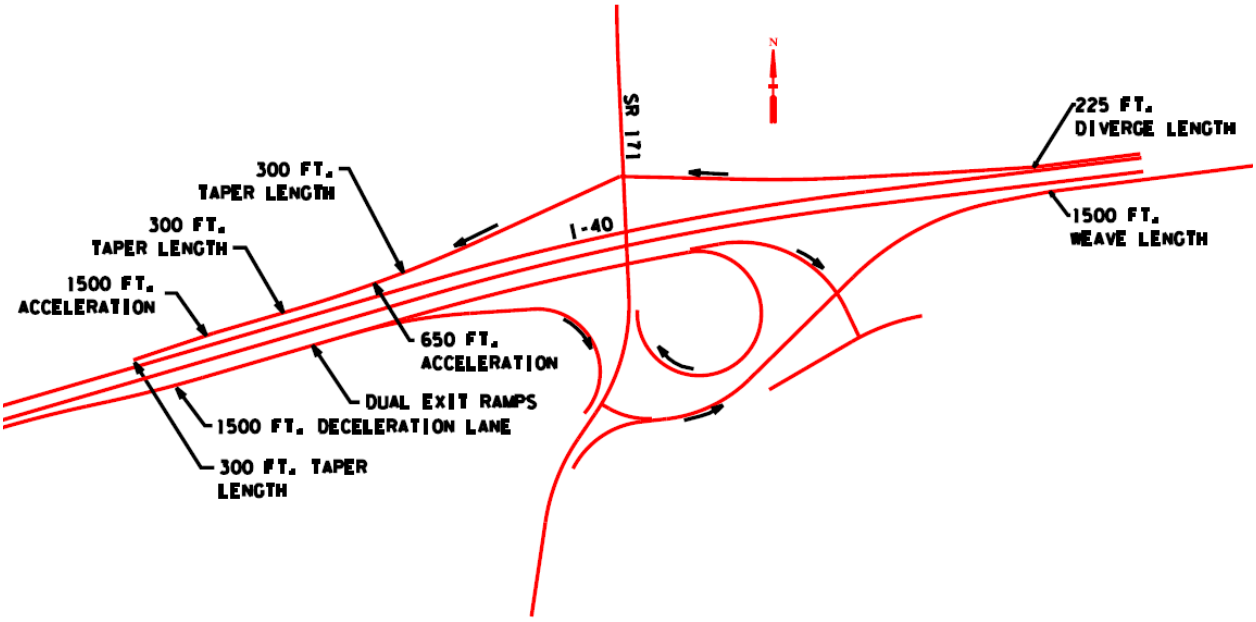


FIGURE 4: EXISTING SR 171 RAMP GEOMETRY

Source: Gresham, Smith and Partners

The area of influence includes multiple intersections. The geometry and laneage for each is listed on the following page.

I-40 Westbound Ramps at SR 171 is a four (4)-leg signalized intersection. Southbound SR 171 has two (2) through lanes and single right turn lane that free flows onto the westbound on-ramp. Northbound SR 171 has two (2) through lanes and a dual left turn lane onto the westbound on-ramp. The westbound on-ramp has three (3) accepting lanes. The westbound off-ramp has two (2) left turn lanes and one (1) right turn lane. The intersection is within a coordinated set of signals, controlled by an Adaptive Signal Control Technology (ASCT) system, along SR 171 that is maintained by the City of Mt. Juliet.

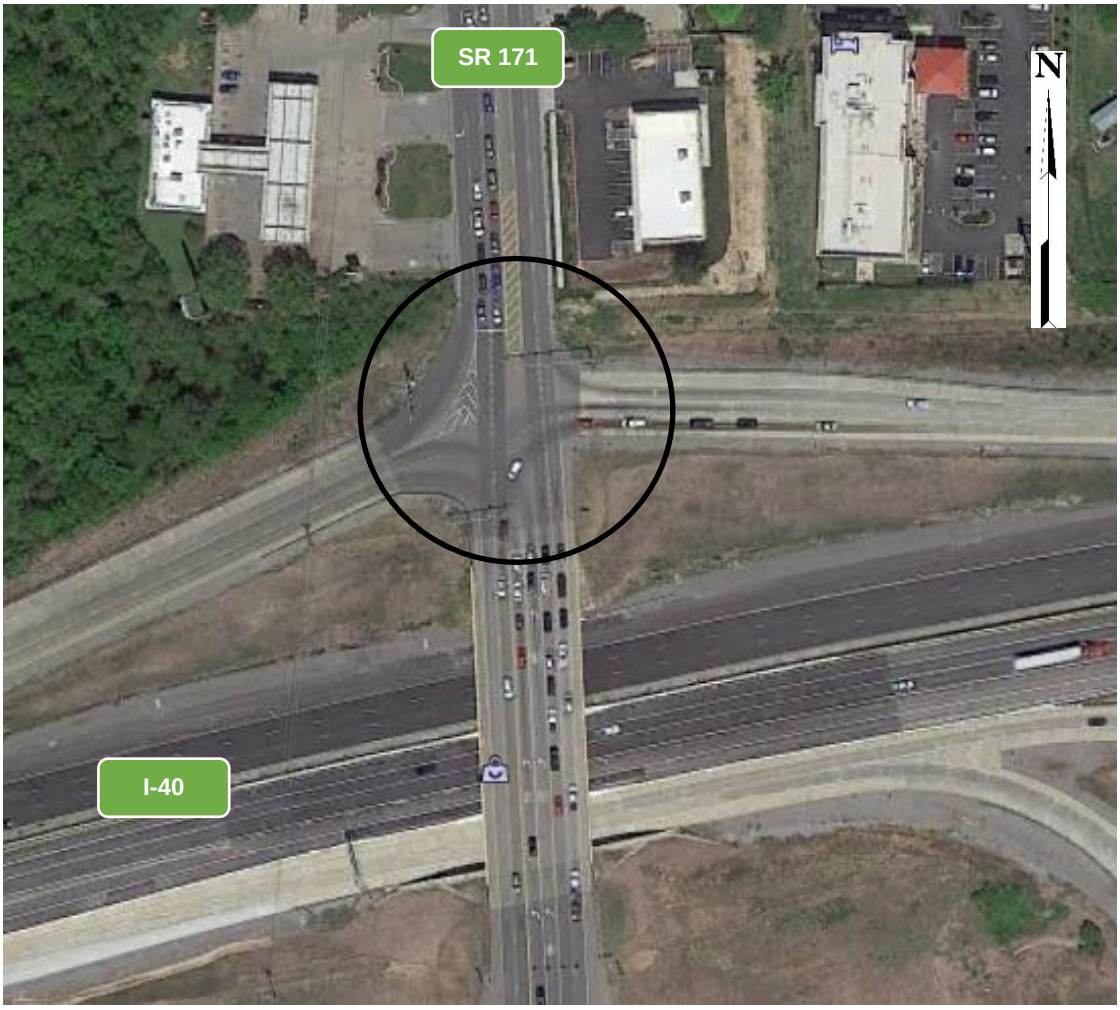


FIGURE 5: SR 171 SIGNALIZED INTERSECTION AT I-40 WESTBOUND RAMPS

I-40 Eastbound Ramps at SR 171 is a partial cloverleaf with directional ramps that form a signalized intersection along SR 171. The eastbound off-ramp is a two (2)-lane ramp that provides access to northbound and southbound SR 171 and Belinda Parkway. The slip ramp to Belinda Parkway allows traffic to bypass SR 171 to access commercial developments within the Providence Marketplace development. The loop ramp from eastbound I-40 forms an added lane onto northbound SR 171. The eastbound on-ramp is a two (2)-lane ramp accepting both northbound and southbound traffic from SR 171. There is a signal for a protected southbound left turn onto the eastbound on-ramp that crosses northbound SR 171. All other movements at this intersection are free-flow movements. The intersection is within a coordinated set of signals, controlled by an ASCT system, along SR 171 that is maintained by the City of Mt. Juliet.

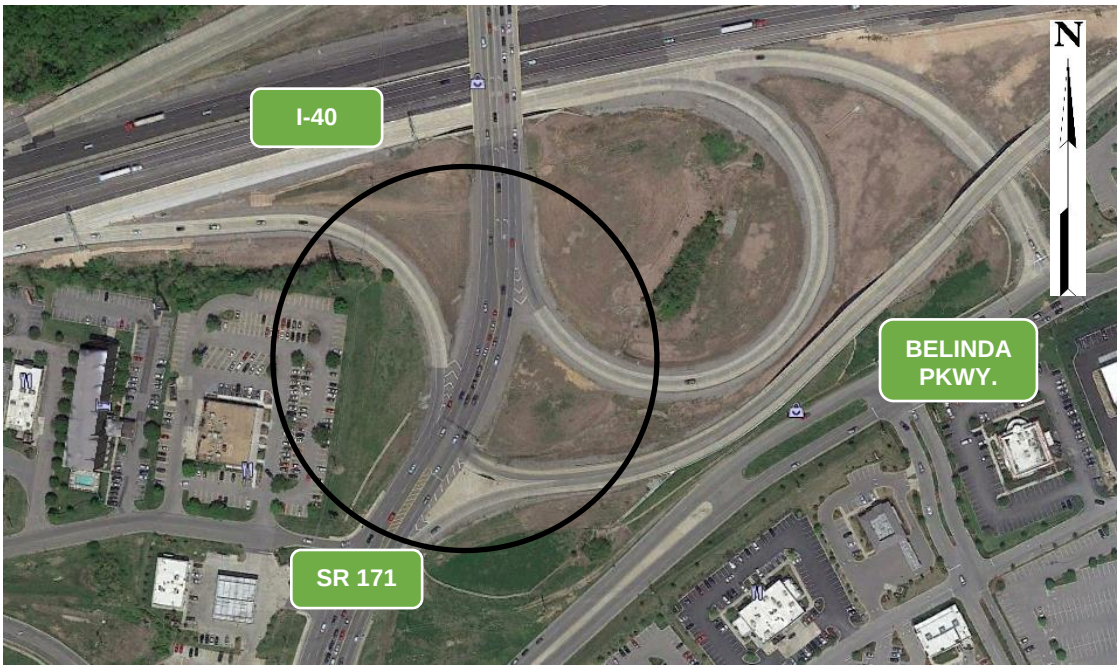


FIGURE 6: SR 171 DIRECTIONAL I-40 EASTBOUND RAMPS

SR 265 at Adams Lane/John Hagar Road is a four (4)-leg, four-way stop controlled intersection (note the aerial imagery below predates conversion to four-way stop control). John Hagar Road continues west of the SR 265 intersection and is a two-lane rural roadway with two (2)-foot or less shoulders. Adams lane continues east of the SR 265 intersection and is a two-lane rural roadway at the intersection with SR 265. Adams Lane continues east and widens to a three (3) -lane urban section near the connection with SR 171. Adams Lane parallels I-40 and serves as a connection for local traffic between SR 265 and SR171. It provides access to multiple retail shopping, residential, and business park locations.



FIGURE 7: SR 265 AT JOHN HAGAR ROAD / ADAMS LANE

SR 265 at SR 171 is a four (4)-leg, signalized intersection. SR 171 is a two (2)-lane roadway that transitions to a five (5)-lane urban section approaching the Providence Marketplace development and the interchange with I-40. SR 171 provides access to multiple retail shopping centers and residential neighborhoods. The eastbound and westbound approaches on SR 265 consists of a shared left-through-right lane. The northbound and southbound approaches on SR 171 both consist of a shared thru-right lane and a dedicated left turn lane. The City of Mt. Juliet maintains the intersection signal timings.

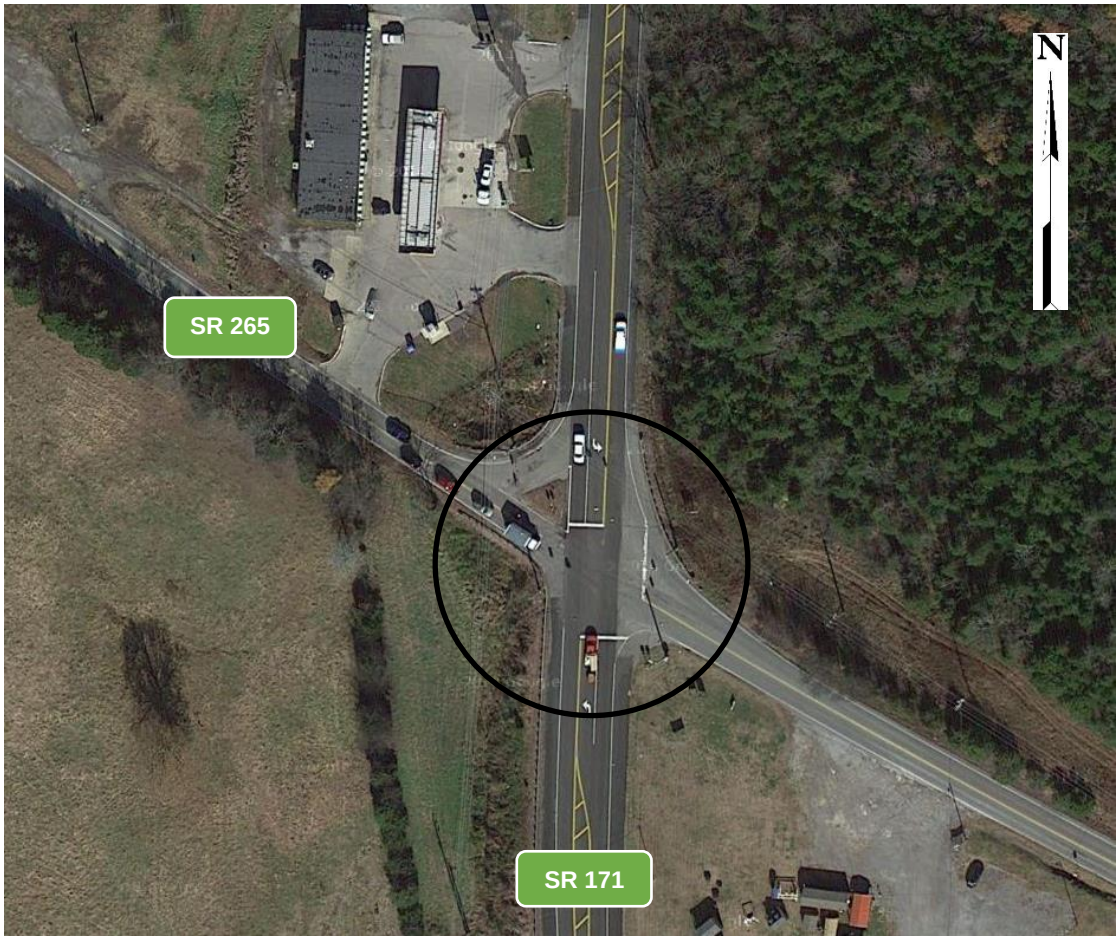


FIGURE 8: SR 265 AT SR 171

SR 265 at Tillman Drive is a three (3)-leg, one-way stop controlled intersection. The intersection is located less than 200 feet north of I-40. None of the approaches have turn lanes. The Tillman Drive approach stops for SR 265 traffic. Tillman Drive is a two-lane rural roadway at the intersection with SR 265. Tillman Drive accesses two residences.

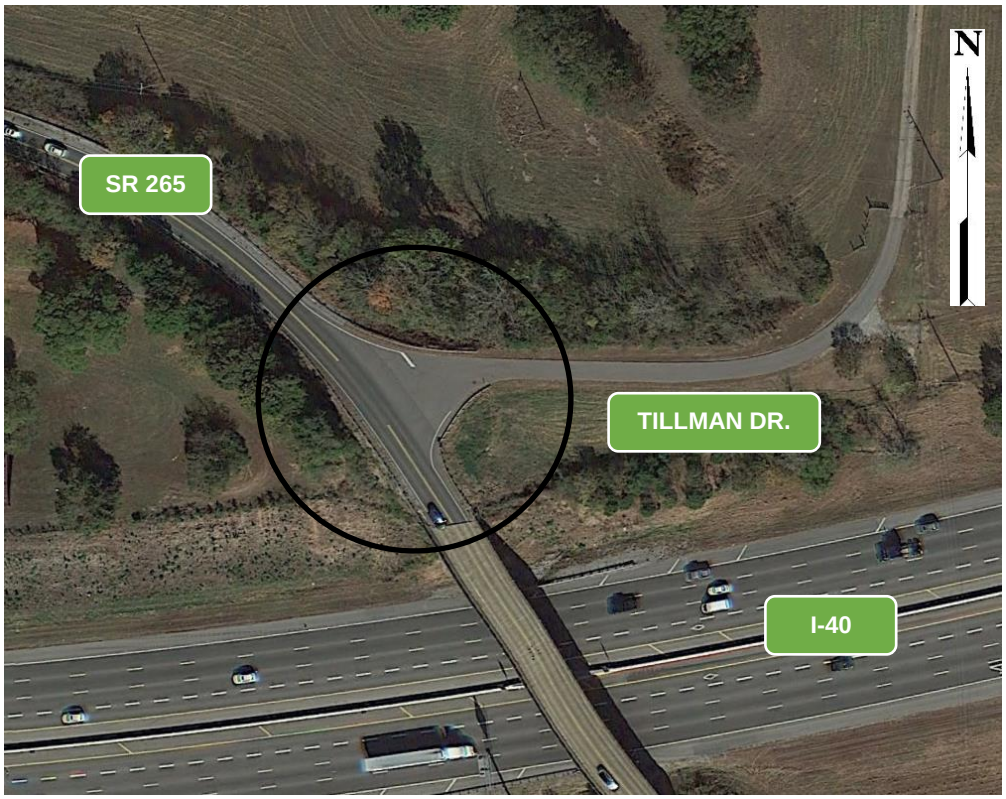


FIGURE 9: SR 265 AT TILLMAN DRIVE

SR 265 at Pleasant Grove Road is a three (3)-leg, one-way stop controlled intersection. The intersection is located approximately 1/3 of a mile west of Tillman Drive. None of the approaches have turn lanes. The Pleasant Grove Road approach stops for SR 265 traffic. Pleasant Grove Road is a two-lane rural roadway at the intersection with SR 265. Pleasant Grove Road continues northeast to provide access to SR 171 and numerous retail and hospitality businesses.



FIGURE 10: SR 265 AT PLEASANT GROVE ROAD

I-40 at SR 45, to the west of SR 171, forms a traditional diamond interchange. SR 45 is a five-lane cross section. The ramps have turn lanes. The intersections of the ramps with SR 45 are signalized. Metro Nashville Public Works maintains the signal timings.

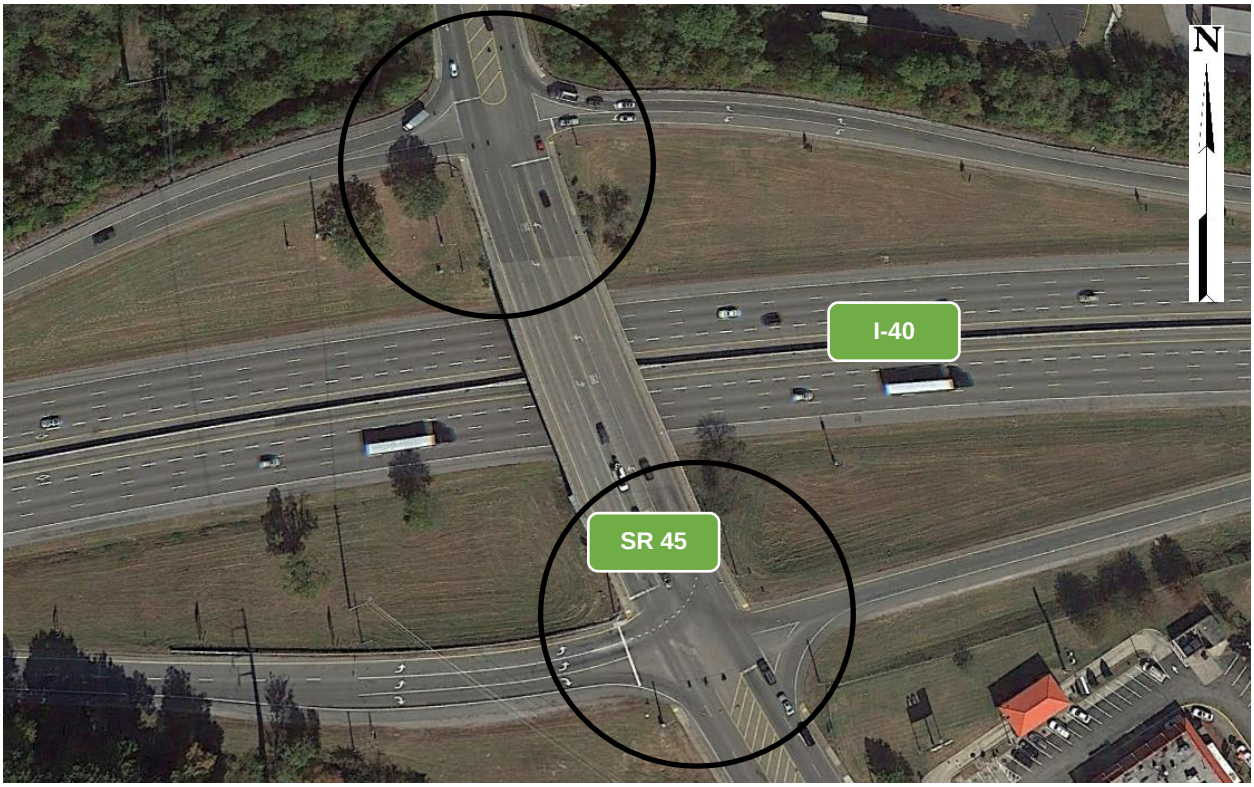


FIGURE 11: I-40 AT SR 45

2.2 GEOMETRIC DEFICIENCIES

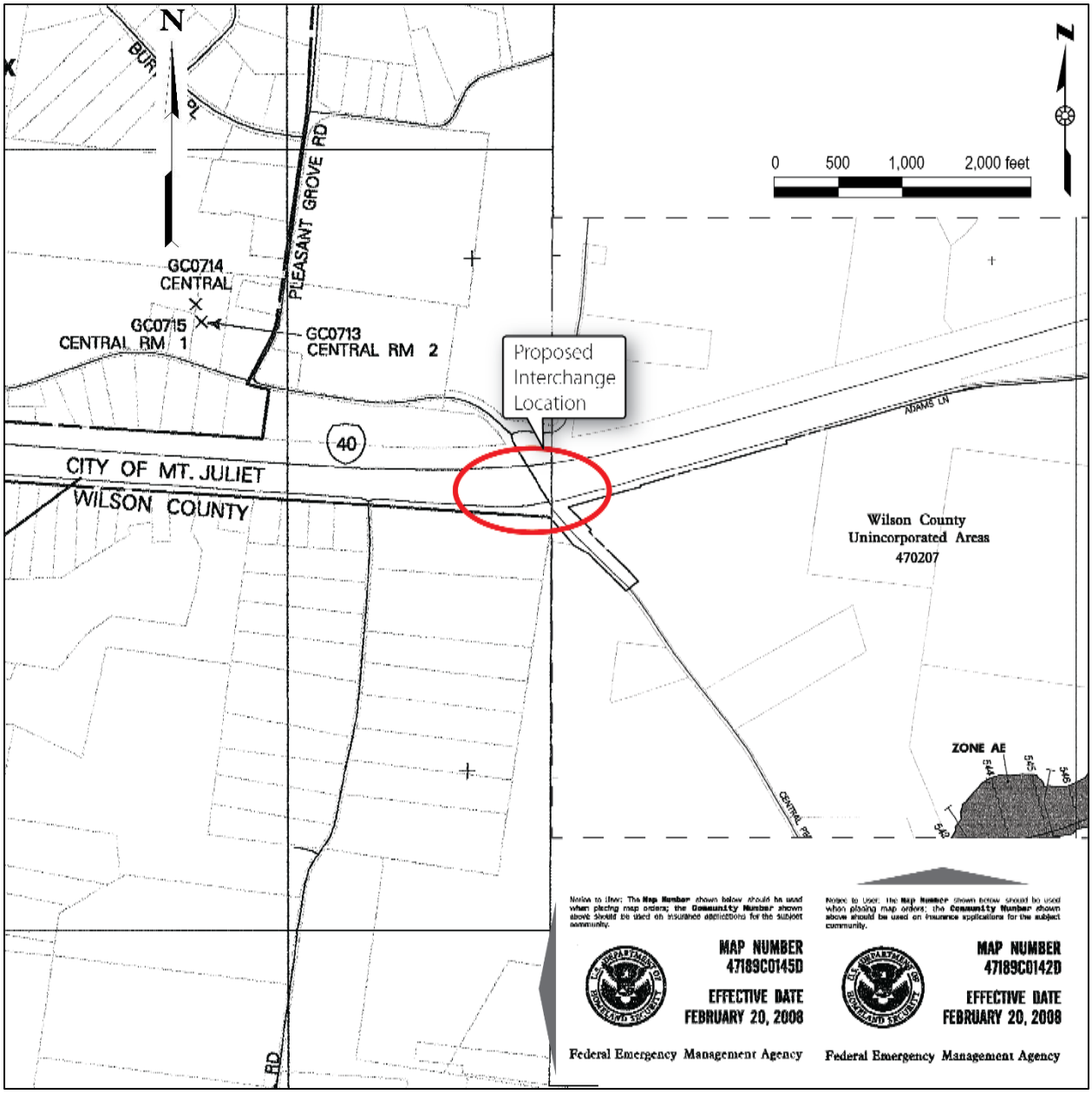
SR 265 has ten (10)-foot travel lanes with no shoulders. Its right-of-way in the area of influence varies from thirty (30) feet to eighty (80) feet. It is an unforgiving roadway with little roadside clear zone. It is lacking bicyclist and pedestrian features. The City of Mt. Juliet desires these multimodal features because more nearby residential development is planned.

2.3 PRELIMINARY ENVIRONMENTAL CONSTRAINTS

The proposed alternatives will require new right-of-way acquisition. All necessary studies, including ecological, hazardous materials, air quality/noise, archaeological, and historical studies are required as the project continues into environmental planning.

The project is located within the Stones River watershed. The Federal Emergency Management Agency (FEMA) Mapping Information Platform was used to identify flood zones within the interchange area. The FEMA data indicate that there are no floodways or flood hazard zones within the study area. The EPA MY Waters Mapper database was used to locate streams and wetlands within the area. No streams or wetlands are located within the footprint of the proposed interchange. One freshwater pond is located in the area of the proposed westbound off-ramp. No permit is required for impacts to freshwater ponds. **Figure 12** shows the FEMA mapping information for the interchange area.

No superfund sites listed on the EPA National Priority List (NPL) Database are located in Wilson County. A review of the EPA EnviroMapper indicated no sites within the project area with environmental concerns.

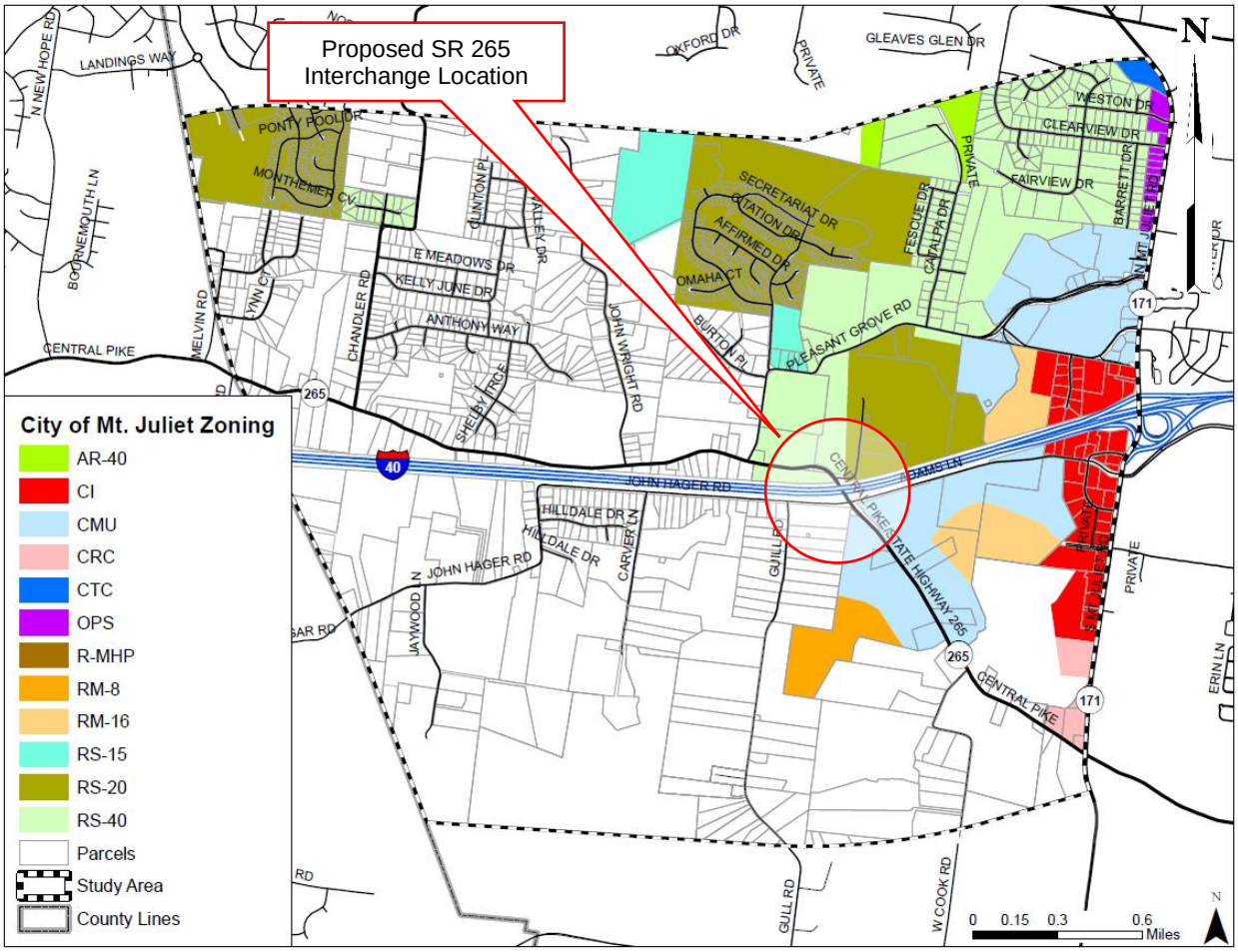


Source: FEMA Flood Maps: 47189C0142D, 47189C0145D

FIGURE 12: FEMA FLOOD MAP

2.4 EXISTING LAND USE AND ZONING

The segment of I-40 between SR 171 (Exit 226) and the proposed interchange with SR 265 is located within the city limits of the City of Mt. Juliet. **Figure 13** shows the zoning map of the study area. The zoning is characterized by a mix of agricultural and rural land, suburban residences, and a strong presence of large-scale retail development and commercial uses at the I-40/SR 171 Interchange and along SR 171.



Source: City of Mt. Juliet

FIGURE 13: ZONING MAP, MT. JULIET

3.0 FUTURE CONDITIONS

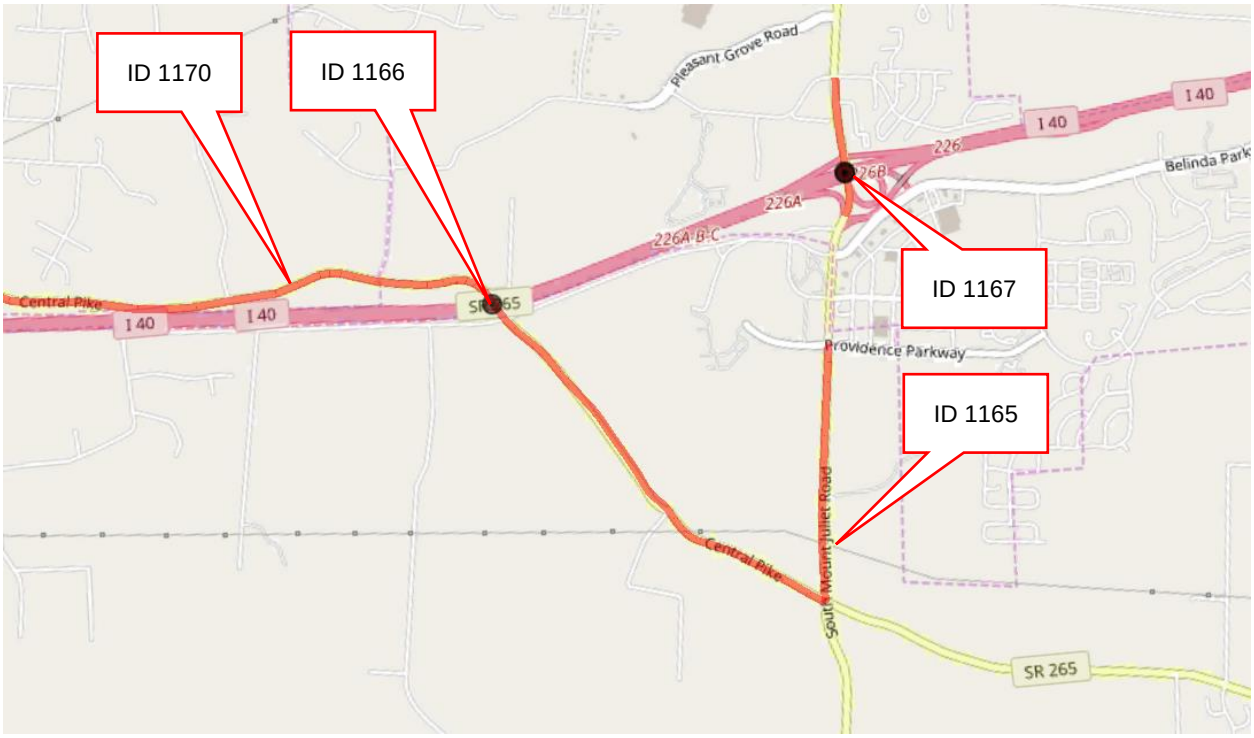
3.1 PLANNED TRANSPORTATION PROJECTS

Four projects are listed as cost-feasible in the Nashville Area MPO's 2040 Regional Transportation Plan (RTP), which was adopted in 2016. These projects are listed in **Table 2** and shown in **Figure 14**. The relevant RTP sheets are provided as **Attachment A**.

TABLE 2: MPO 2040 RTP COST-FEASIBLE PROJECTS

RTP ID	Project Type	Project Name and Description
1166	Interchange New	I-40 at SR 265 Interchange
1167	Roadway Widening	SR 171 at I-40 Bridge
1165	Roadway Widening	SR 171 widening, 2 to 5 lanes, from SR 265 to Providence Parkway
1170	Roadway Widening	SR 265 widening, 2 to 5 lanes, from SR 45 to SR 171

Source: Nashville Area MPO 2040 Regional Transportation Plan



Source: Nashville Area MPO KMZ file, Google Earth

FIGURE 14: MPO 2040 RTP COST-FEASIBLE PROJECTS

The Regional Transportation Plan-listed projects are summarized as follows:

- Project ID 1166 is the proposed I-40 at SR 265 Interchange that is the subject of this IAR.
- Project ID 1170 will widen SR 265 from its existing two lanes to five lanes (two lanes in each direction with a center two-way left-turn lane) between SR 45 and SR 171. The proposed I-40 at SR 265 Interchange is located within these limits. Project ID 1170 will connect to either end of the improvements proposed along SR 265 in this IAR.
- Project ID 1165 will widen SR 171 from two to five lanes from SR 265 to the existing five-lane section at Providence Parkway. The project is located 0.5 miles south of the Exit 226 (SR 171) Interchange.
- Project 1167 will widen SR 171 within the Exit 226 (SR 171) Interchange, including the bridge over I-40. This project will provide two continuous travel lanes along northbound SR 171 through the I-40 Interchange area. Both north and south of the I-40 Interchange, SR 171 has two northbound lanes. Within the interchange, one of the northbound lanes becomes a left-turn lane to I-40 Westbound. Therefore, only one northbound travel lane is present along SR 171 between the intersections with the I-40 Eastbound and Westbound ramps. This restricts flow along northbound SR 171 and creates a safety concern due to vehicular weaving.

TDOT identified the I-40/I-81 Corridor from Memphis to Bristol as a strategic statewide corridor through their statewide planning effort. In 2008, TDOT completed the *I-40/I-81 Corridor Feasibility*

Study. The study area for the I-40/I-81 corridor extends from Memphis to Bristol, a distance of about 550 miles. The purpose of the *I-40/I-81 Corridor Feasibility Study* was to gain a more detailed understanding of the deficiencies of the corridor and to develop corridor level multi-modal solutions to address these deficiencies. The study considered improvements to the I-40/I-81 corridor, investigated parallel arterials to I-40/I-81 that could be used for local travel, rail lines that could be candidates for freight diversion from the interstate, and considered major intermodal hubs located along the corridor. Two projects were listed in the *I-40/I-81 Corridor Feasibility Study* that are within this IAR's study area:

- I-40 from SR-46 (Exit 172) to Briley Parkway (Exit 204) and from Donelson Pike (Exit 216) to SR-840 (Exit 235)/ ITS Freeway Management
- I-40 from Mt. Juliet Rd (Exit 226) to SR-840 (Exit 235)/ Widen to 6 lanes

I-40 has since been widened to six or more lanes to within 2 miles of I-840 (formerly SR 840). ITS message board are now present along I-40 within the study area between SR 45 and SR 171. The *I-40/I-81 Corridor Feasibility Study* may be downloaded at:
http://www.tn.gov/tdot/article/i40-i81-corridor-study-library

The *Mt. Juliet Comprehensive Transportation Plan 2017* lists an interchange at I-40/SR 265 as a high priority project (see **Appendix A**). It also recommends improvements along SR 265 that include roadway widening with a shared-use/multimodal sidepath.

3.2 FUTURE LAND USE, ZONING, AND DEVELOPMENTS

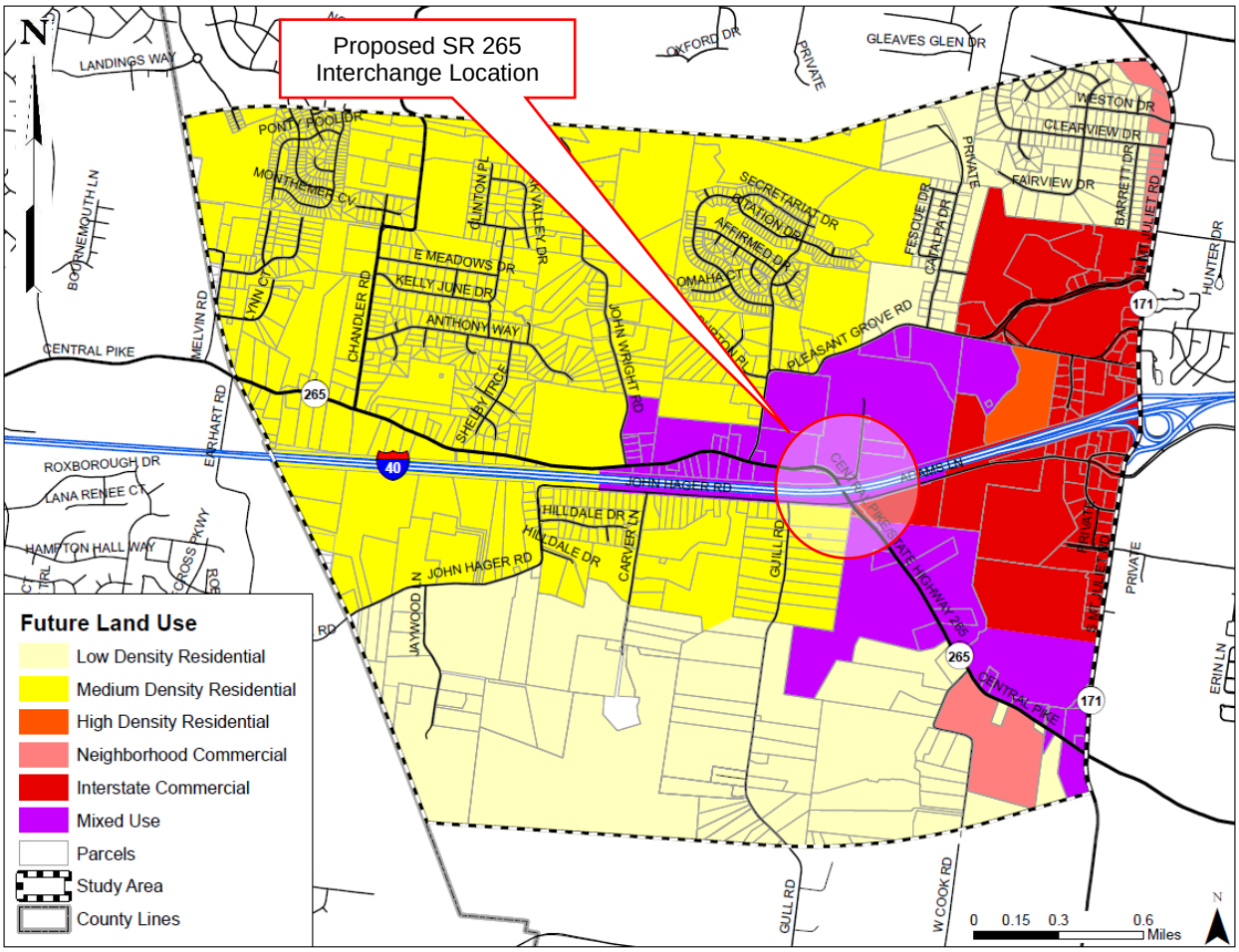
A map of the Future Land Use policy for the study area, assuming the construction of an interchange along I-40 at SR 265, is shown in **Figure 15**. A medium density development pattern is planned to continue mostly to the north of I-40 and a low-density development pattern is planned to continue primarily to the south of I-40 in the more rural area of Wilson County. A low-density development pattern will accommodate residential development with a density of 1.1 to 1.3 dwelling units per acre, whereas a medium density residential development pattern will accommodate a density range of 2.18 to 2.9 dwelling units per acre. Interstate commercial development at the Exit 226 (SR 171) Interchange will extend westward to SR 265, and mixed-use development is planned along SR 265 near the proposed I-40/SR 265 Interchange. Tillman Drive is located in this area, intersecting SR 265 within the footprint of the proposed I-40/SR 265 Interchange. Tillman Drive currently accesses two residences. With the zoning change, it would be expected to access more and should be relocated farther from the proposed interchange. High-density development, which is suitable for multi-family dwellings with a density range of 4.36 to 16.0 dwelling units per acre, is currently being built off Old Pleasant Grove Road, just south of Pleasant Grove Road. A neighborhood commercial type development is expected to extend along SR 171 to the north of Pleasant Grove Road and off SR 265 between Southwest Cook Road and SR 171. These commercial areas are envisioned as smaller, neighborhood retail concentrations that serves the surrounding communities with convenience shopping goods.

Providence Central is an approved master development plan in the City of Mt. Juliet that will be located across from the existing Providence Marketplace, spanning to the west of SR 265 across a 275-acre tract of land that is zoned Commercial Mixed Use (see **Figure 16**). The master plan includes a mixture of high-end office, retail and residential uses. The majority of it will be office and retail, which will front SR 265. Two sections are set aside for high density residential, and a small portion to the west of SR 265 will be for single-family homes. The first phase will be an extension of Providence Parkway to the west, which will provide improved access to the high-density living area that has already been constructed. The next phase will connect Adams Lane

to the extended Providence Parkway and finish in the office and retail space around Adams Lane, which will curve southwest, and another high-density living area. The last phase will fill in the rest, including the proposed SR 265 Interstate Exit and widening of SR 265 to five lanes. Utilities are currently in place to support the Providence Central development. A benefit of this development is it will relocate Adams Lane to the extension of Providence Parkway. The relocated roadway will be farther from the proposed SR 265/I-40 Interchange.

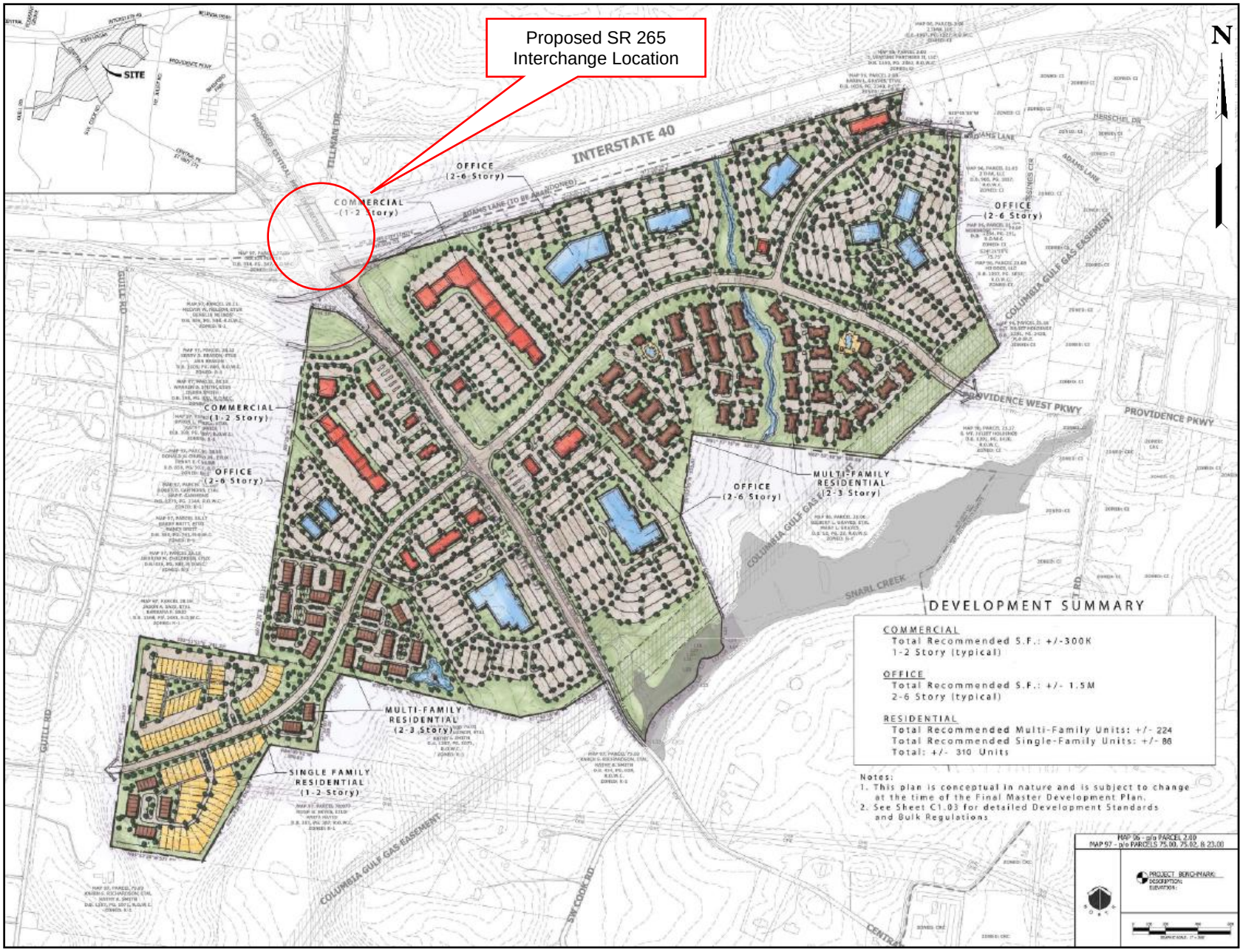
To assist with the coordination of the planned projects and developments within the study area, the City of Mt. Juliet initiated the *Central Pike Subarea Study*. This study guides access control measures and development decisions in the area surrounding SR 265 to ensure the proposed interchange functions optimally. **Appendix B** contains *Central Pike Subarea Study*.

Several additional developments have been approved near the study area that will have an impact on future traffic volumes. The locations of these developments are shown in **Figure 17**.



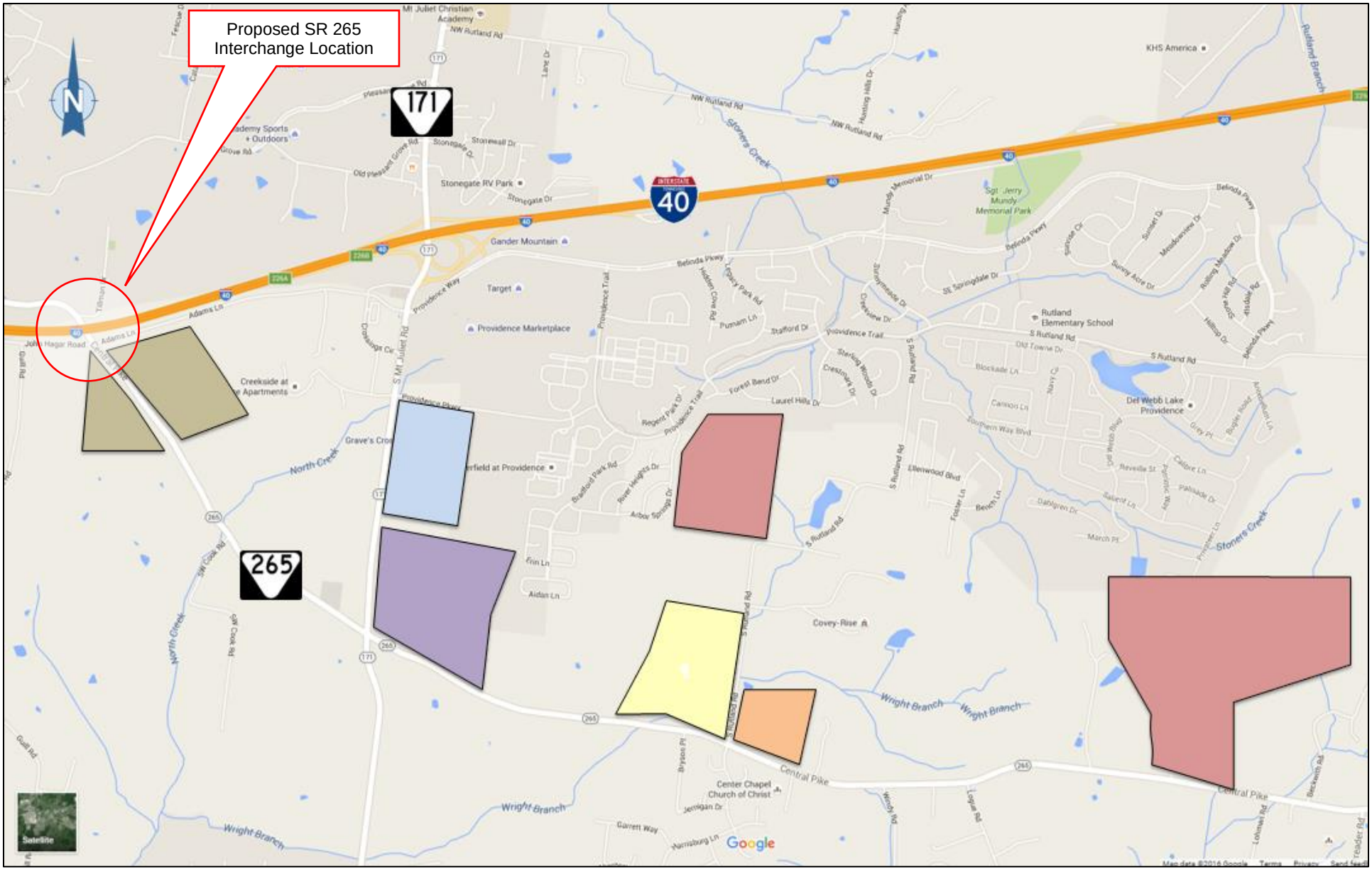
Source: City of Mt. Juliet 2008 Land Use and Transportation Plan

FIGURE 15: FUTURE LAND USE PLAN



Source: City of Mt. Juliet

FIGURE 16: DEVELOPMENT PLAN ALONG CENTRAL PIKE



Source: City of Mt. Juliet

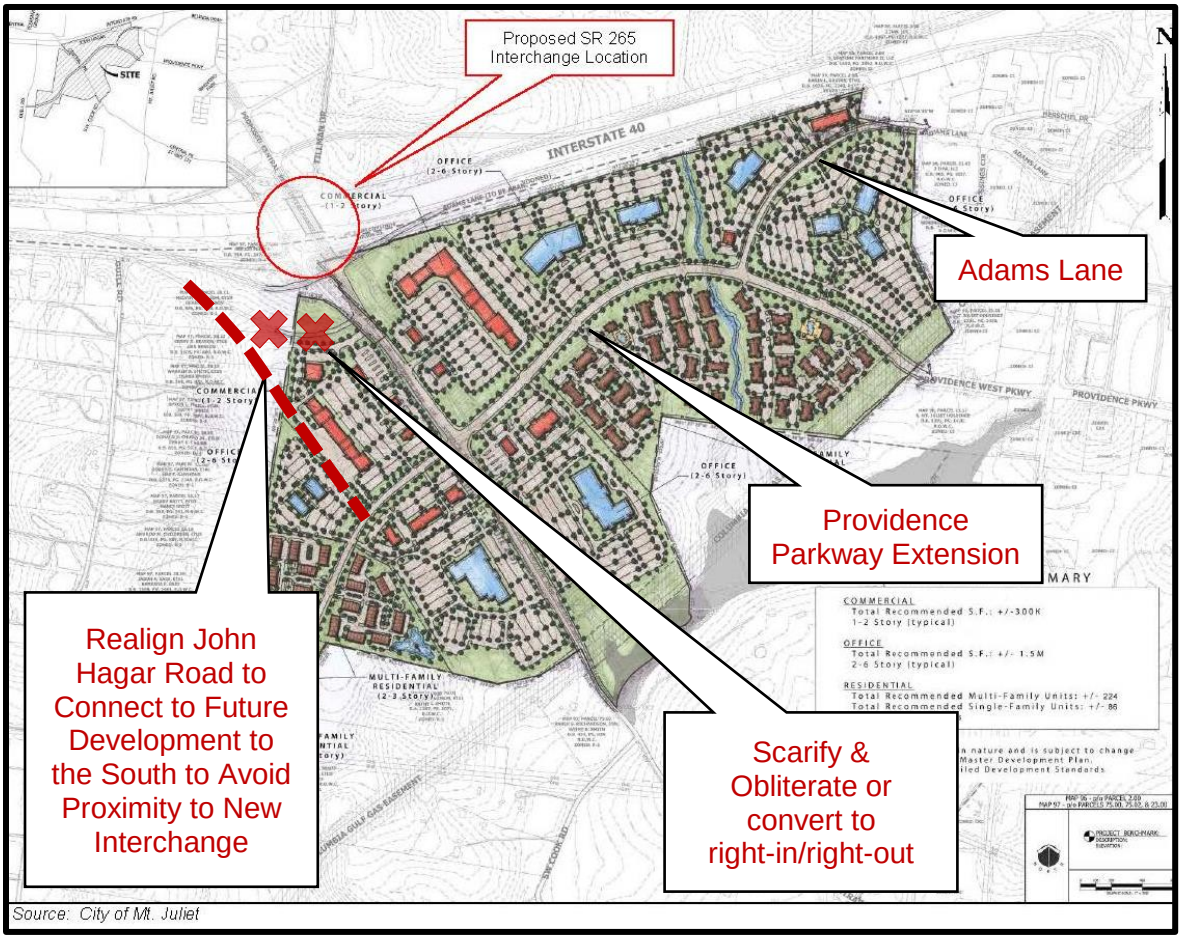
FIGURE 17: ADDITIONAL APPROVED DEVELOPMENTS NEAR THE STUDY AREA

3.3 FUTURE STREET NETWORK NEAR THE PROPOSED INTERCHANGE

SR 265 is planned to be widened from SR 45 to SR 171. The zoning surrounding the proposed interchange is such that higher-density development is expected with the construction of a new interchange. The City of Mt. Juliet will initiate access management strategies to preserve the functionality of the proposed interchange as improvements are made to SR 265 and as the city approves developments. Those measures include the construction of a raised median along SR 265 that will extend 1,200 feet from both sides of the interchange. The raised median will not permit left turns from SR 265, and will limit side road and driveways along SR 265 to right-in/right-out operations. The City of Mt. Juliet has committed in writing to require access management along SR 265 (see **Attachment B**).

John Hagar Road and Adams Lane currently intersect with SR 265 within the footprint of a proposed interchange. These roadways will be realigned as part of the interchange project to connect to SR 265 approximately 1,000 feet South of I-40. As future development occurs, the city plans to extend Providence Parkway from SR 171 to SR 265. The future intersection of the Providence Parkway Extension with SR 265 will be to the south of the future access management median along SR 265. Existing Adams Lane (including the portion realigned with the interchange construction) will be realigned to connect to the Providence Parkway Extension. The existing roadway will be scarified and obliterated. A planned development scenario with roadway realignment is shown in **Figure 18**.

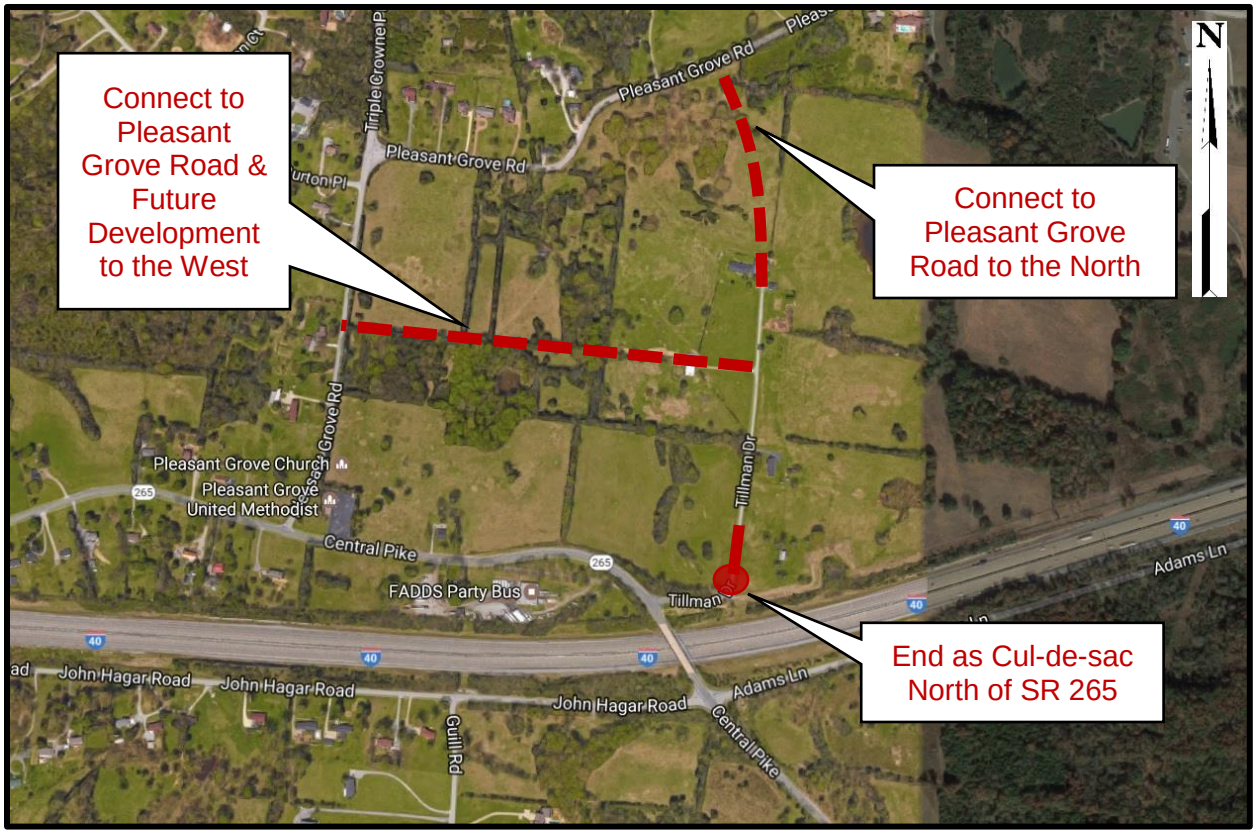
On the west side of SR 265, John Hagar Road will be realigned to the south. John Hagar Road (including the portion realigned with the interchange construction) will be realigned to connect to SR 265 across from the proposed Providence Parkway Extension. The existing roadway will either be scarified and obliterated, or converted to right-in/right/out operations at SR 265. A planned development scenario with roadway realignment is shown in **Figure 18**.



Adapted from: State Route 265 Subarea Study (2017)

FIGURE 18: PLANNED ROADWAY REALIGNMENTS SOUTH OF I-40

North of I-40, Tillman Drive intersects SR 265 within the footprint of a proposed interchange. Tillman Drive currently access two residences. However, the land is zoned mixed-use and can reasonably be expected to service much denser development in the future. Tillman Drive will be realigned as part of the interchange project approximately 1,200 feet northwest of I-40. The realignment places relocated Tillman Drive outside the future 1,200-foot access management zone from the interchange. As future development occurs, Tillman Drive could be connected to Pleasant Grove Road in order to reduce access points along SR 265 and provide improved access management. A potential development scenario with roadway realignment is shown in **Figure 19**.



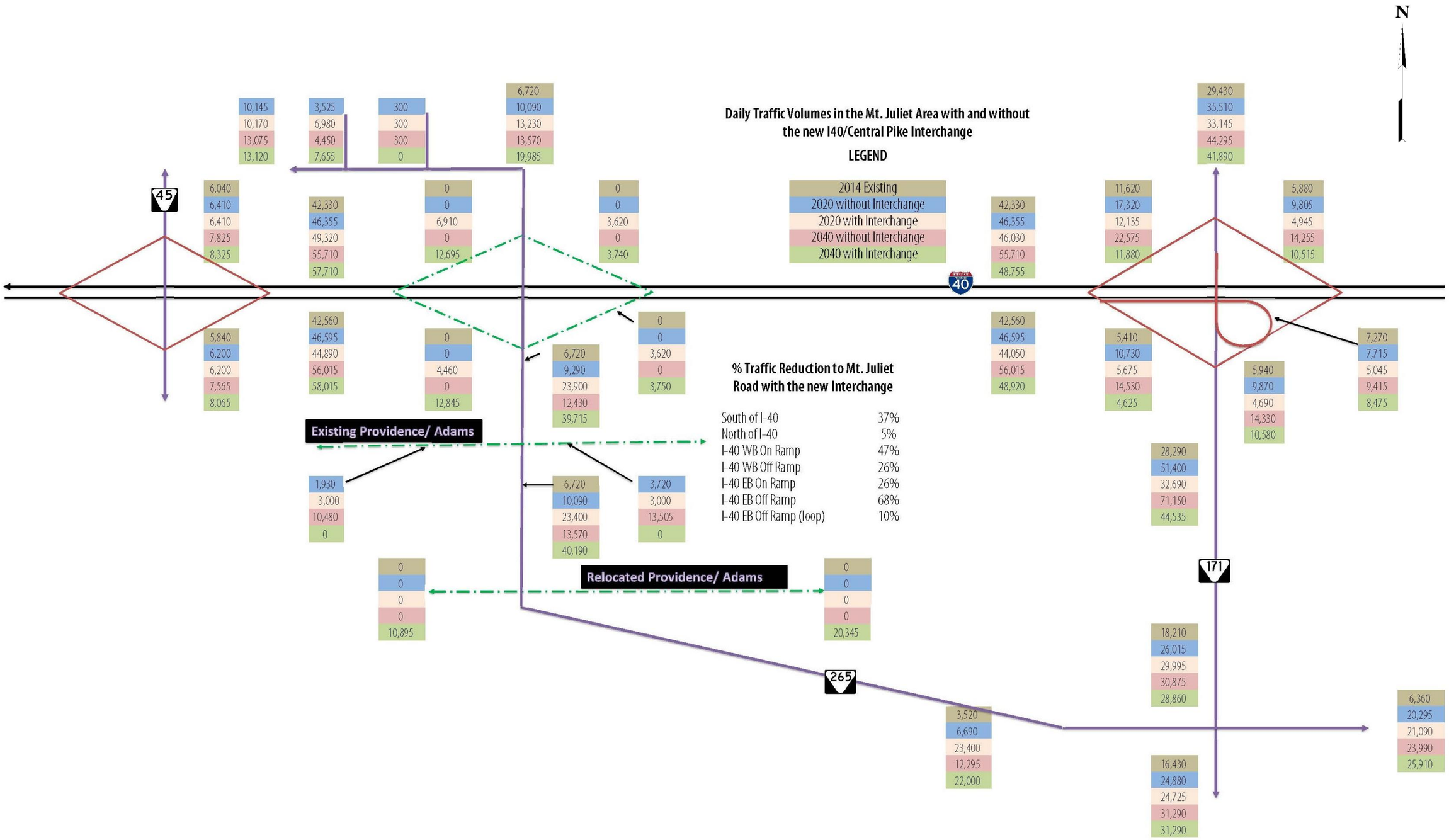
Source: State Route 265 Subarea Study (2017)

FIGURE 19: PLANNED ROADWAY REALIGNMENTS NORTH OF I-40

4.0 TRAFFIC PROJECTIONS

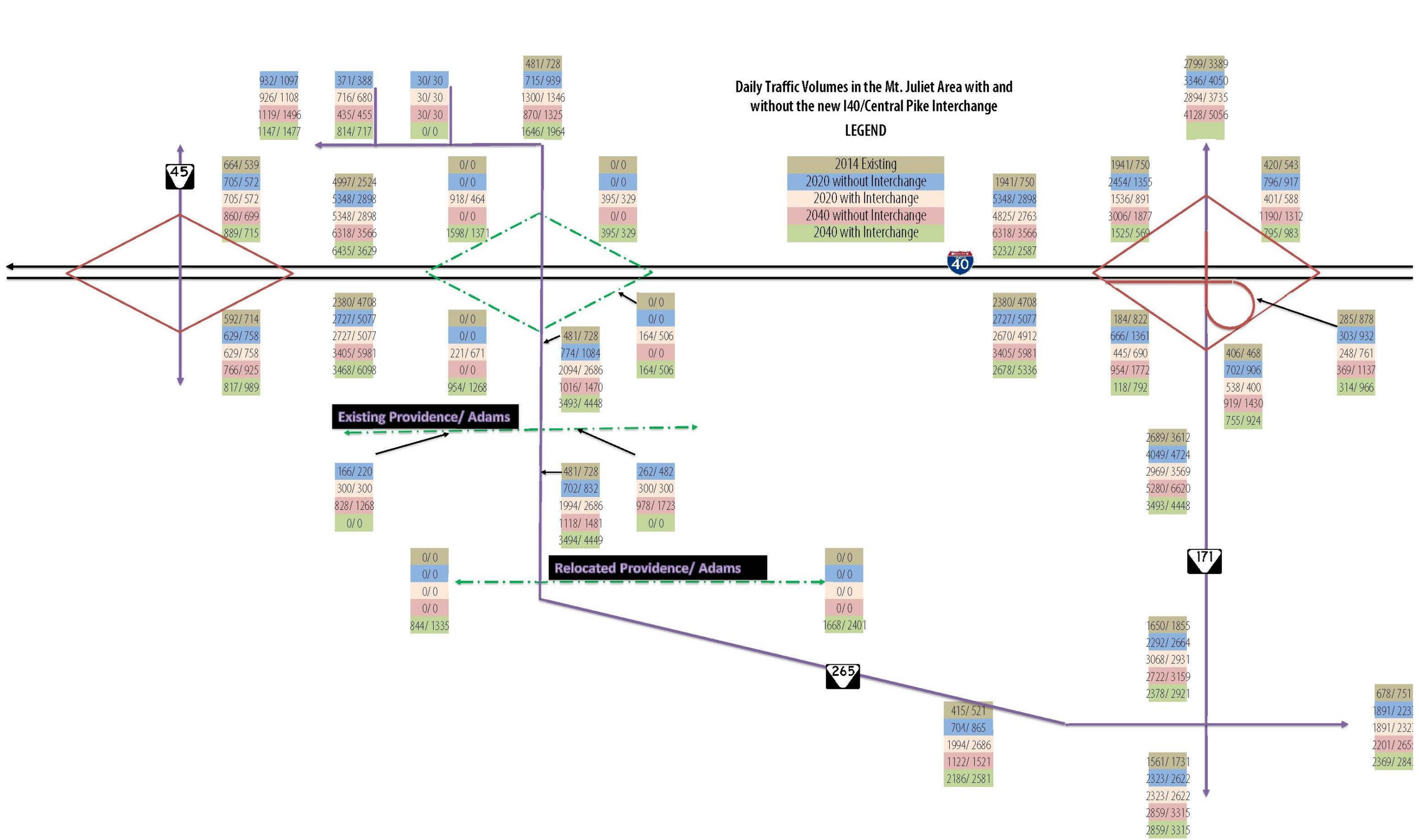
Gresham, Smith and Partners conducted a preliminary traffic forecasting study to support the I-40 at SR 265 (Central Pike) Interchange Access Request (IAR). This preliminary traffic forecasting study was based on the traffic volumes projected by the Nashville Area MPO's travel demand model (TDM). Based on additional information received from the City of Mt. Juliet, the preliminary traffic forecasting study was updated to reflect the traffic generated by the various approved developments that would influence traffic within the study area (see **Figure 16** and **Figure 17**). The year 2020 and 2040 Average Annual Daily Traffic (AADT) and the Design Hour Volumes (DHV) for the AM and PM peak hours utilized in this IAR therefore incorporate data from both the MPO's TDM, developments approved subsequent to the development of the TDM, and developments with a high likelihood to be constructed pending construction of a new I-40 Interchange at SR 265. The traffic forecasting study is located in **Appendix C.**

Figure 20 through **Figure 23** summarize the results of the traffic forecasting effort. **Figure 20** provides a summary of the daily traffic volumes with and without the proposed I-40 Interchange at SR 265. **Figure 21** provides a summary of the hourly traffic volumes with and without the proposed I-40 Interchange at SR 265. As can be seen in these two figures, without a new interchange along I-40 at SR 265, the highest growth in traffic will occur to the south and west of SR 171. **Figure 22** summarizes the turning movement volumes at the study area interchanges without the proposed I-40 at SR 265 Interchange. **Figure 23** summarizes the turning movement volumes at the study area interchanges with the proposed I-40 at SR 265 Interchange. The proposed interchange is predicted to pull considerable traffic volumes from critical turning movements along SR 171.



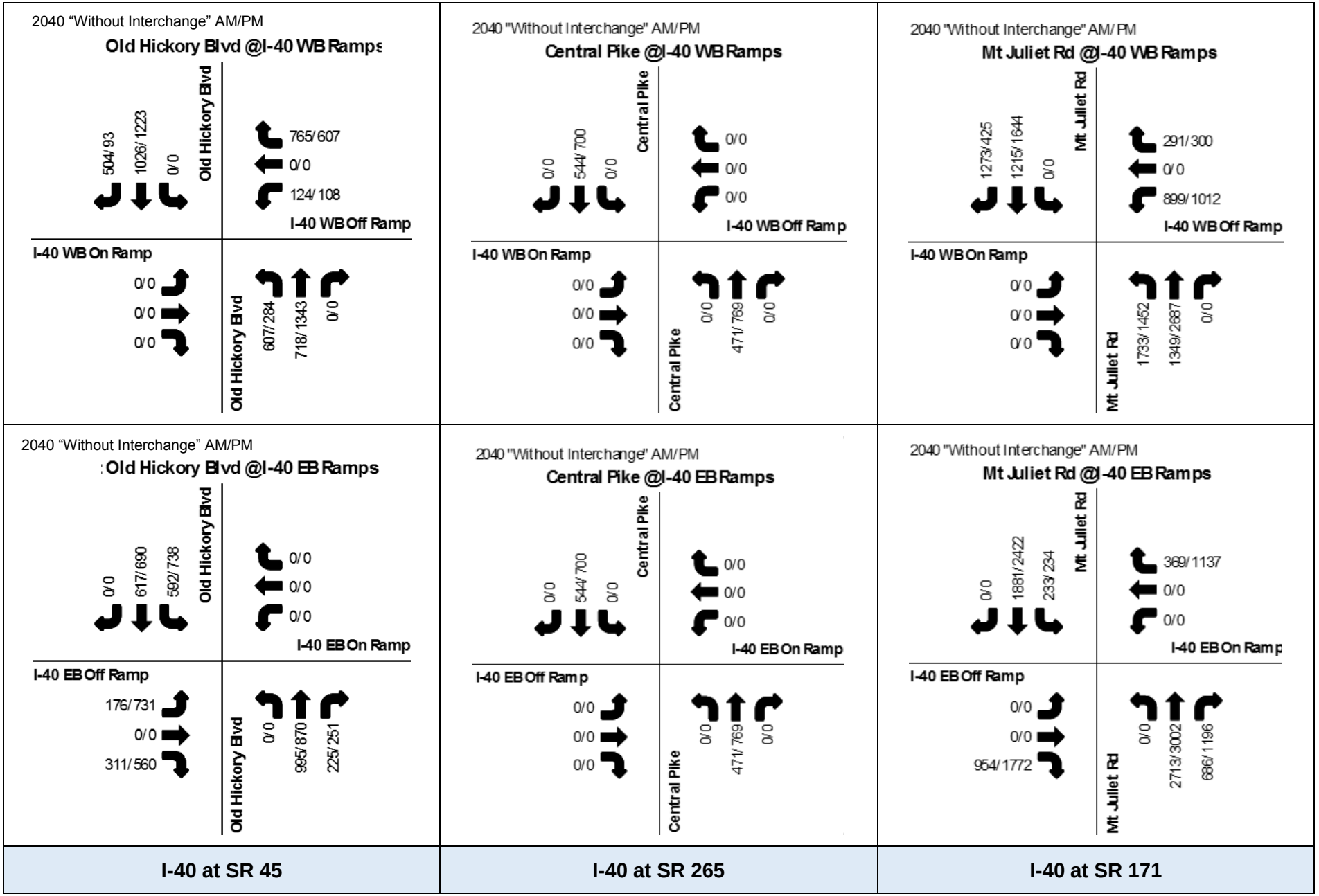
Source: Gresham, Smith and Partners Traffic Forecasting Study (Appendix A)

FIGURE 20: DAILY TRAFFIC VOLUMES WITH AND WITHOUT THE NEW I-40/SRS 265 INTERCHANGE



Source: Gresham, Smith and Partners Traffic Forecasting Study (Appendix A)

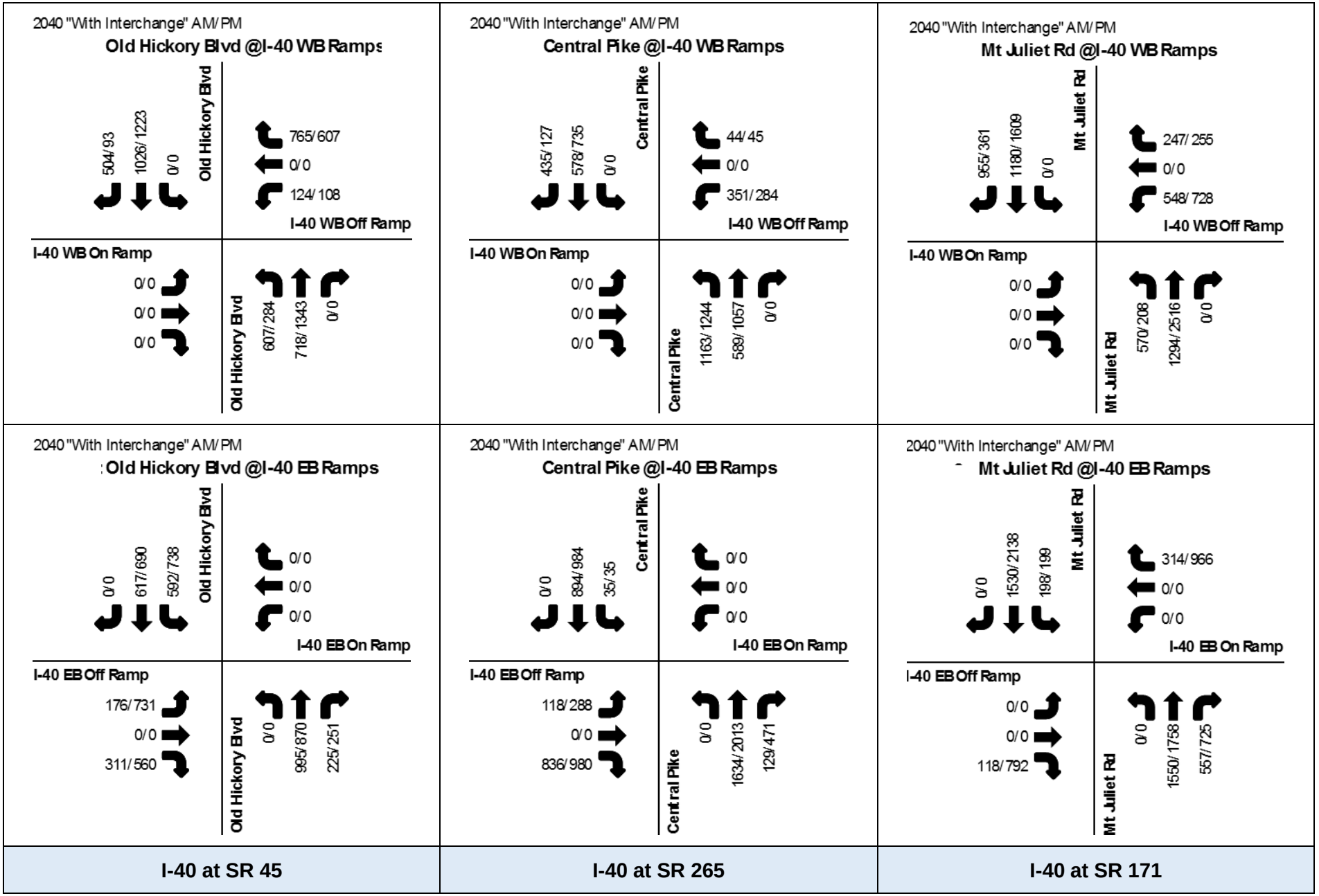
FIGURE 21: PEAK HOUR (AM/ PM) TRAFFIC VOLUMES WITH AND WITHOUT THE PROPOSED I-40/SR 265 INTERCHANGE



I-40 at SR 45	I-40 at SR 265	I-40 at SR 171

Source: Gresham, Smith and Partners

FIGURE 22: 2040 PEAK HOUR (AM/ PM) INTERSECTION TURNING MOVEMENT VOLUMES WITHOUT SR 265 INTERCHANGE



Source: Gresham, Smith and Partners

FIGURE 23: 2040 PEAK HOUR (AM/ PM) INTERSECTION TURNING MOVEMENT VOLUMES WITH SR 265 INTERCHANGE

5.0 CONCEPTUAL ALTERNATIVES

5.1 NO BUILD ALTERNATIVE

The No Build Alternative, as described in **Section 2.0 Existing Conditions**, serves as a baseline for the demand of the region. The traffic demand in the area would continue to be served primarily by the Exit 226 (SR 171) Interchange. This interchange currently experiences congestion and poor traffic operations. The Exit 226 (SR 171) Interchange is shown in **Figure 24**.



FIGURE 24: NO BUILD ALTERNATIVE - EXIT 226 (SR 171) INTERCHANGE

5.2 BUILD ALTERNATIVES

Two build alternatives are proposed in this IAR: a Diamond Interchange, and a Diverging Diamond Interchange (DDI). Both build alternatives provides access between I-40 and SR 265. They will alleviate traffic demand on the existing interchange at Exit 226 (SR 171). They both provide twelve-foot travel lanes, a five-foot wide sidewalk along the westbound side of SR 265 and a twelve-foot wide shared-use path along the east side of SR 265. Grass strips/pedestrian buffers will be provided between the roadway's curb and the sidewalk/shared use-path. These multimodal accommodations are consistent with the city's *Comprehensive Transportation Plan 2017* (see **Appendix A**). All signalized intersections will include crosswalks, curb ramps, and pedestrian countdown signals. SR 265 will be an urban design with curb and gutter and raised median. Many mixed-use developments with residential units are planned within and adjacent to the study area. Pedestrian and bicyclist accommodations are therefore important to the City of Mt. Juliet.

The Conceptual Layouts include initial connections for Tillman Drive, Adams Lane and John Hagar Road to connect to SR 265. These roadways will be relocated even farther from the proposed interchange in separate, development-driven, projects to conform with planned land use changes that are contingent upon construction of the SR 265 interchange. Additionally, the city has committed to providing access control along SR 265, extending 1,200 feet north and south of the interchange (see **Attachment B**). The access management measures will consist of a raised median along SR 265 and only right-in/right-out access within these limits. The access management measures will be installed concurrent with future development. Existing Adams Lane, John Hagar Road, and Tillman Drive will be relocated outside of the 1,200-foot access control limits (or converted to right-in/right/out operations), also concurrent with the future developments. This will ensure the proposed interchange functions optimally into the future. Additional information is provided in **Section 3.0**. The *Central Pike Subarea Study* also provides guidance concerning access control measures and roadway improvements along SR 265 and other roads within the study area to accommodate future developments (see **Appendix B**).

The build alternatives will transition to SR 265's existing two-lane cross section away from the functional area of the interchange. The transition areas will not include curb and gutter or sidewalks/shared-use paths. The future SR 265 improvement project that will extend from SR 45 to SR 171 (Nashville MPO RTP Project #1170) will construct these elements with full widening of the corridor.

5.3 DIAMOND INTERCHANGE BUILD ALTERNATIVE

Figure 25 provides a schematic diagram of the Diamond Interchange Build Alternative. Conceptual Layouts of the alternative are provided in **Section 10**. Conceptual Signing Plans for the interstate are provided in **Section 11**.

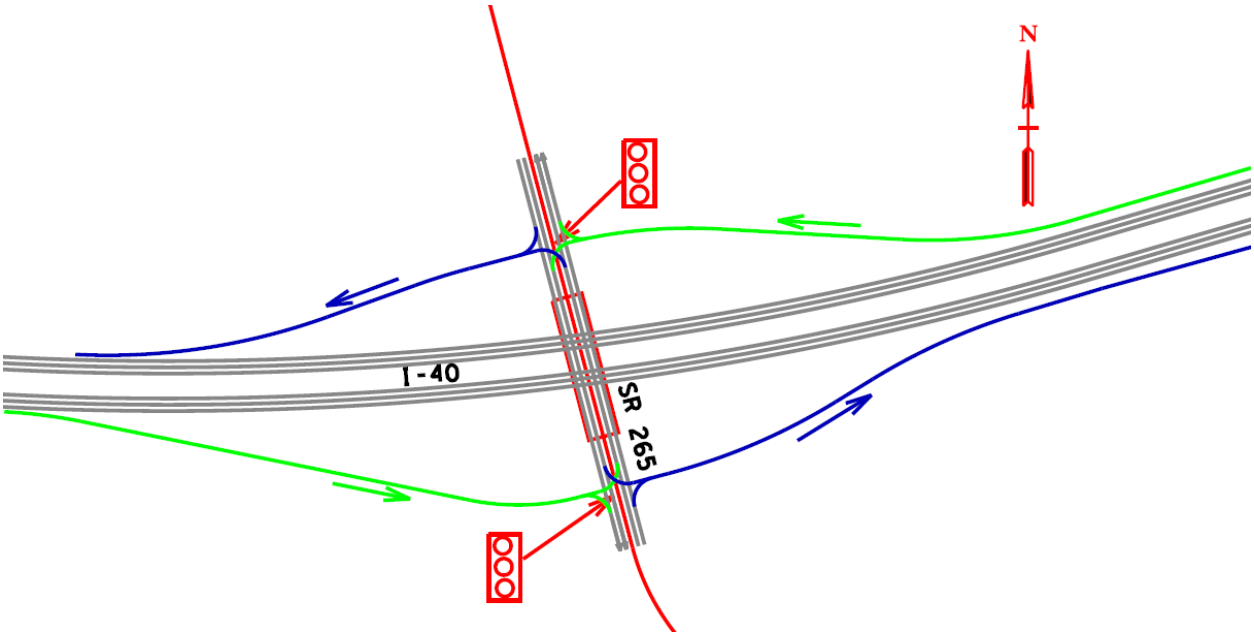


FIGURE 25: PROPOSED MOVEMENTS FOR DIAMOND INTERCHANGE BUILD ALTERNATIVE

The following are recommended as part of Diamond Interchange Build Alternative:

SR 265 Northbound:

- SR 265 Northbound will transition from one (1) existing lane to two (2) through lanes south of the interchange. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.
- Two (2) lanes will enter from the signalized intersection with John Hagar Road/Adams Lane.
- At the signalized intersection with the eastbound I-40 Ramps, SR 265 will have three (3) through lanes and one (1) right turn lane with 1,000 feet of storage.
- At the signalized intersection with the westbound I-40 Ramps, SR 265 will have two (2) left turn lanes entering westbound I-40 with approximately 300 feet of storage each and two (2) through lanes.
- East of the intersection with Pleasant Grove Road, SR 265 will transition from two (2) through lanes to one (1) through lane. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.

SR 265 Southbound:

- SR 265 southbound will transition from one (1) existing lane to two (2) through lanes north of the interchange. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.
- At the intersection with the westbound I-40 Ramps, SR 265 will have two (2) through lanes and a right turn lane with approximately 250 feet of storage.
- At the signalized intersection with the eastbound I-40 Ramps, SR 265 will have one (1) southbound left turn lane entering eastbound I-40 with approximately 180 feet of storage and two (2) through lanes.
- At the intersection with John Hagar Road/Adams Lane, SR 265 will transition from two (2) through lanes to one (1) through lane. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.

I-40 Eastbound Off-Ramp:

- The eastbound I-40 to SR 265 single lane exit will transition to three (3) lanes on the ramp, becoming a single left turn lane for the movement to northbound SR 265 and a dual right turn lane for the movement to southbound SR 265.
- The single left turn lane will provide approximately 700 feet of storage and will be under signal control.
- The two (2) right turn lanes will provide approximately 1,000 feet of storage (the leftmost right turn lane will provide 700 feet of storage and the rightmost right turn lane will provide 300 feet of storage). The right turn lanes will be under signal control with permitted right turns on red.

I-40 Eastbound On-Ramp:

- Southbound SR 265 will have a single left turn lane proceeding to the one (1) lane I-40 Eastbound On-Ramp.
- Northbound SR 265 will have a single right turn lane that will yield onto the single lane ramp.
- The ramp continues for approximately 900 feet as a single lane ramp. The existing deceleration lane from Exit 226 (SR 171) will be extended into an auxiliary lane between SR 265 and the eastbound Exit 226 (SR 171) Off-Ramp.
- The proposed auxiliary lane along I-40 is approximately 2,400 feet where traffic from SR 265 will weave across one lane to continue on to eastbound I-40.

I-40 Westbound Off-Ramp:

- An auxiliary lane will be constructed along westbound I-40 between the existing acceleration lane from Exit 226 (SR 171) to the single lane westbound SR 265 Off-Ramp. The proposed auxiliary lane along I-40 is approximately 2,400 feet.
- The westbound I-40 to SR 265 single lane off-ramp will then transition to three (3) lanes, becoming a double left turn lane to go south on SR 265 and a single right turn lane to go north on SR 265.
- The three (3) turn lanes will each provide approximately 300 feet of storage and will be under signal control.

I-40 Westbound On-Ramp:

- Northbound SR 265 will have a dual left turn lane proceeding to the two (2) lane I-40 Westbound On-Ramp.
- Southbound SR 265 will have a 400-foot right turn lane proceeding to the two (2) lane I-40 Westbound On-Ramp.
- The ramp continues for approximately 735 feet as a two (2) lane ramp before transitioning to a single lane ramp.
- The on-ramp will have an acceleration lane of approximately 1,000 feet and then merge into westbound I-40.

5.4 DIVERGING DIAMOND INTERCHANGE (DDI) BUILD ALTERNATIVE

Figure 26 provides a schematic diagram of the DDI Build Alternative. Conceptual Layouts of the alternative are provided in **Section 10**. Conceptual Signing Plans for the interstate are provided in **Section 11**.

SR 265 is anticipated to have heavy movements from northbound SR 265 to westbound I-40 towards Nashville. The layout of the DDI allows free flow left turns. This free flow movement allows the layout of the proposed bridge across I-40 to be reduced by one travel lane in comparison to the traditional Diamond Interchange.

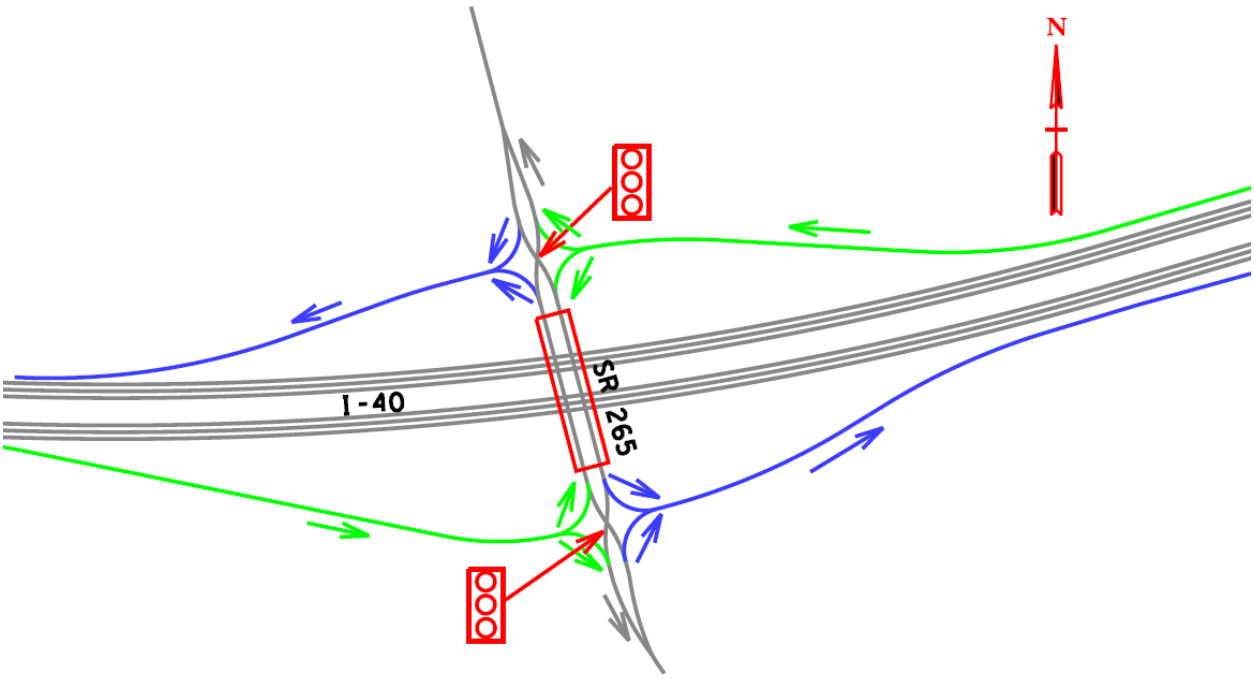


FIGURE 26: PROPOSED MOVEMENTS FOR DDI BUILD OPTION

The following are recommended as part of the DDI Build Alternative:

SR 265 Northbound:

- SR 265 Northbound will transition from one (1) existing lane to two (2) through lanes south of the interchange. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.
- Two (2) lanes will enter from the signalized intersection with John Hagar Road/Adams Lane.
- At the signalized crossover intersection with the eastbound I-40 Ramps, SR 265 will have three (3) through lanes.
- Three (3) through lanes will be carried across the northbound SR 265 Bridge.
- The three (3) through lanes will diverge such that two (2) lanes proceed to westbound I-40 and two (2) lanes proceed north along SR 265.
- At the signalized crossover intersection with the westbound I-40 Ramps, SR 265 will have two (2) through lanes.
- East of the intersection with Pleasant Grove Road, SR 265 will transition from two (2) through lanes to one (1) through lane. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.

SR 265 Southbound:

- SR 265 southbound will transition from one (1) existing lane to two (2) through lanes north of the interchange. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.
- At the crossover intersection with the westbound I-40 Ramps, SR 265 will have two (2) through lanes.
- At the crossover intersection with the eastbound I-40 Ramps, SR 265 will have two (2) through lanes. The eastbound I-40 On-Ramp will depart SR 265 by diverging into a single ramp.
- At the intersection with John Hagar Road/Adams Lane, SR 265 will transition from two (2) through lanes to one (1) through lane. As noted in **Section 3.0 Future Conditions**, SR 265 is planned to be widened, and will eventually create a continuous five-lane typical section between SR 45 and SR 171.

I-40 Eastbound Off-Ramp:

- The eastbound I-40 to SR 265 single lane exit will transition to three (3) lanes on the ramp, becoming a single left turn lane for the movement to northbound SR 265 and a dual right turn lane for the movement to southbound SR 265.
- The single left turn lane will provide approximately 275 feet of storage and will be under signal control.
- The two (2) right turn lanes will provide over 1,000 feet of storage each and will be under signal control with permitted right turns on red.

I-40 Eastbound On-Ramp:

- Southbound SR 265 will have a single free-flow left turn lane proceeding to merge onto the one (1) lane I-40 Eastbound On-Ramp.
- Northbound SR 265 will have a single right turn lane that will yield onto the single lane ramp.
- The ramp continues for approximately 365 feet as a single lane ramp. The existing deceleration lane from Exit 226 (SR 171) will be extended into an auxiliary lane between SR 265 and the eastbound Exit 226 (SR 171) Off-Ramp.
- The proposed auxiliary lane along I-40 is approximately 2,800 feet where traffic from SR 265 will weave across one lane to continue on to eastbound I-40.

I-40 Westbound Off-Ramp:

- An auxiliary lane will be constructed along westbound I-40 between the existing acceleration lane from Exit 226 (SR 171) to the single lane westbound SR 265 Off-Ramp. The proposed auxiliary lane along I-40 is approximately 2,400 feet.
- The westbound I-40 to SR 265 single lane off-ramp will then transition to two (2) lanes, becoming a single left turn lane to go south on SR 265 and a single right turn lane to go north on SR 265.

- The single left turn lane will provide approximately 300 feet of storage and will be under signal control.
- The single right turn lane will provide approximately 350 feet of storage and will be under yield control.

I-40 Westbound On-Ramp:

- Northbound SR 265 will have dual left turn lanes proceeding to merge onto the two (2)-lane I-40 Westbound On-Ramp.
- Southbound SR 265 will have a single right turn lane that merges into the two (2)-lane I-40 Westbound On-Ramp.
- The ramp continues for approximately 600 feet as a two (2)-lane ramp before transitioning to a single lane ramp.
- The on-ramp will have an acceleration lane of approximately 1,000 feet and then merge into westbound I-40.

5.5 ALTERNATIVES EXAMINED, BUT NOT CARRIED FORWARD

One additional interchange configuration alternative was evaluated as part of this study, but not carried forward to concept development. Additionally, Transportation Systems Management (TSM) options were considered, but not carried forward.

DIAMOND INTERCHANGE WITH ROUNDABOUTS AT RAMP TERMINALS

This alternative would have proposed a new interchange along I-40 at SR 265, similar to the Diamond Interchange and DDI Build Alternatives. It would have alleviated traffic demand at Exit 226 (SR 171) similar to the two build alternatives. The alternative proposed a diamond interchange configuration with roundabouts at the two I-40 Ramp intersections with SR 265. Multilane roundabouts would have been required due to the traffic demand. This alternative was eliminated by TDOT in early project screening. A schematic diagram of this alternative is provided in **Appendix D**.

TSM ALTERNATIVE

The TSM approach to congestion mitigation seeks to identify improvements to enhance the capacity of existing transportation systems. Through better management and operation of existing transportation facilities, these techniques are designed to improve traffic flow, air quality, and movement of vehicles and goods, as well as enhance system accessibility and safety. TSM strategies are low-cost but effective in nature, minimizing the need for major construction/reconstruction projects.

Many TSM strategies are already implemented within or near the study area, including High Occupancy Vehicle (HOV) lanes, Intelligent Transportation Systems (ITS) along I-40, signal optimization along arterials, and transit service. A Park and Ride lot is located nearby along Belinda Parkway, near I-40. The Music City Star Commuter Rail Line provides access between Mt. Juliet and Nashville. An Adaptive Signal Control Technology (ASCT) project was installed in 2016 along SR 171. The ASCT project includes the eight signalized intersections located along SR 171 between Graves Crossing (located 0.7 miles south of I-40) and Pleasant Grove Road (located 0.5 miles north of I-40). The ASCT project provides optimized signal timings along the SR 171 corridor that can instantly adapt to changing traffic patterns.

With these strategies in place, the Exit 226 (SR 171) Interchange still experiences high traffic demand and poor operations. The SR 171 Bridge over I-40 is planned to be widened to provide two continuous travel lanes in the northbound direction (Nashville MPO RTP Project #1167). However, these nor other additional TSM strategies have been identified that would accommodate future traffic demands in the area and relieve existing and anticipated capacity deficiencies at the Exit 226 (SR 171) Interchange. The proposed SR 265 Interchange will provide an important connection between I-40 and SR 265, which provides access to many existing and proposed commercial and residential developments in Mt. Juliet and Wilson County. It will serve to relieve traffic at the Exit 226 (SR 171) Interchange. The proposed SR 265 Interchange will complement the ongoing TSM strategies in the area. It will not prohibit nor conflict with these existing strategies.

6.0 TRAFFIC ANALYSIS

6.1 CAPACITY ANALYSIS METHODOLOGY AND ASSUMPTIONS

Merge, diverge, and weave capacity analyses were developed for the I-40 Ramp areas for the three alternatives under consideration: the No Build Alternative, a Diamond Interchange Alternative, and a DDI Alternative. These analyses were developed using Highway Capacity Manual (HCM 2010) methodology as implemented through the Highway Capacity Software 2010 (HCS 2010).

Intersection capacity and queue analyses were developed along SR 45, SR 265, and SR 171 for the three alternatives under consideration. These analyses were developed using HCM 2010 methodology as implemented through the Synchro 9 traffic analysis software and its corresponding traffic simulation software, SimTraffic.

The capacity and queue analyses were performed for AM and PM peak hour conditions for the three alternatives. The traffic for the years 2020 and 2040 were analyzed. The year 2020 is estimated as "opening day" for the proposed project and provides a baseline condition for the No Build Alternative. The year 2040 is the Design Year for the proposed project, and provides an estimate of future conditions if the No Build Alternative is selected. The year 2040 is the Design Year, and provides a basis to select and analyze an alternative for operations through its anticipated lifespan. The traffic analysis for the year 2020 and 2040 No Build Alternative assumes no geometric improvements within the study area. The traffic analysis for the year 2020 Build Alternatives assume an interchange along SR 265 is constructed, along with only those roadway improvements shown in the conceptual layouts in **Section 10**. The 2040 Build Alternatives assume all roadway improvements discussed in **Section 3.0 Future Conditions** are constructed, including the widening of SR 265 from SR 45 to SR 171 and the extension of Providence Parkway to SR 265.

The objectives of the traffic analysis were as follows:

- Forecast the projected No Build Alternative and Build Alternatives conditions;
- Determine intersection capacity;
- Identify traffic flow and queuing concerns;
- Identify mitigation measures and alternatives; and
- Model and analyze the operational improvements under the Build Alternatives.

Level of Service (LOS) is a qualitative traffic capacity measure that is used to gauge the operational performance of an intersection or roadway segment. There are six (6) levels ranging from 'A' to 'F' with 'F' being the worst. Each level represents a range of operating conditions. **Table 3** defines the traffic flow conditions and approximate driver comfort at each LOS for signalized and unsignalized intersections. **Table 4** defines the traffic flow conditions and approximate driver comfort at each LOS for freeway segments.

A schematic diagram summarizing the Design Year LOS traffic analysis is provided in **Source:** *Gresham, Smith and Partners*

Figure 27. A more in-depth discussion of each alternative's analysis, along with summary tables, follows. The traffic analysis calculations/output are provided in **Appendix E**.

TABLE 3: LEVEL OF SERVICE INDEX FOR INTERSECTIONS

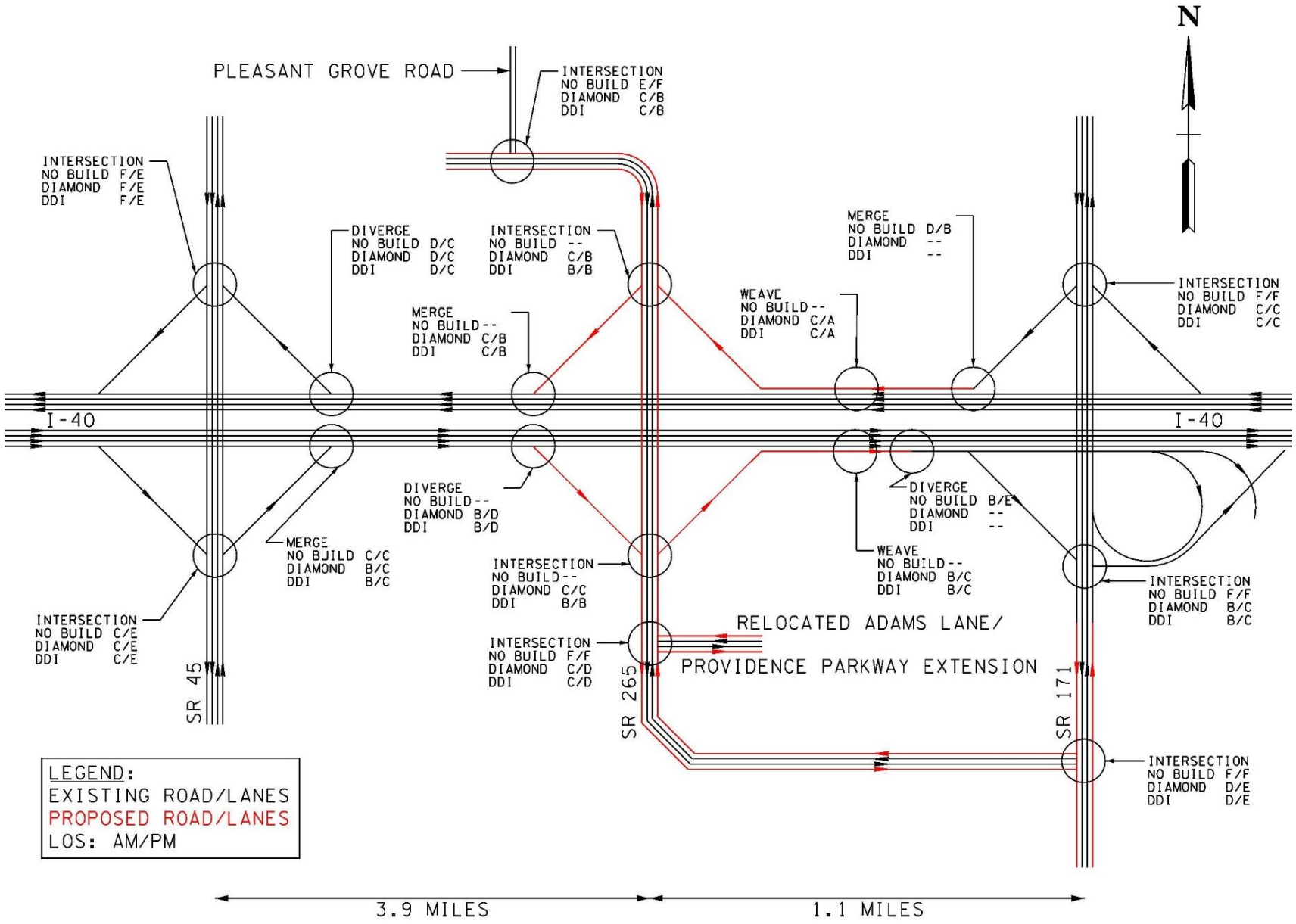
LOS	TRAFFIC FLOW CONDITIONS	SIGNALIZED INTERSECTIONS DELAY (SEC/VEH)	UNSIGNALIZED INTERSECTIONS DELAY (SEC/VEH)
A	Progression is extremely favorable and most vehicles do not stop at all.	0-10	0-10
B	Good progression, some delay.	10-20	10-15
C	Fair progression, higher delay.	20-35	15-25
D	Unfavorable progression, congestion becomes apparent.	35-55	25-35
E	Poor progression, significant delay.	55-80	35-50
F	Poor progression, extreme delay.	>80	>50

Source: Gresham, Smith and Partners, HCM 2010

TABLE 4: LEVEL OF SERVICE INDEX FOR RAMP JUNCTIONS

LOS	TRAFFIC FLOW CONDITIONS	DENSITY (PC/MI/LN)
A	Unrestricted operations.	0-10
B	Merging and diverging maneuvers noticeable to drivers.	10-20
C	Influence area speeds begin to decline.	20-28
D	Influence area turbulence becomes intrusive.	28-35
E	Turbulence felt by virtually all drivers.	>35
F	Ramp and freeway queues form.	Demand exceeds capacity

Source: Gresham, Smith and Partners, HCM 2010



Source: Gresham, Smith and Partners

FIGURE 27: 2040 LOS SINGLE LINE SKETCH

6.2 NO BUILD ALTERNATIVE

Under the No Build Alternative there is no direct connection from I-40 to SR 265, and all traffic would utilize the adjacent interchanges at Exit 221 (SR 45) and Exit 226 (SR 171).

The SR 45/eastbound I-40 Ramps overall intersection LOS is E in the Design Year of 2040. The SR 45/westbound I-40 Ramps overall intersection LOS is F in the Design Year of 2040. Despite the poor intersection LOS, queues are not calculated to reach the I-40 mainline.

The SR 171/eastbound I-40 Ramps overall intersection LOS is F in the Design Year of 2040. The SR 171/westbound I-40 Ramps overall intersection LOS is also F in the Design year of 2040. A project is planned along northbound SR 171 that will widen the bridge over I-40 to add a through-lane. The improvement will provide two continuous through lanes along northbound SR 171, where one is currently dropped as a left-turn lane to westbound I-40. The improvement will improve driver expectancy and possibly safety, but is calculated to have minimal effect on LOS. The LOS of the SR 171 intersections with both the eastbound and westbound I-40 Ramps is calculated to remain F in the Design Year of 2040. More significantly, the vehicular queue lengths along the westbound I-40 Off-Ramp are calculated to reach the I-40 mainline by the year 2020, even with the added travel lane along northbound SR 171. The summary of the LOS are shown in **Table 5** and **Table 6**. The queue summaries are shown in **Table 7** and **Table 8**. Locations with a LOS F are highlighted in red in the tables. Locations where queues are calculated to reach the I-40 mainline are highlighted in red.

A merge and diverge analysis was developed for the I-40 Ramp areas. Along I-40, there are five (5) miles separating the Exit 221 (SR 45) Interchange and the Exit 226 (SR 171) Interchange. Due to this separation, both interchanges operate under a merge and diverge condition, and not a weave condition. Through the year 2040, all of the ramps within the study area will operate at LOS D or better with the exception of the eastbound SR 171 Off-Ramp. This Off-Ramp will operate at LOS E in the PM Peak Hour. The summary of the LOS are shown in **Table 9**.

The following non-interchange intersections within the study area were also analyzed: SR 265 at SR 171, SR 265 at Pleasant Grove Road, SR 265 at Tillman Drive, and SR 265 at John Hagar Road/Adams Lane. The summary of the LOS are shown in **Table 10**. Without improvements all of these intersections, with the exception of SR 265 at Tillman Drive, will operate at a LOS F by the 2040 Design Year. SR 265 at Tillman Drive will operate at LOS D. Only SR 265 at SR 171 is currently signalized. SR 265 at Pleasant Grove Road and SR 265 at Tillman Drive are two-way top intersections. With two-way stop intersections, an overall LOS is not reported; LOS are reported only for each approach to the intersection. The intersection of SR 265 at John Hagar Road/Adams Lane has recently been converted to a 4-way stop, and the LOS are reported as such.

6.3 DIAMOND INTERCHANGE BUILD ALTERNATIVE

The Diamond Interchange Build Alternative would construct an interchange along I-40 at SR 265. Direct access between I-40 and SR 265 would be provided. The new interchange would mitigate congestion at the over-capacity Exit 226 (SR 171) Interchange. The proposed interchange would have minimal effect on traffic volumes at the Exit 221 (SR 45) Interchange.

The Diamond Interchange Build Alternative's SR 265/eastbound I-40 Ramps overall intersection LOS is C or better through the Design Year of 2040. The SR 265/westbound I-40 Ramps overall intersection LOS is also C or better through the Design Year of 2040.

With the Diamond Interchange Build Alternative, the SR 45/eastbound I-40 Ramps overall intersection LOS is E in the Design Year of 2040. The SR 45/westbound I-40 Ramps overall intersection LOS is F in the Design Year of 2040. Despite the poor intersection LOS, queues are not calculated to reach the I-40 mainline. This is consistent with the No Build Alternative.

A new interchange along I-40 at SR 265 will pull considerable traffic volumes from the Exit 226 (SR 171) Interchange. With the Diamond Interchange Build Alternative, the SR 171/eastbound I-40 Ramps overall intersection LOS is C or better through the Design Year of 2040. This is an improvement compared to the No Build Alternative's overall intersection LOS of F. The SR 171/westbound I-40 Ramps overall intersection LOS is C through the Design Year of 2040. This is an improvement compared to the No Build Alternative's overall intersection LOS of F. More significantly, the vehicular queue length along the westbound I-40 Off-Ramp is not calculated to reach the I-40 mainline by the year 2040, as it is with the No Build Alternative. The summary of the LOS are shown in **Table 5** and **Table 6**. The queue summaries are shown in **Table 7** and **Table 8**. Locations with a LOS F are highlighted in red in the tables. Locations where queues are calculated to reach the I-40 mainline are highlighted in red.

A merge, diverge, and weave analysis was developed for the I-40 Ramp areas. Along I-40, there are five (5) miles separating the existing Exit 221 (SR 45) Interchange and the Exit 226 (SR 171) Interchange. The proposed interchange at SR 265 will be 3.9 miles from the Exit 221 (SR 45) Interchange and 1.1 miles from the Exit 226 (SR 171) Interchange. Due to the separation from the Exit 221 (SR 45) Interchange, the SR 45 Ramps and the eastbound SR 265 Off-Ramp and westbound SR 265 On-Ramp will continue to operate in merge and diverge conditions, and not as weaves. Due to the 1.1-mile spacing, one-lane auxiliary lanes will be constructed between the proposed SR 265 Interchange and the Exit 226 (SR 171) Interchange. The eastbound SR 265 On-Ramp and eastbound SR 171 Off-Ramp will operate in a weave condition, as will the westbound SR 171 On-Ramp and westbound SR 265 Off-Ramp. Through the Design Year of 2040, all of the ramps within the study area will operate at LOS D or better. In general, each ramp terminus along I-40 will operate one LOS letter grade better than it would under the No Build Alternative. The summary of the LOS are shown in **Table 9**.

6.4 DDI BUILD ALTERNATIVE

The DDI Build Alternative would construct an interchange along I-40 at SR 265. Direct access between I-40 and SR 265 would be provided. The new interchange would mitigate congestion at the over-capacity Exit 226 (SR 171) Interchange. The proposed interchange would have minimal effect on traffic volumes at the Exit 221 (SR 45) Interchange.

The DDI Build Alternative's SR 265/eastbound I-40 Ramps overall intersection LOS is B through the Design Year of 2040. The SR 265/westbound I-40 Ramps overall intersection LOS is also B through the Design Year of 2040. This is an improvement compared to the Diamond Interchange Build Alternative's LOS of C for both intersections.

With the DDI Build Alternative, the SR 45/eastbound I-40 Ramps overall intersection LOS is E in the Design Year of 2040. The SR 45/westbound I-40 Ramps overall intersection LOS is F in the Design Year of 2040. Despite the poor intersection LOS, queues are not calculated to reach the I-40 mainline. This is consistent with the No Build Alternative.

A new interchange along I-40 at SR 265 will pull considerable traffic volumes from the Exit 226 (SR 171) Interchange. With the DDI Build Alternative, the SR 171/eastbound I-40 Ramps overall intersection LOS is A through the Design Year of 2040. This is an improvement compared to the A new interchange along I-40 at SR 265 will pull considerable traffic volumes from the Exit 226 (SR 171) Interchange. With the DDI Build Alternative, the SR 171/eastbound I-40 Ramps overall intersection LOS is C or better through the Design Year of 2040. This is an improvement compared to the No Build Alternative's overall intersection LOS of F. The SR 171/westbound I-40 Ramps overall intersection LOS is C through the Design Year of 2040. This is an improvement compared to the No Build Alternative's overall intersection LOS of F. More significantly, the vehicular queue length along the westbound I-40 Off-Ramp is not calculated to reach the I-40 mainline by the year 2040, as it is with the No Build Alternative. The summary of the LOS are shown in **Table 5** and **Table 6**. The queue summaries are shown in **Table 7** and **Table 8**. Locations with a LOS F are highlighted in red in the tables. Locations where queues are calculated to reach the I-40 mainline are highlighted in red.

A merge, diverge, and weave analysis was developed for the I-40 Ramp areas. Along I-40, there are five (5) miles separating the existing Exit 221 (SR 45) Interchange and the Exit 226 (SR 171) Interchange. The proposed interchange at SR 265 will be 3.9 miles from the Exit 221 (SR 45) Interchange and 1.1 miles from the Exit 226 (SR 171) Interchange. Due to the separation from the Exit 221 (SR 45) Interchange, the SR 45 Ramps and the eastbound SR 265 Off-Ramp and westbound SR 265 On-Ramp will continue to operate in merge and diverge conditions, and not as weaves. Due to the 1.1-mile spacing, one-lane auxiliary lanes will be constructed between the proposed SR 265 Interchange and the Exit 226 (SR 171) Interchange. The eastbound SR 265 On-Ramp and eastbound SR 171 Off-Ramp will operate in a weave condition, as will the westbound SR 171 On-Ramp and westbound SR 265 Off-Ramp. Through the Design Year of 2040, all of the ramps within the study area will operate at LOS D or better. In general, each ramp terminus along I-40 will operate one LOS letter grade better than it would under the No Build Alternative. The summary of the LOS are shown in **Table 9**.

TABLE 5: INTERSECTION LOS AT SR 45 AND SR 265 INTERCHANGES

ALTERNATIVE:	NO BUILD		BUILD DIAMOND		BUILD DDI	
INTERSECTION	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**
SR 45 at I-40 WB Ramps						
Northbound Approach	C / A	F / C	C / A	F / C	C / A	F / C
Southbound Approach	C / C	F / F	C / C	F / F	C / C	F / F
Westbound Approach	C / C	F / E	C / C	F / E	C / C	F / E
Overall Intersection LOS	**C / B**	**F / E**	**C / B**	**F / E**	**C / B**	**F / E**
SR 45 at I-40 EB Ramps						
Northbound Approach	B / C	D / F	B / C	D / F	B / C	D / F
Southbound Approach	A / B	B / E	A / B	B / E	A / B	B / E
Eastbound Approach	B / C	B / E	B / C	B / E	B / C	B / E
Overall Intersection LOS	**B / B**	**C / E**	**B / B**	**C / E**	**B / B**	**C / E**
SR 265 at I-40 WB Ramps						
Northbound Approach	--	--	B / B	B / A	A / A	B / B
Southbound Approach	--	--	B / B	D / D	B / B	A / B
Westbound Approach	--	--	C / C	C / D	A / A	B / B
Overall Intersection LOS	--	--	**B / B**	**C / B**	**A / B**	**B / B**
SR 265 at I-40 EB Ramps						
Northbound Approach	--	--	A / A	B / C	B / B	B / B
Southbound Approach	--	--	A / A	B / C	B / B	B / B
Eastbound Approach	--	--	B / B	D / D	B / B	B / C
Overall Intersection LOS	**--**	**--**	**A / A**	**C / C**	**B / B**	**B / B**

Source: Gresham, Smith and Partners

TABLE 6: INTERSECTION LOS AT SR 171 INTERCHANGE

ALTERNATIVE:	NO BUILD		NO BUILD		DIAMOND & DDI BUILD ALTERNATIVES	
	WITHOUT PLANNED IMPROVEMENTS TO SR 171		WITH PLANNED IMPROVEMENTS TO SR 171		WITH PLANNED IMPROVEMENTS TO SR 171	
INTERSECTION	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**
SR 171 at I-40 WB Ramps						
Northbound Approach	D / E	F / F	D / D	F / F	C / C	C / B
Southbound Approach	C / E	F / F	D / E	F / F	A / B	B / C
Westbound Approach	F / F	F / F	F / F	F / F	D / E	E / E
Overall Intersection LOS	**D / E**	**F / F**	**D / E**	**F / F**	**B / C**	**C / C**
SR 171 at I-40 EB Ramps						
Northbound Approach	E / F	F / F	E / F	F / F	A / B	B / E
Southbound Approach	B / B	B / C	B / B	C / C	B / A	A / A
Eastbound Approach	A / B	A / F	A / C	A / F	A / A	A / A
Overall Intersection LOS	**D / D**	**F / F**	**D / D**	**F / F**	**B / A**	**B / C**

Source: Gresham, Smith and Partners

TABLE 7: QUEUE LENGTHS ALONG INTERCHANGE RAMPS (2020)

ALTERNATIVE:		NO BUILD	DIAMOND	DDI
INTERSECTION	**RAMP LENGTH[A]**	**2020 QUEUE LENGTH (AM/PM)**	**2020 QUEUE LENGTH (AM/PM)**	**2020 QUEUE LENGTH (AM/PM)**
SR 45 at I-40 WB Ramps				
Westbound Approach	1,250	256[C] / 246[C]	256[C] / 246[C]	256[C] / 246[C]
SR 45 at I-40 EB Ramps				
Eastbound Approach	1,100	56 / 186[C]	56 / 186[C]	56 / 186[C]
SR 265 at I-40 WB Ramps				
Westbound Approach	1,300	**--**	103 / 87	135 / 119
SR 265 at I-40 EB Ramps				
Eastbound Approach	1,300	**--**	52 / 116	31 / 77
SR 171 at I-40 WB Ramps				
Westbound Approach	1,150	470[C] / 549[D]	153 / 267	153 / 267
SR 171 at I-40 EB Ramps[B]				
Eastbound Approach	--	--	--	--

[A] Measured from I-40 to arterial terminus

[B] Free-flow ramps on C-D Road

[C] Demand exceeds capacity, simulation demonstrates queue will not reach I-40

[D] Demand exceeds capacity, simulation demonstrates queue will reach I-40

Source: Gresham, Smith and Partners

TABLE 8: QUEUE LENGTHS ALONG INTERCHANGE RAMPS (2040)

ALTERNATIVE:		NO BUILD	DIAMOND	DDI
INTERSECTION	**RAMP LENGTH[A]**	**2040 QUEUE LENGTH (AM/PM)**	**2040 QUEUE LENGTH (AM/PM)**	**2040 QUEUE LENGTH (AM/PM)**
SR 45 at I-40 WB Ramps				
Westbound Approach	1,250	615[C] / 621[C]	615[C] / 621[C]	615[C] / 621[C]
SR 45 at I-40 EB Ramps				
Eastbound Approach	1,100	80 / 497[C]	80 / 497[C]	80 / 497[C]
SR 265 at I-40 WB Ramps				
Westbound Approach	1,300	**--**	132 / 135	151 / 118
SR 265 at I-40 EB Ramps				
Eastbound Approach	1,300	**--**	338[C] / 500[C]	173 / 247
SR 171 at I-40 WB Ramps				
Westbound Approach	1,150	803[D] / 922[D]	362 / 548[C]	362 / 548[C]
SR 171 at I-40 EB Ramps[B]				
Eastbound Approach	--	--	--	--

[A] Measured from I-40 to arterial terminus

[B] Free-flow ramps on C-D Road

[C] Demand exceeds capacity, simulation demonstrates queue will not reach I-40

[D] Demand exceeds capacity, simulation demonstrates queue will reach I-40

Source: Gresham, Smith and Partners

TABLE 9: RAMP TERMINI LOS ALONG I-40

ALTERNATIVE:	NO BUILD		BUILD ALTERNATIVES DIAMOND[A] AND DDI[A]	
Ramp Junction	**2020 (AM / PM)**	**2040 (AM / PM)**	**2020 (AM / PM)**	**2040 (AM / PM)**
SR 45 at I-40				
I-40 WB Off-Ramp Diverge	D / B	D / C	D / B	D / C
I-40 EB On-Ramp Merge	B / C	C / C	B / C	B / C
SR 265 at I-40				
I-40 WB Off-Ramp Diverging Weave	--	--	C / B	C / A
I-40 WB On-Ramp Merge	--	--	B / A	C / B
I-40 EB Off-Ramp Diverge	--	--	B / C	B / D
I-40 EB On-Ramp Merging Weave	--	--	B / C	B / C
SR 171 at I-40				
I-40 WB Off-Ramp Diverge	C / C	D / C	C / C	D / C
I-40 WB On-Ramp Merge	C / B	D / B	--	--
I-40 WB On-Ramp Merging Weave	--	--	C / B	C / A
I-40 EB Off-Ramp Diverge	B / D	B / E	--	--
I-40 EB Off-Ramp Diverging Weave	--	--	B / C	B / C
I-40 EB On-Ramp Merge	B / C	B / D	B / C	B / C

[A] Diamond and DDI Build Alternatives include auxiliary lanes between SR 265 and SR 171

Source: Gresham, Smith and Partners, HCS2010

6.5 INTERSECTIONS IN STUDY AREA

The following intersections within the study area were also analyzed: SR 265 at SR 171, SR 265 at Pleasant Grove Road, and SR 265 at John Hagar Road/Adams Lane. The traffic analysis for the year 2020 and 2040 No Build Alternative assumes no geometric improvements to intersections within the study area. The traffic analysis for the year 2020 Build Alternatives includes the intersection improvements shown in the conceptual layouts in **Section 10**. The 2040 Build Alternatives assume all roadway improvements discussed in **Section 3.0 Future Conditions** are constructed, including:

- SR 265 will be widened to a 5-lane cross section throughout the study area.
- The SR 265 at John Hagar Road/Adams Lane Intersection would be incorporated into the Providence Parkway Extension project, relocated farther from I-40, signalized, and incorporate turn-lane improvements. The Providence Parkway Extension will have four travel lanes (two in each direction)

- The SR 265 at Pleasant Grove Road intersection would be improved with the SR 265 widening project. Tillman Drive will no longer connect directly to SR 265; it will be accessed via Pleasant Grove Road.
- Lastly, the SR 265 at SR 171 intersection would have through-lane, turn-lane, and signal timing improvements as part of the planned SR 265 and SR 171 widening projects (see **Section 3.0**).

With these improvements, these intersections will operate at a LOS E or better through the 2040 Design Year. Without improvements, these intersections will typically operate at a LOS F by the 2040 Design Year. **Table 10** provides a summary of the non-interchange intersection LOS.

TABLE 10: INTERSECTION LOS (NON-INTERCHANGE)

ALTERNATIVE:	NO BUILD		BUILD DIAMOND		BUILD DDI	
INTERSECTION	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**	**2020 LOS (AM/PM)**	**2040 LOS (AM/PM)**
SR 265 at SR 171						
Northbound Approach	F / F	F / F	F / F	C / D	F / F	C / D
Southbound Approach	F / F	F / F	F / F	D / E	F / F	D / E
Eastbound Approach	F / F	F / F	F / F	D / E	F / F	D / E
Westbound Approach	F / F	F / F	F / F	D / E	F / F	D / E
Overall Intersection LOS	**F / F**	**F / F**	**F / F**	**D / E**	**F / F**	**D / E**
SR 265 at Pleasant Grove Road[A]						
Southbound Approach	C / E	E / F	F / F	C / B	F / F	C / B
Eastbound Approach	A / A	A / A	A / A	C / B	A / A	C / B
Westbound Approach	A / A	A / A	A / A	A / B	A / A	A / B
SR 265 at Tillman Drive[A, D]						
Northbound Approach	A / A	A / A	-	-	-	-
Southbound Approach	B / C	A / A	C / D	-	C / D	-
Eastbound Approach	-	-	A / A	-	A / A	-
Westbound Approach	B / C	B / D	A / A	-	A / A	-
SR 265 at John Hagar Rd/Adams Lane[B]						
Northbound Approach	C / D	F / F	F / F (A / A)[C]	D / E	F / F (A / A)[C]	D / E
Southbound Approach	C / F	F / F	F / F (A / A)[C]	C / D	F / F (A / A)[C]	C / D
Eastbound Approach	B / B	F / F	C / C (B / C)[C]	D / E	C / C (B / C)[C]	D / E
Westbound Approach	B / C	F / F	C / C (B / C)[C]	C / D	C / C (B / C)[C]	C / D
Overall Intersection LOS	**B / E**	**F / F**	**F / F (A / A)[C]**	**C / D**	**F / F (A / A)[C]**	**C / D**

[A] Unsignalized intersection

[B] Unsignalized intersection with No Build Alternative and 2020 Build Alternatives, signalized with 2040 Build Alternatives

[C] Signalized intersection analysis

[D] Roadway realigned such that Tillman's existing westbound approach becomes southbound with the Build Alternatives and the northbound approach becomes westbound.

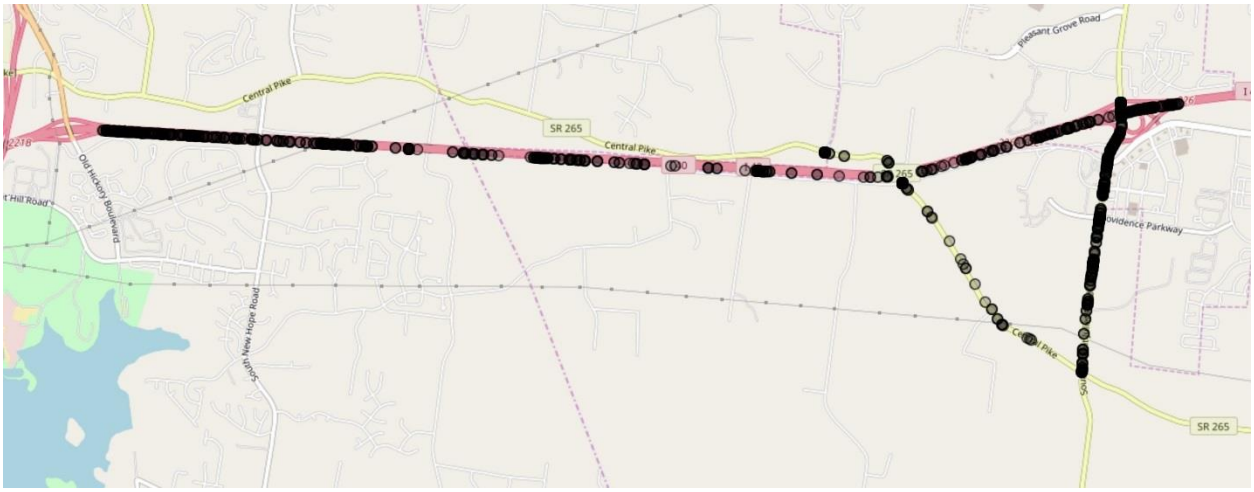
Source: Gresham, Smith and Partners

7.0 SAFETY ANALYSIS

7.1 CRASH HISTORY

Crash history was reviewed for I-40, SR 265, and SR 171, within the proposed interchange's area of influence. I-40 was analyzed from SR 45 to SR 171, SR 265 was analyzed from Pleasant Grove Road to SR 171, and SR 171 was analyzed from SR 265 to I-40. These limits were chosen because they include the proposed interchange location and are the limits along these routes that will see diverted traffic associated with the construction of a Build Alternative. Crash data are not available for Adams Lane, or it would have been included in the analysis. The reviewed data included the period from January 1, 2014 through December 31, 2016. Crash data and calculations are provided in **Appendix F**.

Crashes along I-40, SR 265, and SR 171 are mapped in **Figure 28**. The crash data are reported in **Table 11**.



Source: eTRIMS Crash Data, Google Maps

FIGURE 28: REPORTED CRASHES IN STUDY AREA

Along I-40, 379 crashes were reported in 2014, 2015, and 2016. Eighteen (18) occurred along the ramps in the study area; the remaining 361 occurred along the I-40 mainline. The crash rate along the I-40 mainline was 0.69 crashes per million vehicle miles. This is 33% lower than the statewide average along interstates with similar characteristics.

Along SR 265, fifty (50) crashes were reported in 2014, 2015, and 2016. Twenty-seven (27) occurred at intersections in the study area; the remaining twenty-three (23) occurred along the SR 265 mainline. The crash rate along the SR 265 mainline was 1.49 crashes per million vehicle miles. This is 42% lower than the statewide average along arterials with similar characteristics.

Along SR 171, 253 crashes were reported in 2014, 2015, and 2016. One hundred and twenty-two (122) occurred at intersections in the study area; the remaining one hundred and thirty-one (131) occurred along the SR 171 mainline. The crash rate along the SR 171 mainline was 4.69 crashes per million vehicle miles. This is 57% higher than the statewide average along arterials with similar characteristics.

TABLE 11: CRASH HISTORY (2014-2016)

Year	Criteria/Route	I-40	SR 265	SR 171
	Distance (Miles)	5.12	3.57	1.28
2016	AADT	93,120	3,960	19,910
2014-2016	Fatal Crashes	1	0	0
	Injury Crashes	129	16	53
	Fatal + Injury Crashes	130	16	53
	Property Damage Crashes	256	34	65
	Intersection Crashes	--	27	122
	Ramp Crashes	18	--	--
	Mainline Crashes	361	23	131
	Total Crashes	379	50	253
	Mainline Crash Rate (Crashes per Million Vehicle Miles)	0.69	1.49	4.69
	Statewide Average Crash Rate (Crashes per Million Vehicle Miles)	1.04	2.56	3.00
	Percent Difference	-33%	-42%	57%

Source: GS&P, TDOT eTRIMS Crash and Traffic Data

Notes:

- I-40 from SR 45 to SR 171 (Log Miles 29.5-31.2; 0-3.4)
- SR 265 from Pleasant Grove Road to SR 171 (Log Miles 1.89 to 3.57)
- SR 171 from SR 265 to I-40 Westbound Ramps (Log Miles 3.57 to 4.85)
- Mainline Crash Rates do not include intersection or ramp crashes
- Crash data not available for Adams Lane

7.2 PREDICTED CRASH ANALYSIS

Two Build Alternatives are proposed that would construct a new interchange along I-40 at SR 265. An analysis was conducted to predict how either of the Build Alternatives would affect safety within the study area.

The Highway Safety Manual (HSM) (AASHTO, 2010 with a 2014 Supplement) is a resource that aides in providing safety performance measures. The HSM provides a number of Crash Modification Factors (CMFs) to determine how improvements impact safety. The HSM defines a CMF as "an index of how much crash experience is expected to change following a modification in design or traffic control. CMF is the ratio between the number of crashes per unit of time expected after a modification or measure is implemented and the number of crashes per unit of time estimated if the change does not take place." Applying the CMFs available in the HSM and the CMF Clearinghouse website (www.cmfclearinghouse.org) provides a quantitative basis for estimating how a given CMF might improve safety. The CMF Clearinghouse is a website funded by the U.S. Department of Transportation Federal Highway Administration and is maintained by the University of North Carolina Highway Safety Research Center. The website provides a database of CMFs to assist in selecting appropriate improvements based on safety.

The Interactive Highway Safety Design Model (IHSDM) was used to predict crashes within the proposed interchange's area of influence along I-40, SR 265, SR 171, and Adams Lane. IHSDM is an integrated system of modules that evaluates the safety of highway geometric design alternatives. IHSDM supports the implementation of the HSM procedures. The predicted crash analysis calculations are provided in **Appendix D**.

Table 12 provides a comparison of the annual average crash history from 2014, 2015, and 2016 with the number of crashes predicted by the HSM for the No Build Alternative.

Along I-40, an average of 126.3 crashes per year were reported in 2014, 2015, and 2016. The HSM predicts 108.6 crashes per year. The actual average number of crashes is 16% higher than the HSM prediction. The actual fatal + injury crashes are 20% higher than the HSM prediction. This indicates the I-40 mainline operates in a manner less safe than routes used in the nationwide calibration of the HSM.

Along SR 265, an average of 16.7 crashes per year were reported in 2014, 2015, and 2016. The HSM predicts 8.9 crashes per year. The actual average number of crashes is 88% higher than the HSM prediction. The actual fatal + injury crashes are 75% higher than the HSM prediction. This indicates SR 265 operates in a manner less safe than routes used in the nationwide calibration of the HSM.

Along SR 171, an average of 84.3 crashes per year were reported in 2014, 2015, and 2016. The HSM predicts 34.2 crashes per year. The actual average number of crashes is 147% higher than the HSM prediction. The actual fatal + injury crashes are 55% higher than the HSM prediction. This indicates SR 171 operates in a manner less safe than routes used in the nationwide calibration of the HSM. This is consistent with the finding that SR 171 has a higher crash rate than the statewide average for similar facilities.

TABLE 12: ANNUAL AVERAGE CRASHES VS. HSM PREDICTED CRASHES (2016 NO BUILD ALTERNATIVE)

Year	Criteria/Route	I-40	SR 265	SR 171
	Distance (Miles)	5.12	3.57	1.28
2016	AADT	93,120	3,960	19,910
Actual	Fatal + Injury Crashes	43.3	5.3	17.7
HSM 2016	Fatal + Injury Crashes	36.2	3.1	11.4
	Difference	7.2	2.3	6.3
	Percent Difference	20%	75%	55%
Actual	Property Damage Crashes	85.3	11.3	21.7
HSM 2016	Property Damage Crashes	72.4	5.8	22.8
	Difference	12.9	5.5	-1.1
	Percent Difference	18%	95%	-5%
Actual	Total Crashes	126.3	16.7	84.3
HSM 2016	Total Crashes	108.6	8.9	34.2
	Difference	17.8	7.8	50.2
	Percent Difference	16%	88%	147%

Source: GS&P, TDOT eTRIMS Crash and Traffic Data, HSM (2010), HSM Spreadsheet Tools

Notes:

- Actual annual crashes are 3 year totals from 2014 to 2016 divided by 3 years
- Crash data not available for Adams Lane

Table 13 provides a comparison of the HSM-predicted Year 2040 crashes for the No Build Alternative vs. the Build Alternatives within the proposed interchange's area of influence.

Along I-40, constructing an interchange at SR 265 is projected to increase crashes by 5%. Fatal + injury crashes are projected to increase by 3%. The positive effect of 12% reduced traffic volume along I-40 is offset with the negative effect of the additional conflict points created with the addition of ramps to the mainline.

Along SR 265, the number of crashes is estimated to increase 57% with the Build Alternatives. Fatal + injury crashes are projected to increase 52%. This increase is associated with the 79% increase in predicted traffic volumes and construction of signalized intersections required with the new interchange and roadway widening.

Along SR 171, the number of crashes is estimated to decrease 34% with the Build Alternatives. Fatal + injury crashes are projected to decrease 38%. This decrease is associated with the 37% decrease in predicted traffic volumes along SR 171 anticipated because of the new interchange at SR 265.

Along Adams Lane/Relocated Adams Lane/Providence Parkway Extension, the number of crashes is estimated to increase 13%. Fatal + injury crashes are projected to increase 11%. This increase is associated with the 51% increase in predicted traffic volumes along the route.

The net effect is that crashes are predicted to decrease 9% along the routes within the proposed interchange's area of influence. Fatal + injury crashes are predicted to decrease 12%. The increase in predicted crashes along I-40, SR 265, and Adams Lane is offset by the decrease in crashes along SR 171.

TABLE 13: HSM-PREDICTED CRASHES (2040 NO BUILD AND BUILD ALTERNATIVES)

Alt.	Criteria/Route	I-40	SR 265	SR 171	Adams	Total
	Distance (Miles)	5.12	3.57	1.28	1.00	9.97
No Build	Fatal + Injury Crashes	44.11	9.14	51.91	1.75	106.91
Build	Fatal + Injury Crashes	45.63	13.92	32.41	1.95	93.91
	Difference	1.52	4.78	-19.50	0.20	-13.00
	Percent Difference	3%	52%	-38%	11%	-12%
No Build	Property Damage Crashes	93.49	16.71	91.45	3.7	201.65
Build	Property Damage Crashes	93.6	26.55	62.16	4.21	182.31
	Difference	0.11	9.84	-29.29	0.51	-19.34
	Percent Difference	0%	59%	-32%	14%	-10%
No Build	Total Crashes	137.60	25.85	143.36	5.45	312.26
Build	Total Crashes	144.06	40.47	94.57	6.16	285.26
	Difference	6.46	14.62	-48.79	0.71	-27
	Percent Difference	**5%**	**57%**	**-34%**	**13%**	**-9%**

Source: GS&P, TDOT eTRIMS Crash and Traffic Data, HSM (2010), HSM and IHSDM

Queues at the Exit 226 (SR 171) Interchange are predicted to reach the I-40 mainline by the Year 2040 with the No Build Alternative. Queued vehicles adjacent to high-speed freeway traffic poses a notable safety concern that is not accounted for in the HSM-predicted crash analysis. With either Build Alternative, the ramp queues are not calculated to reach the I-40 mainline. This will provide an additional safety benefit with either Build Alternative.

The IHSDM analysis utilized did not differentiate between the Diamond Interchange Build Alternative and the DDI Build Alternative. The results were therefore presented for a No Build Alternative and "Build Alternatives". However, the HSM CMF Clearinghouse website does have a CMF for converting a Diamond Interchange into a DDI. The CMF reported is 0.592, meaning a DDI is projected to have 41% less crashes than a traditional Diamond Interchange. The CMF document is provided in **Appendix D**.

8.0 CONSTRUCTION

8.1 CONSTRUCTABILITY

Full functionality of SR 265, I-40, and the two adjacent interchanges at SR 45 and SR 171 can be maintained during the construction of either build alternative.

The Diamond Interchange Build Alternative can be constructed in three (3) construction phases. The proposed construction shall maintain traffic and ensure minimal disruption in traffic flow.

1. Phase 1 includes the following:
    - Construct proposed SR 265 Bridge over I-40.
    - Realignment of John Hagar Road, Adams Lane, and existing SR 265 (Adams Lane realignment is an interim improvement until development realigns Adams Lane to the south as discussed in **Section 3.0)**.
    - Provide temporary connections to existing SR 265 south of the proposed bridge.
2. Phase 2 includes the following:
    - Place traffic on proposed SR 265 Bridge.
    - Construct proposed I-40 Eastbound and Westbound ramps.
    - Complete SR 265 southbound lanes south of proposed bridge.
3. Phase 3 includes the following:
    - Remove existing SR 265 Bridge.
    - Scarify and abandon existing pavement.
    - Install proposed signals at ramp terminals

The DDI Build Alternative also includes three (3) construction phases.

1. Phase 1 includes the following:
    - Construct proposed SR 265 Bridge over I-40.
    - Provide temporary connections from south of proposed bridge to existing SR 265.
    - Realign John Hagar Road, Adams Lane, and existing SR 265. (Adams Lane realignment is an interim improvement until development realigns Adams Lane to the south as discussed in **Section 3.0)**.
    - Construct I-40 Westbound Off-Ramp.
2. Phase 2 includes the following:
    - Place traffic on proposed SR 265 Bridge
    - Maintain one lane in each direction along SR 265.
    - Construct I-40 Eastbound On and Off-Ramps and I-40 Westbound On-Ramp.
3. Phase 3 includes the following:
    - Remove the existing SR 265 Bridge.
    - Install proposed traffic signals at ramp terminals.
    - Complete construction of south crossover intersection.
    - Remove temporary pavement.

8.2 INITIAL COST ESTIMATE

The estimated costs for the Diamond Interchange Build Alternative and the DDI Build Alternative are summarized in **Table 14**.

The estimated costs include all associated ramp improvements, improvements to SR 265, signalization, and side road realignments. The following assumptions were made when developing the cost estimates:

- Concrete ramp pavement.
- Reconstruction of SR 265 within the interchange area from John Hager Road/Adams Lane to east of Pleasant Grove Road.
- Curb and gutter with a sidewalk on one side of SR 265 and a shared-use path on the other.
- Lighting within the interchange.
- Temporary transitions to existing SR 265 include roadside ditches, and not curb and gutter; nor do they have multimodal facilities. The future widening project along SR 265 will construct these features.

The detailed cost calculations are included in **Appendix G**.

TABLE 14: SUMMARY OF COST ESTIMATES – BUILD ALTERNATIVES

	Diamond	DDI
Right-of-Way Cost	$857,000	$857,000
Construction Cost	$14,783,000	$15,657,000
Utility Cost	$96,000	$96,000
Mobilization	$739,000	$783,000
Engineering and Contingency (10%)	$1,562,000	$1,654,000
Total Construction Cost	$17,181,000	$18,189,000
Preliminary Engineering (10%)	$1,718,000	$1,819,000
Project Cost	**$19,755,000**	**$20,865,000**

9.0 SUMMARY

9.1 DISCUSSION OF FHWA POLICY POINTS

Policy Point 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)).***

The proposed I-40/SR 265 Interchange is located in Wilson County, Tennessee, within the city limits of the City of Mt. Juliet. SR 265 is an urban minor arterial through the study area with no direct access to I-40. The existing Exit 226 (SR 171) Interchange to the east is a diamond interchange for westbound ramps and has directional ramps for the eastbound ramps. The eastbound exit-ramp has a slip ramp to Belinda Parkway to let traffic by-pass SR 171.

As demonstrated in the traffic analysis in **Chapter 6.0**, anticipated traffic demands over the next twenty years will require capacity beyond what can be accommodated by the existing Exit 226 (SR 171) Interchange.

On June 20, 2000, FHWA provided engineering and operational approval for an Interchange Justification Study (IJS) for a new interchange at this location. FHWA's Policy on Access to the Interstate System states that if a project has not progressed to construction within eight (8) years of receiving an affirmative determination of engineering and operational acceptability (23 CFR 625.2(a)), then an updated study based on current and projected future conditions must be resubmitted to FHWA for review and approval.

The primary purpose and need for providing access along I-40 at SR 265 is to address high volumes of traffic, poor levels of service, and projected ramp queues at the adjacent Exit 226 (SR 171) Interchange. FHWA approved the Exit 226 (SR 171) Interchange Modification Study (IMS) in 2006 with the understanding that a new interchange would need to be constructed along I-40 at SR 265 to alleviate traffic demand at SR 171 beyond the IMS's 2016 Design Year. The proposed build alternatives will provide for efficient traffic operations through the Design Year of 2040.

Policy Point 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)).***

Many TSM strategies are already implemented within or near the study area, including High Occupancy Vehicle (HOV) lanes/facilities, Intelligent Transportation Systems (ITS) along I-40, signal optimization along arterials, and transit service. A Park and Ride lot is located nearby along Belinda Parkway, near I-40. The Music City Star Commuter Rail Line provides access between Mt. Juliet and Nashville. With these strategies in place, the Exit 226 (SR 171) interchange still experiences high traffic demand and poor operations. An Adaptive Signal Control Technology has recently been implemented along SR 171, and the SR 171 Bridge over I-40 is planned to be widened to provide two continuous travel lanes in the northbound direction. However, these nor other additional TSM strategies have been identified that would accommodate future traffic demands in the area and relieve existing and anticipated capacity deficiencies at the Exit 226 (SR 171) Interchange. The proposed SR 265 Interchange will provide an important connection between I-40 and SR 265, which provides access to many existing and proposed commercial and residential developments in Mt. Juliet and Wilson County. It will serve to relieve traffic at the Exit 226 (SR 171) Interchange.

Policy Point 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)).***

Three alternatives are proposed in this IAR; a No-Build Alternative, a Diamond Interchange, and a Diverging Diamond Interchange. The No-Build Alternative resulted in poor Levels of Service (LOS) and queues along the westbound I-40 Off-Ramp at SR 171 that reach the mainline of I-40, creating safety and operational concerns.

The Diamond Interchange Alternative provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have levels of service of C or better at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange.

The Diverging Diamond Interchange (DDI) Alternative provides many of the same advantages as the Diamond Interchange Alternative. It also provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have

levels of service of B at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange.

Both interchange build alternative configurations meet the purpose and need for the new interchange access along I-40 and are recommended for consideration. The build alternatives are calculated to reduce crashes by 9% within the study area. The conceptual layouts and conceptual signing plans for both of the build alternatives are included in **Sections 10** and **11**, respectively.

Policy Point 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)).***

Both of the build options provide a full interchange option with access to all movements. SR 265 is a public road. All minor roads within the study area requiring realignment are also public roads. A more detailed survey of existing topography will be performed during the preliminary design phase to fully determine the extent of the construction limits.

Sidewalks and a shared-use path will be provided along SR 265 and through the interchange area to accommodate both bicycles and pedestrians. The City's desire for bike and pedestrian accommodations was confirmed during project development and in their *Comprehensive Transportation Plan*.

Conceptual design geometry and traffic control measures for both the Diamond and DDI Build Alternatives are in accordance with TDOT's current design standards and with the appropriate Federal policies and standards mentioned in 23 CFR 625.4(a)(2) and 23 CFR 655.603(d). The Synchro 9 traffic analysis software was used to evaluate queue lengths and overall traffic operations through the interchange area.

Policy Point 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.***

The project has been coordinated with TDOT, Wilson County and the City of Mt. Juliet. The proposed improvements are consistent with all local, regional and statewide land use and transportation plans.

A previous Interchange Justification Study was completed in 2000 and has since expired. This proposal is an update of the previous request. The project is on the current Nashville MPO Regional Transportation Plan and is a priority to the City of Mt. Juliet.

Policy Point 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).

There are no plans for future interchange additions between the proposed SR 265/I-40 Interchange and the adjacent interchanges on I-40 to the east and west. The recommended improvements for this section of I-40 do not include any interchange additions. No new interchanges are anticipated to be proposed within the study boundary.

Policy Point 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)).***

TDOT initiated study of a request for new interchange access on I-40 at State Route (SR) 265 (Central Pike) in Wilson County, Tennessee at the request of the Nashville Area Metropolitan Planning Organization (MPO), the City of Mt. Juliet, and Wilson County. The new access point is not requested due to any single development, but due to continued overall growth in the area. To assist with the coordination of the planned projects and developments within the study area, the City of Mt. Juliet has developed a *Central Pike Subarea Study* (see **Appendix B**). Additionally, the city has committed to providing access management measures along SR 265, extending 1,200 feet north and south of the interchange (see **Attachment B**). The access management measures will consist of a raised median along SR 265 and only right-in/right-out access within these limits. The access control measures will be installed concurrent with future development. Existing Adams Lane, John Hagar Road, and Tillman Drive will be relocated outside of the 1,200-foot access control limits, also concurrent with the future developments. This will ensure the proposed interchange functions optimally into the future.

Policy Point 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).***

Both of the build alternatives will require proposed right-of-way (ROW). All necessary studies, including but not limited to, ecological, archeological, historical, air and noise, environmental justice and HAZMAT will be conducted during the NEPA phase of the project. **Section 2.3** provides an overview of known social and environmental issues that could be impacted by the addition of the SR 265 at I-40 Interchange. The conclusions of this report will be presented to the City of Mt. Juliet; TDOT will emphasize that this is the first step of a two-step process, including engineering and environmental approvals.

Prompt List for Review of Interstate System Access Change Requests		
Adequately Addressed?		**FHWA Interstate Access Policy Points**
Yes	**No**	
X		**Policy Point 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)).
X		**Policy Point 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)).
X		**Policy Point 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)).
X		**Policy Point 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)).
X		**Policy Point 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.
X		**Policy Point 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).

Prompt List for Review of Interstate System Access Change Requests		
Adequately Addressed?		**FHWA Interstate Access Policy Points**
X		**Policy Point 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)).
X		**Policy Point 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).

Policy Point 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))."

Addressed Adequately?			Question	Reference Location
Y	**N**	**N/A**		
X			**Does the access request clearly describe the need and purpose of the proposal and identify project goals and objectives that are specific and measurable?**	***Section 1.3***
X			**Is the proposal in the best interest of the public, or does it merely serve a narrow interest?**	***Section 1.3, 6.2***
X			**Is the proposal serving a regional transportation need, or is it merely compensating for deficiencies in the local network of arterials and collectors?**	***Section 1.1, 1.2, 1.3***
X			**In lieu of granting new access, is there any reasonable alternative consisting of improvements to the existing roadway(s) or adjacent access points that could serve the need and purpose?**	***Section 5.5, 6.2 and 6.3***
X			**Has the evaluation of existing interchanges and the local road network taken into account all proposed improvements currently identified in the State and/or Regional Long Range Plan?**	***Section 1.1, Chapter 3, Chapter 6***
X			**Will the proposed change in access result in needed upgrades or improvements to the cross road for a significant distance away from the interchange?**	***Section 1.1, Chapter 3, Chapter 6***

Policy Point 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))."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			**Was FHWA actively involved in preliminary studies and decisions? If not, then more detailed information may be required in support of proposed action.**	***Section 1.1***
X			**Did the study area cover sufficient area to allow for an evaluation of all reasonable alternatives?**	***Section 1.2***
X			**Was a No-Build Alternative evaluated?**	***Section 5.1***
X			**Considering the context of the proposal, is this the best location for the proposed new interchange?**	***Section 1.1, 1.2***
X			**Were different interchange configurations (Tight diamond, SPDI, Parclo) considered?**	***Chapter 6***
X			**Were pedestrians and bicyclists considered in the alternative evaluation?**	***Chapter 5***
X			**Was there an evaluation of different intersection configurations (stop control, signal, roundabout, free right turns, etc?)**	***Chapter 6***
X			**Have Transportation Systems Management (i.e. HOV, ITS, Ramp Metering, Transit etc.) options been evaluated as an alternative to a new or modification to an existing interchange?**	***Section 5.5***
X			**Did the report discuss how TSM alternatives were evaluated and eliminated from consideration?**	***Section 5.5***
X			**Does the proposal consider any future planned TSM strategies and is the design consistent with the ability to implement the future TSM strategies?**	***Section 3.1, 5.5***

Policy Point 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)).**"

Addressed Adequately?			Question	Reference Location
Y	N	N/A		
X			Does the report demonstrate that a proper traffic operational analysis was conducted? The analysis should include the applicable basic freeway segments, freeway weaving segments, freeway ramp segments, ramp junctions and crossroad intersections related to the proposed access point and at least the two adjacent interchanges.	*Chapter 6*
X			Does the report include a safety analysis of the mainline, ramps and intersections of the proposed access point and the nearest adjacent interchange (provided they are near enough that it is reasonable to assume there may be impacts)?	*Chapter 7*
X			Has the design traffic volume been validated?	*Appendix C*
X			Does the report include verification that the data used in the traffic analysis is consistent with the traffic and air quality models MPOs use to develop their current Transportation Plan (20-year) and Transportation Improvement Program (TIP)?	*Section 3.1*
X			Does the report include a design period of 20 years commencing at the time of project approval (PS&E approval)?	*Chapter 6*
X			Does the report include quantitative analyses and results to identify operational differences between alternatives that are heavily congested?	*Chapter 6*
X			Has a conceptual signing plan been provided?	*Chapter 11*
X			Is guidance signing (i.e., way-finding or trail blazing signs) clear and simple?	MUTCD Chapter 2E: Guide Signs – Freeways and Expressways
X			Do the results of the operational analysis result in a significant adverse impact to existing or future conditions?	*Chapter 6*
X			Will the proposed change in access result in needed upgrades or improvements to the cross road for a significant distance away from the interchange? If so, have impacts to the local network been disclosed and fully evaluated?"	*Chapter 3*

Policy Point 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))."**

Addressed Adequately?			Question	Reference Location
Y	N	N/A		
X			Are the cross roads or adjacent surface level roads and intersections affected by the proposed access point analyzed to the extent (length) where impacts caused or affecting the new proposed access point are disclosed to the appropriate managing jurisdiction?	*Chapter 6*
X			Are pedestrian and/or bicycle facilities included (as appropriate) and do these facilities provide for reasonable accommodation?	*Section 5.2*
X			Does the proposed access secure sufficient Limits of Access adjacent to the Interchange ramps?	AASHTO's "A Policy on Design Standards Interstate System, 2005" Pg. 2; NCHRP Synthesis 332
X			Does the proximity of the nearest crossroad intersections to the ramps contribute to safety or operational problems? Can they be mitigated?	*Chapter 6, 7*
X			In addition to HCS, what analysis tools were employed and were they appropriate?	*Chapter 6*
X			Has the proposal distinguished between nominal safety (i.e. adherence to design policies and standards) and substantive safety (actual and expected safety performance)?	*Chapter 7*
X			Will any individual elements within the recommended alternative be degraded operationally as a result of this action? If yes, are reasons provided to accept them?	*Chapter 6*
X			In evaluating whether the proposal has a "significant adverse impact" on safety, has the State Strategic Highway Safety Plan been used as a benchmark?	*Chapter 7*
X			Are the proposed interchange design configurations able to satisfactorily accommodate the design year traffic volumes?	*Chapter 6*
X			If the project is to be built in stages, has the traffic operational and safety analyses considered the interim stages of the proposal?	*Section 8.1*

Policy Point 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))."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			Does the proposed access connect to a public road?	*Section 1.2*
X			Are all traffic movements for full interchange access provided?	*Section 5.2, 5.3, 5.4*
		X	If not, is the proposed access for special purposes such as transit vehicles, HOVs, and/or a park and ride lot?	*Not Applicable (N/A)*
		X	If a partial interchange is proposed, is there sufficient justification for providing only a partial interchange?	AASHTO Greenbook 2004 Pg. 821-823
		X	If a partial interchange is proposed; was a full interchange evaluated as an alternative and is there sufficient justification to eliminate or discard it?	*Not Applicable (N/A)*
		X	Is sufficient ROW available (or being acquired) to provide a full interchange at a future date (staged construction)?	*Not Applicable (N/A)*
		X	Are you comfortable with how the missing movements will be accommodated on the surface streets and adjacent interchanges?	*Not Applicable (N/A)*
X			Does FHWA support the selection of design controls/criteria and desired operational goals?	*Chapter 1.1*
X			Does the proposed access meet or exceed current design standards for the Interstate System?	AASHTO's Greenbook and A Policy on Design Standards Interstate System, 2005
		X	If not, have anticipated design exceptions been identified and reviewed (at least conceptually)?	*Not Applicable (N/A)*
		X	If expected design exceptions could have significant operational impacts on the Interstate and/or Crossroad system, are mitigation measures described?	*Not Applicable (N/A)*
X			Will the length of access control along the crossroad provide for acceptable operations and safety? (100-300' is a minimum. Additional access control is strongly encouraged when needed for safety and operational enhancement)	AASHTO "A Policy on Design Standards Interstate System" 2005
X			Does FHWA support selection of opening and design years?	*Chapter 4*
X			Has each movement of the proposal been "tested" for ease of operation?	AASHTO Greenbook 2004 Pg. 863
Have all design criteria (including but not limited to the following) been adequately addressed?				
X			a. Sight distance at ramp terminals (Don't overlook signal heads obscured by structures.)	AASHTO Greenbook 2004 Pg. 841
X			b. Sufficient storage on ramp to prevent queues from spilling on to the Interstate (based on current and/or future projected traffic demand)	*Chapter 6*
X			c. Vertical clearance	AASHTO "A Policy on Design Standards Interstate System" 2005

Policy Point 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))."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			**d. Pedestrian access through the interchange**	**AASHTO Greenbook 2004 Pg. 864**
X			**e. Length of acceleration/deceleration lanes**	**AASHTO Greenbook 2004 Pg. 823, 847**
X			**f. Length of tapers**	**AASHTO Greenbook 2004 Pg. 849**
X			**g. Spacing between ramps**	**Greenbook pg 843 & Ex. 10-68 and operational analysis**
X			**h. Lane continuity**	**AASHTO Greenbook 2004 Pg. 810**
X			**i. Lane balance**	**AASHTO Greenbook 2004 Pg. 810 AASHTO Greenbook 2004 Pg. 807**
X			**j. Uniformity in interchange design and operational patterns (i.e. right-side ramps, exit design consistent w/adjacent interchanges)**	***Section 5.2, 5.3, 5.4***

Policy Point 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."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			**Does the IJR discuss or include (as appropriate) other project(s), studies or planned actions that may have an effect on the report analysis results?**	***Section 3.1***
X			**Does the project conform to the local planning, MPO or other related plans?**	***Section 3.1***
X			**Does the report include an endorsement of land use plans by the appropriate government entity before it is utilized for traffic generation purposes?**	***Chapter 4***
X			**Is the access request located within a Transportation Management Areas? (TMAs are metropolitan areas of 200,000 or more in population)**	***Section 3.1***
X			**Is the access request located within a non-attainment area for air quality? (requests for access in a non-attainment or maintenance areas for air quality must be a part of a conforming transportation plan)**	***Section 3.1***
X			**Is the project included in the TIP/STIP and LRTP?**	***Section 3.1***

Policy Point 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."				
X			Is the access point covered as a part of an Interstate corridor study or plan? *(especially important for areas where the potential exists for construction of future adjacent interchanges)*	*Section 3.1*

Policy Point 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)."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			Is it possible that new interchange(s) not addressed in the IJR could be added within an area of influence to the proposed access point? (If so, could the proposal preclude or otherwise be affected by any future access points?)	*Section 1.1*
		X	Does the IJR report include the traffic volumes generated by any future additional interchanges within a vicinity of influence that are proposed?	*Not Applicable (N/A)*
		X	Does the IJR report fail to include any other proposed interstate access points within a vicinity of influence that are being proposed or are in the current long range construction program?	*Not Applicable (N/A)*

Policy Point 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))."				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			Does the access request adequately demonstrate that an appropriate effort of coordination has been made with appropriate proposed developments?	*Chapter 3*
X			Are the proposed improvements compatible with the existing street network or are other improvements needed?	*Chapter 3, 5.2, 5.3, 5.4*
		X	Are there any pre-condition contingencies required in regards to the timing of other improvements?	*Not Applicable (N/A)*
X			Have all commitments to improve the local transportation network been included in a TIP/STIP/LRTP prior to the Interstate access approval (final approval of NEPA document)?	*Section 3.1, 9.3*
		X	If pre-condition contingencies are required, are pertinent parties in agreement with these contingencies and is this documented?	*Not Applicable (N/A)*
		X	If the proposed improvements are founded on the need for providing access to new development, are appropriate commitments in place to ensure that the development will likely occur as planned?	*Not Applicable (N/A)*

Policy Point 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)).”				
		X	**If project is privately funded, are appropriate measures in place to ensure improvements will be completed if the developer is unable to meet financial obligations?**	***Not Applicable (N/A)***
X			**If the purpose and need to accommodate new development/traffic demands aren't fully known, is a worst case scenario used for future traffic?**	***Section 3.2, Chapter 4***
		X	**Does the project require financial or infrastructure commitments from other agencies, organizations, or private entities?**	***Not Applicable (N/A)***

Policy Point 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).”				
Addressed Adequately?			**Question**	**Reference Location**
Y	**N**	**N/A**		
X			**Are there any known social or environmental issues that could affect the proposal?**	***Section 2.3***
X			**Is the project consistent with the current TIP/STIP and LRTP and/or proposed amendments to the plan?**	***Section 3.1***
X			**Although NEPA is a separate action, is an environmental overview for the proposed improvements included?**	***Section 2.3***
X			**Is it appropriate to emphasize to the project stakeholders that the access approval will be handled as a two-step process? (i.e. Step 1: Engineering and Operational Acceptability and Step 2: Environmental Approvals)**	***Section 9.3***
X			**Are all funding commitments included in a TIP/STIP/LRTP prior to the Interstate access approval (prior to final approval of the NEPA document)?**	***Section 3.1***
X			**Are all commitments included in a TIP/STIP/LRTP prior to the Interstate access approval (prior to final approval of the NEPA document)?**	***Section 3.1***

9.2 CONCLUSIONS AND RECOMMENDATIONS

Based on operational deficiencies and to accommodate the future growth in Mt. Juliet, Wilson County, and the surrounding region, two build alternatives were fully studied for new interstate access; a Diamond Interchange Build Alternative and a DDI Build Alternative. Both build alternatives provide operational improvements to the transportation network. In particular, both build alternatives improve traffic operations at the adjacent Exit 226 (SR 171) Interchange. Neither build alternative has notable impact on the adjacent Exit 221 (SR 45) Interchange due to its 3.9-mile distance along I-40.

Three alternatives are proposed in this IAR; a No-Build Alternative, a Diamond Interchange, and a Diverging Diamond Interchange. The No-Build Alternative resulted in poor Levels of Service (LOS) and queues along the westbound I-40 Off-Ramp at SR 171 that reach the mainline of I-40, creating safety and operational concerns.

The Diamond Interchange Alternative provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have levels of service of C or better at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange. The estimated project cost is $19.8 million.

The Diverging Diamond Interchange (DDI) Alternative provides many of the same advantages as the Diamond Interchange Alternative. It also provides access between I-40 and SR 265 and relieves traffic demand at the existing Exit 226 (SR 171) Interchange. This alternative will have levels of service of B at the proposed SR 265 Interchange through the 2040 Design Year. Queues are no longer projected to reach the I-40 mainline at the Exit 226 (SR 171) Interchange. The estimated project cost is $20.9 million.

Both interchange build alternative configurations meet the purpose and need for the new interchange access along I-40. The construction of an interchange at SR 265, along with other planned and associated roadway improvement projects within the area of influence, is calculated to reduce crashes within the study area by 9%. However, data from the HSM CMF Clearinghouse website indicates the DDI Build Alternative will operate more safely than the Diamond Interchange Build Alternative. Both Build Alternatives are recommended for consideration.

9.3 NEXT STEPS

This report is an evaluation of the impacts of a No Build Alternative, Diamond Build Alternative, and DDI Build Alternative for the I-40/SR 265 interchange. The next step is for FHWA to make a determination of Engineering and Operational Acceptability (E&OA). The NEPA environmental documentation development can proceed as Federal requirements do not require the finding of E&OA to precede the NEPA process; only final approval of access cannot precede the completion of NEPA. This finding of Engineering and Operational Acceptability by FHWA of the IAR is contingent on the consistency of the chosen NEPA alternative with the proposed access change outlined in this IAR. The No-Build and Build Alternatives, as presented, would need to be included for review in the NEPA document.

10.0 CONCEPTUAL LAYOUTS

Index Of Sheets

SHEET NO.	DESCRIPTION
1	..... TITLE SHEET
2-2L	..... TYPICAL SECTIONS
3-6	..... FUNCATIONAL LAYOUTS DIAMOND INTERCHANGE
7-10	..... FUNCATIONAL LAYOUTS DIVERGING DIAMOND INTERCHANGE

LETTER "I" NOT USED IN SHEET NUMBERING

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

WILSON COUNTY

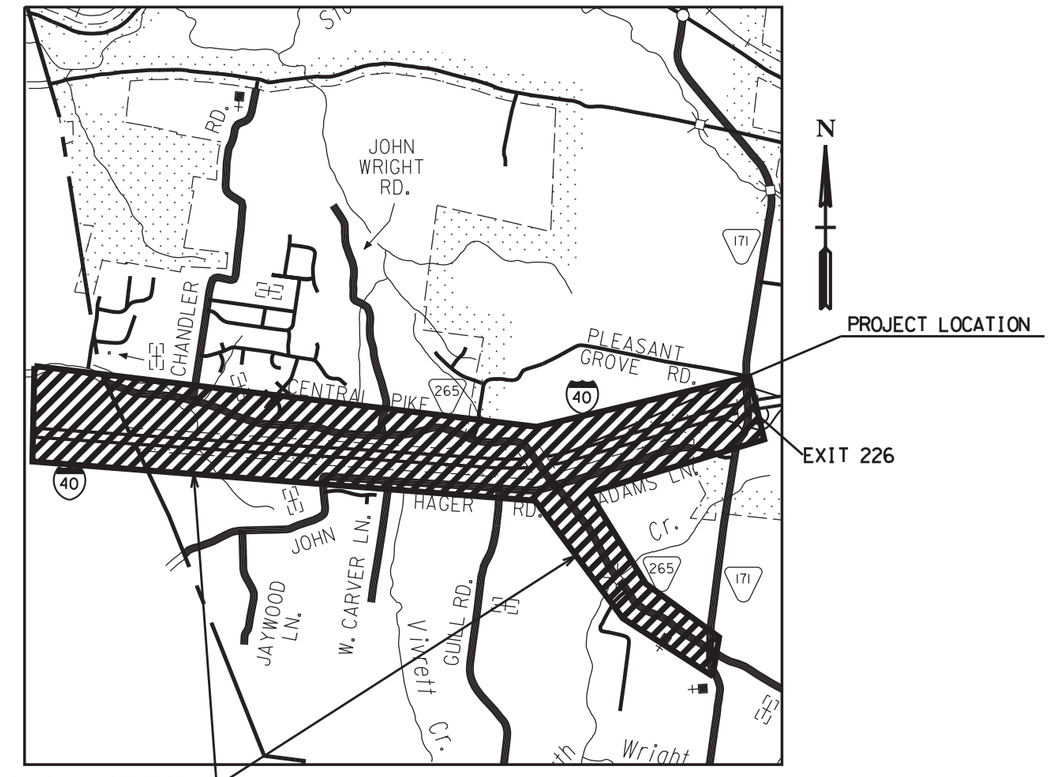
INTERSTATE 40 AT STATE ROUTE 265 (CENTRAL PIKE)

INTERSTATE ACCESS REQUEST

STATE HIGHWAY NO. I-40 F.A.H.S. NO. I-40

TENN.	YEAR	SHEET NO.
	2017	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		



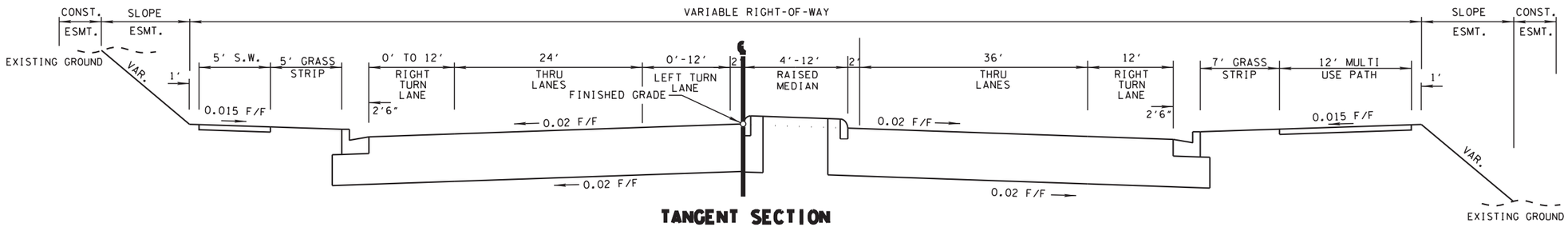


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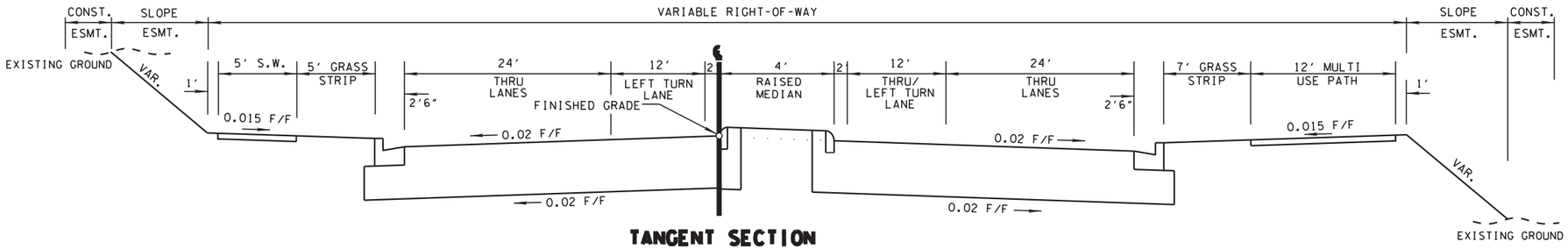
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

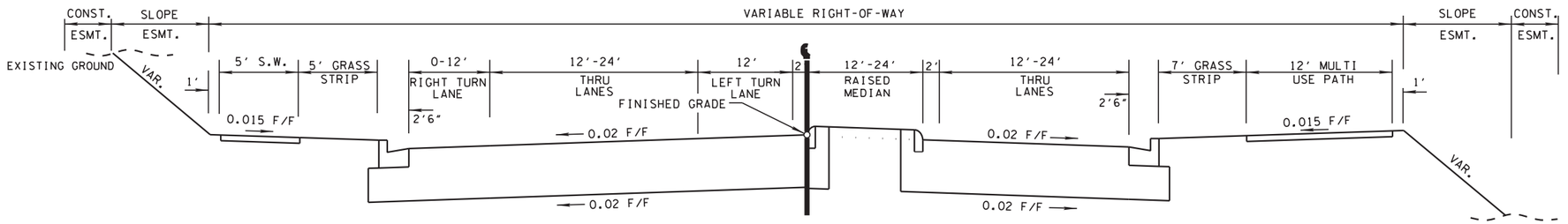
TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2



TANGENT SECTION
(BASED ON STD. DWG. RD-TS-6)
DIAMOND INTERCHANGE
S.R. 265 FROM ADAMS LANE
TO RAMPA/RAMPC



TANGENT SECTION
(BASED ON STD. DWG. RD-TS-6)
DIAMOND INTERCHANGE
S.R. 265 FROM RAMP A/RAMP C
TO NORTH OF RAMP B/RAMP D



TANGENT SECTION
(BASED ON STD. DWG. RD-TS-6)
DIAMOND INTERCHANGE
S.R. 265 FROM NORTH OF RAMP B/RAMP D
TO END OF FULL BUILD

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

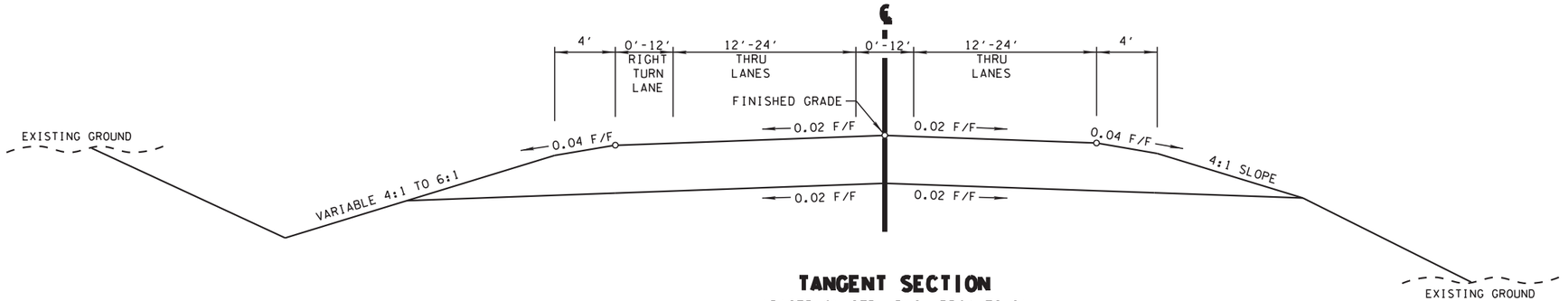
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

TYPICAL SECTIONS DIAMOND INTERCHANGE
N.T.S.

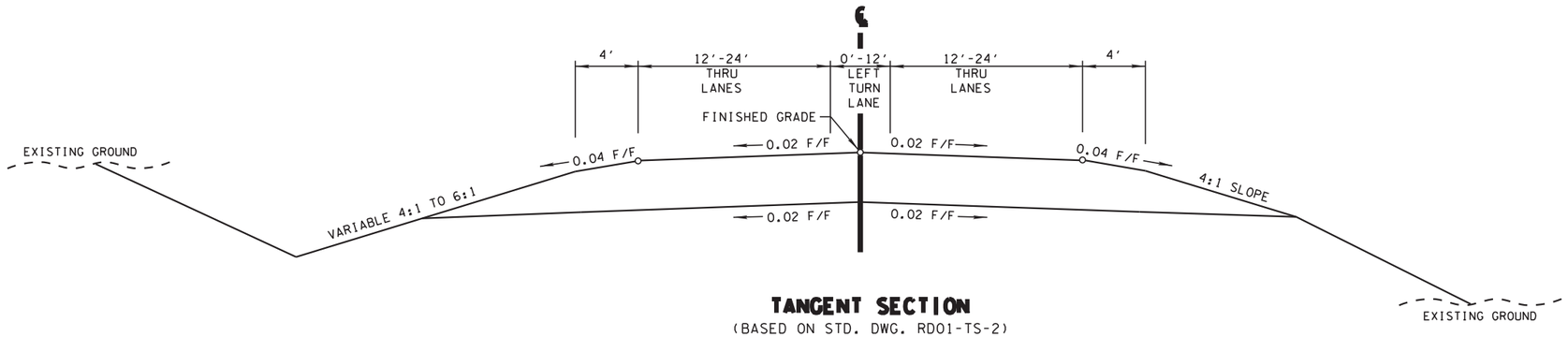
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2A



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-2)
S.R. 265 NORTH OF I-40
FROM END OF FULL BUILD TO TILLMAN DRIVE



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-2)
S.R. 265 SOUTH OF I-40
FROM SOUTHERN TIE-IN TO ADAMS LANE

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INTERSTATE ACCESS REQUEST

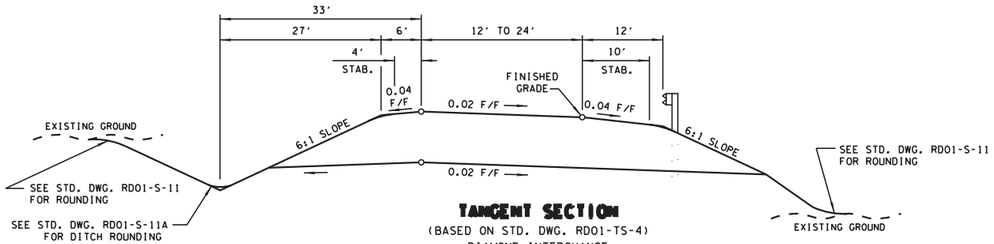
I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

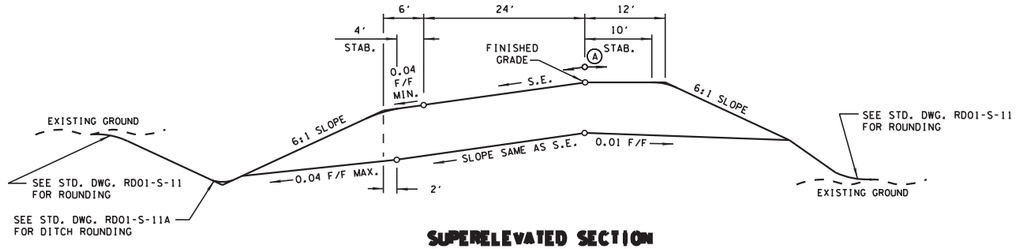
TYPICAL
SECTIONS
DIAMOND
INTERCHANGE
N.T.S.

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

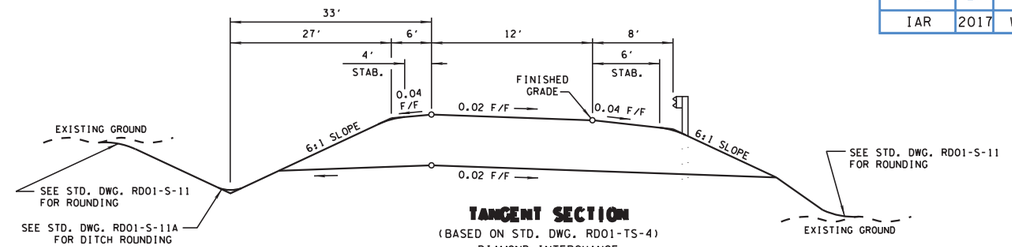
TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2B



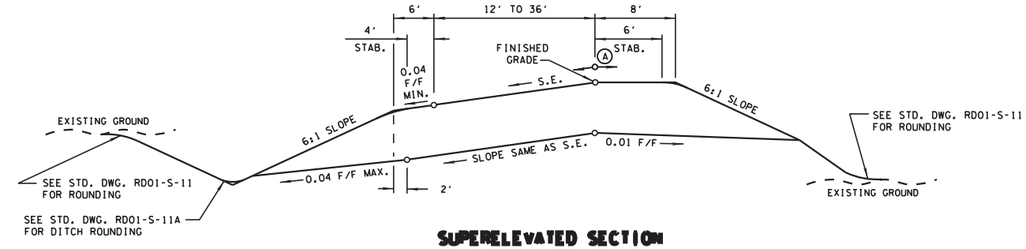
TANGENT SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP D



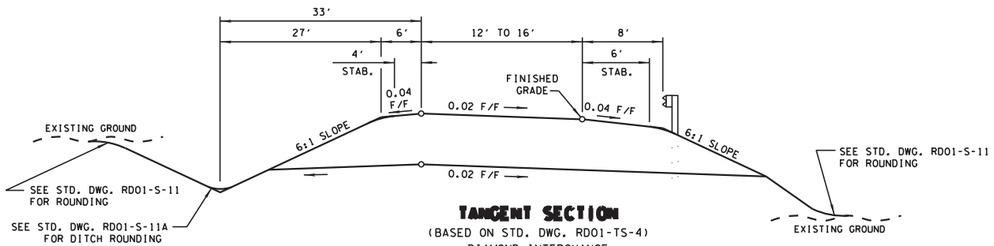
SUPERELEVATED SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP D



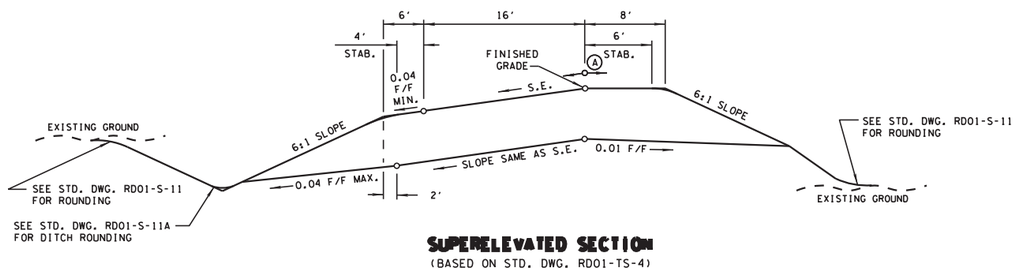
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(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP B



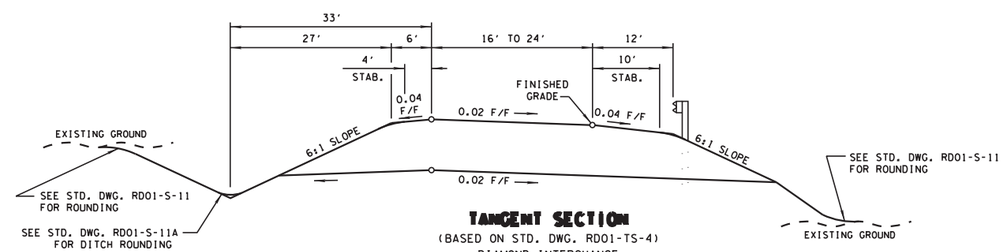
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(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP B



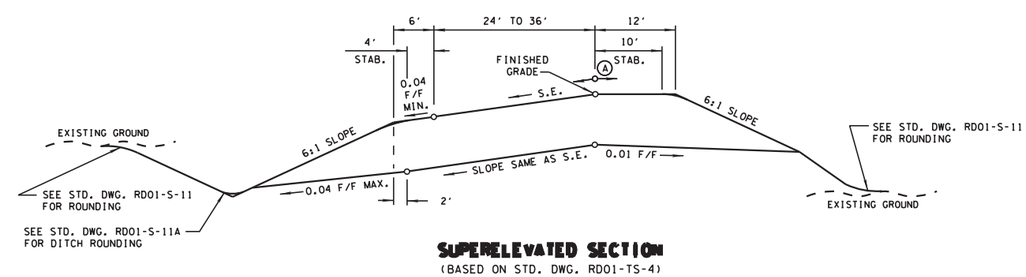
TANGENT SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP C



SUPERELEVATED SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP C



TANGENT SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP A



SUPERELEVATED SECTION
(BASED ON STD. DWG. RDO1-TS-4)
DIAMOND INTERCHANGE
RAMP A

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

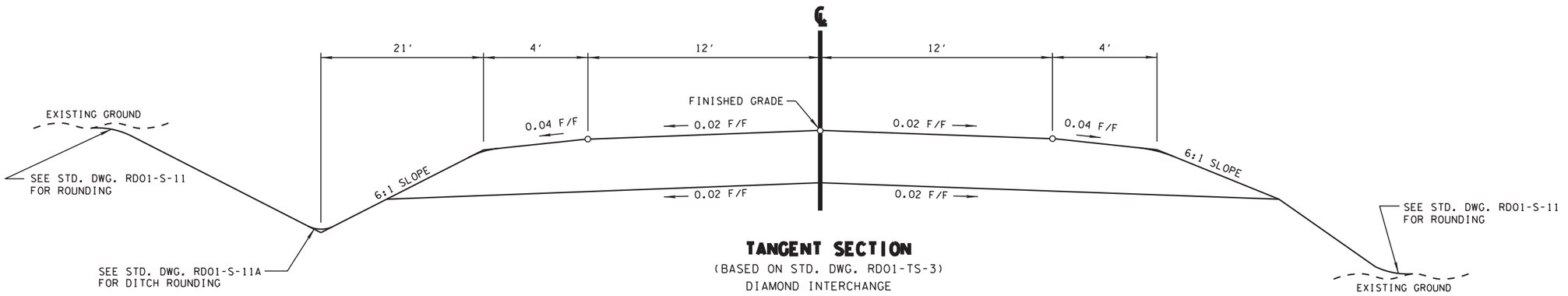
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

TYPICAL SECTIONS DIAMOND INTERCHANGE
N.T.S.

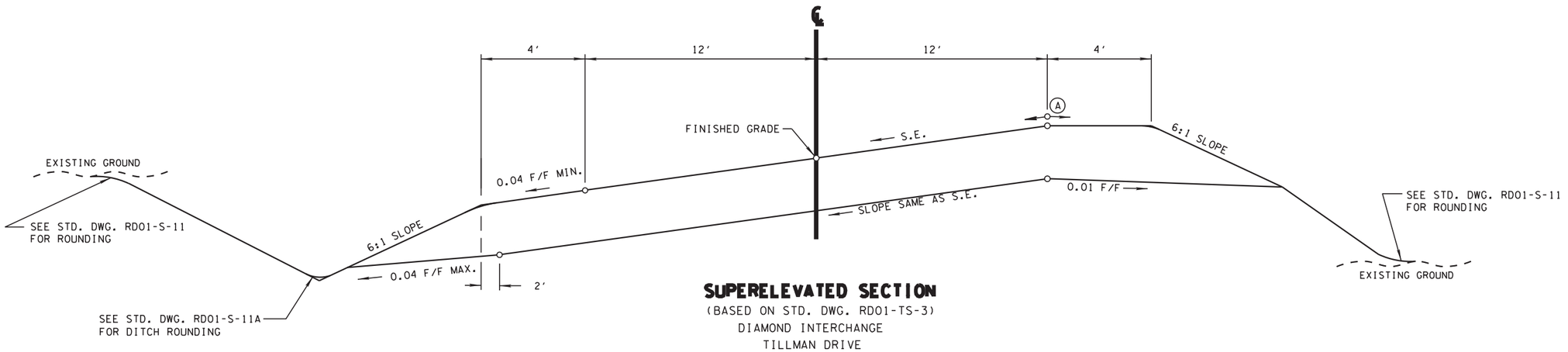
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2C



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-3)
DIAMOND INTERCHANGE
TILLMAN DRIVE



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-3)
DIAMOND INTERCHANGE
TILLMAN DRIVE

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INTERSTATE ACCESS REQUEST

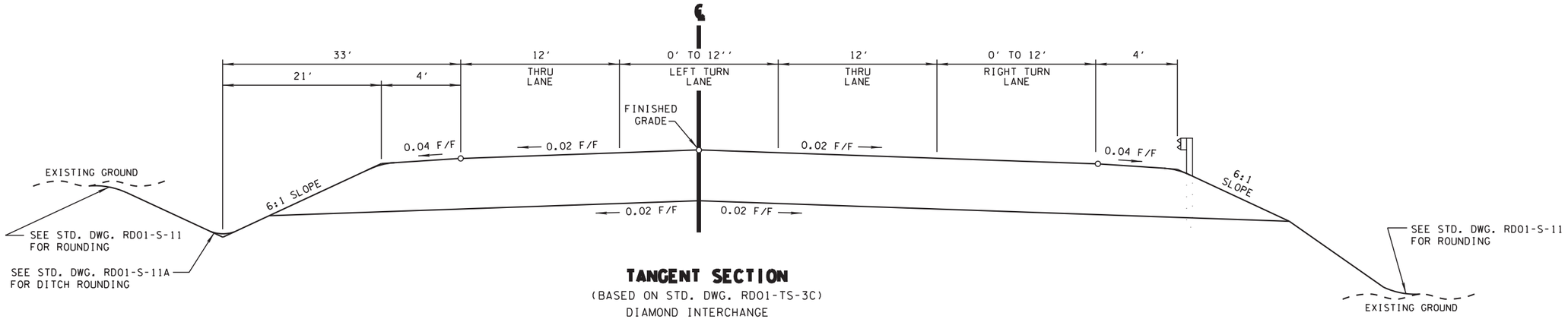
I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

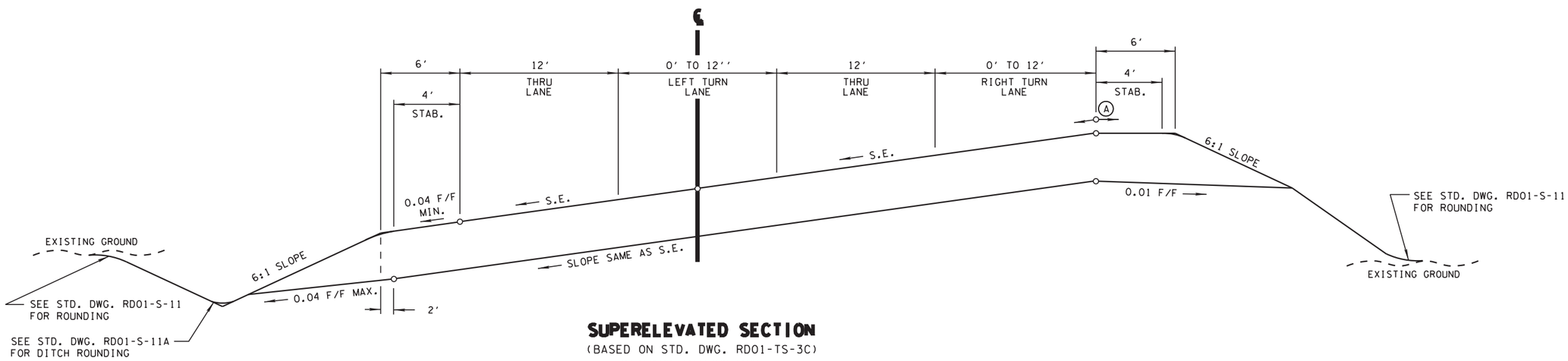
TYPICAL SECTIONS DIAMOND INTERCHANGE
N.T.S.

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2D



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-3C)
DIAMOND INTERCHANGE
JOHN HAGAR ROAD
ADAMS LANE



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-3C)
DIAMOND INTERCHANGE
JOHN HAGAR ROAD
ADAMS LANE

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INTERSTATE ACCESS REQUEST

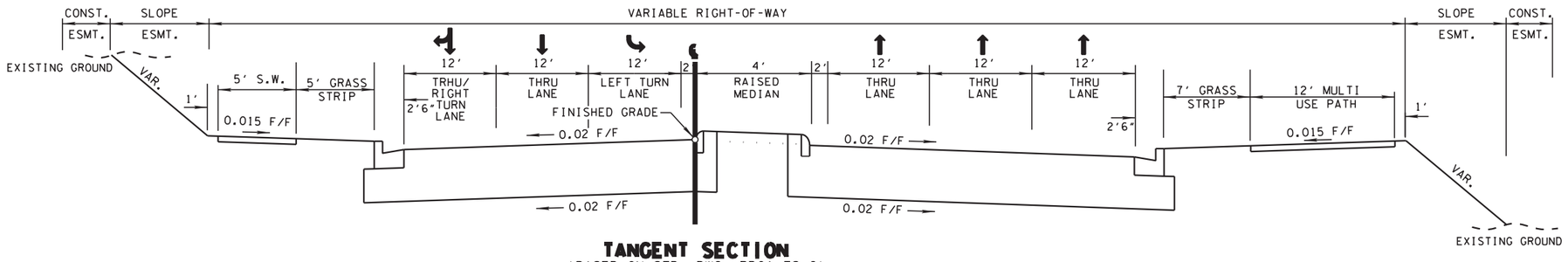
I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

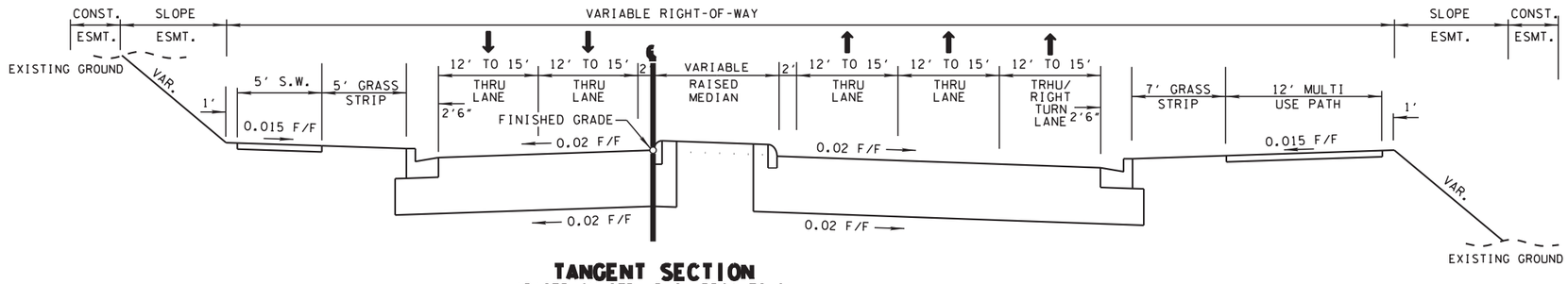
TYPICAL SECTIONS DIAMOND INTERCHANGE
N.T.S.

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2E



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-6)
DIVERGING DIAMOND INTERCHANGE
S.R. 265 FROM ADAMS LANE
TO NORTH OF ADAMS LANE



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-6)
DIVERGING DIAMOND INTERCHANGE
S.R. 265 FROM NORTH OF ADAMS LANE
TO SOUTHERN CROSS OVER

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INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

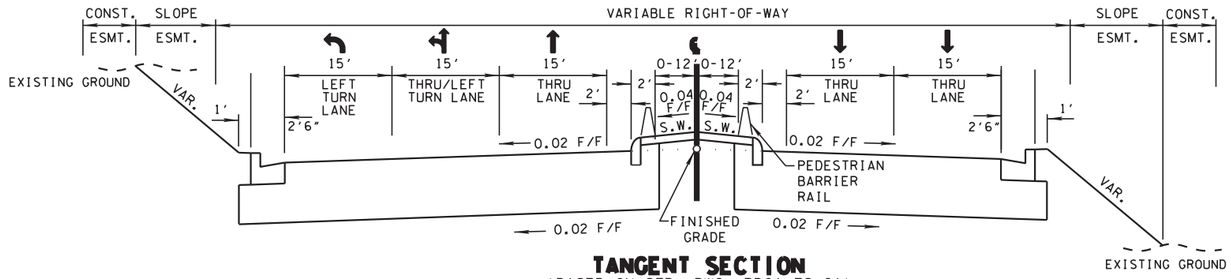
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

TYPICAL SECTIONS DDI

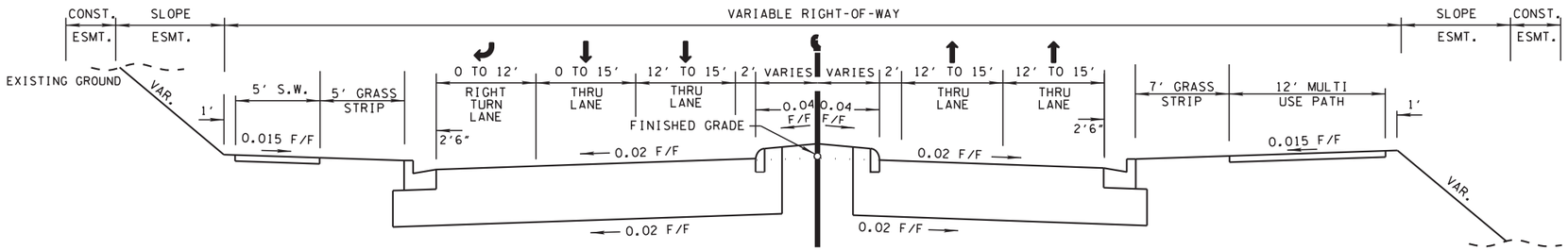
N.T.S.

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2F



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-6A)
DIVERGING DIAMOND INTERCHANGE
S.R. 265 FROM SOUTHERN CROSS OVER
TO NORTHERN CROSS OVER



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-6)
DIVERGING DIAMOND INTERCHANGE
S.R. 265 FROM NORTHERN CROSS OVER
TO END OF FULL BUILD

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

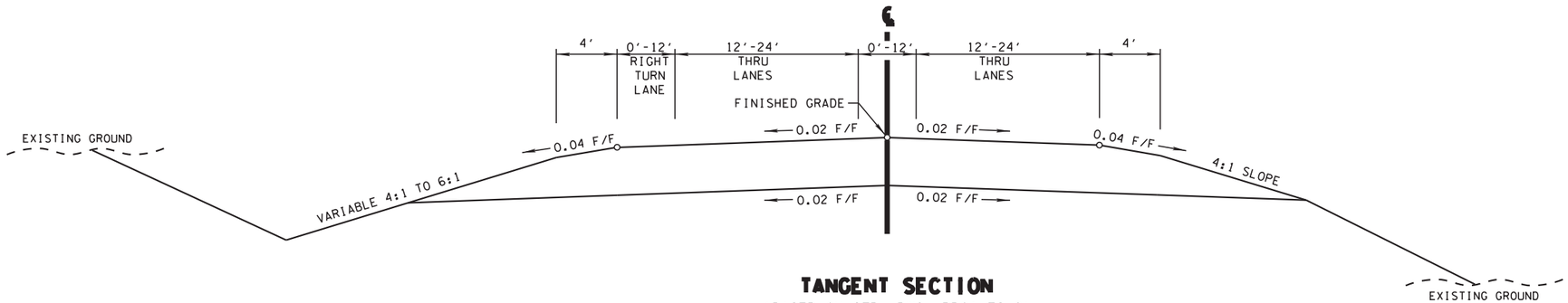
TYPICAL SECTIONS DDI

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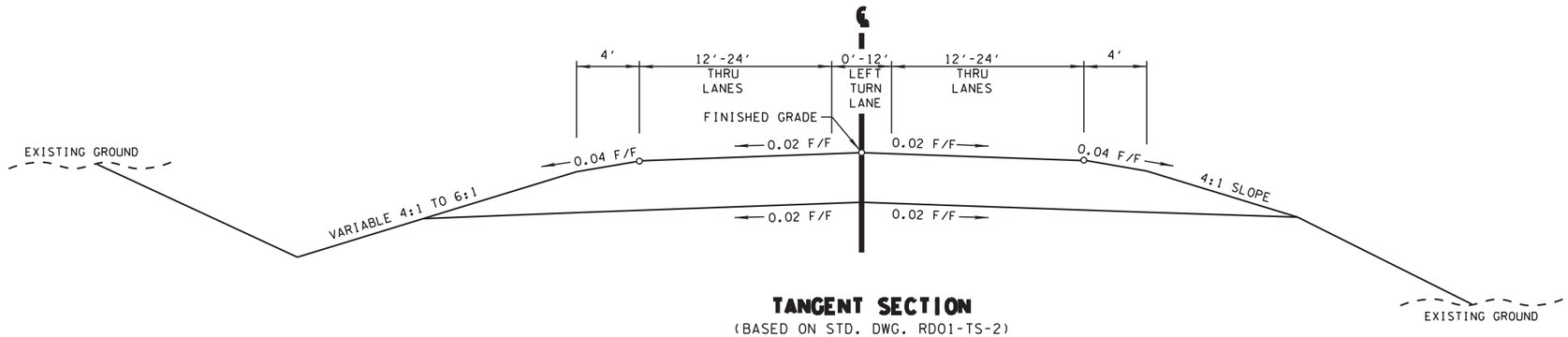
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2G



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-2)
S.R. 265 NORTH OF I-40
FROM END OF FULL BUILD TO TILLMAN DRIVE



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-2)
S.R. 265 SOUTH OF I-40
FROM SOUTHERN TIE-IN TO ADAMS LANE

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INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

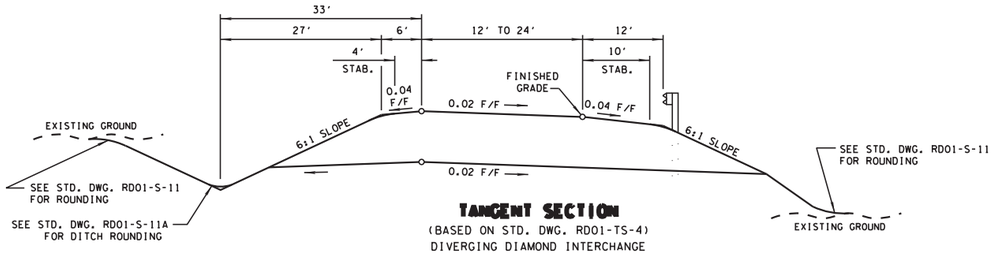
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

TYPICAL SECTIONS DDI

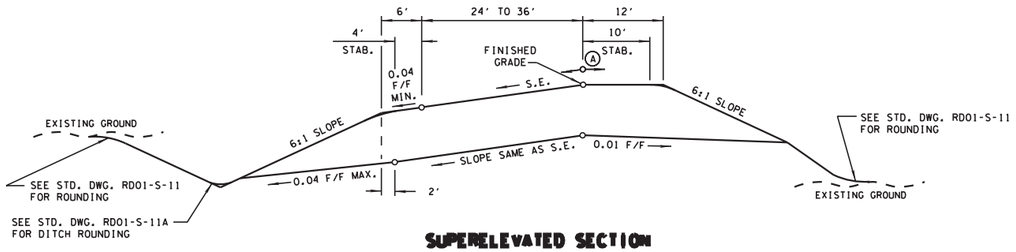
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2H

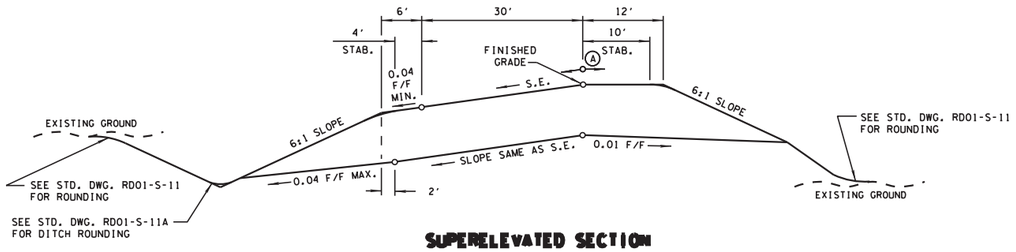


TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. MERGED ENTRANCE RAMP

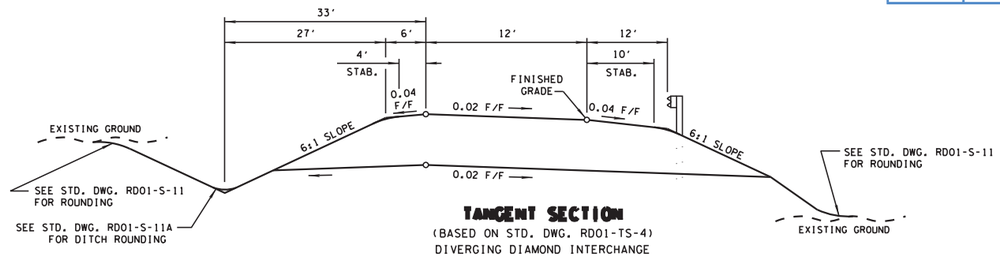


SUPERELEVATED SECTION
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DIVERGING DIAMOND INTERCHANGE
I-40 W.B. MERGED ENTRANCE RAMP

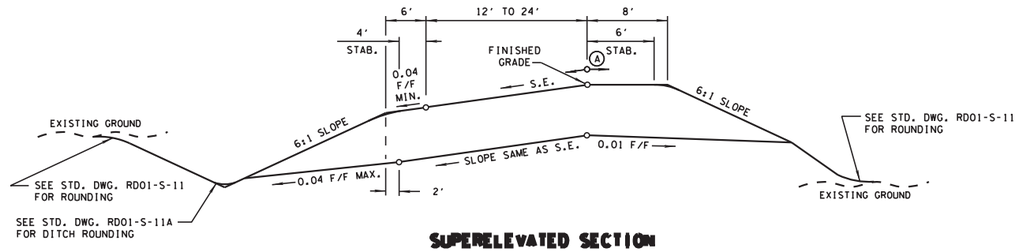
SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. ENTRANCE RAMP FROM S.R. 265 S.B.



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. ENTRANCE RAMP FROM S.R. 265 N.B.

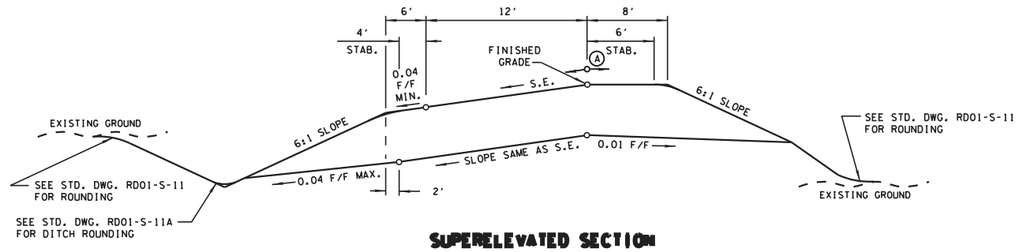


TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. EXIT RAMP BEFORE SPLIT



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. EXIT RAMP BEFORE SPLIT

SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. EXIT RAMP TO S.R. 265 S.B.



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 W.B. EXIT RAMP TO S.R. 265 N.B.

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

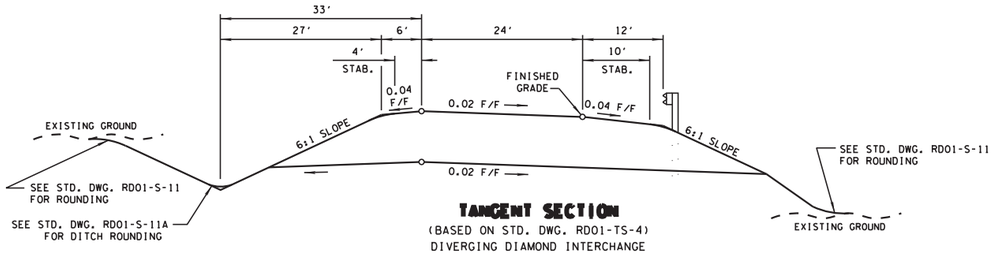
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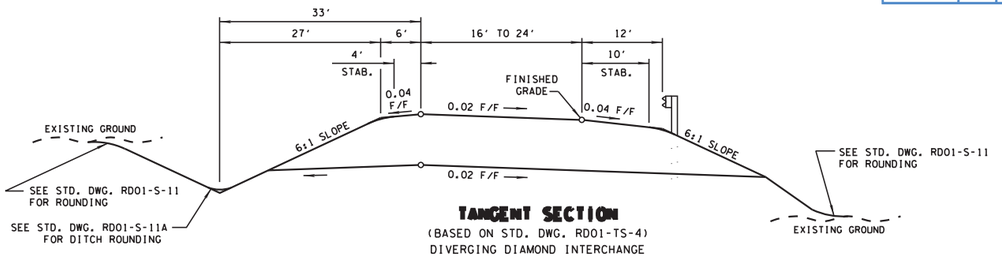
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

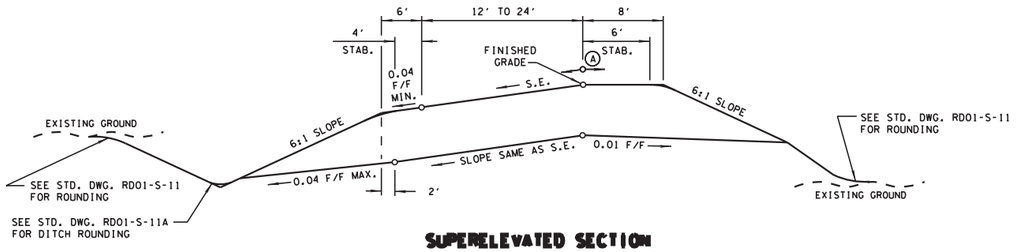
TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2J



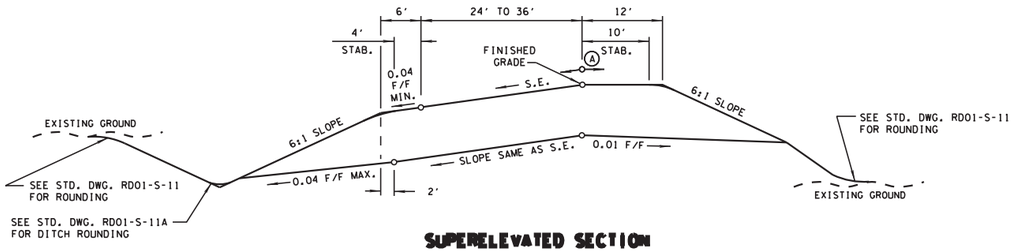
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(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. MERGED ENTRANCE RAMP



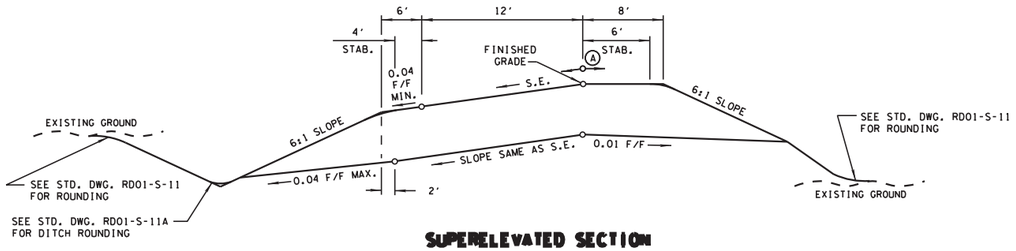
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DIVERGING DIAMOND INTERCHANGE
I-40 E.B. EXIT RAMP BEFORE SPLIT



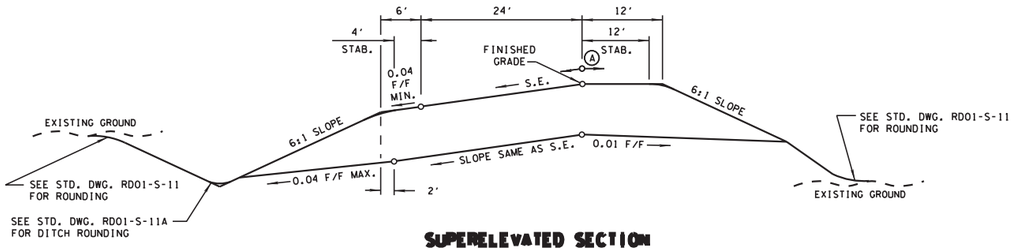
SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. MERGED ENTRANCE RAMP



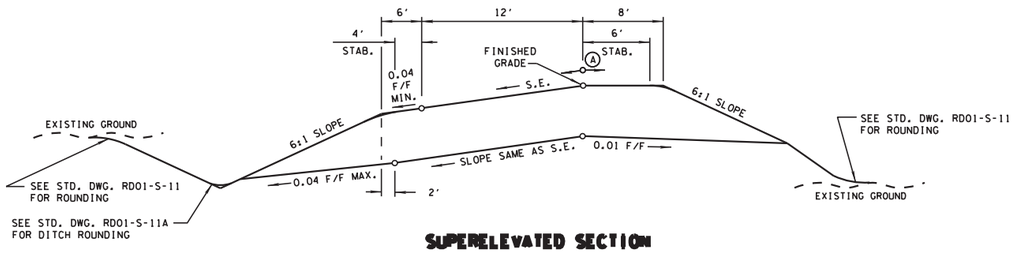
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(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. EXIT RAMP BEFORE SPLIT



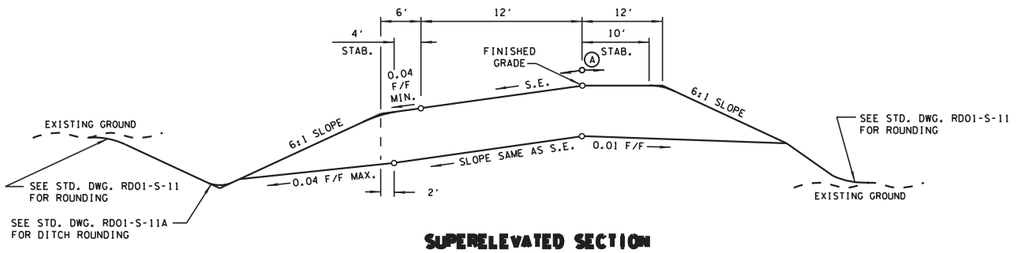
SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. ENTRANCE RAMP FROM S.R. 265 S.B.



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. EXIT RAMP TO S.R. 265 S.B.



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. ENTRANCE RAMP FROM S.R. 265 N.B.



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-4)
DIVERGING DIAMOND INTERCHANGE
I-40 E.B. EXIT RAMP TO S.R. 265 N.B.

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

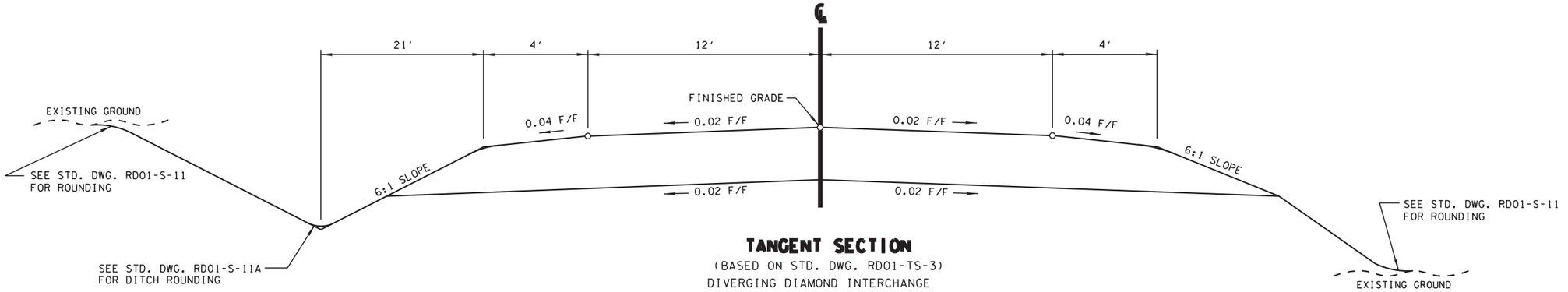
TYPICAL SECTIONS DDI

N.T.S.

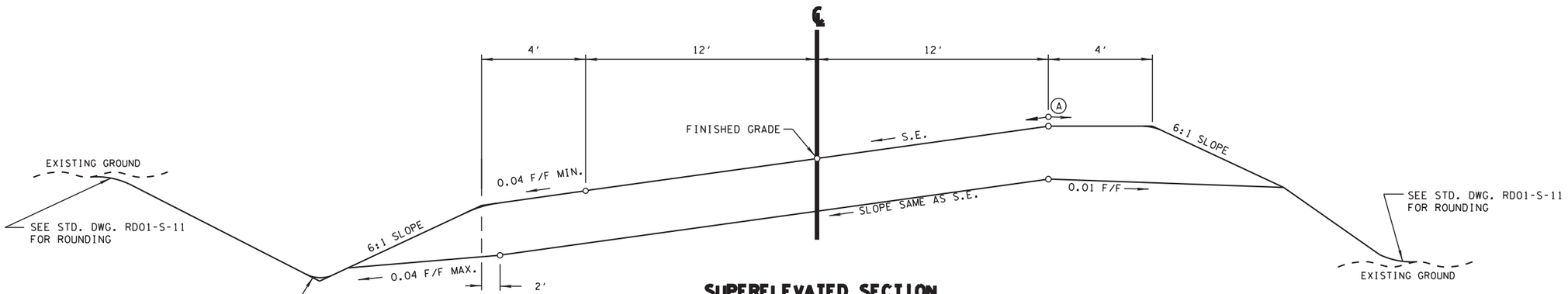
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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2K



TANGENT SECTION
(BASED ON STD. DWG. RD01-TS-3)
DIVERGING DIAMOND INTERCHANGE
TILLMAN DRIVE



SUPERELEVATED SECTION
(BASED ON STD. DWG. RD01-TS-3)
DIVERGING DIAMOND INTERCHANGE
TILLMAN DRIVE

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

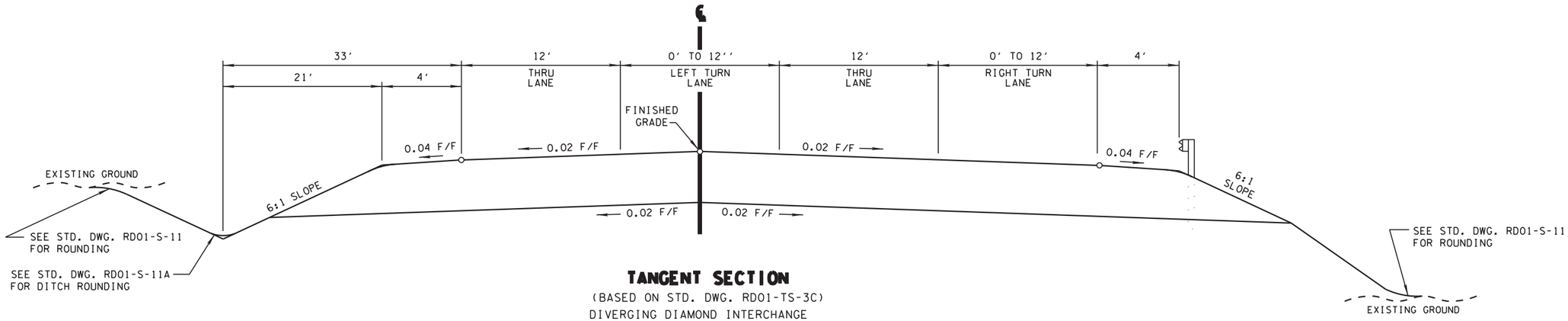
TYPICAL SECTIONS DDI

N.T.S.

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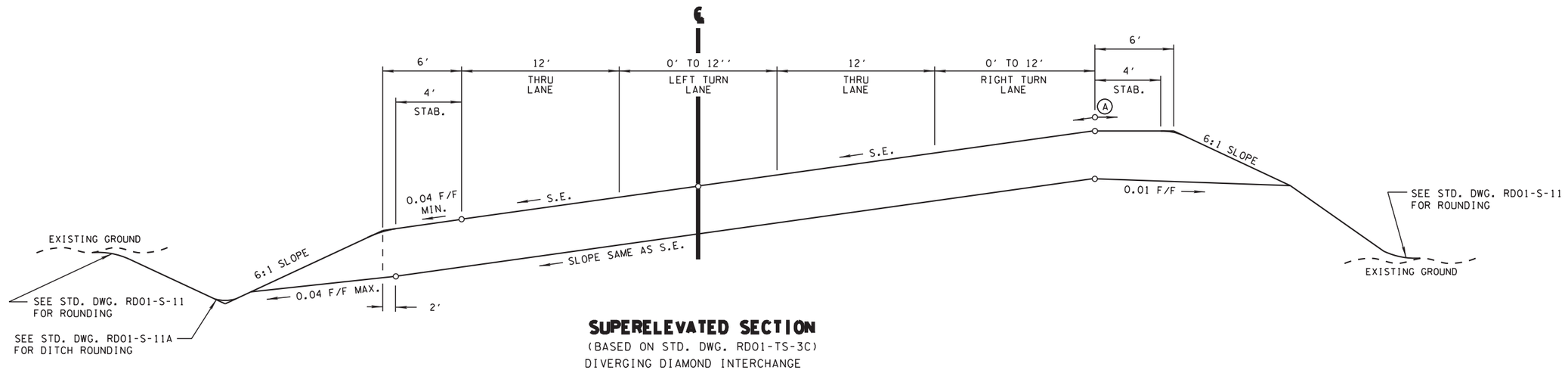
TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	2L



TANGENT SECTION

(BASED ON STD. DWG. RD01-TS-3C)
DIVERGING DIAMOND INTERCHANGE
JOHN HAGAR ROAD
ADAMS LANE



SUPERELEVATED SECTION

(BASED ON STD. DWG. RD01-TS-3C)
DIVERGING DIAMOND INTERCHANGE
JOHN HAGAR ROAD
ADAMS LANE

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

TYPICAL SECTIONS DDI

N.T.S.

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	3



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE 3
DIAMOND INTERCHANGE

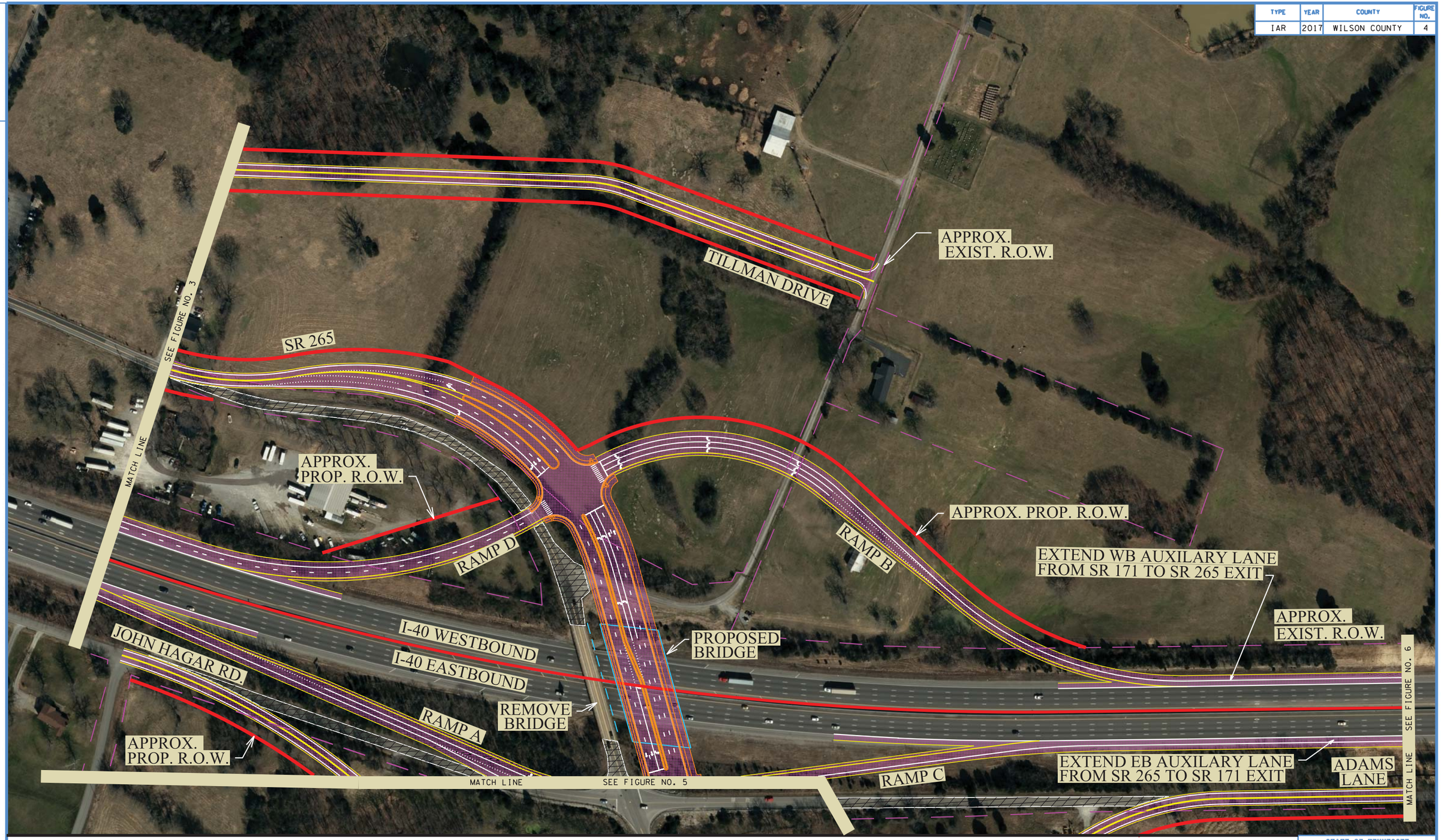
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TENNESSEE D.O.T.

STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	4



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

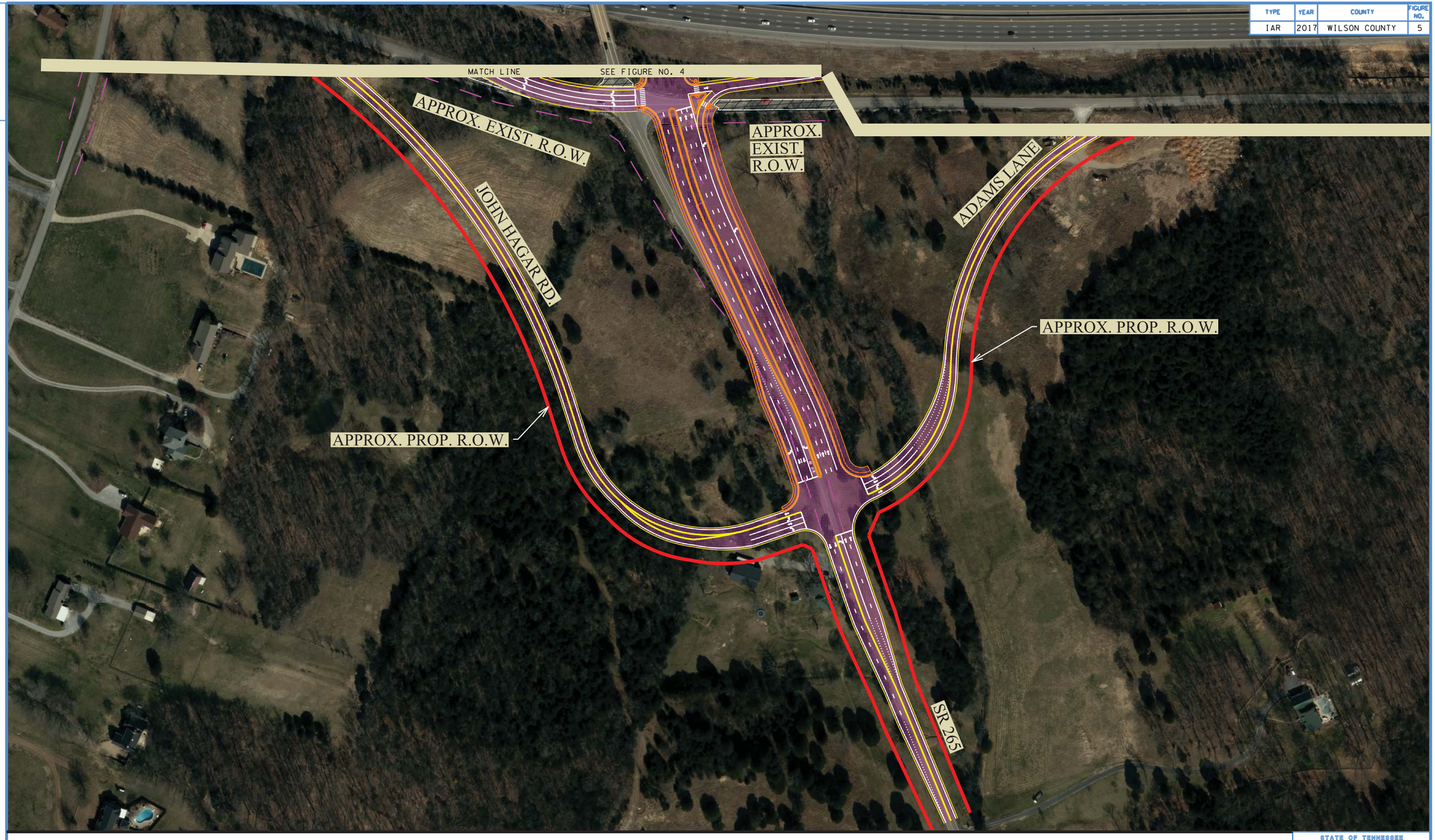
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE 4
DIAMOND INTERCHANGE

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	5



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE 5
DIAMOND INTERCHANGE

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TENNESSEE D.O.T.

STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	6



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 6
DIAMOND INTERCHANGE

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	7



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

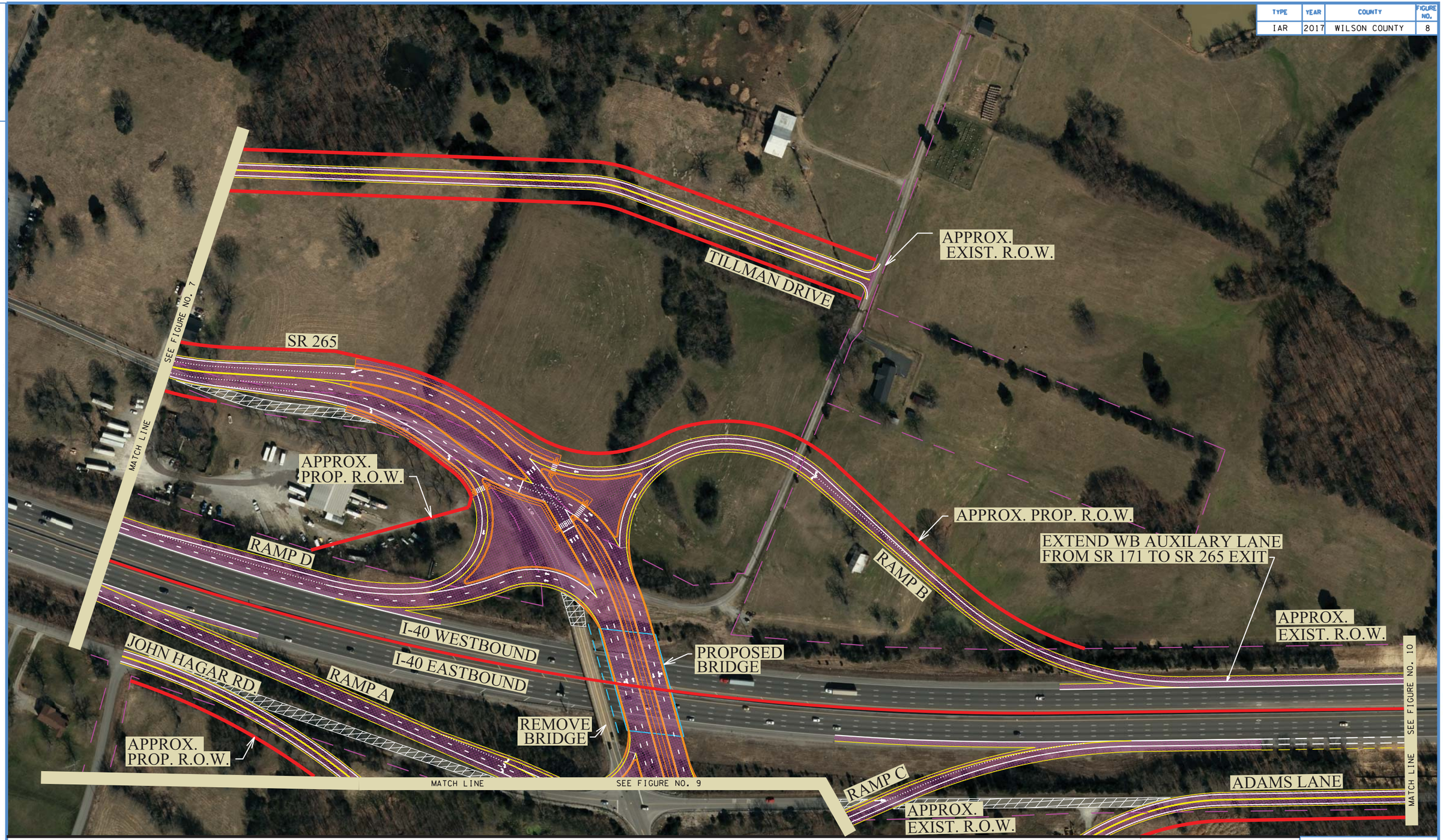
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 7
DIVERGING DIAMOND INTERCHANGE

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	8



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

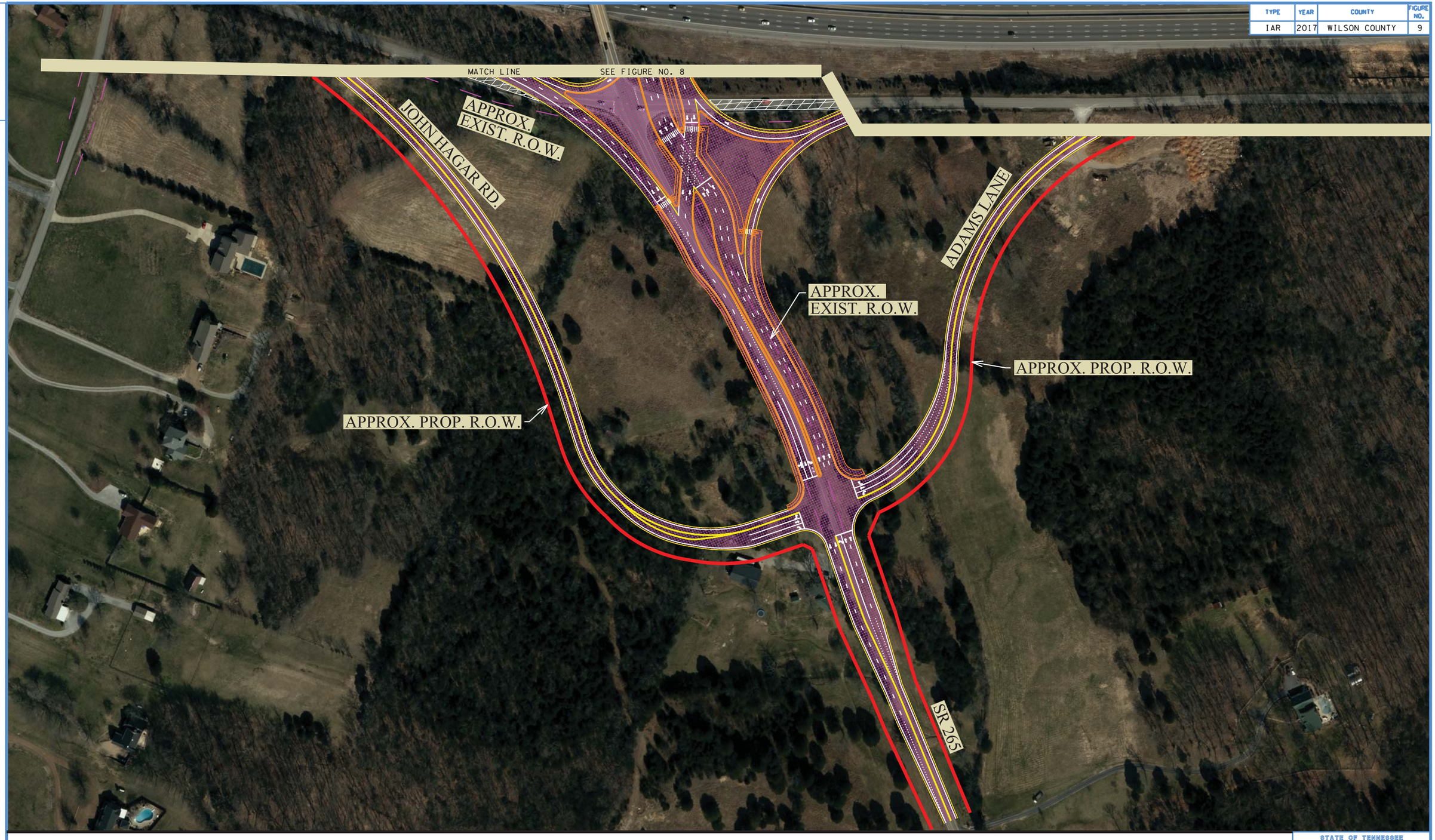
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 8
DIVERGING DIAMOND INTERCHANGE

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	9



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE 9
DIVERGING DIAMOND INTERCHANGE

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TENNESSEE D.O.T.

STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	10



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE 10
DIVERGING DIAMOND INTERCHANGE

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11.0 CONCEPTUAL SIGNING PLANS

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S1



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE S1
DIAMOND SIGNING LAYOUT

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S2

TILLMAN DRIVE
APPROX. EXIST. R.O.W.
SR 265
SHARE THE ROAD
SR 265
SOUTH 265
DO NOT ENTER
WRONG WAY
SEE FIGURE NO. S1
MATCH LINE
EAST NASHVILLE 40
WEST NASHVILLE 40
WEST 40
RAMP D
NASHVILLE WEST 40
RAMP B
EXIT 225
APPROX. EXIST. R.O.W.
EXIT 225 CENTRAL PIKE 265
I-40 WESTBOUND
I-40 EASTBOUND
EAST 40
WEST 40
RAMP A
WRONG WAY
EAST KNOXVILLE 40
EXIT 225
JOHN HAGAR RD.
RAMP C
MATCH LINE
SEE FIGURE NO. S3
APPROX. EXIST. R.O.W.
ADAMS LANE
MATCH LINE
SEE FIGURE NO. S4

0' 200' 400' 600'

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

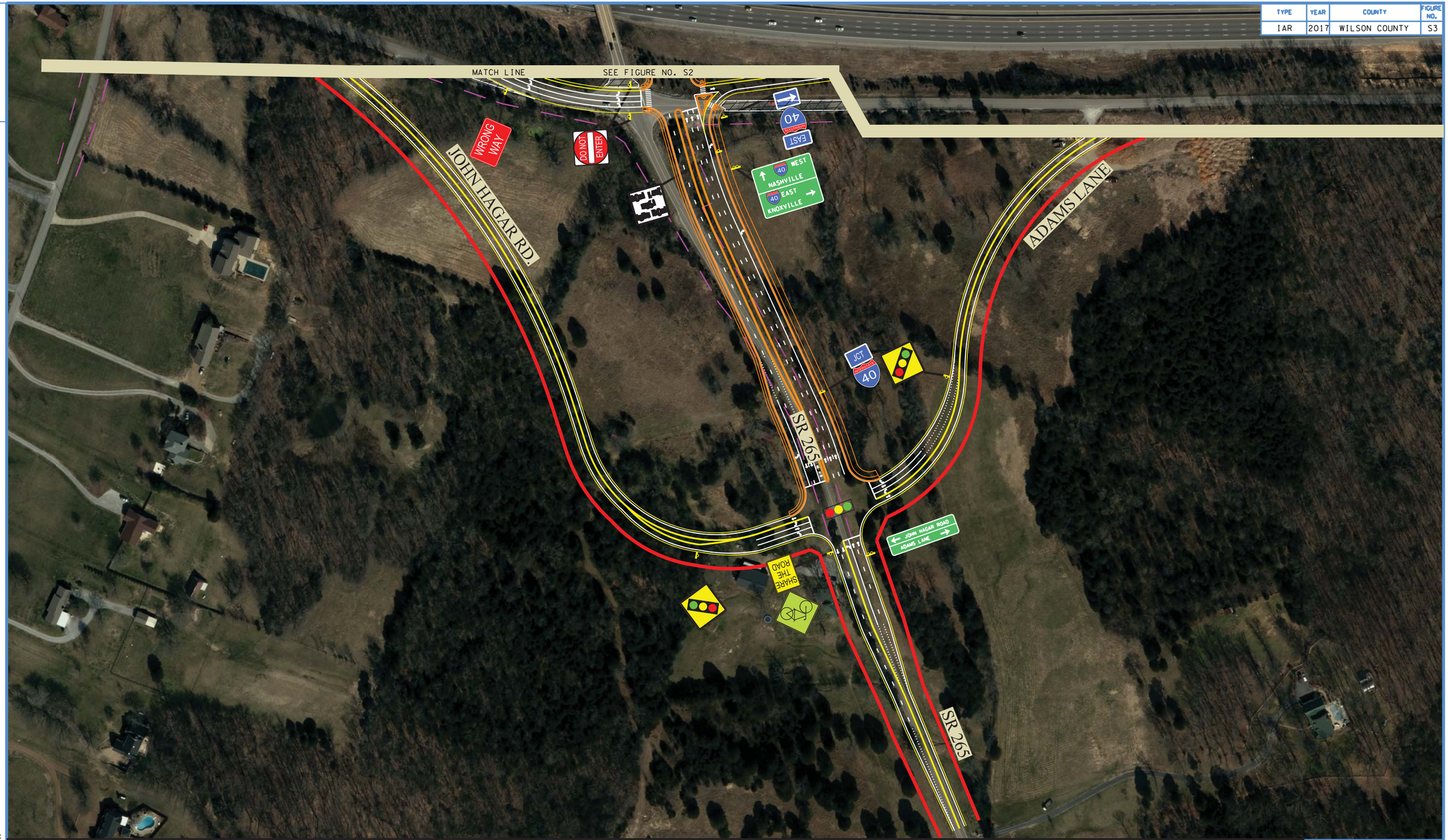
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE S2 DIAMOND SIGNING LAYOUT

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S3



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE S3
DIAMOND SIGNING LAYOUT

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S4



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE S4
DIAMOND SIGNING LAYOUT

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S5



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE S5
DDI
SIGNING
LAYOUT

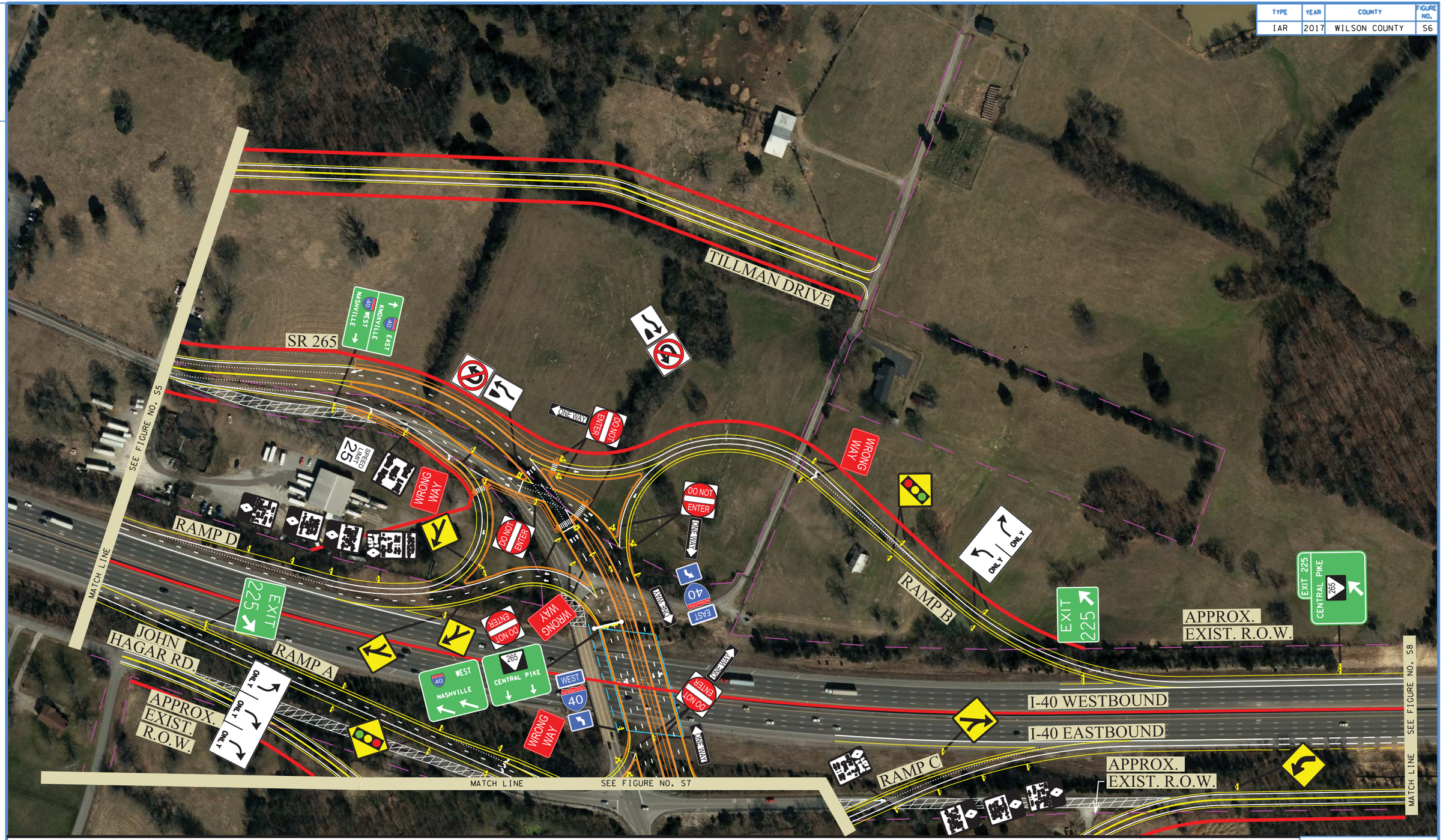
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TENNESSEE D.O.T.

STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S6



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

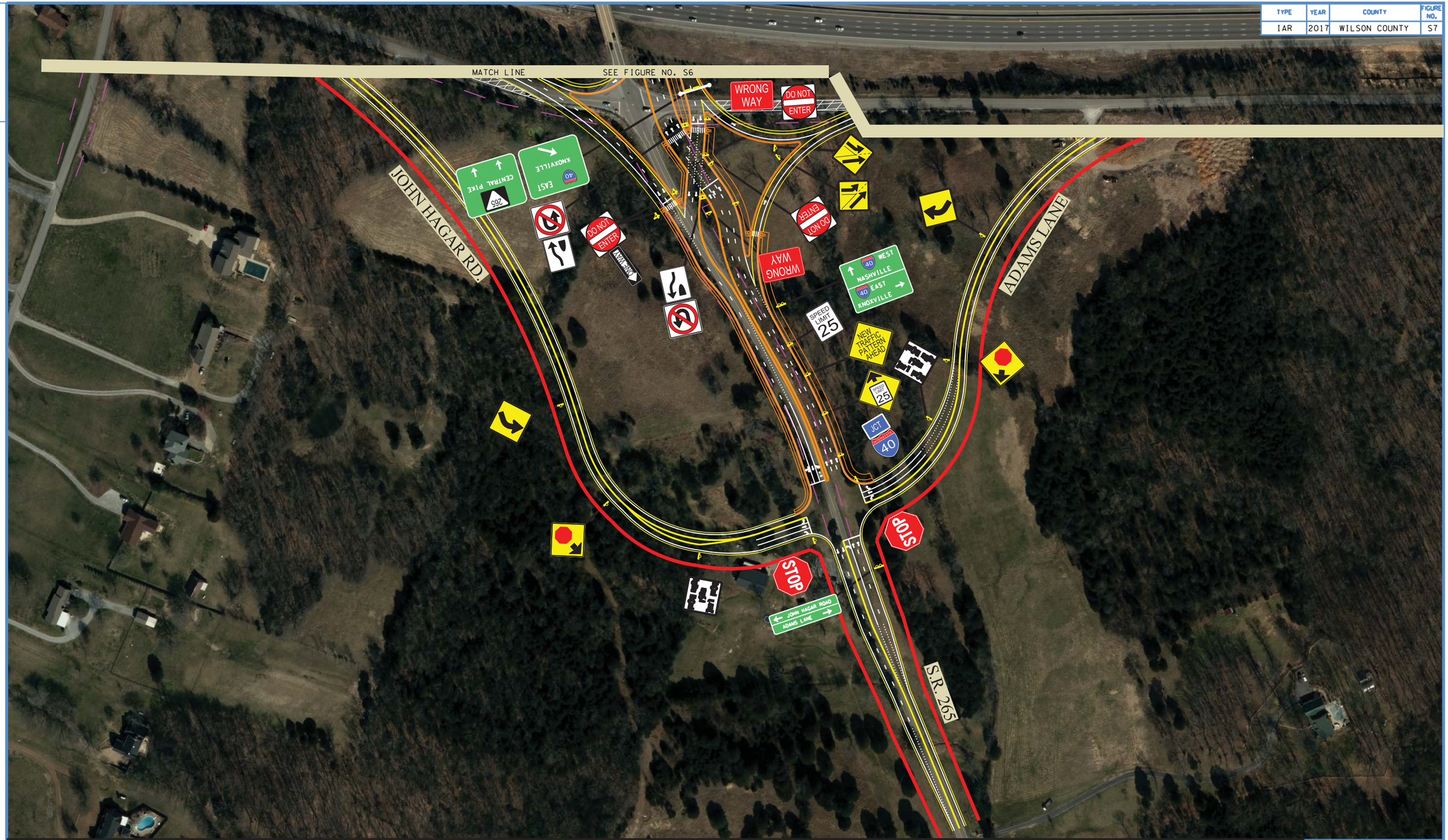
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE S6
DDI
SIGNING
LAYOUT

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TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S7



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FIGURE S7
DDI SIGNING LAYOUT

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TENNESSEE D.O.T.

STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

FILE NO.

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2017	WILSON COUNTY	S8



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION
INVESTMENTS DIVISION

FIGURE S8
DDI
SIGNING
LAYOUT

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ATTACHMENT A: COMJ LETTER OF SUPPORT

ED HAGERTY
MAYOR

JAMES MANESS
VICE-MAYOR

KENNY MARTIN
CITY MANAGER

CITY OF MT. JULIET

COMMISSIONERS

BRIAN ABSTON
ART GILES
RAY JUSTICE

Mr. Paul Degges, P.E.
Chief Engineer
Tennessee Department of Transportation
Suite 700, James K. Polk Building
Nashville, TN 37243

RE: I-40 Interchange at Central Pike (SR-265)

Dear Mr. Degges:

I am writing to support efforts of TDOT on the planning, design, and construction of a new interchange on Interstate 40 at Central Pike (SR-265) in Mt. Juliet and to obtain approval from the Federal Highway Administration for the project. We appreciate the opportunity to coordinate with TDOT on the project and also want to commend your staff for their hard work.

With the exponential growth occurring in Mt. Juliet and of the greater metropolitan Nashville region, we are presently experiencing traffic capacity issues on Mt. Juliet Road (SR-177) with much of the traffic utilizing the existing interchange with Interstate 40. The interchange has served the City and TDOT well over its history, but improved local and regional access from the two area State Routes to the Interstate is now needed. In the area of the proposed interchange, the approved Providence Central development proposes to add over 30,000 daily trips from a mix of office, retail, and residential land uses. In conjunction with this development, the realignment of Adams Lane and the extension of Providence Parkway will aid in the construction of the interchange.

The proposed interchange will result in a dramatic, positive impact to the City as well as western Wilson County and we appreciate TDOT's funding and support of this proposal. Not only will the new Central Pike (SR-265) interchange with Interstate 40 support economic growth, it will also help to meet the current and future traffic demands from area land uses. Again, we appreciate your support and coordination of the project and look forward to partnering with you through the development and construction of the interchange.

Sincerely,

Ed Hagerty, Mayor
City of Mt. Juliet

P.O. Box 256 • Mt. Juliet, TN 37121 • (615) 754-2552 • Fax (615) 754-5742

ATTACHMENT B: COMJ LETTER OF COMMITMENT FOR ACCESS MANAGENET ALONG SR 265

City of Mt. Juliet

September 28, 2017

Mr. Paul Degges
Deputy Commissioner and Chief Engineer
Tennessee Department of Transportation
Suite 700, James K. Polk Building
Nashville, TN 37243

RE: I-40 Interchange at Central Pike (SR-265)

Dear Mr. Degges:

I am writing in support of efforts by TDOT for access management on Central Pike (SR-265) in the area of the proposed interchange on Interstate 40 at Central Pike (SR-265). We appreciate the opportunity to coordinate with TDOT on access management and also want to commend your staff for their hard work. We agree that regardless of how much the roadway network is expanded, the benefits will be short-lived unless proper access control is achieved.

The City of Mt. Juliet has recently undertaken efforts to complete a comprehensive transportation plan. As part of the plan, access management guidelines have been put in place to control the distances of full and partial access to roadways based on speed. This will apply to all roadway designs and development proposals that affect state or local roadways within the City's jurisdiction.

Specific to Central Pike (SR-265), we agree and support TDOT's efforts to prohibit any full access points within 1,200 feet of the interchange. For this roadway, this distance meets the City's guidelines for full access points. This will ensure to preserve roadway capacity in the area of the interchange by providing appropriate signal spacing and protecting the safety of the roadway.

Again, we appreciate your support and coordination of the project and look forward to partnering with you through the development and construction of the interchange and surrounding network connections.

Sincerely,

Ed Hagerty, Mayor
City of Mt. Juliet

71 E. Hill Street | Mt. Juliet, TN 37122 | (615) 773-7957 | Fax (615) 773-6286

ATTACHMENT C:
TDOT PROJECT DEVELOPMENT CONCURRENCE LETTER

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
REGION 3
6601 CENTENNIAL BOULEVARD
NASHVILLE, TENNESSEE 37243
(615) 350-4300

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

MEMORANDUM

TO: Steve Allen, Director, Strategic Transportation Investments Division

FROM: David Layhew, Assistant Chief Engineer, Region 3

DATE: October 10, 2016

SUBJECT: Interstate Access Request
Interstate 40 at SR-265 (Central Pike)
PIN 104360.00
Wilson County

The Interstate Access Request for the subject project has been received by my office and we concur with the conceptual plan for both alternatives.

Please notify me if you need further assistance.

JD:dl

Cc: Joe Deering
Jim Waters
Ron Baker
Shaun Armstrong

ATTACHMENT D: NASHVILLE AREA MPO RTP LISTINGS

Nashville Area MPO - 2040 Regional Transportation Plan
Cost-Feasible Project List, 2016 to 2040

RTP ID	Need ID	TIP ID (PIN)	County	Lead Agency	Project Type	Project Name and Description	Miles	Horizon	Grant/ Source	Federal Funding	State Funding	Local Funding	Total Amount
1052-273	1243	2011-510-017	Sumner	Gallatin	Roadway Widening	Airport Road Widening, 2 to 4 lanes, from SR-109 to Hartsville Pk (SR-25)	3.8	2030	O-STP	$ 21.47	$ -	$ 5.37	$ 26.84
1652-176	1431		Sumner	TDOT	Roadway Widening	I-65 Widening (Seg 1), 4 to 6 lanes, SB only from Blue Star Rd (US 31) to Bethel Rd (SR-257)	4.8	2030	NHPP	$ 53.68	$ 13.42	$ -	$ 67.10
1652-177	1376		Sumner	Hendersonville	Roadway Widening	Indian Lake Rd Widening, 2 to 5 lanes, from E Main St to Crosby/Pin Oak Dr	0.5	2030	O-STP	$ 6.44	$ -	$ 1.61	$ 8.05
1652-178	1277		Sumner	TDOT	Roadway Widening	NET Corridor Section 2A - Vietnam Veterans Pkwy (SR-386) Multi Modal Widening, 4 to 6 lanes, from US 31E/Saundersville Rd to SR 109 Bypass	7.0	2030	NHPP	$ 105.21	$ 26.30	$ -	$ 131.52
1052-176	1254		Sumner	Hendersonville	Roadway Widening	New Shackle Island Rd (SR-258) Widening (Phase 2), 2 to 4 lanes, from Iris Dr to W Main St (US 31E)	1.3	2030	O-STP	$ 8.48	$ -	$ 2.12	$ 10.60
1652-179	1392		Sumner	Hendersonville	Roadway Reconstruct	Old Shackle Island Rd Reconstruction, 2 to 3 lanes, from Volunteer Dr to Wessington Dr	0.6	2030	O-STP	$ 6.44	$ -	$ 1.61	$ 8.05
1652-180	1221		Sumner	TDOT	Roadway Widening	Red River Rd (SR-174/SR 25) Widening, 2 to 4 lanes, near and across CSX RR	0.3	2030	O-STP	$ 4.29	$ -	$ 1.07	$ 5.37
1663-181	1175		Williamson	TDOT	Interchange New	I-65 New Interchange between Old Hickory Blvd (SR-254) and Concord Rd (SR-253)	-	2030	NHPP	$ 37.58	$ 9.39	$ -	$ 46.97
1666-182	1319		Williamson	Franklin	Roadway Multi-Modal	Murfreesboro Rd (SR-96) Sidewalks from Pinkerton Park to Mack Hatcher Pkwy (SR-397)	1.1	2030	O-STP	$ 0.86	$ -	$ 0.21	$ 1.07
1062-163	1174		Williamson	Brentwood	Roadway Reconstruct	Wilson Pik (SR-252) Reconstruction, 2 to 3 lanes, from Church St to Concord Rd (SR-253)	2.6	2030	S-STP	$ 20.94	$ 5.23	$ -	$ 26.17
1662-183	1195		Williamson	Spring Hill	Roadway Widening	Buckner Ln Widening, 2 to 5 lanes, from Duplex Road (SR-247) to Thompson's Station Rd	2.6	2030	S-STP	$ 35.43	$ 8.86	$ -	$ 44.29
1662-184	1204		Williamson	Spring Hill	Roadway Widening	Columbia Pk (SR-6/ US-31) Widening, 2 to 5 lanes, from Buckner Rd to Miles Johnson Pkwy	1.8	2030	S-STP	$ 26.84	$ 6.71	$ -	$ 33.55
1062-142	1359	2011-62-011	Williamson	Franklin	Roadway Widening	East McEwen Dr (Phase 4) Widening, 2 to 4 lanes, from near Cool Springs Blvd to Wilson Pk (SR-252)	1.5	2030	O-STP	$ 29.31	$ -	$ 7.33	$ 36.64
1062-138	1341		Williamson	Franklin	Roadway Widening	Lewisburg Pk (SR-106/ US 431) Widening (Phase 1), 2 to 4 lanes, from Mack Hatcher Pkwy (SR-397) to Donelson Creek Pkwy	0.7	2030	S-STP	$ 13.96	$ 3.49	$ -	$ 17.45
1073-256	1166		Wilson	TDOT	Interchange New	I-40 @ Central Pk (SR-265) Interchange	-	2030	NHPP	$ 24.16	$ 6.04	$ -	$ 30.19
1679-185	1427		Wilson	Lebanon	Roadway Maintenance	Main St (SR-26/US 70) Restriping, from 4 to 3 lanes, from Hartmann Dr/Tennessee Blvd to Sparta Pk/ High St	3.0	2030	S-STP	$ 0.54	$ 0.13	$ -	$ 0.67
1679-186	1381		Wilson	Lebanon	Roadway Reconstruct	SR-10/US-231 Reconstruction, 4 to 3 lanes, from High St (SR-26) to North Castle Heights	0.8	2030	S-STP	$ 2.15	$ 0.54	$ -	$ 2.68
1072-112	1346	2008-72-042	Wilson	Lebanon	Roadway Widening	Hartmann Dr Widening, 2 to 5 lanes, from Baddour Pkwy (SR-26) to Coles Ferry Pk	1.4	2030	O-STP	$ 6.44	$ -	$ 1.61	$ 8.05
1672-187	1167		Wilson	Mt. Juliet	Roadway Widening	Mt. Juliet Rd (SR-171) @ I-40 Bridge Widening	-	2030	O-STP	$ 13.75	$ -	$ 3.44	$ 17.19
1672-188	1165		Wilson	Mt. Juliet	Roadway Widening	S Mt. Juliet Rd (SR-171) Widening, 2 to 5 lanes, from Central Pk (SR-265) to Providence Pkwy	0.7	2030	S-STP	$ 5.90	$ 1.48	$ -	$ 7.38
1679-189	1379		Wilson	Lebanon	Roadway Reconstruct	SR-10/US-231 Widening, 2 to 3 lanes, from North Castle Heights to Tenear Dr	0.2	2030	S-STP	$ 1.40	$ 0.35	$ -	$ 1.74
1682-190	1170		Wilson/ Davidson	TDOT	Roadway Widening	Central Pike (SR-265) Widening, 2 to 5 lanes, from Old Hickory Blvd (SR-45) to Mt. Juliet Rd (SR-174)	5.4	2030	S-STP	$ 42.94	$ 10.74	$ -	$ 53.68
Mid-Term Horizon (2030) Totals										**$ 2,677.59**	**$ 518.07**	**$ 144.22**	**$ 3,339.88**

APPENDIX A: COMPREHENSIVE TRANSPORTATION PLAN



Mt. Juliet, Tennessee
Comprehensive Transportation Plan
2017



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Acknowledgments

Thank you to all of the organizations and individuals who committed their time, energy and resources to this effort. This study would not have been possible without the support of many throughout the process. On behalf of the City of Mt. Juliet, thanks to the diverse group of participants whose collective efforts are reflected in the Mt. Juliet Comprehensive Transportation Plan (CTP). These groups and individuals include the Transportation Advisory Committee, local staff and elected officials, the Nashville MPO, Tennessee Department of Transportation, numerous stakeholders, and the dedicated citizenry of the greater Mt. Juliet area. ***Thank you!***

City Officials

Ed Hagerty (Mayor)
Ray Justice (Commissioner)
James Maness (Commissioner/Vice Mayor)
Art Giles (Commissioner)
Brian Abston (Commissioner)

Transportation Plan Steering Committee

Tyler Chandler
Bill Robinson
Mark Hinesley
William Anderson
Art Giles
Mary Connelly
Pam Perry
Kelly Morgan

Mt. Juliet Planning & Engineering

Andy Barlow
Jessica Gore
Rob Ealy
Bo Logan

Stantec Consulting Team

Mike Rutkowski
Cherie Akers
Scott Lane
Erin Convery
Amanda Morrell
Matt Noonkester
Michelle Peele
Chandler Hagen
Jaquasha Colón

The Mt. Juliet CTP was adopted by the Mt. Juliet City Commissioners on [Insert Date].



Introduction & Vision



Located just miles from Nashville, there's no wonder why Mt. Juliet has become an attractive community to work, live, and play. While there are so many economic, social, and educational advantages that accompany rapid growth, there are also trade-offs associated with these benefits.

Mt. Juliet is experiencing tremendous growth due to its proximity to Nashville and connectivity to I-65, I-40, I-24, and I-840. It's important for Mt. Juliet to accommodate continued future growth while maintaining the community's values and unique "small town" feel. Growth in any community comes with opportunities and challenges, so it's imperative to develop a comprehensive transportation plan that will shape the future transportation system in Mt. Juliet. This plan supports regional mobility and safety while addressing local access needs - now and in the future - to create a viable comprehensive transportation plan.

This comprehensive multi-modal plan will address the city's transportation needs and establish the goals and objectives in order to improve access and circulation. It will also create multi-modal opportunities, transit oriented development, and improve the connectivity between the city and the Nashville region. The character of Mt. Juliet mixes the charm of a small town with the dynamics of a larger city so we understand the need to create a community that benefits from providing walking, bicycling, transit and vehicle accessibility.

"Cities have the capability of providing something for everybody, only because, and only when they are created by everybody"

—Jane Jacobs

In the past 17 years, Mt. Juliet has experienced a **136 percent increase in population**. This tremendous incline strains the transportation network.




WELCOME TO
Mt. JULIET
City Between The Lakes

Mt. Juliet continues to grow and change significantly in ways that affect transportation.

The Mt. Juliet Comprehensive Transportation Plan will guide decision making for the future by recommending improvements for all modes of transportation, including walking, cycling, and vehicles. The City seeks to embrace the concept of "complete streets" by providing strategies and polices to improve mobility. Roadways should become public spaces for multi-modal travel meeting current and future mobility needs. The results of this project is a series of recommendations to help the City address transportation problems that will help the area grow to become a livable and sustainable community.

The process is designed to include input from local citizens, business owners, City and County staff, and local officials. In the Spring of 2016, City officials developed a scope for the project that outlined the process of developing the plan with a steering committee to help lead the project and a time-line for the project.

The following sections describe the existing system, usage, and performance for travel modes in the study area. These performance measures define the final project recommendations.







Planning Process

1 PROJECT INITIATION

Data Collection, Review of Existing Plans & Studies, Area Tour

2 CITY ASSESSMENT

Assessment of Current and Emerging Conditions, Identification of Issues & Opportunities

3 PLAN DEVELOPMENT

Evaluation of Current Policies and Testing of Alternatives to Define a New Direction to Better Achieve Stated Goals

4 POLICY RECOMMENDATIONS & IMPLEMENTATION STRATEGIES

Policies and Action Steps to Realize the Desired Transportation Options

5 PLAN DOCUMENTATION

Transportation Plan Document

Guiding development of the Plan is an inclusionary public engagement process. Understanding community values today ensures that this Plan, implemented in accordance with the recommendations, supports and advances those priorities over the long term.

Advisory Committee Meetings

This effort was guided by the Advisory Committee, made up primarily of business owners, residents, City staff, and property owners in the area. Also included on the committee were representatives from local governing agencies. Regular meetings of this group throughout the process were held to set goals, provide feedback, and advise the project team on plan concepts and recommendations. A list of the Advisory Committee members can be found in the Acknowledgments section of this document.

"The only place I walk is in my neighborhood because the area lacks sidewalks"

—Survey respondent

Meetings & Symposiums

Community meetings were held throughout the process to provide an opportunity for property owners, residents and other interested stakeholders to learn about the project, refine the goals established by the Advisory Committee, provide comments on plan components, react to concepts developed in response to that input, help define the future land use vision, and suggest ways in which the Plan can be effectively implemented over time.

Stakeholder Interviews

Stakeholder interviews were conducted to verify and supplement the data gathered, to explain the conditions observed, and to further understand the issues and opportunities that affect the study area. Their input supplemented the feedback received directly from citizens and property owners participating in the process. The stakeholders included key personnel from City departments as well as representatives of interest groups who addressed questions about the following topics: economic development, transportation, and neighborhoods.

Website

To supplement the information gathered during community meetings, a project website **(www.gomj.info)** was created so residents, property owners, business owners and other stakeholders could access information and provide input throughout the process. Such input was recorded, and like the input shared at the community meetings, used to clarify the concerns and desires of the community.



Past planning documents provide valuable insight and background on the community and have influenced the development of this Plan.

The following plans were reviewed early in the planning process as they relate to existing conditions and future needs for transportation improvements.

The table below encapsulates the types of recommendations found in each plan

The 2015 Comprehensive Transportation Plan will serve as a holistic document that combines the services provided in previous pedestrian, bicycle, and roadway plans.

Mt. Juliet Town Center Master Plan

Leadership in Mt. Juliet recognized changes happening in the area and heard the desire from local businesses and citizens for the City to establish a new Town Center identity. The Plan focused on properties along Mt. Juliet Road from Old Lebanon Dirt Road to just north of Oakmont Drive. This district contains significant civic buildings such as the Library, City Hall, Post Office and Mt. Juliet Elementary Schools. The Plan was developed with goals to reduce reliance on Mt. Juliet Road and promote alternative forms of transportation along the corridor; encourage mixed use development; and to connect adjacent neighborhoods by multi-modal transportation infrastructure.

Plans	Types of Recommendations Found in Each Plan Reviewed						
	Roadway	Sidewalk	Bicycle	Greenway & Trail	Public Transport	Design Guidelines	Land Use & Zoning
Mt. Juliet Town Center Master Plan	●	●	●				●
Mt. Juliet Greenway, Bike and Pedestrian Master Plan		●	●	●		●	
Nashville MPO Regional Bicycle and Pedestrian Study		●	●	●			
Wilson County Bicycle and Pedestrian Master Plan		●	●	●		●	
MPO Tri-County Transportation & Land Use Study	●	●	●	●	●		
Middle Tennessee Connected 2016-2040 Regional Transportation Plan	●	●	●	●	●		

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The Town Center Plan presents the needs and ideas for the future as it pertains to Mt. Juliet Rd. The plan identifies opportunities and constraints to future development and strategies to encourage new development, such as rezoning and new zoning overlays. Ideas for streetscaping, intersection, and roadway standards are presented to transform local roads into a gateway for the Town and encourage multi-modal transportation options.

Mt. Juliet Greenway, Bicycle and Pedestrian Master Plan

The Greenway, Bicycle and Pedestrian Master Plan identifies multi-modal facility needs on and off roadways as well as policies that should be implemented during development to address impacts. Objectives of the plan include:

- Promote a greenway system that connects public and private open spaces and attracts a wide range of users.
- Encourage local support for greenway development.
- Create a greenway system that enhances economic development.
- Preserve and enhance sensitive features.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The Master Plan advocates the need for a multi-objective trail system in Mt. Juliet as well proactive policies for avoiding impacts during development. The recommendations detailed in the Plan are used to guide the recommendations in the Multi-Modal Plan.

Nashville MPO Regional Bicycle and Pedestrian Study

The Nashville Metropolitan Planning Organization undertook a regional study to improve walking and biking in the greater Nashville region. Mt. Juliet was included in the study area for the development of the Plan. The Study included a comprehensive inventory of existing on- and off-road facilities, a traffic analysis to define congestion along corridors, a non-motorized demand analysis, and identification of barriers to walking and biking to understand the region's issues and needs.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The Regional Bicycle and Pedestrian Study is intended to serve as a means of guidance for future policies and programs to maximize walking and biking opportunities. The Plan provides an improvement list for bicycle and pedestrian facilities and will serve as a framework for prioritizing future projects.

Wilson County Bicycle and Pedestrian Master Plan

The overall goal of the Wilson County Bicycle and Pedestrian Master Plan is to provide a connectivity and access plan for area communities. The Plan includes an evaluation of existing conditions and a final set of recommendations for enhancing multi-modes of travel within Wilson County.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The purpose of the Bicycle and Pedestrian Master Plan is to provide municipalities in the County a list of recommended improvements that can be integrated with future multi-modal transportation plans. A few of the projects in the Plan, including the addition of bicycle lanes on Mt. Juliet Road, have been completed. Project and policy recommendations from the Master Plan will be considered in the Multi-Modal Plan.

Middle Tennessee Connected 2016-2040 Regional Transportation Plan.

The Middle Tennessee Connected 2016-2040 Regional Transportation Plan, complied by the MPO, is a comprehensive Plan defining solutions to transportation infrastructure issues in the region. The overall goal of the Plan is to improve mobility across the region. Over 200 improvement projects were identified and prioritized according to the goals and objectives of the Plan.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The Regional Transportation Plan designed a vision for the future in regards to roadways, active and walkable communities, and transit infrastructure for Wilson County. Major corridors in the area were considered for improvements to maximize economic impacts of limited dollars to prepare roadways for the future. The Plan contains detailed information in regards to trends, growth, accidents, and transportation needs in the study area and provides recommendations regarding expansion of transit, multi-modal infrastructure, and design guidelines for the region.

NMotion Nashville Mt.A/RTA Strategic Plan

The Nashville Metropolitan Transit Authority and Regional Transportation Authority developed a Strategic Plan to address public transit needs for the Greater Nashville area. The area continues to growth at a rapid pace, as does ridership for regional bus and train service. Routes and new technologies in the Plan were studied to determine feasibility of the various options proposed.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

The Plan not only includes transit elements, it includes recommendations to improve accessibility for every neighborhood by improving pedestrian and bicycle access.

MPO Tri-County Transportation and Land Use Study

The Tri-County Transportation and Land Use Study was conducted by the MPO and completed in 2012. The study area consisted of Robertson, Wilson, and Sumner counties in Middle Tennessee. The study area is located in a high growth area in Middle Tennessee. The Study was conducted to assist the MPO in identifying the needs and priorities for the study area in regards to transportation projects in the Region. The Tri-County Transportation and Land Use Study focused on the future land uses and the local governmental growth plans for the communities and the goals was to improve regional mobility and to plan for an efficient transportation network that supported the growth patterns. The Study also served as a precursor to the MPO's 2035 Long Range Transportation Plan for the entire Middle Tennessee Area. The local governments in the Tri-County area used the Study to develop and improve their Comprehensive Plans.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

Wilson County and the City of Mt. Juliet are included in the Tri-Study area. The Study has been used by the City to update their Land use and Transportation Plan and also in the development of this effort to create a Multi-Modal Transportation Plan. The Study contains detailed information in regards to growth patterns in the study area and provides detailed Regional and Local transportation improvement recommendations including adoption of Complete Streets Policies to increase

mobility for bicycles and pedestrians. Many of these recommendations have been included in the City of Mt. Juliet Future Land Use and Transportation Plan and in the current update taking place today.

City of Mt. Juliet Land Use and Transportation Plan (2008)

The 2008 Mt. Juliet Land Use and Transportation Plan provides the foundation for the City's future land use and development policies. The Plan was officially adopted by the Mt. Juliet Planning Commission and Board of County Commissioners in 2008. The Plan was updated during 2016. The purpose of the Plan is to guide the future development and redevelopment of the City of Mt. Juliet and the surrounding area and to establish a long-range vision for the City of Mt. Juliet.

The 2008 Mt. Juliet Land Use and Transportation plan was adopted by the City based upon five principles as outlined in the Plan:

- To be a safe place for people to live;
- To have viable neighborhoods working together as a community;
- To be an attractive, clean, and aesthetically pleasing City;
- To be a financially responsible City government providing high quality services and infrastructure; and
- To achieve economic vitality through healthy business. (2008 Mt. Juliet Land Use and Transportation Plan).

Overall the Plan provides a "road map" for future growth and redevelopment. More specifically, the Plan details the existing physical conditions and summarizes the growth issues and planning initiatives that have taken place in the region at the time of Plan adoption. More specifically, the Plan identifies the key policy issues to be addressed in the Mt. Juliet Land Use and Transportation Plan, and it sets the goals and policies for future growth. The Plan provides specific recommendations for the following: Land Use, Transportation, Community Facilities and Services, Natural Resources, Economic Development, Housing, and Parks and Recreation. The bulk of the Plan is dedicated to the Future Land Use Element, which is referred to as the Development Plan. The Development Plan illustrates future growth and development patterns for the City of Mt. Juliet.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

As the main Planning document directing development in the City of Mt. Juliet, the Plan advocates for efficient, quality and fiscally sound growth; conservation and protection of natural resources; open space preservation; efficient public facilities and Services; and transportation and land use integration. Mt. Juliet is transitioning from a suburban residential community to a more self-sustaining urban city and the Plan proposes to continue to allow suburban residential densities in the majority of the City; however, it limits suburban densities at the City's fringe in order to protect the rural areas. The Plan further discourages the expansion of city services to low density areas. The Plan encourages the development of neighborhood and employment commercial centers and strongly discourages further development of strip commercial centers along the major roadways in the City.

The Transportation Element of the Plan recognizes the importance of integrating land use and transportation. The long term goal is to provide a transportation system in Mt. Juliet that is convenient, accessible, efficient, and economical. The Plan adopts specific transportation policies which support multi-modal choices, including transit, walking, bicycling, and driving. Additional policies strive to reduce dependence on the automobile and require the City to develop a transportation demand program. The 2008 Land Use and Transportation Plan encourages mixed uses, employment centers and other activity centers that must be supported

by a network of pedestrian, bicycle, and automotive systems. In addition to the policies, there are a number of specific road improvements recommended in the 2008 Land Use and Transportation Plan. Finally, the Plan recognizes the need to have the Major Thoroughfare updated, a key component of the current effort to create a Multi-Modal Transportation Plan. This effort will use the Land Use Plan to identify the anticipated growth patterns and identify the transportation system improvements that will be necessary to accommodate the future land uses.

City of Mt. Juliet Land Use and Transportation Plan (2015 Update)

The 2015 Mt. Juliet Land Use and Transportation Plan (herein referred to as the Update) was adopted by the City of Mt. Juliet in 2016.

The Mt. Juliet Vision Statement was expanded and updated to emphasize Mt. Juliet's commitment to maintaining a sense of community and a place for its residents and future generations. The new Vision Statement also incorporates the need to provide for a variety of housing and transportation choices in order to allow residents to live and work in Mt. Juliet. The Update includes an extensive review of the existing conditions and considers recent regional and state planning efforts that are occurring in the Middle Tennessee area. During the update process, a number of meetings and discussions were held with the general public, key stakeholders, and elected officials in the region and the City.

The Update contains a number of new goals, objectives and policies that encourage the City of Mt. Juliet to:

- Maintain and improve design guidelines for future development
- Protect and preserve open space, park lands and environmentally sensitive areas
- Create a Town Center to "recapture" the small town feel of Mt. Juliet

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

In this draft Update, the Development Plan divides the City of Mt. Juliet into six planning areas for the purpose of recognizing the unique set of strengths and weaknesses of each geographic. For each of the planning areas, the Update analyzes the existing conditions, growth patterns, and land uses, and identifies issues in these areas. In addition, the Update includes specific transportation needs and recommendations for each of the planning areas. While the Update is not officially adopted, the data and recommendations will be considered during the planning process for the Multi-Modal Transportation Plan.

MPO Southeast Area and Land Use Study

The Southeast Area Transportation and Land Use Study was conducted by the Nashville Metropolitan Organization (MPO). The purpose of the Southeast Area Transportation & Land Use Study was to plan for future growth in the southeastern portion of the Nashville-Murfreesboro metropolitan area, and to establish a shared vision among regional and local partners in the area paralleling I-24 between I-40 and I-65 in Davidson, Rutherford, Williamson, and Wilson counties. The southeast area continues to experience strong population and job growth in the region. The Study seeks to coordinate plans for future development among participating agencies and jurisdictions so that they can put in place the multi-modal transportation improvements and land use policies necessary to support long-term prosperity and quality of life throughout the area.

Recommendations for improving roadways and intersections, transit routes, sidewalks, and bicycle lanes will be provided to the participating jurisdictions and agencies, and to the MPO -- the regional agency responsible for selecting transportation projects for federal funding

and coordination with TDOT. The project team will define needs for transportation infrastructure and services based on (1) the systems and services that exist today, (2) those that are needed to support the preferred growth vision, and (3) the gap between them.

Relationship to the City of Mt. Juliet Multi-Modal Transportation Plan

Wilson County and the City of Mt. Juliet are included in the Study area. This Study can be used by the City to update their Land use and Transportation Plan and in the development of the Multi-Modal Transportation Plan. The Study contains detailed information in regards to growth in the study area and provides detailed transit service and improvement recommendations along the I-24 corridor.



Existing Conditions

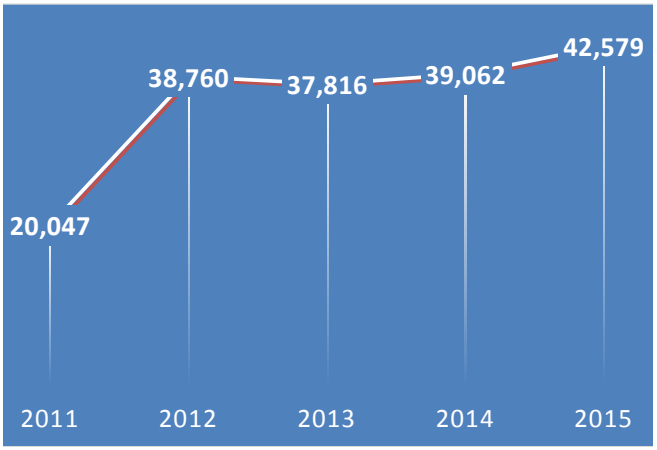


Identifying the characteristics and operations of the community provide an understanding of how the system is currently operating.

Mt. Juliet is located just east of Nashville, a large metropolitan city, in Middle Tennessee. The study area for the Mt. Juliet Comprehensive Transportation Plan encompasses over 55 sq. miles of Wilson County and includes all areas within the Mt. Juliet urban growth boundary. The study area has grown significantly in the last decade. The population has increased by 136% since 2000 deeming Mt. Juliet as one of the fastest growing cities in Tennessee. Recent growth paired with close proximity to Nashville are indicators for more growth. Motorists experience delays and congestion on area roadways currently. Additional growth in the study area will continue to impact the already suffering roadways. The plan will address the potential effects of additional growth by reviewing the conditions and understanding where issues and deficiencies are occurring. Final recommendations will be developed based on the findings.

Unique to the State of Tennessee, Mt. Juliet offers limitless scenic beauty. Dominant features of the area include historic agricultural lands, scenic waterways, and parkland. Choices in lifestyle range from suburban neighborhoods to rural living. The roadway network in the study area consists of an Interstate Highway (I-40), several major roadways and local streets. Critical corridors in the area consist of Lebanon Rd (US Highway 70, State Route 24), Mt. Juliet Rd (State Route 171), I-40, Division St and Old Lebanon Dirt Rd. Recent progress on area roadways include bicycle lanes added to Mt. Juliet Rd and Lebanon Rd. A majority of the existing sidewalks can be found in residential areas, newer commercial areas such as Providence, and those along Mt. Juliet Rd. Connectivity by alternative forms of transportation are limited in the area. The Plan should provide recommendations for regional sidewalk and bicycle connectivity.

Public transportation is a growing need for the community. Currently there is no bus operation in the study area. The Middle Tennessee Regional Transportation Authority operates a commuter train service in Mt. Juliet. The station is located near the intersection of Division St and Mt. Juliet Rd. In 2015, 42, 579 riders were reported at the Mt. Juliet Music City Star Station. Ridership for the line continues to grow each year. The commuter train offers alternative transportation into Nashville for work and recreation. There is also a concurrent planning study that is looking into Transit Oriented Development at this location.



Music City Star Ridership 2011-2015

Did you know there are...

662 miles of roadway

80 miles of sidewalks

9 miles of greenways/trails

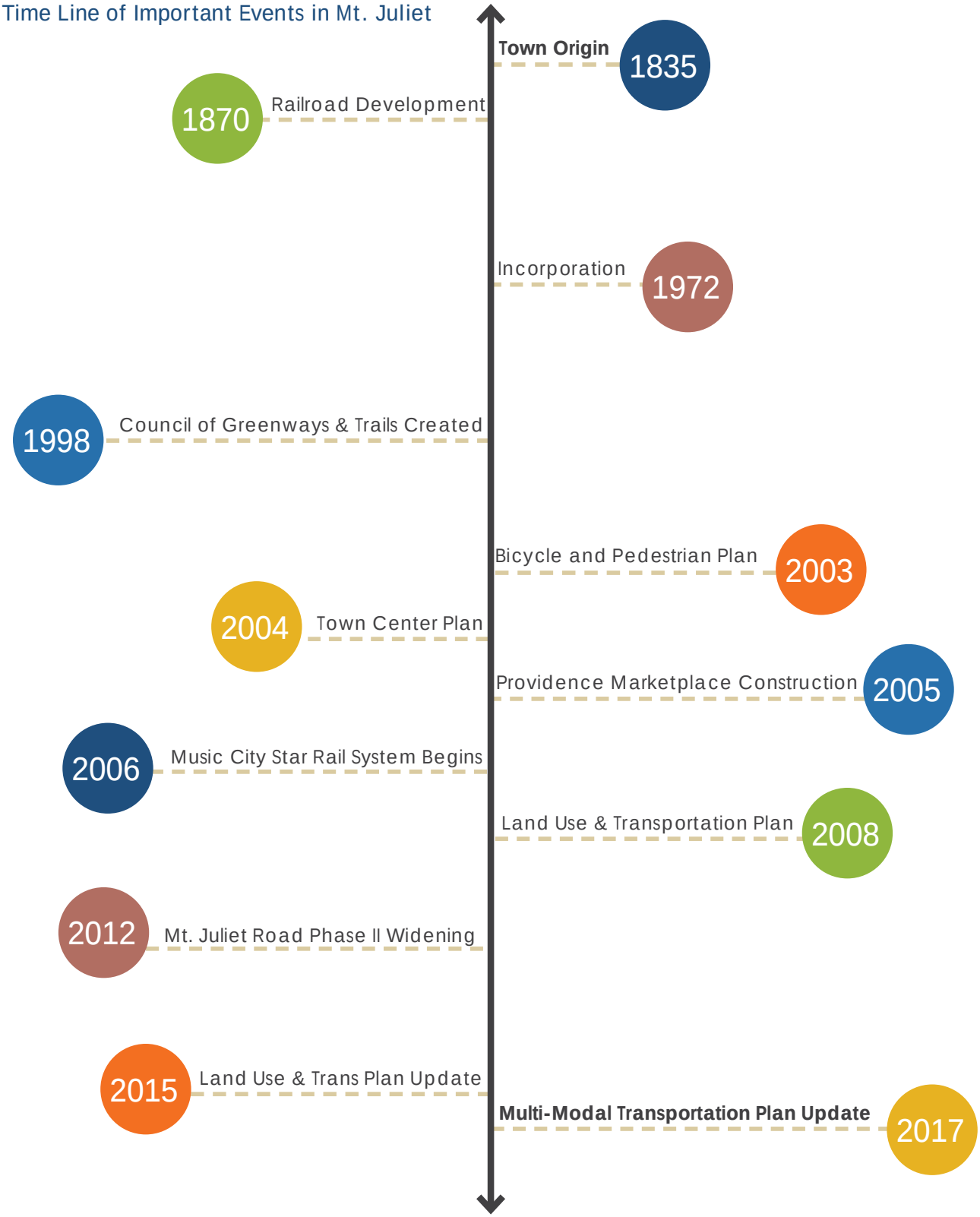
13 miles of bicycle lanes

AND

90% of population drive to work

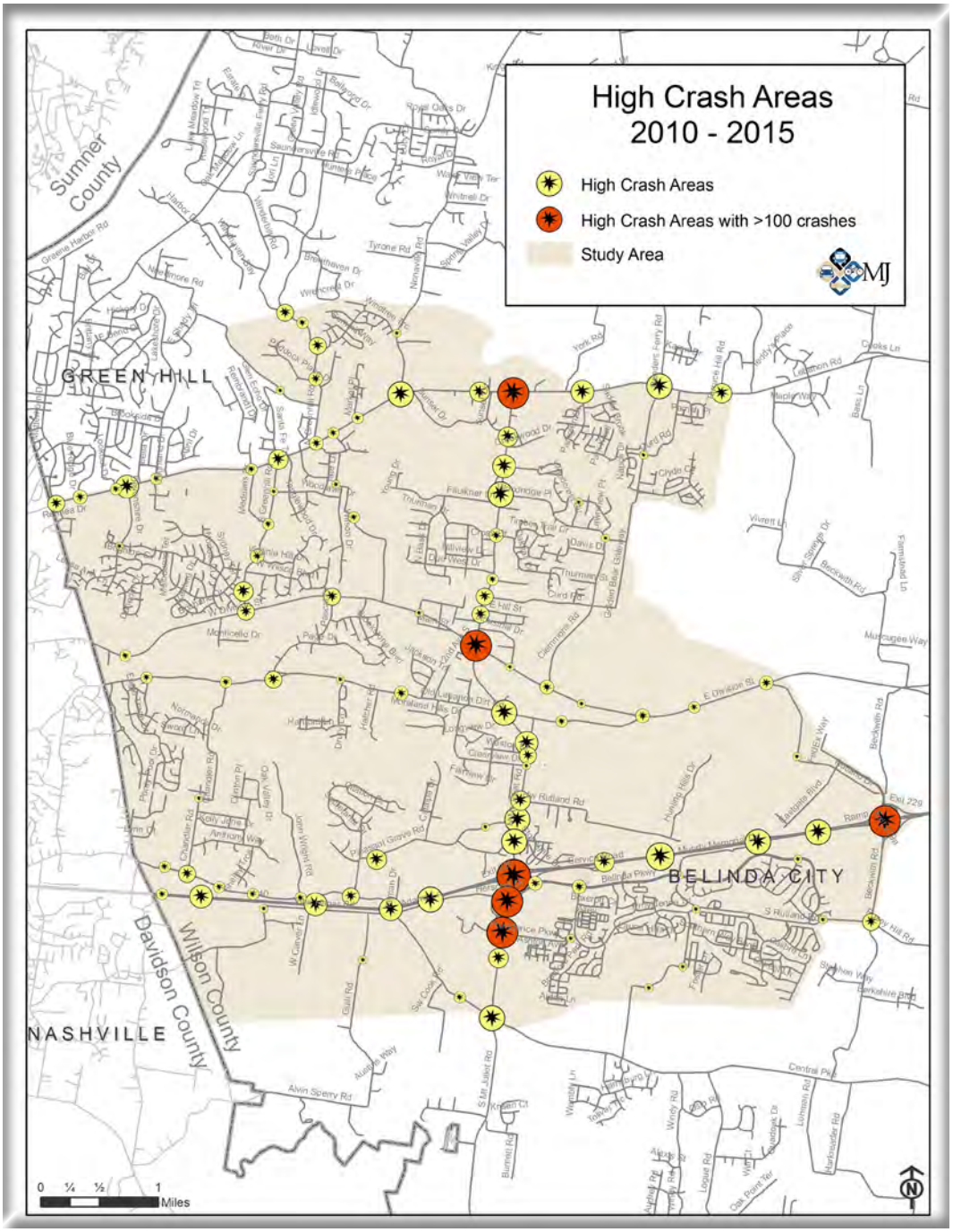


Time Line of Important Events in Mt. Juliet



Crash Analysis

An assessment of high-crash severity intersections was completed using crash data from State of Tennessee Highway Patrol's safety database. Analysis of vehicle crashes was conducted for the study area The data was derived from January 2010 to December 2015 reported crash data along the major roadways in the area. The map below shows areas in yellow that reported less than 100 crashes and the red depicts areas that reported more than 100 crashes for that location. Crashes are an indicator of specific locations that are experiencing issues. An assessment of the data reveals significant issues at or near intersections along Mt. Juliet Rd and Lebanon Rd. Further studies will be completed to define safety enhancements needed to reduce the number of accidents in the high crash areas.



The City of Mt. Juliet enjoys a strategic location just a half-hour (or an hour using the Music City Star train service) away from downtown Nashville, one of the Southeast's most dynamic cities. Heralded as the number one housing market in the U.S.; number one metro area for creating white-collar jobs; top retirement destination; and one of the best cities in the country in general, Nashville has many admirers. As many satellite communities in Tennessee elsewhere have developed, their evolution has included some common themes that are shared with Mt. Juliet.

Mt. Juliet in the Middle.

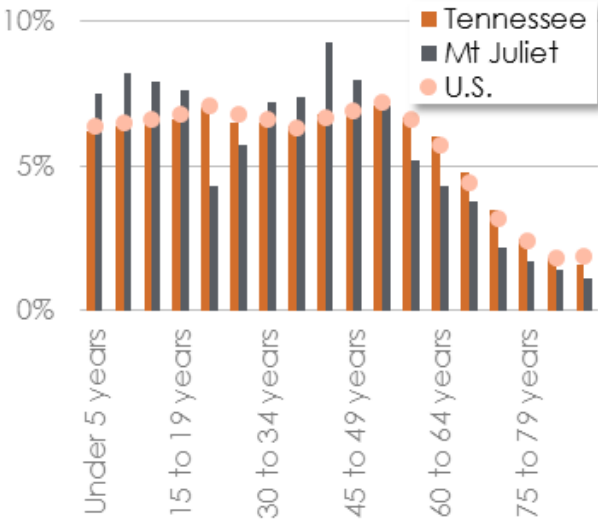
Over 28% of the residents of Mt. Juliet arrived in their current home in 2010 or later; nearly two-thirds of those renting homes have moved in since 2010. Mt. Juliet's current population skews heavily towards middle-aged families. Both the young (under 30) and older (over 60) percentages of the population are much lower in Mt. Juliet than in the State of Tennessee.

A Good and Fast Alternative.

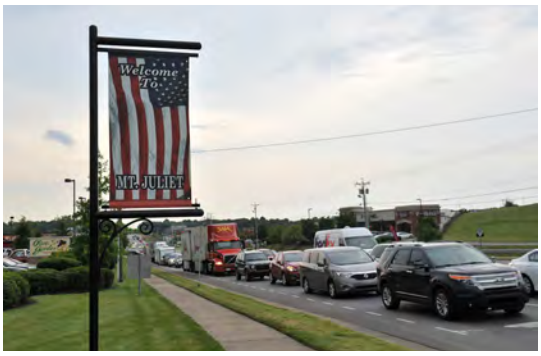
People that want to work in Nashville have to contend with escalating housing prices that follow in the wake of the City's success.

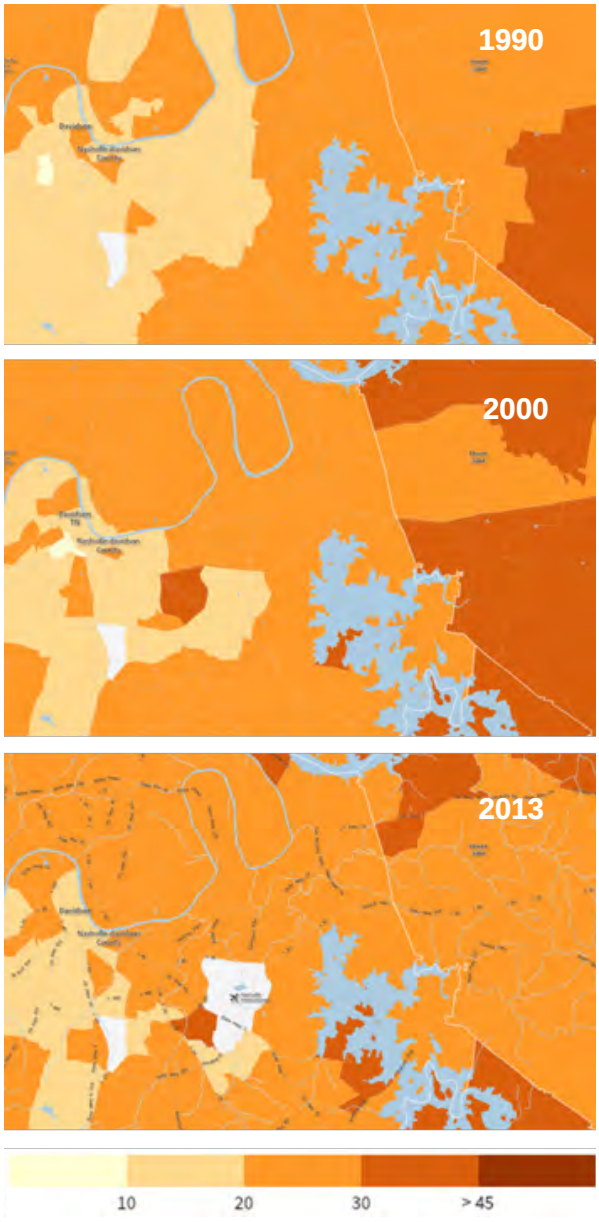
However, Mt. Juliet offers a reasonably affordable alternative without an unreasonable commute time to work (about 28 minutes, on average – see Figure 2).

Figure 1. 2014 Ages in Mt. Juliet, Tennessee, and the U.S. *The middle-age family composition of Mt. Juliet is evident (these figures do not reflect the special (re-) count of the Census conducted in Mt. Juliet in 2015).*





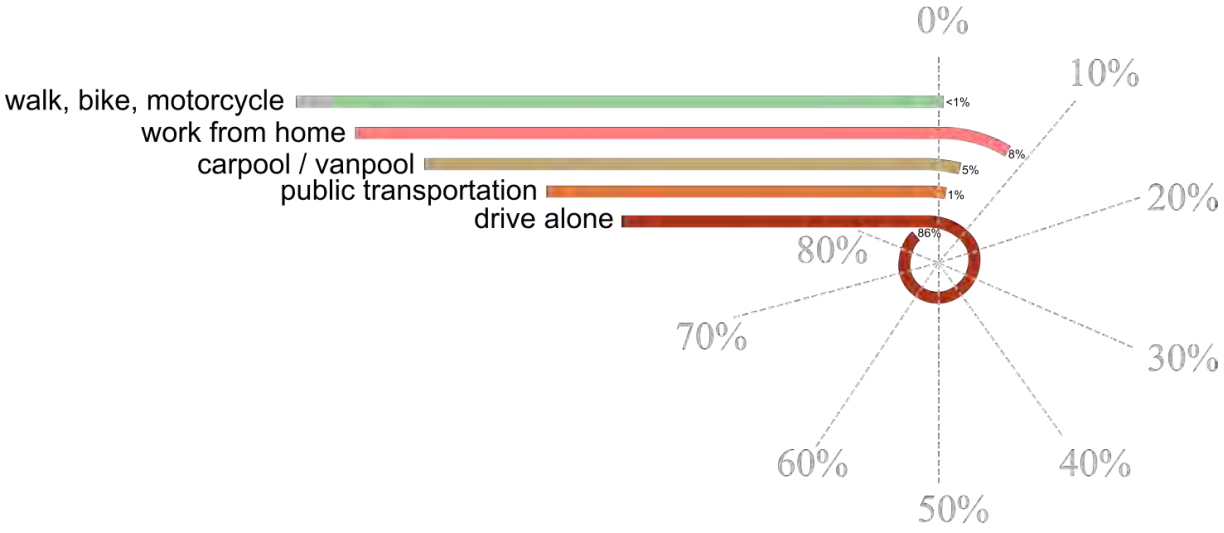




The U.S. Bureau of the Census conducts partial surveys of commuters, including in Mt. Juliet. Transportation should mean something, and the trip to work is one of the most common trip types where success is achieved (or not).

By far, automobile travel is the preferred choice for commuting in Mt. Juliet (and just about everyplace else): over 85% of all commute trips were made in a car - alone. Transit use in 2015 only accounted for 1% (149) of all commute trips; walking had nearly as many (109). Working from home garnered nearly 10% of all work trips, more than all of the other non-single occupant vehicle commute trips combined (walking, biking, transit, carpool/vanpool).

Figure 2. My Commute Got Better?
Census results of work trips from 1990 (top), 2000 (middle), and 2013 (bottom) suggest fewer places have commute times of over 30 minutes.



An Incomplete Picture. Although the term "bedroom community" doesn't necessarily apply to all aspects of Mt. Juliet, the City doesn't possess every type of business required to support its residents now. Figure 3 illustrates employment across major sectors of the economy, as well as how Mt. Juliet's employment stacks up proportionately compared to Tennessee.

Industry	Tennessee		Mt. Juliet		LQ
Accommodation and Food Services	261,909	9.50%	1,776	22.50%	2.4
Real Estate and Rental and Leasing	36,014	1.30%	232	2.90%	2.2
Retail Trade	327,953	11.90%	2,032	25.80%	2.2
Utilities	16,843	0.60%	94	1.20%	2.0
Professional, Scientific, and Technical Services	122,099	4.40%	661	8.40%	1.9
Finance and Insurance	103,118	3.80%	346	4.40%	1.2
Arts, Entertainment, and Recreation	31,669	1.20%	96	1.20%	1.0
Other Services (excluding Public Administration)	74,360	2.70%	201	2.50%	0.9
Construction	110,863	4.00%	278	3.50%	0.9
Information	44,645	1.60%	104	1.30%	0.8
Wholesale Trade	124,669	4.50%	285	3.60%	0.8
Health Care and Social Assistance	394,921	14.40%	663	8.40%	0.6
Administration & Support, Waste Management	208,616	7.60%	323	4.10%	0.5
Manufacturing	330,342	12.00%	428	5.40%	0.5
Public Administration	132,574	4.80%	160	2.00%	0.4
Transportation and Warehousing	140,194	5.10%	112	1.40%	0.3
Educational Services	240,455	8.70%	83	1.10%	0.1
Management of Companies and Enterprises	36,995	1.30%	9	0.10%	0.1
Agriculture, Forestry, Fishing and Hunting	7,562	0.30%	0	0.00%	0.0
Mining, Quarrying, and Oil and Gas Extraction	3,342	0.10%	0	0.00%	0.0



Figure 3. Employment Representation in Mt. Juliet, Compared to Tennessee (2014). *This table shows the number and percent of employees working in basic employment sectors in Tennessee and Mt. Juliet. The far-right column (LQ, or Location Quotient) shows which industries have (compared to Tennessee) a relatively high (green), equivalent (orange), and low (red) proportion of workers engaged in various sectors of the economy.*

The chart at left shows the same information just for Mt. Juliet – the size of the circle is the percent of all employees, the left axis shows the comparative (to Tennessee) ratio of those employees, and the bottom axis shows the total number of employees in that sector of the economy. Retail trade and Accommodation / Food Services have large total numbers of employees, and both are over-represented compared to the percentages of those employees in Tennessee. Health Care & Social Assistance employment and Educational Services typically have to be sought outside of Mt. Juliet.

A (Not) Single Community? As more homes are added to the area, the pressure will increase to add more service types. Promoting this evolution is critical to the transportation system since many people traveling farther for goods and services creates more traffic congestion. Exacerbating these effects is the fact that these types of trips are poorly suited to public transit service since bus and rail services are set up to handle commuting trip patterns, not shopping, health care, school, or other kinds of trips-making.

The average household size of Mt. Juliet (2.75 people) is just over 10% more than that of the State of Tennessee, which correlates with the age cohort discussed earlier. A third of these households fall squarely into the "Soccer Mom" segment (Figure 4): suburban lifestyles, dual workers, owner-occupied housing, highly educated, and low unemployment are commonplace – and that is true of many residents here. Household incomes are 50% higher in Mt. Juliet, on average, compared to Tennessee as a whole, and the percentage of people in poverty (9.3%) is half that of the State. Mt. Juliet is not as racially diverse as the State: 87% of the population is White, according to the 2010 decennial census count.



Figure 4. 2014 Description of Life Mode: Soccer Moms Demographic

Presenting: the Future… Although predicting the future changes in Mt. Juliet isn't possible with absolute certainty, we do know that many suburban communities behave much the same way as they continue to add people and employment locally. Mt. Juliet could see its large middle-age cohort grow up (as will their children) in place – provided that strong schools and transportation are there to support their lifestyles. Attracting younger age groups to the City also has implications that suggest a stronger dependence on "walkable" lifestyles and a more diverse entertainment market than is currently the case.

A strong asset that the City has not fully realized is the development of the emerging City Center near the passenger train station, the subject of a 2005 planning study conducted for the City. Concepts are currently being discussed that would see the potential for a great mix of uses and a push towards a more walkable, village center development style. The interchange areas that have helped drive the kinds of retail growth seen in the preceding figures do not have to always end up as the same kind of auto-only development. Good examples exist throughout the Southeast of mixed-use communities that employ both vertical (three-story, generally) and horizontal mixtures of retail, office, and variable lot sizes of residential uses. Supporting these higher-density nodes of development will be crucial to creating a more "closed" system in Mt. Juliet, one that doesn't rely on longer external, or as many internal, automobile trips. Planning this way can help focus precious public investment dollars to enhance the community in ways besides large roadways. Wilson County is imposing tax increases to accommodate the same growth that is driving the demand for transportation services.

High-growth areas share one thing in common if they are successful: traffic congestion. The growth in vehicular traffic congestion closely tracks with greater commercial success; therefore, creating a more diverse set of planning-level indicators to enhance our understanding of success is paramount to managing expectations and accurately planning for this future. The following considerations are therefore incorporated into the concept of performance measures and guiding principles for the development of this Plan:

- **Multi-modal Quality Service Standards** – instead of traditional, vehicular delay-only measures used in development reviews to ensure a more walkable, aesthetically focused community;
- **Remember Safety as a Measure** – to reflect that more crashes equal more delay (as much as 40% of all travel delay can be attributed to crashes), as well as greater human misery and costs in a community; and
- **Utilize Mt. Juliet's Assets** – while they are still here. The commute times, while still reasonable, are already four minutes longer than the State average; it's not likely that figure will decrease going forward. Opportunities like developing a downtown core, leveraging the demand for premium Interstate access, and a population that is both relatively homogeneous and prosperous aren't "forever" conditions – and once they are exhausted they are hard or impossible to replace. Mt. Juliet needs to take steps to ensure that new and redeveloped properties reflect the values and quality of construction that the City wants to have for a long time to come.

"We're not in a vacuum. We're seeing the same things that other counties in this high-growth area are seeing. We all have to deal with it the same way. Unfortunately, it comes with tax increases."

—Wilson County Finance director Aaron Maynard (Xavier Smith, MtJulietNews.com)



Transportation and land use planning are integrated and should be planned together. A transportation network allows access to destinations, if a network is not present then destinations would be impossible to get to and if there are no destinations, then a network is not necessary.

A land use analysis was completed for the study area to define which areas has the most potential for future development. CommunityViz™ software was used for this task. CommunityViz™ is a scenario planning software tool that allows decision-makers to evaluate the impacts related to development. It helps translate complex planning data into easily understandable outputs. Using existing land use data, including land use types, building heights, and floor to area (FAR) ratios, the tool can reasonably estimate figures for a number of metrics, such as total population, total employment, total dwelling units, water and sewer impacts, number of students (K – 12), and trips generated from different land use types.

Working with the Mt. Juliet officials, a variety of data inputs were generated for use in the CommunityViz model for the study area. To begin, each parcel in the study area was coded for development status and place type. The development status element consists of five groups, underdeveloped, undeveloped, developed, committed development, and permanent open space, while the place type refers to the specific land use. Development status is very important, as only those parcels designated as underdeveloped or undeveloped are able to accommodate new growth. The placetype codes are also very important and provide the basis for applying metrics to each specific land use type. Placetypes were created using aerial imagery and by examining the land use and zoning data for the area and aerial photography. Existing and future facilities as well as constraints are included in the scenario planning analysis. Factors such as slopes, wetlands, flood prone areas, wildlife management areas, historic properties, century farms, locality near major activity centers, and current and future water and sewer service are used when factoring potential for development.

Based on the results, (Figure 5) the scenario planning revealed most of the areas on the southern and northern portion of the study area are least likely to development. These areas present the most challenges due to steep slopes (>15%). The central portion of the study has a higher probability of development due to the locality within the current network, current or future water service prevalent and lower elevations. The scenario planning activity identified two catalyst site project areas for future studies. The site for the future interchange at I-40 and Central Pike and vacant parcels near Industrial Drive and Division St were identified as areas with higher opportunity to development and to receive a return on investment if developed. More detailed market and economic analysis will provide an opportunity to better understand development potential.

"Stop developing without proper infrastructure"

—Survey Respondent

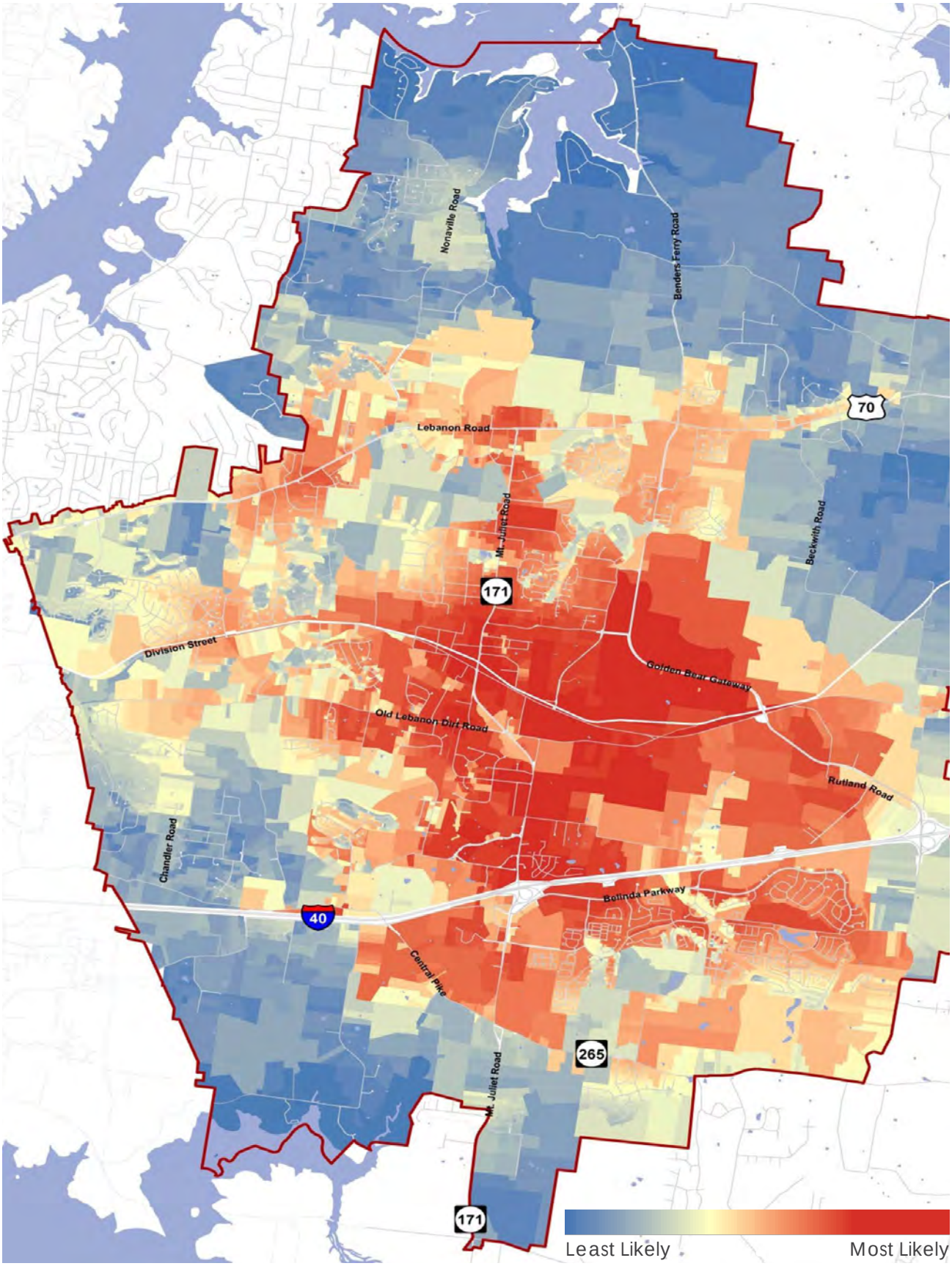


Figure 5. Likelihood of Development Map

Transportation planning models are tools used to predict future roadway and travel conditions for all users. Identifying deficiencies define needs and assist in building project recommendations.

Roadway Deficiencies

The 2010 base year highway network was compared with the 2040 E+C (Existing plus Committed projects) roadway network using the results from the Nashville Area Metropolitan Planning Organization Regional Travel Demand Model (TDM) volume to capacity analysis.

According to the travel model, most of the study area roads experience a significant increase in traffic capacity in 2040. Congestion issues caused by the increase will be addressed through the recommended roadway projects. Figures 7 and 8 define existing and future traffic capacity for area roadways.

Level of Service

Level of Service (LOS) describes measures of effectiveness for various transportation operations. The idea of LOS presents a report card on how area roadways are performing in regards to moving vehicles, pedestrians, and cyclists. LOS ranges from A to F. LOS D and E indicate roads that are operating with longer vehicle delays and are getting closer to capacity. LOS F indicates a road has exceeded capacity and vehicles are experiencing the longest delays. A low LOS indicates pedestrians and cyclists experience safety issues and delays as they maneuver area roadways.

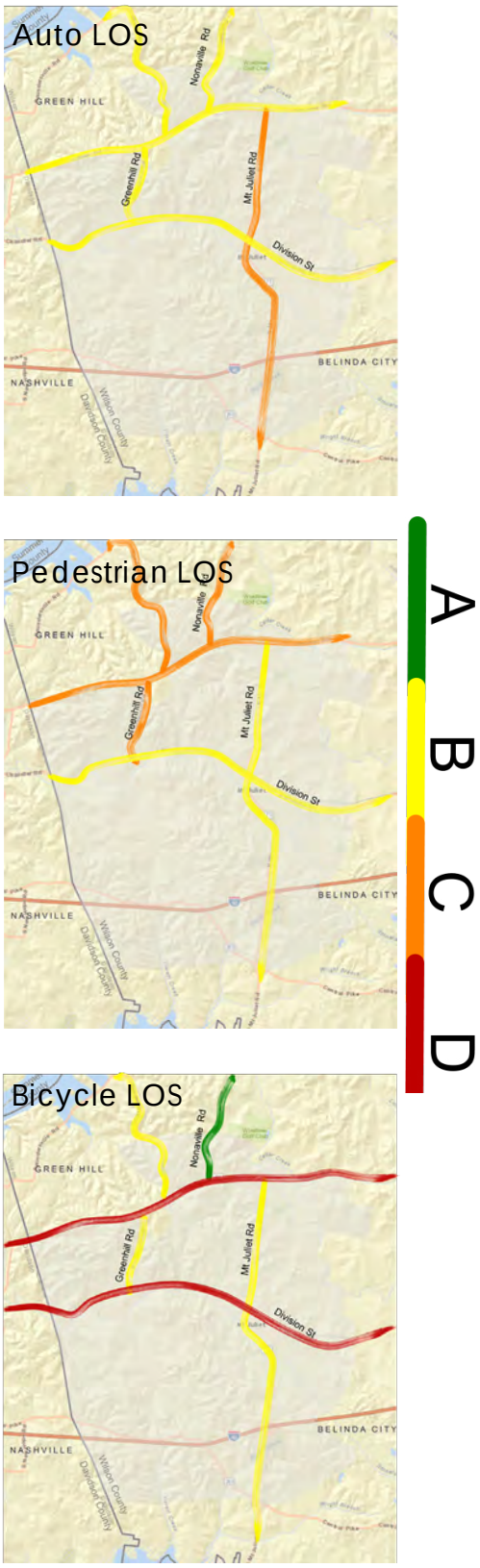


Figure 6. Level of Service (LOS)



Figure 7. 2015 Peak Hour Traffic Capacity

- <.3
- 0.31 - 0.60
- 0.61 - 0.80
- >.8
- Study Area

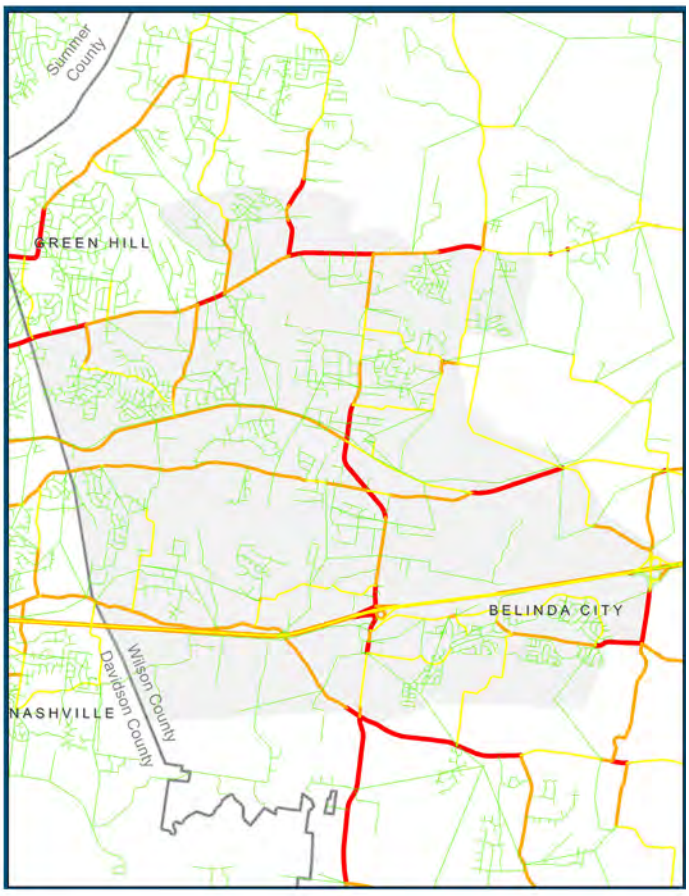
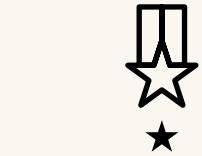


Figure 8. 2040 Peak Hour Traffic Capacity

- <.3
- .3-.6
- .6-.8
- >.8
- Study Area

Directions for Mt. Juliet

The preceding section describes some of the current conditions in the City, as well as some of the places we expect the City could go in the near future. The following is a brief summary of some of the major trends that the Mt. Juliet Comprehensive Transportation Plan will have to address to ensure it remains economically competitive, enjoys a high level of mobility, and improves the safety and security of its residents. Going forward, each of the following sections will address these directional issues and identify specific recommendations for each major mode of travel.



Congestion is Coming

And is already Here, Sometimes

The periodic congestion that is seen at key intersections now will continue to worsen, spreading to peak period "shoulders" as time goes on. People will tend to leave earlier from home to reach work, or simply travel out of the current peak hours of travel, thereby extending the period of time when traffic congestion is noticeable.

To an extent, traffic congestion is both unavoidable and desirable: only areas that are dying have lowering levels of traffic congestion. A multi-pronged approach of increasing connectivity, capacity, smarter signals, crash (delay) reductions, and enhancing mobility choices will be necessary to keep traffic congestion manageable.



Isolation Hurts

More Connections = Better Travel

Highly interconnected cities and towns tend to have much lower levels of congestion. Even when congestion does appear, it is relatively short-lived and avoidable by taking a different route. Mt. Juliet has a relatively low level of connectivity now, but it is important to build on these connections, especially as new / redeveloped properties are planned. Putting these connections in place sooner rather than later helps reduce the amount of push back received by concerned neighbors, as does a more thoughtful set of design criteria that includes requirements for roadway curvature, traffic calming, and streetscaping.



Diversity of Product

Design for Success

In nearly every marketplace across the country that is growing, there is market-driven call for more multifamily development. The old-school, poorly constructed and maintained multifamily developments that eventually become eyesores are largely gone now, but ensuring a quality of materials, design features, and appropriate location is still very important to ensure that existing properties are not damaged and roadway capacity is not completely absorbed.

Multifamily, experiential retail, and even offices come in many different "flavors" now, some of which are vertically or horizontally integrating various land uses. This close proximity of complimentary land uses reduces the number of automobile trips and trip lengths while improving reliability.

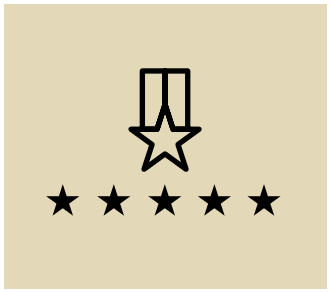


A Place to Walk

(And Bike)

In years past, a company's CEO would dictate where their employees would relocate by deciding on a house or neighborhood that suited that one person. Now, places dictate where valuable people want to go to live and work, often in an environment that is walkable, scenic, and with many nearby destinations like schools, parks, shopping, and workplaces. The CEO then follows their workers to set up the new office.

To continue to attract Millennials and young families, a place should have sidewalks, street trees, integrated parks, and possess a fine-grained street network. Even if one more person doesn't make one more trip by walking or biking (though they will), walkable spaces are attractive to these young professionals.

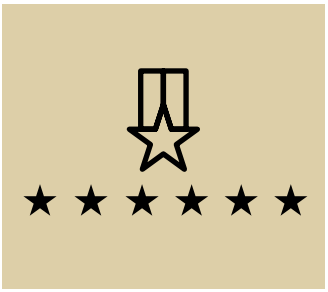


Adjust the Spine

It's All About Mt. Juliet (Road)

Mt. Juliet Road dominates the car crash experience, as it is used for nearly every trip made by anyone who starts or ends their trip in the City.

Proposals to change Mt. Juliet Road need to address key intersections at Interstate 40, Division Street, Old Lebanon Dirt Road and Lebanon Road. Stricter management of new driveways entering the road should be coupled with better management of crossing traffic through the use of medians, cross-access between properties, rear access, and driveway channelization.



Tie It Together

Land & Transport Go Together

People use the transportation system because they want to go someplace. Transportation improvements become necessary because too many people are using (or sometimes, abusing) the roadway or other transportation space and services available to them.

To get the most out of our public and private investments, it is necessary to plan for both land use / development and transportation together. Questions about resiliency, choices, capacity, design, density, external v. internal demand, diversity of uses, connectivity, and policy have to come together to make a great transportation system. Simply reacting to new development won't be enough.



Roadway & Freight Element



With 85% of Mt. Juliet residents driving - alone - to work each day, roadway congestion and alleviating it will be a major point of discussion for years to come.

The most significant traffic issue, both in terms of public commentary and observations analysis is Mt. Juliet Road, the north-south "spine" of the City. Typically a five-lane roadway with a center "suicide" two-way left-turn lane, this road is where a majority of all crashes occur in the City.

Other roadways that the public noted as needing improvement included the following:

- Division Street
- Lebanon Road
- Old Lebanon Dirt Road
- Nonaville Road
- North Greenhill Road
- Central Pike

To address the most common concerns brought up by the public - traffic congestion and safety, as well as better connections for biking, walking, transit, and automobiles - several overarching strategies are proposed. These strategies work much better when they are implemented together: each tends to reinforce the others in a "virtuous circle" of improvements.



Increase Capacity

Build the Road

It seems obvious: if freight and travelers encounter congestion, then simply expand the capacity of the road(s) to accommodate them. In isolation, such as the case with limited-access freeways and Interstates, this approach makes a lot of sense (although it is often breathtakingly costly to implement). However, in real-world communities, the advantages of bigger roads have to be weighed against needs beyond short-term (and it is short-term in a growing region) congestion relief: right-of-way / private property acquisitions, disruption due to construction, damage to streams, and the costs to appearance and aesthetics. While this last category of impact is less tangible, it's impact is felt keenly in communities that have lost, or given away, a sense of place, economic vitality, and historic character in exchange for temporary traffic relief. Adding more lanes to a road or intersection as well as building new roads fall into this category. Special considerations for freight are necessary on major truck routes, including intersection design and pavement depth and width, as well as accommodating pedestrians, cyclists, and transit patrons to create complete streets.

"My daddy said that's what I get for putting 50 pounds of mud in a five-pound bag."

- Dolly Parton, 1978 CMA Awards Show, during acceptance speech shortly after splitting her dress



Continue Creating the Options

Walk, Bike, Bus, Train Connections

Biking, walking, and public transportation are good options in Mt. Juliet because of relatively short distances and existing infrastructure. Promoting connectivity through street extensions, streetscaping, and better, safer intersection and street design will continue to improve on critical options to offer relief (and health) to more people in Mt. Juliet. A bonus is that more people and businesses are favoring "walkable" communities - as are older populations.



Manage Access

Preserving Precious Road Capacity

Regardless of how many new roads are built, the benefits don't last long if access to them isn't managed. Driveway spacing standards, left-turn controls (e.g., with medians), and cross-access requirements are key elements of an access management policy. Generally, no roadway should be constructed without strong access management controls in place. This practice can, if implemented consistently and fairly, preserve accessibility to existing businesses, accommodate traffic from future businesses, and grow fiscal revenues without incurring downstream costs for major roadway improvements.



Controlling Demand

Policy and Land Use Integration

Ultimately, congestion compromises any roadway if more development and travelers are added to the network than it can handle. Land use and development should respond to known constraints, and help pay for future improvements. In broad stroke terms, this practice of balancing infrastructure capacity with the development types and quantities that create demand is called *concurrency* planning. Many of the survey respondents requested measures along these lines, often citing the need to slow or halt development until the infrastructure can "catch up" with the existing or future needs. As with Access Management, a balance between mobility and a supportive business environment has to be struck for land use planning to be long-lived partner in helping to build a successful transportation system: it's important to remember that places with traffic congestion are often successful economically. Ghost towns in the midwest have no traffic and not much else. Creating a permanent dialogue with the public is the best way to continuously "plan-do-check-act" the roles, strategies, and effectiveness of land-transportation partnerships. Part of that dialogue should be understanding how to create transit- and walk-supportive densities without apartments: auxiliary units, rear alley-loading, and a variety of attached townhomes can accomplish this objective near the developing downtown core.

Recommendations

Map ID	Street	From	To	Length (mi.)	Type
1	Benders Ferry	Lebanon Road	Mays Chapel Road	2.6	Widening 2/3 Lanes
2	Nonaville Road	Windtree Trace	Saundersville Road	2.8	Widening 2/3 Lanes
3	Nonaville Road	Lebanon Road	Windtree Trace	0.5	Widening 2/3 Lanes
4	John Wright Road	Central Pike	New Collector	1.4	Widening 2/3 Lanes
5	Mt. Juliet Road	Providence	NW Rutland Road	1.5	Access Management
6	N. Mt. Juliet Road	W. Division Street	Lebanon Road	2.2	Access Management
7	Lebanon Road	Devonshire Drive	Nonaville Road	2.5	Access Management
8	Lebanon Road	Nonaville Road	York Road	1.4	Access Management
9	Central Pike	County Line	Tillman Drive	2.2	Widening 4 Lane Divided
10	Central Pike	N. Mt. Juliet Road	Tillman Drive	1.4	Widening 4 Lane Divided
11	Mt. Juliet Road	Central Pike	Providence Parkway	0.7	Widening 4 Lane Divided
12	E. Division Street	N. Mt. Juliet Road	Golden Bear Pkwy	2.4	Widening 4 Lane Divided
13	Lebanon Road	York Road	Dogwood Trail	2.1	Widening 4 Lane Divided
14	Greenhill Road	Division Street	Lebanon Road	1.4	Widening 4 Lane Divided
15	Central Pike	Mt. Juliet Road	Stockbridge Way	1.2	Widening 4 Lane Divided
16	Beckwith Road	S. Rutland Road	I-40 EB Ramp	0.6	Widening 4 Lane Divided
17	New Location	Golden Bear	Eastgate Boulevard	2.5	New Location 4 Lane Divided
18	Golden Bear	Curd Road	Lebanon Road	1.9	Widening 4 Lane Divided
19	N. Mt. Juliet Road	NW Rutland Road	Division Street	1.5	Access Management
20	W. Division Street	Greenhill Road	N. Mt. Juliet Road	2.1	Widening 4 Lane Divided

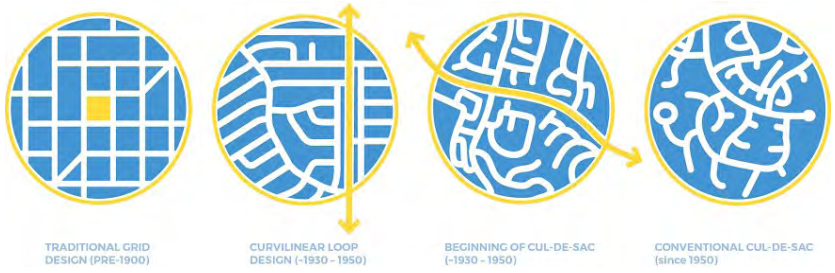
Some projects listed herein are already under development; others would be financed by either or both public and private sector sources. For example, the connector streets shown on the map are likely to be under developer requirements. However, these connector streets are intentionally narrow (two lanes), curvaceous (to self-enforce slower speeds), and indirect (to accomplish movement of all types within an area) to reduce cut-through traffic volumes while promoting walking, biking, and low-speed automobile travel.

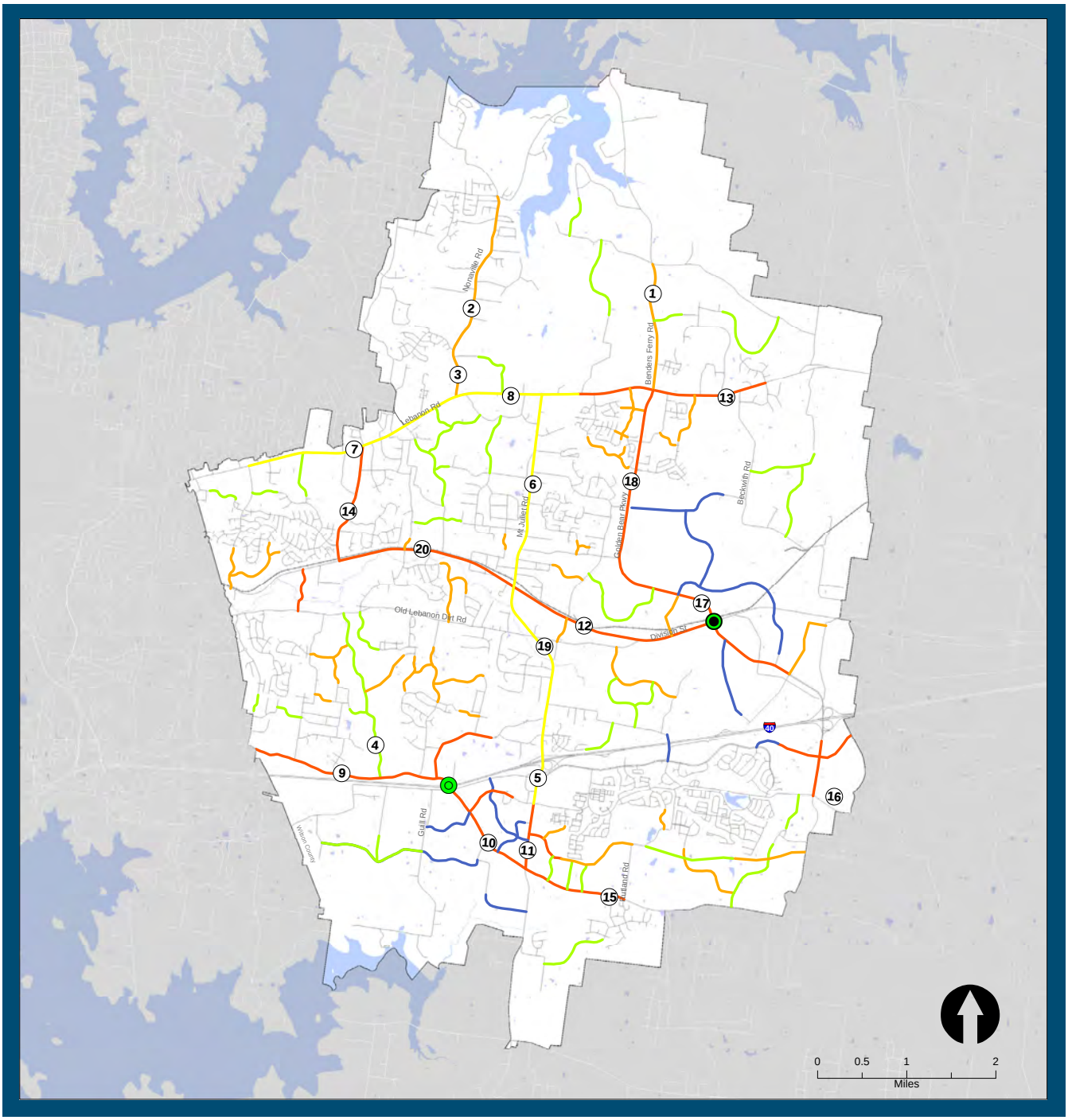


We used to know how to build new streets and neighborhoods that supported people; then we started buildings streets for cars.

Good streets respect a specific purpose: moving lots of cars quickly is desirable in one place and perceived as dangerous and detrimental in another. The collector street connections proposed should be built to people scale, with narrow lanes, curvy paths, lighting (as needed), streetscaping, and provisions for putting more people on them walking and biking.

source: Congress for New Urbanism





Intersections

- High-Priority (I-40/Central Pike)
- Under construction (Golden Bear/Division)

Roadway Laneage

- Rural Collector (2 Lanes)
- Residential Collector (2 Lanes)
- Commercial (2-3 Lanes)
- Multi-Lane (4 Lanes Divided)
- Access Management (Driveway Closures/Median Use)

Figure 9. Roadway Projects

Corridor Recommendations

Two of the most problematic roadways in Mt. Juliet are also the ones that form most of the identification of the City: Lebanon Road and Mt. Juliet Road. To address some of the design concerns associated with each road, the project team developed conceptual designs for each roadway, incorporating Complete Streets and Access management design elements in both.

Shown here is N. Mt. Juliet Road; Lebanon Road is shown on the following pages.

Safety First | "crash and learn"

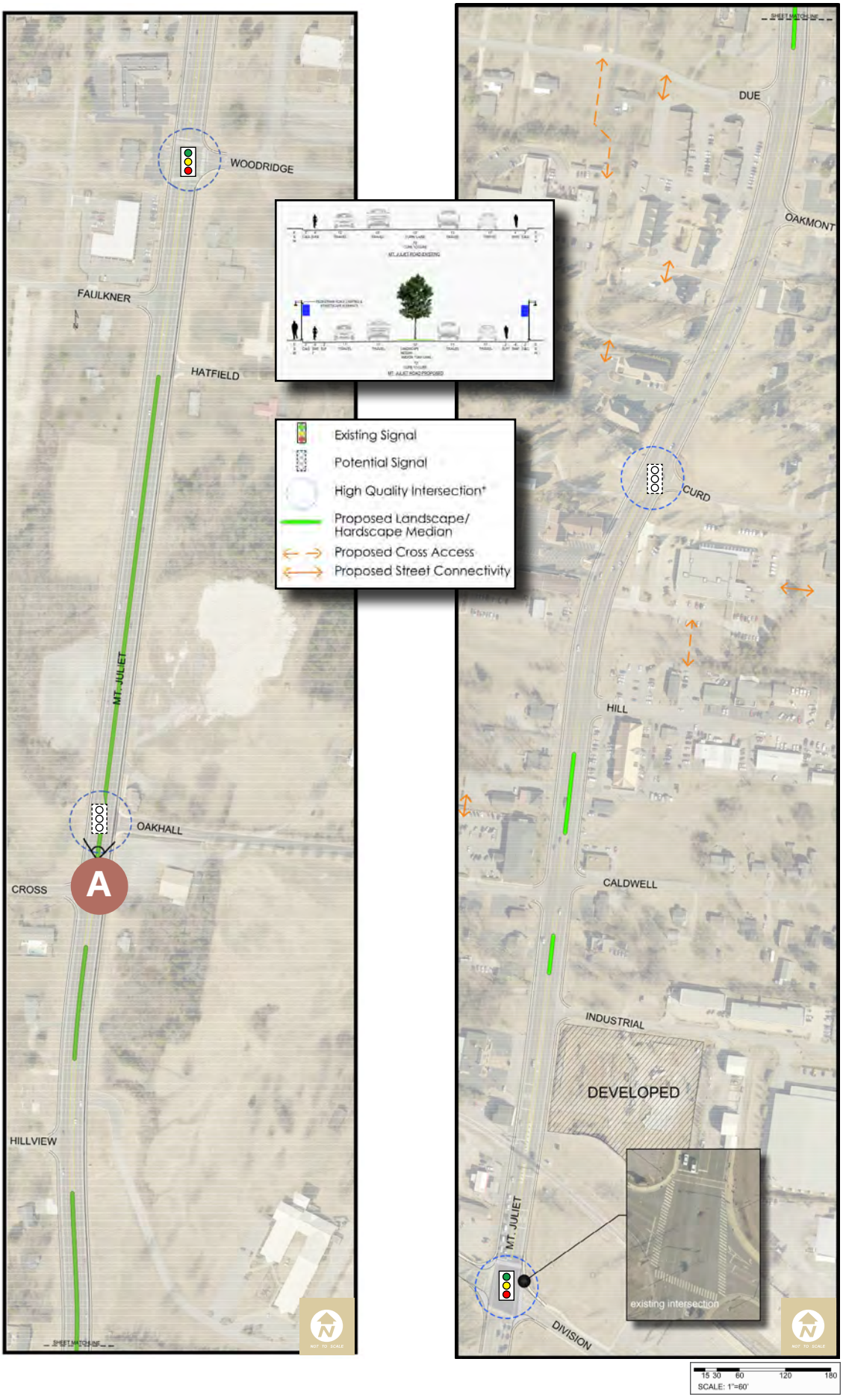
N. Mt. Juliet Road

Division Street to Woodridge Place

About 60% of crashes that occur in Mt. Juliet happen on its namesake roadway, and the public comments support the need to do something soon to help make the road safer, as well as improve its appearance and "walkability."

ISSUES	RESPONSES
Too many crashes	Add median to reduce conflicts from turning vehicles except at key locations; redesign key intersections to improve geometry. The median can reduce crashes by as much as 40% in some cases.
Roadside Appearance	Landscape the median and edges of the road consistently
User Access	Filling sidewalk gaps and separating the bicycleways; creating new connections to adjacent properties; and improving landscaping and lighting at the edges of the roadway




WOODRIDGE
FAULKNER
HATFIELD
MT. JULIET
OAKHALL
CROSS
A
HILLVIEW
DUE
OAKMONT
CURD
HILL
CALDWELL
INDUSTRIAL
DEVELOPED
MT. JULIET
DIVISION
existing intersection
Existing Signal
Potential Signal
High Quality Intersection*
Proposed Landscape/ Hardscape Median
Proposed Cross Access
Proposed Street Connectivity
15 30 60 120 180
SCALE: 1"=60'

Building to Greatness | "fix it first"

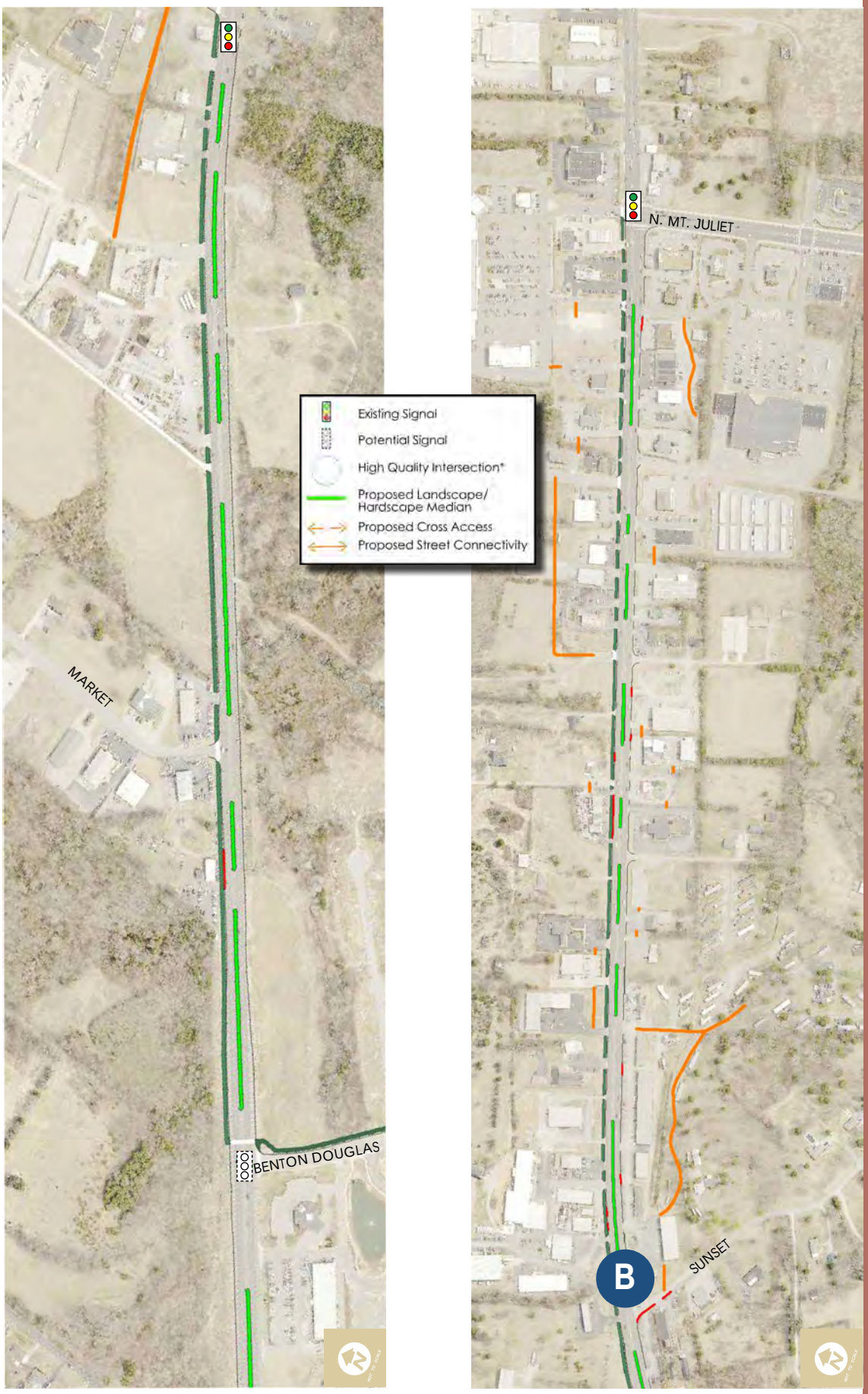
Lebanon Road

N. Greenhill Road to N. Mt. Juliet Road

Lebanon Road provides both a crucial east-west parallel offering to I-40, and also creates important economic opportunities, particularly at its major crossing with North Mt. Juliet Road. Further west, bicycle lanes and greenways connect Mt. Juliet to parks along the Cumberland River and Nashville.

ISSUES	RESPONSES
Better Biking	To take advantage of the long-distance biking destinations, construct a multi-use sidepath on the north side of the roadway
Roadside Appearance	Create a higher-quality and more consistent median treatment throughout
Connectivity Gaps	Creating cross-access paths between adjacent properties prevents quick "in-and-out" movements on and off Lebanon, thereby increasing accessibility and reducing the potential for collisions and vehicular delays




Existing Signal
Potential Signal
High Quality Intersection*
Proposed Landscape/ Hardscape Median
Proposed Cross Access
Proposed Street Connectivity
MARKET
BENTON DOUGLAS
N. MT. JULIET
SUNSET
B

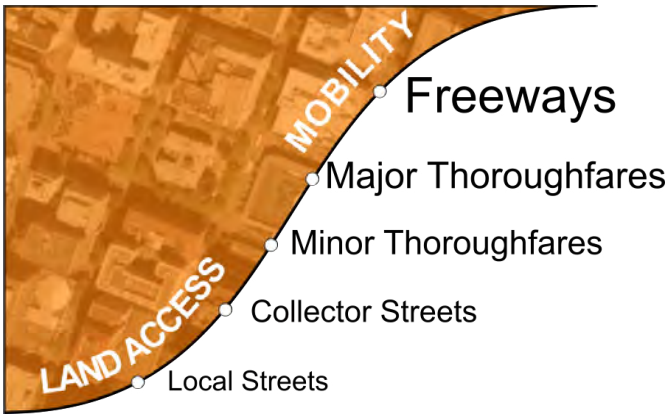
Managing Access

A principle job of transportation professionals is preserving and, where possible, enhancing roadway capacity. Often, roads that start off by accessing quiet residential areas become tense with through traffic. The same happens to large roadways that were designed to carry many cars and trucks quickly over long distances when there are too many driveways and cross-streets that offer opportunities for stopping and turning - and crashes. Many of the issues encountered in Mt. Juliet can be traced back to this issue of roads no longer serving their intended function well.

It is therefore good practice to (a) recognize a hierarchy of streets that preserve their function as mobility carriers of through traffic, and other roads that principally serve adjacent homes, shopping centers, and businesses; and (b) pro-actively manage access to and from these roads to preserve their capacity, reduce crashes, improve safety, and decrease vehicular delay.

The intent of the access management guidelines that follow is to permit reasonably convenient and suitable access to land abutting the road system included in the **Mt. Juliet Comprehensive Transportation Plan** while preserving the regional flow of traffic in terms of safety, capacity, and speed. Appropriate access management will protect the substantial public investment in the City's roadway system and reduce the future need for construction measures that are costly to taxpayers, the environment, and local residents and businesses.

Requests regarding access locations and /or new median openings requested as part of a development application will be coordinated between the City Engineer and Tennessee DOT.



Definitions

For purposes of this guideline, the following definitions will apply. If not defined in the guidelines, the definitions used in Mt. Juliet's zoning or subdivision ordinances or as stipulated by the TDOT Manual for Constructing Driveway Entrances on State Highways and TDOT Region Office.

Access – A public or private roadway used to enter or leave a public highway from adjacent land using an on-road motor vehicle. An access may be a driveway or a street.

Access Point – The intersection of an existing or proposed access with the public right of way.

AADT – Average annual daily traffic volume – The total two-way yearly traffic volume on a section of roadway, divided by 365; often referred to as the average daily traffic (ADT).

Change of Land Use – Any proposed property use that is different from the current use of the property, or current use that is different than the use identified in a preexisting driveway permit.

Connectivity – A term used to infer connections between adjoining properties for vehicular and/or pedestrian usage.

Corner Clearance – The minimum distance, measured parallel to a highway, between the nearest curb, pavement or shoulder line of an intersecting public way and the nearest edge of a driveway excluding its radii.

Cross-Access – A service drive providing vehicular access between two or more continuous properties so that the driver need not enter the public street system to travel between adjacent uses.

Directional Median Opening – An opening in a restrictive median which provides for U-turns and or left-turn ingress or egress movements.

Driveway – An entrance used by vehicular traffic to access property abutting a street. As used in this guideline, the term includes private residential, non-residential, and mixed-use driveways.

Driveway Throat – The portion of a driveway between the public road and the internal circulation system or area where parking maneuvers occur.

Frontage – The length along the street right-of-way line of a single property tract or roadside development area between the edges of the property lines.

Full Median Opening – An opening in a restrictive median that allows all turning and through movements to be made.

ITE – Institute of Transportation Engineers.

Joint Driveway – A single access point connecting two or more contiguous sites to a public roadway that serves more than one property or development, including those in different ownership or in which access rights are provided in legal descriptions.

Major Intersection – An intersection with high volumes exceeding the MUTCD warrants for signalization.

Median – The portion of a divided highway separating the traveled ways for traffic in opposing directions.

MUTCD – Manual on Uniform Traffic Control Devices.

TDOT – Tennessee Department of Transportation

Posted Speed – The speed limit set and maintained by the TDOT or Mt. Juliet.

Sight Distance – This is the area that establishes a clear line of sight for a waiting vehicle to see on-coming traffic and make turning movements into or out of a street or driveway connection safely or for traffic to see entering or waiting vehicles.

Storage Length – Additional lane footage added to a turning lane to hold the maximum number of vehicles likely during a peak period so as not to interfere with through travel lanes.

Throat Length – The distance between the edge of the nearest travel lane to the near edge of an internal drive interior to the site that represents the first opportunity for a car to make a turn into a parking lot.

All connections in Mt. Juliet shall meet or exceed the minimum connection spacing requirements as specified in the table below.

Posted Speed Limit	Signal Spacing	Full Median Spacing	Directional Median Opening	Adjacent Driveway Spacing	Opposite Street Driveway
> 45MPH	2,000 ft	2,000 ft	1,000 ft	500 ft	500 ft
26-44 MPH	1,200 ft	1,200 ft	600 ft	100 ft	100 ft
< 25 MPH	600 ft	600 ft	300 ft	100 ft	100 ft

Spacing between driveways or medians shall be measured along the right-of-way line between the tangent projection of the inside edges of adjacent driveways, opposite street driveways or median openings. The City Engineer may reduce the connection spacing requirements for situations where they prove impractical, but in no case shall the permitted spacing be less than 85% of the standard. Spacing below 85% of the standard will require the issuance of a variance.

For sites with insufficient road frontage to meet minimum spacing requirements, consideration shall first be given to providing access via connection to a side street, utilization of a joint or shared driveway with an adjacent property that meets the recommended spacing requirement, or development of a service road to serve multiple properties.

The City Engineer, in coordination with the Tennessee DOT, may grant access approval for a permanent use not meeting the spacing requirements of these guidelines on an interim basis if an access plan is submitted that demonstrates how spacing requirements will ultimately be met and appropriate assurances in the form of a recordable and enforceable easement of access agreement will be provided insuring future provision of a conforming access. Deviation from these spacing standards may be permitted at the discretion of the City Engineer in cooperation with the Tennessee DOT where the effect would to enhance the safety and operation of the roadway. Examples might include a pair of one-way driveways in lieu of a two-way driveway, or alignment of median openings with existing access connections.

All road and driveway connections to a single parcel shall be brought into compliance with the minimum connection spacing requirements set forth in the guidelines when the lane use(s) on the single parcel is modified or expanded.

The Tennessee DOT may additionally prohibit, restrict, or modify the placement of any connection, at any time, to a single property in the interest of public safety and mobility on state-maintained streets.

Corner Clearances:

Corner clearance is the distance between an intersection and the first point of ingress or egress to a corner property's driveway. The purpose of corner clearance is to remove conflicting movements from the functional area of intersections and provide sufficient stacking space for queued vehicles at intersections so that the driveways are not blocked. No driveway will be permitted to enter directly into an intersection. Driveways must turn traffic into the traffic stream of the highway and/or intersecting road or street before it is permitted to pass through the intersection. Unless an exception is granted, the minimum corner clearance for entrances will be established by a queuing analysis or 100 feet for unsignalized intersections and 125 feet for signalized intersections, whichever is larger. Approved exceptions at intersections without provisions for sight distance or clear vision areas (flared right-of-way) will prohibit driveway connections within 50 feet of the highway, crossroad, or street from the outside shoulder of the adjacent street and access will be a right-in/right-out. Exceptions may be approved if as a result of the City or the Tennessee DOT action the property would become landlocked. No part of a driveway entrance or exit may be permitted within a corner radius.

Near a signalized intersection, the location for a full movement driveway connection may be required to exceed the minimum spacing requirements set forth in the guidelines to avoid interference with the operations of the traffic signal and resulting traffic queues. The radius of a full movement driveway connection shall not encroach on the minimum corner clearance.

The minimum lot size for any new corner lot created through the subdivision process shall be of adequate size to provide for the minimum corner spacing as specified in the guidelines.

Joint and Cross Access:

Non-residential and Mixed-Use Projects

Adjacent land uses classified as major traffic generators shall provide a cross access drive and pedestrian access to allow circulation between sites. Major trip generators attract a minimum of100 additional vehicle trips during the peak of the adjacent roadway or a development.

A system of joint use driveways and cross access easements shall be established if deemed

feasible by the City Engineer and the building site shall incorporate the following:

A continuous service drive or cross access corridor extending the entire length of the property frontage and to provide driveway separation in order to provide the minimum spacing requirements as contained in the guidelines.

A design speed of ten miles per hour and sufficient width to accommodate two-way travel aisles designed to accommodate automobiles, service vehicles, and loading vehicles.

Stub-out connections and other design features that make it visually obvious that the abutting properties may be tied-in to provide cross access via a service drive.

A unified access and circulation system plan that includes coordinated or shared-use parking areas wherever feasible.

The property owner shall record an easement with the deed for the property that allows cross access to and from other properties served by a joint use driveway, cross-access, or service drive.

The property owner shall record a joint maintenance agreement with the deed for the property defining maintenance responsibilities of the adjacent property owners.

Residential Projects

Residential subdivisions with lots fronting along the primary roadway system shall be designed with combined access points, alley access, or otherwise shall derive access from the side streets to the highway. Normally a maximum of two access points shall be allowed regardless of the number of lots served.

The property owner shall enter into a written agreement with the city, recorded with the deed for the property, that pre-existing connections along the frontage will be closed and eliminated after construction of joint use driveways.

The City Engineer may modify or waive the requirements of this section where the characteristics or layout of abutting properties would make implementation of joint use driveways or development of a shared access circulation system impractical, provided that all the following requirements are met:

Joint access driveways and cross access easements are provided wherever feasible.

The site plan incorporates a unified access and circulation system.

Median Openings:

No new median openings shall be allowed along roadways with an existing center median unless it is in conformance with latest edition of the Access Management guidelines published by the Tennessee DOT or in conformance with the City of Mt Juliet Access Management requirement, where applicable. In all circumstances, new median openings shall not encroach on the functional area of an existing median opening or intersection. Approval of any new opening lies ultimately with the Tennessee DOT Traffic Engineering Branch or with the City Engineer, where applicable.

Minimum criteria for evaluating a request for a new median opening may include, but not be limited to, the following:

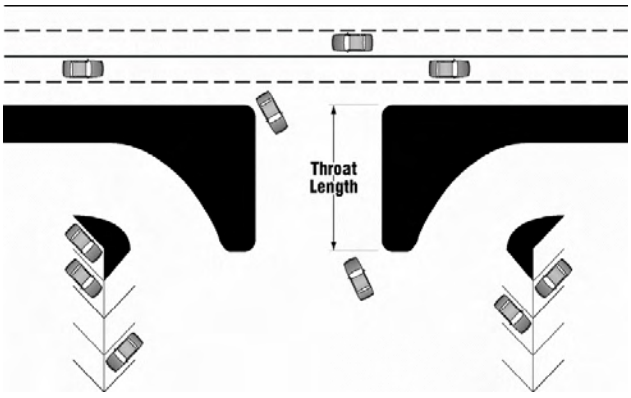
- Median openings shall not be located where intersection sight distance (both vertical and horizontal) cannot meet current design criteria required by the TDOT or AASHTO Green Book.
- Median openings shall not be placed in areas where the grade of the crossover will exceed five percent. Special consideration should be given to the vertical profile of any proposed new median opening that has the potential for future signalization.
- A median opening shall not be provided where the median width is less than sixteen feet.
- Median openings that require a traffic signal, or where one may be expected in the future, should be avoided.
- It is the responsibility of the property owner to provide the justification for new median openings.

Sight Distance Requirements: Driveways shall not be permitted to connect with any highway, road, street or frontage road at a location if it does not meet the minimum

stopping sight distance criteria, based on vertical or horizontal alignment, terrain or other reasons which will cause an undue hazard to the traveling public. Any driveway application that does not provide adequate sight distance as outlined in the Tennessee Roadway Design Guidelines shall be denied. In order to provide adequate sight distance in both directions when entering the highway, driveway entrances and exits should be at a 90 degree angle. Angles less than 90 degrees should not be constructed unless justified by an engineering analysis and in no case shall be less than 60 degrees with the highway.

Additional Design Criteria

Throat Length Distances: The connection depth of a driveway (throat length) as measured from the edge of the abutting roadway to the near edge of the internal circulation road or buffer area shall be of sufficient length to allow a driver to enter the site without interfering with the mainline of traffic. The Figure below shows the minimum throat lengths based on both site activities as well as the category of adjacent roadway (either minor or major thoroughfare).



SITE ACTIVITY	THROAT LENGTHS	
	Minor	Major
Regional Shopping Centers (Malls)	250’	250’
Community Shopping Center (Supermarket, Drug Store)	80’	100’
Small Strip Shopping Center	30’	100’
Regional Office Complex	250’	250’
Office Center	80’	100’
Small Commercial Developments	30’	100’

Offset Access Connections: On undivided roadway segments, access connections on opposing sides of the highway shall be offset at an adequate distance to minimize overlapping left turns and other maneuvers that may result in safety hazards or operational problems.

Auxiliary Lanes: Auxiliary lanes (left or right turn lanes) shall be required for new driveways where they meet the Tennessee DOT or ITE warrants.

Out-Parcel Access: All access to an out-parcel shall be internalized using the shared circulation system of the principle development. Access to out-parcels shall be designed to avoid excessive movement across parking aisles and queuing across surrounding parking and driving aisles.

Minimum On-Site Vehicle Storage Area: Adequate storage must be provided within the internal circulation system for properties that include either a drop-off loop or drive-through facility so that vehicles do not queue onto the highway system. Specific storage areas will be determined by the City Engineer in cooperation with the Tennessee DOT on a case-by-case basis during the development review process. However, the following minimum storage lengths are required for specific development types:

(A) For single-lane drive-in banks, storage to accommodate a minimum queue of six vehicles will be provided. Banks having several drive-in service windows will have storage to accommodate a minimum of four vehicles per service lane.

(B) For single-lane drive-through full service car washes, storage to accommodate a minimum of twelve vehicles will be provided. Automatic or self service car washes having a multi-bay design will have a minimum vehicle storage length of three vehicles per bay.

(C) For fast-food restaurants with drive-in window service, storage within the site to accommodate a minimum of eight vehicles per service lane from the menu board/ ordering station will be provided.

(D) For service stations where the pump islands are parallel to the pavement edge, a minimum setback of 35 feet between the pump islands and the public right-of-way will be provided. For service stations where the

pump islands are not parallel to the pavement edge, minimum vehicle storage of 50 feet in length between the pump islands and the public right-of-way will be provided.

(E) For land uses that require an entry transaction or have service attendants, gates or other entry control devices, the vehicle storage will have an adequate length so that entering vehicles do not queue back on the adjacent right-of-way. No portion of a parking area, attendant booth, gates, signing or parking activity shall encroach on the public right-of-way.

(F) For schools, adequate storage for parental drop-off and pick-up areas should be provided entirely on the school campus site.

Crossroad Access Spacing at Interchanges:

Minimum access spacing on crossroads for freeway interchange areas is critical for avoiding traffic backups and providing safe maneuvering distances for turning and weaving vehicles to enter the appropriate lanes. No driveway, intersection, or median opening will be allowed less than 500 feet from the end of the taper of the ramp furthest from the interchange. If the proposed distances are less than the minimum spacing then a written justification demonstrating why the recommended distances cannot be met shall be submitted to the City Engineer and TDOT for approval as an exception.

Traffic Study: A traffic study may be required by the City Engineer or the TDOT to evaluate one or all access locations proposed in a development application. The estimated trip generation shall be based on the latest edition of the ITE Trip Generation Report. If required by the city, the traffic study shall be completed in conformance with the minimum rules and procedures set forth in the Access Management Guidelines (TDOT) or in the City standards, as applicable.

Variances: The granting of a variance shall be in harmony with the purpose and intent of the Mt. Juliet Access Management Guidelines and shall not be considered until every feasible option for meeting the minimum access management standards is explored.

Applicants for a variance from the standards must provide proof of unique or special conditions that make strict application of the provisions impractical. This shall include proof that:

- Indirect or restricted access cannot be obtained.
- No engineering or construction solutions can be applied to mitigate the conditions.
- No alternative access is available from a side street.
- Under no circumstances shall a variance be granted, unless not granting the variance would deny all reasonable access, endanger public health, welfare or safety, or cause an exceptional and undue hardship on the applicant. No variance shall be granted where such hardship is self-created.

Business Impact Mitigation:

An important aspect of minimizing the impact of access management projects and medians is to maintain open access to businesses during the construction phase. Potential actions to mitigate construction impacts include:

- Clearly sign business entrances from the roadway;
- Provide temporary and/or secondary business access points, where feasible:
- Schedule construction during after business hours or during times of low usage for seasonally oriented businesses;
- Avoid blocking business entrances with construction equipment or construction barriers;
- Provide alternative parking, if possible and avoid taking or blocking parking spaces;
- Establish a single point of contact in the agency about the construction project to communicate with property and business owners; and
- Provide regular project progress reports to business and property owners.



Bicycle, Pedestrian, & Transit Element



Every other mode of travel depends on walking (or moving in a wheelchair, on crutches, etc.). In fact, walking is so obvious that, when asked to record their daily travel for transportation studies, people forget most of the walking trips they make during the day.

Walking, and it's cross-town cousin, bicycling, is conducted in a way that is much more intimate and personal than driving a car. Walking or biking is to driving as driving is to riding in an airplane: a person senses details of the environment that are simply missing and missed when traveling in a car. The Mt. Juliet Comprehensive Transportation Plan therefore had to rely on people telling us about the state of walking and biking across the city, along with crash data, to help understand barriers, concerns, gaps, and necessary improvements. In most cases, biking and walking don't have to compete with the car for trips. Instead, people choose to walk or bike because it rewards them with better health, better attitudes, or as an escape from the more commonplace but less soulful method of traveling in an automobile.

Riding public transportation is also very different from auto travel in that it is, by definition (traditionally) conducted in the presence of strangers. The trade-offs of waiting for buses or trains are at least partially offset by creating personal space to conduct work, read a book, and generally slow down for a few minutes while we are moved to the places we want to be from the places we were. Public transportation works best when it is time-competitive with automobile travel: the closer the time between automobile travel and transit travel the more likely people are to use public transportation as a real choice. For many riders of today's system, the Music City Star represents a benefit that many probably take for granted, but it is a rare gift to Mt. Juliet to have commuter rail transportation both anchoring an emerging downtown core and providing premium transit service to the city's residents.

"The simplest consequence of walking on crutches is that you walk slower. Every step must be a necessary one. When you hurry, you get where you're going, but you get there alone. When you go slow, you get where you're going, but you get there with a community you've built along the way."

—Bruce Feller

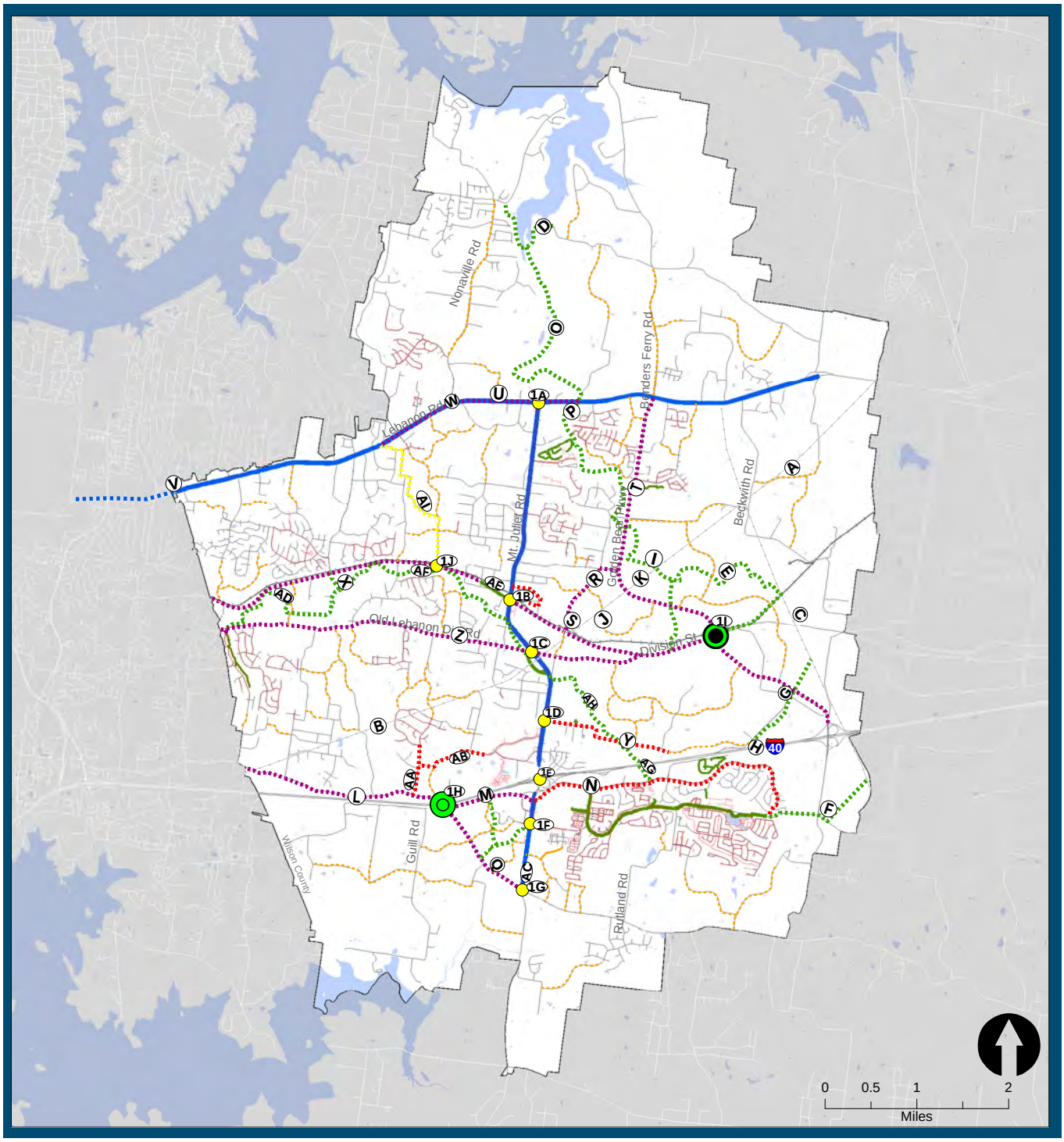


Recommendations

The following pages illustrate the key recommendations for biking, walking, and public transportation that emerged from the planning process. The following map and points and lines correspond to the table on the right-hand side that describe specific improvements.



A Challenging Ride. *The bicycle lane on Lebanon Road sits next to high volumes of fast traffic. Few venture here during rush hours, making the facility an occasionally used treatment for more experienced cyclists and recreational trips.*



Intersections

- High-Priority (I-40/Central Pike)
- Under construction (Golden Bear/Division)
- Recommended Crossing Treatments

Roadway Improvements

- Proposed Road with Sidewalk

Active Mode Recommendations

- Proposed Sidepath
- Proposed Sidewalk
- Proposed Greenway
- Proposed 5' Bike Lane
- Proposed Shared Signage
- Utility Corridor (Future Greenway)

Existing Facilities

- Existing Sidewalks
- Outside or Shared Bike Lane
- Existing Greenways and Trails

Figure 10. Active Mode Recommendations

Intersection and Crossing Recommendations

Map ID	Priority	Type	Location
1A	High	Intersection	Mt. Juliet/Lebanon Road
1B	High	Intersection	Mt. Juliet/Division Street
1C	Medium	Intersection	Mt. Juliet/Old Lebanon Dirt Road
1D	Medium	Intersection	Mt. Juliet/NW Rutland Road
1E	Medium	Interchange	Mt. Juliet/I-40 Interchange
1F	Medium	Intersection	Mt. Juliet/Central Pike
1G	Medium	Intersection	Mt. Juliet/Providence Way
1H	Medium	Interchange	I-40/Central Pike
1I	High	Interchange	Golden Bear/E. Division St (under construction)
1J	Low	Mid-Block	Tate Ln/W. Division St; w/Stoner's Creek Greenway

Trail and Sidewalk Recommendations

Map ID	Priority	On Street	From	To	Length (mi.)	Type
A - K	Vision				variable	Greenway/Util.
L	Vision	Central Pike	County Line	Tillman Road	2.2	10' Sidepath
M	Low	Adams Lane	Mt. Juliet Road	Central Pike	1.1	10' Sidepath
N	High	Belinda	Stoner's Creek	Mt. Juliet Road	1.3	Sidewalk
O	Medium	Cedar Creek	Lebanon Road	Saundersville	3.3	12' Greenway
P	High	Cedar Creek	Golden Bear	Lebanon Road	0.5	12' Greenway
Q	High	Central Pike	S. Mt. Juliet	Tillman Road	1.4	10' Sidepath
R	Medium	Clemmons	Curd Road	East Division	0.8	10' Sidepath
S	Medium	East Division	Clemmons	Music City Star	0.6	10' Sidepath
T	High	Golden Bear	Lebanon Road	South of Stoner's	1.5	10' Sidepath
U	Medium	Lebanon Road	Nonaville Road	Cedar Creek	1.4	10' Sidepath
	Vision	Lebanon Road	Matterhorn	Andrew Jackson	0.8	5' Bike Lane
W	Low	Lebanon Road	Nonaville Road	Tate Lane	0.9	10' Sidepath
X	Medium	New Location	S. Greenhill	Cedar Creek	0.2	10' Greenway
Y	High	NW Rutland	Mt. Juliet Road	Proposed	1.5	Sidewalk
Z	High	Old Lebanon	Kelsey Glen	Moreland Drive	0.8	10' Sidepath
AA	High	Pleasant Grove	Triple Crown Ln	Central Pike	0.6	Sidewalk
AB	Medium	Pleasant Grove	Triple Crown Pl	Old Pleasant	0.8	Sidewalk
AC	High	South Mt. Juliet	Providence	Central Pike	0.7	5' Bike Lane
AD	Low	Stoner's Creek	Greenhill	Cobblestone	2.0	12' Greenway
AE	Low	Stoner's Creek	Existing	Stoner's Creek	1.6	12' Greenway
AF	Medium	Stoner's Creek	Tate Lane	Greenhill	1.3	12' Greenway
AG	Vision	Stoner's Creek	NW Rutland	Belinda Parkway	0.6	12' Greenway
AH	High	Stoner Creek	Mt. Juliet Road	NW Rutledge	1.3	12' Greenway
AI	Medium	Tate Lane	Division Street	Lebanon Road	1.9	Shared



Public transportation enjoys a special place in Mt. Juliet, thanks to the presence of a rail station in the center of town.

Future plans for the city's redeveloped core area intentionally contemplate the role that the transit station plays now and will continue to fulfill in the future. The station is very popular now, with the parking lot servicing the facility at or near capacity on weekdays.

Recommendations

The following page provides information on five key transit recommendations, also supported in the text below.

1. **Create a new circulator connecting Providence area to Music City Star Station (long-term).** Many respondents noted the need for better accessibility to Providence, and connecting new developments at the town center will help articulate the energy from the I-40 / Mt. Juliet interchange inwards to those investments. The service should be considered for route-deviation capabilities, allowing people to call in or use the Internet to create specialized deviated routes for pick-up and drop-off to destinations within three-quarters of a mile of the main route (thereby avoiding the need to provide complimentary paratransit services).

2. **Work with RTA to add more service during the peak periods of travel (medium-term).** The most consistent, transit-related comment received concerned adding more service to the existing station. Currently, only three stops are made in the morning (with the latest being 7:45) and the last afternoon train arriving at 6:12pm from Riverfront station. Additional trains departing Mt. Juliet after 7:45am and Nashville between the current 5:05pm and 5:45pm trains would likely be popular. A mid-day and Saturday service should also be considered.



3. **Construct sidewalk connections to station, including along Industrial Drive (medium-term).** As the core part of the City is further developed, pedestrian connections like sidewalks and new crossing treatments will be crucial to getting people to and from the existing station on foot and by bike, avoiding the need for additional parking spaces.

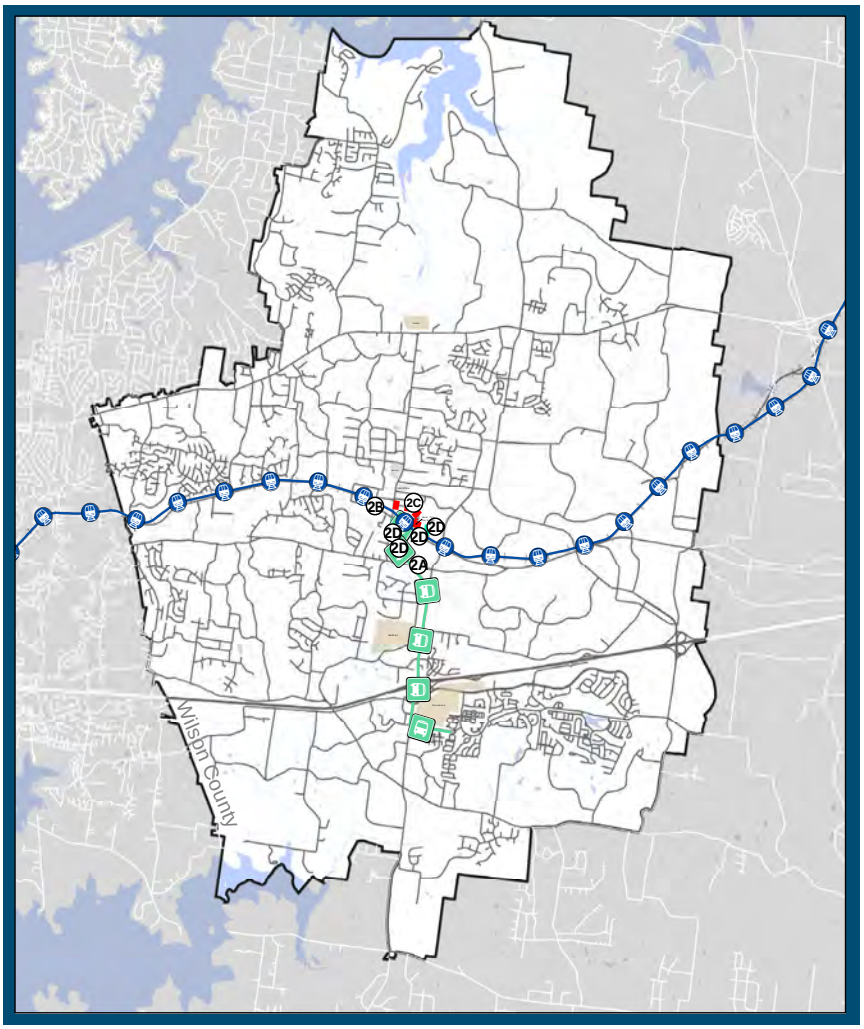
4. **Create park-and-ride lots in the vicinity of the Music City Star station (short-term).** Creating nearby overflow parking coupled with pedestrian crossing treatments will help address the immediate parking capacity concerns at the station.

5. **Subsidize peer-to-peer ridesharing and car sharing services (short-term).** Companies like Uber and Zipcar are changing the face of the way people are accessing shared rides by making them more convenient and cost-effective than traditional, fixed-route transit services. Other cities (e.g., Altamont Springs, FL) have already worked on subsidy programs that have shown in the early going to be effective alternatives to major new transit investments for the majority of users (mobility challenged and those who need access to on-line reservations are segments of the population that this solution may not serve immediately).



Transit Recommendations

Map ID	Priority	Type	Location
2A	Low	Service	Circulator (30-minute headway, 2 vehicles)
2B	Medium	Service	Add 2 additional Music City Star peak-period runs (4 total)
2C	Medium	Sidewalk	Industrial Drive (to Music City Star terminal)
2D	High	Park-and-Ride	Various (south of Music City Star)
N/A	High	Service	Subsidize Peer Ridesharing at Music City Star Station



"...within Providence shopping areas, a shoppers' shuttle would be great and cut down on traffic congestion.... People could park in one place and hop on and hop off as needed."

- survey respondent

Figure 11. Transit Recommendations





Development



Mt. Juliet is an area divided into two very different places in terms of land use. The central portion of the area includes higher density development of commercial and residential. The outer bands of the region are more rural and residential with little commercial.

Included as part of this Plan, two sites were identified in the City of Mt. Juliet by the Steering Committee that are potentially prime for development in the near future. The purpose of identifying these catalyst sites in such a detailed way allows City of Mt. Juliet residents to see what the future might hold for their growing city.

About the Catalyst Sites

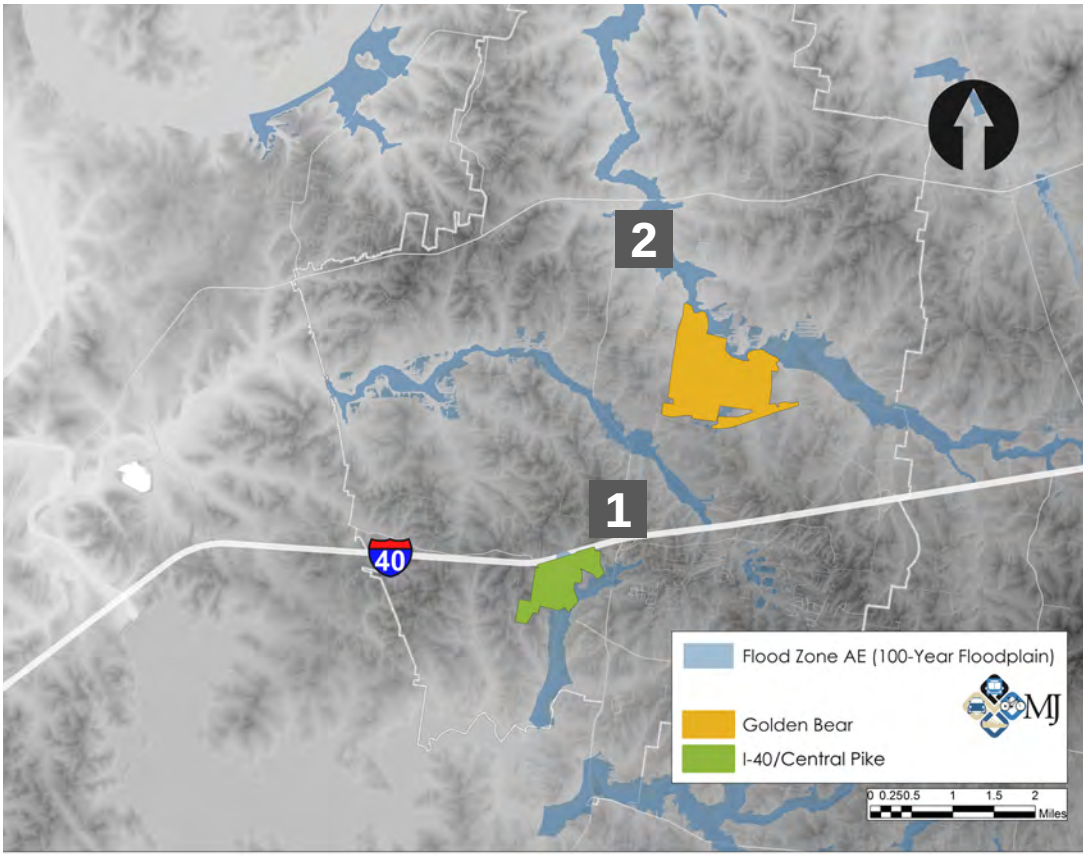
The sites were studied to visualize and illustrate how potential new development can represent some of the best design practices (not specific build out) that demonstrate the recommendations of this plan such as preserve roadway capacity, create interconnected travel, and connectivity.

The plans shown in this section are intended to be conceptual visions for two primarily vacant and significant parcels of land that are prime for development in the near future. The purpose of these conceptual plans is to show general patterns and intensities and potential development/redevelopment opportunities that are consistent with the community's goals. The plans do not consider a specific program and no market analysis was generated.

Future development and redevelopment proposals for these sites reflect the following aspects of the concept plans: the general street network; street connections and rights-of-way; open space areas and usable public spaces; general intensity of development; urban pattern (relationship of buildings to the streets and adjacent properties); building massing; street and pedestrian circulation patterns. Further, developments on these sites should mix uses both horizontally (within sites) and vertically (within buildings), where appropriate.

The proposed plan is designed as a complete community where people can live, work, and play. Residents, visitors, and employees will keep the place vibrant throughout the day. It is designed to be a memorable and unique place, not "Anywhere USA."

Development/Catalyst Sites



Catalyst sites #1 (I-40 at Central Pike) and #2 (at Golden Bear Parkway) are shown here on top of a topographic overlay, floodplains, and roadway system.

- Catalyst Site 1: **I-40/Central Pike**. Area near the new interchange of I-40 at Central Pike.
- Catalyst Site 2: **Golden Bear Parkway**. End of Golden Bear Parkway at Curd Road.

Both sites are ripe for development, as most of the land is vacant and is in close proximity to existing development and main thoroughfares.

The Catalyst sites chosen are ripe for development, primarily vacant and selected for their ample acreage, central locations, proximity to existing development, and main thoroughfares. These sites reflect the prime locations for development based on the Land Suitability analysis discussed previously.

I-40 Interchange (at Central Pike)

The Providence Central Site is generally located at the Southeast and Southwest corners of Central Pike and I-40 in Mt. Juliet. The site is comprised of approximately 231 acres and encompasses multiple parcels.

This site was chosen due to the proposed future I-40 Interchange at Central Pike and the site's close proximity to the Providence Community and Providence Marketplace located east of the site. The site is most likely to develop in the near future. The development potential for the site was explored and the current plan was studied to determine the feasibility of additional and improved development options for the site that incorporate best planning practices.

The future land use designation for the property is Mixed Use and the current zoning on the property is Commercial Mixed Use District and Planned Unit Development (CMU/PUD).

The developer's conceptual site plan proposes approximately 300,000 square feet of commercial square footage (1-2 story), 1.5 million square feet of office (2-6 story) and approximately 310 units (224 multi family units and 88 single family units). The site has not received Final Master Development Plan approval from the City. The Plan is designed with large blocks and consists primarily of office and retail space with surface parking visible from the street which impairs the walkability and connectivity within the development and to adjacent properties.



The "improved" conceptual plan for Central Providence has considered the future Central Pike I-40 interchange and is designed as a compact and walkable development that creates a sense of place. This plan includes a mixed-use neighborhood center that includes ground floor retail with commercial and residential uses on the second floor. More traditional corporate office space is provided on the site as well, taking advantage of freeway visibility and the site's adjacency to I-40. The buildings are anticipated as two-story mixed use, however, if the market were to dictate, the buildings could increase in height and structured parking could be implemented as necessary. The current site design uses surface parking that is predominately screened from pedestrian view along the street.

The street network is designed to be highly walkable by providing pedestrian scaled blocks, smaller blocks. Development with active uses is envisioned to be built up to the sidewalk which helps to activate the street. The entryway from Providence Parkway has been curved down to intersect the neighborhood center area. The streets are designed as "complete" streets, providing access and connectivity for multiple users such as automobiles, bicyclists, and pedestrians and including sidewalks and street trees.

The proposed apartments remain at the entrance from Providence Parkway to be consistent with the existing multi family under construction, however, the overall development becomes more compact and urban as you get closer to the neighborhood center. A variety of housing types are recommended in this site plan including apartments, attached townhomes and detached single family (shown in a variety of lot sizes). The mix of uses and variety of residential offerings will help to make this a complete neighborhood that is desirable to a wide range of citizens, making it more marketable, vibrant and successful over the long term. The proposed buildings are located closer to the streets and the street networks, open space and the buffers all respect natural features and existing topography of the site, making it more sustainable. The plan includes a number of formal and informal parks, neighborhood greens and opens spaces with multiple trail and greenway opportunities.

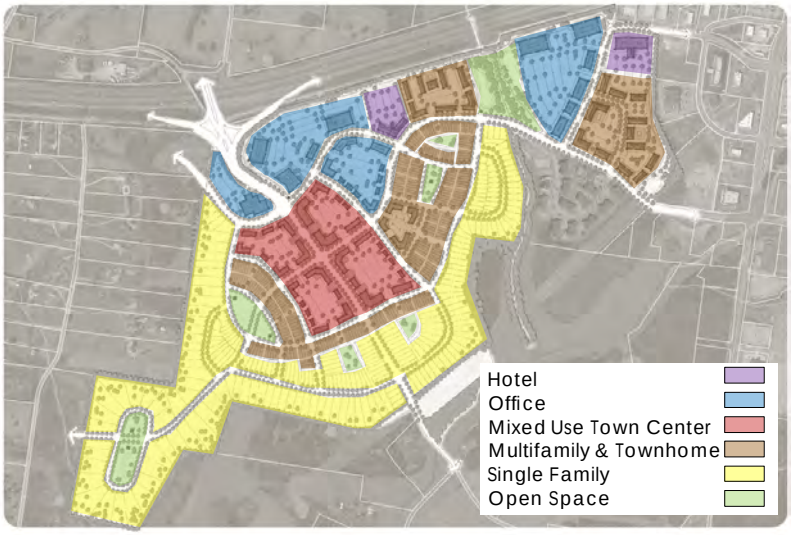
The proposed office square footage takes advantage of freeway visibility near the I-40 interchange and should attract Class A office space. A variety of different scales of commercial space are provided including large and mid size, small office and condo offices are provided near the town center.

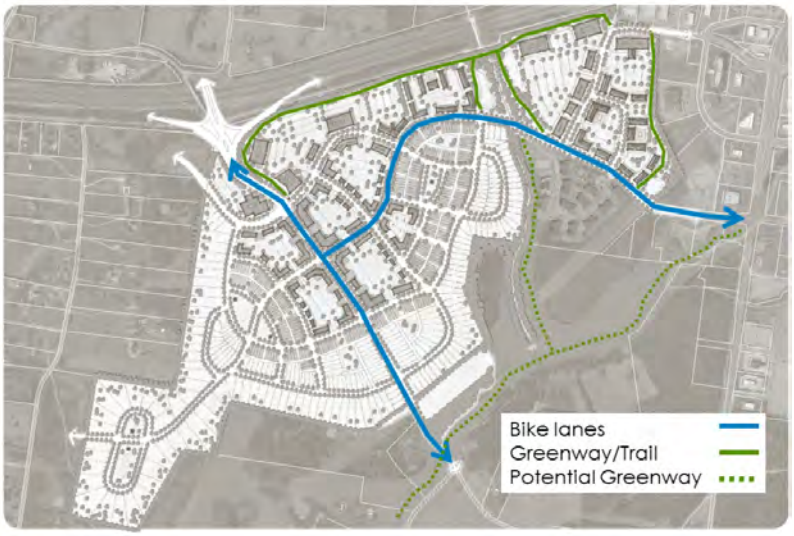
In addition, two hotels are proposed, one along the north property line, providing visibility from I-40 and connecting to the proposed greenway along Adams Lane which has been rerouted to connect to the town center as well to increase walkability. The other is proposed at the eastern

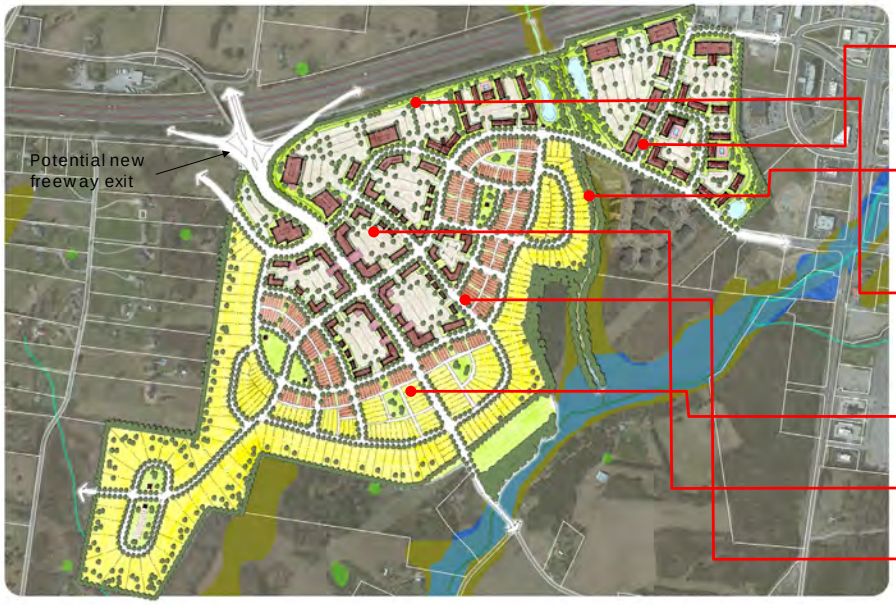
edge of the property near an existing hotel off Providence Parkway.

The plan increases connectivity with the addition of off street trail or greenway opportunities for pedestrians and cyclists. In particular, bike lanes, sidewalks, and multi-use paths are proposed along Providence Parkway and Central Pike in the conceptual plan. A potential greenway is also shown along Adams Lane at the north property line and connecting to the Providence community to the east. Additional greenways are also proposed along the streams and creeks in the projects vicinity. These greenways would connect to the pedestrian, bike, and greenway elements as outlined elsewhere in this plan.

The overall strategy of the proposed plan accommodates a variety of product and allows for flexibility. It can be adjusted for future market demand, but what remains consistent in this design is that it provides a great street network that creates a walkable place where people want to be. The proposed plan is designed as a complete community where people can live, work and play. Residents, visitors and employees will keep the place vibrant throughout the day. It is designed to be a memorable and unique place, not "Anywhere USA."

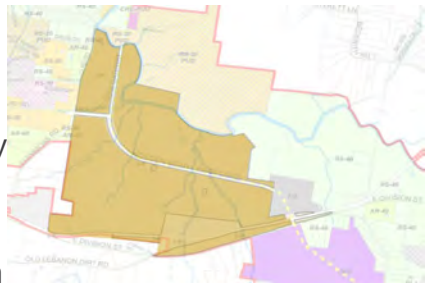






- Streets Respect Natural Features, as Does Open Space / Buffers
- Walkable street network/pedestrian scale block sizes
- Network of formal and informal parks and open space with trail opportunities
- Various lot sizes and housing types
- Highway exposure for Class A office
- Mixed-use Town Center

Golden Bear Gateway



The second catalyst site is comprised of approximately 620 acres located along Golden Bear Parkway which has recently been completed. The current Future Land Use designation is Mixed Use and the property is currently zoned Industrial District Restricted (IR) which generally does not allow residential. No site plan has been approved by the City thus far.

Access to the site is provided via Golden Bear Gateway, but there are several constraints to note. Cedar Creek runs along the property on the north side and a significant portion of land adjacent to the creek is located within the floodplain. Tributaries that feed into Cedar Creek also cut through the center of the site from south to north.

Overhead high voltage and gas transmission lines cut across the eastern and central portions of the property, respectively. Two cemeteries also exists on site and have been preserved in the plan. In addition, there is a future school site on the northeast side of the property. Rail lines serving commuter and freight rail exist along the southern property line.

The proposed plan illustrates a conceptual network of streets and blocks that is walkable with a high degree of connectivity. Typical block size is 300 feet x 300 feet to provide flexibility for a variety of development scenarios. This conceptual network allows for a mix of uses including commercial , retail and residential.

Golden Bear Gateway serves as the primary connection to the existing high school and neighborhoods located to the north of the site, as well as areas to the east and west of the site. While the parkway is the major connector to and through the site, a variety of connected secondary and local roads are also proposed here. In addition, a commuter train station may be possible along the southeastern property line in the future.

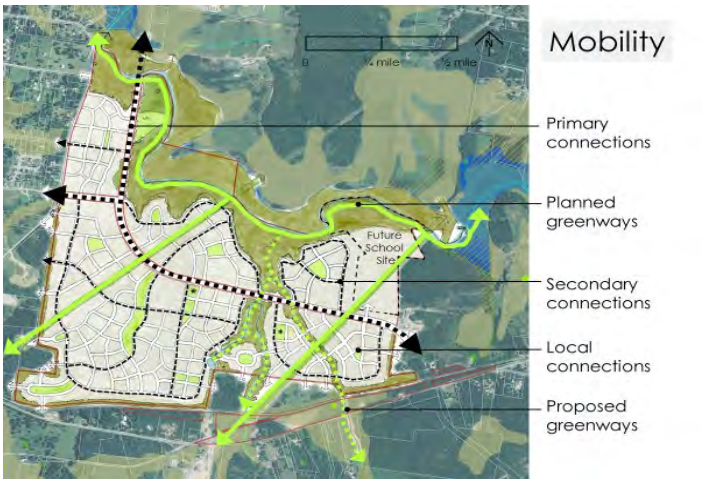
While this site plan does not specify building footprints, only streets and blocks, we have recommended the most appropriate locations for mixed use centers.

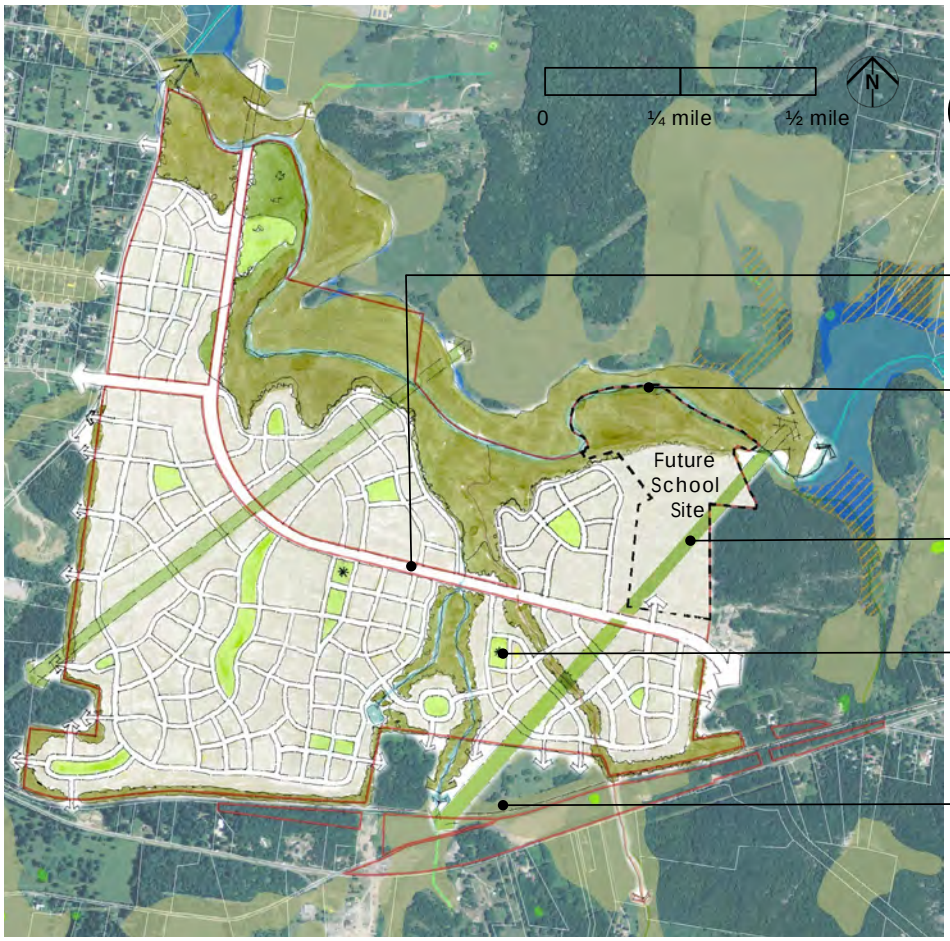
Three potential neighborhood centers are proposed along Golden Bear Parkway, each within a five (5) and ten (10) minute walk from adjacent development on the site. A variety of development types are possible for the site and a thorough market analysis is necessary to determine the most appropriate. Given the vast acreage, the site is likely to develop in phases over time.

A key theme of this conceptual plan is to create value by increasing connectivity not only through the network of streets and blocks, but through the use of formal and informal open spaces and by providing trail opportunities throughout the development.

Preserved open spaces are proposed along the northern property line that are located in the floodplain and along Cedar Creek. The existing cemeteries are also preserved. The proposed trails and greenways provide exceptional amenities for future communities and also extend and connect to the pedestrian, bike, and greenway elements as outlined elsewhere in this plan.

A core principle of the proposed plan is to illustrate how a large site like this can be developed with a high degree of connectivity and walkability while preserving strategic open space and taking into consideration the existing topography, floodplain, and other constraints. This plan provides a framework and development strategy that includes a flexible network of streets and blocks that can accommodate future market conditions while incorporating best design practices including walkability, complete streets, and open space provision and preservation.





Context

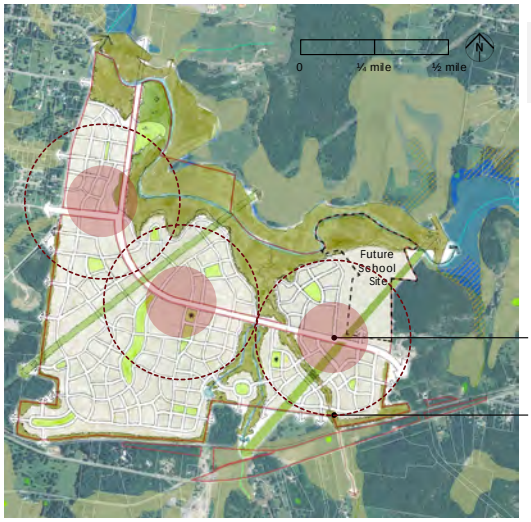
Parkway recently completed

Cedar Creek

Gas Transmission Lines

Existing Cemetery

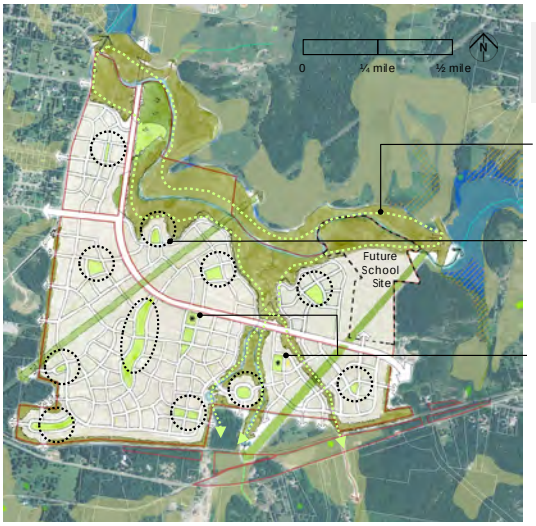
Rail line



Activity Centers

Potential neighborhood center

5-10 minute walkshed



Open Space

Network of connected informal open spaces

Planned formal open spaces – *walkable to each other*

(2) Existing Cemeteries preserved



Action Plan: Recommendations & Priorities

Funding Sources

The core of implementing transportation recommendations is the development of partnerships that will allow Mt. Juliet to finance, design, construct, and maintain projects. The following summary of action items is therefore organized around this principle of shared responsibilities for implementation, being broken out into local government (Mt. Juliet), regional planning (Nashville Metropolitan Planning Organization), state government (TDOT), and private sector responsibilities. The resources and key implementation characteristics of each one are presented. The list of projects contained in prior sections is also reproduced and summarized.



Private Sector

Developers and Property Owners

Mt. Juliet is a desirable place to live and, as more people move in, demand for new development to accommodate, feed, and employ them will increase. This development creates demand for transportation that the new development should fairly pay for through taxes, fees, wages, and other contributions.

Keys: Land development ordinances have to create specific requirements that tie back to the demands that each new development creates.

Projects: Mostly collector streets, sidewalks, intersection improvements, rights-of-way for transit stops.



Local Government

Mt. Juliet, Tennessee

City policy influences nearly every aspect of the demand for transportation services through land use / zoning codes, plans, and individual actions of officials. The ability of any individual city (unless it is a very large city) to construct transportation projects is more limited, a disparity that leads to demand outstripping supply - congestion. Mt. Juliet funding sources follow:

State Street-Aid Fund. Direct distribution to municipalities based on a population proportionate formula.

Property Tax. As property taxes are dependent on economic conditions a separate tax for transit operations and capital can be administered by voter approval.

Sales Tax. The Wilson County sales tax rate of 2.25% could be raised to 2.75%, helping finance transportation improvements.

Wheel Tax. Wilson County's rate of $25/vehicle is low compared to the 59 counties that apply this tax.

Development Impact Fees. Mt. Juliet has both a square footage and per unit impact fee. An impact fee study is expected after the passage of this plan. Raising fees would have to be done carefully and consider impacts to affordable housing.

Keys: Potential for raising the Wheel Tax exists; Mt. Juliet can fund modest improvements, or work with other partners to match funds for larger-scale improvements.

Projects: Regulation changes, intersection improvements, safety improvements, ADA-compliance measures, repairs/resurfacing/striping/signage, and matching funds for larger, more capital-intensive efforts.



Regional Government

Metropolitan Planning Organization

The metropolitan planning organization (MPO) that covers Mt. Juliet and surrounding cities and counties provides some funding options for projects in Mt. Juliet, but also serves as a gatekeeper to state and federal funding. The State Transportation Improvement Program (STIP) and Metropolitan Transportation Improvement Program (Mt.IP) must show the same projects to be compliant with federal requirements. Furthermore, the Mt.IP is a subset of the long-range transportation plan (Regional Transportation Plan, or RTP) that is updated at least every five years by the MPO.

State and federal funding sources and applications are numerous, complex, and sometimes change, as do the project priority mechanisms employed by MPOs. Details should be sought out on the MPO website (**www.nashvillempo.org**) or by contacting their staff.

Keys: Attend technical and policy board meetings regularly; schedule one-on-one coordination meetings with MPO staff at least twice per year; and be aware of the MPO's way of prioritizing projects and planning / funding cycles.

Projects: Nearly every kind of project, including transit, biking, walking, roadway widenings / new location, demand, and programs can be funded by one or more of these programs.



State Government

Tennessee Department of Transportation

In many ways, Mt. Juliet accesses the talents and resources of the State Department of Transportation (TDOT) through the metropolitan planning organization. However, TDOT plays a major role in prioritizing, designing, and maintaining major roadways across the state, and is therefore a critical partner in transportation solutions and regulations. The regulatory aspect is important, since everything from driveway permitting to design standards is managed by the State.

Keys: Maintaining a close working relationship with both the Region (3) and District (37) representatives is important to Mt. Juliet. For example, understanding repaving schedules and minor improvements can help coordinate accessibility, sidewalk, bicycle, aesthetic, access management, and other priorities on Mt. Juliet's major roadways that otherwise could be missed.

Projects: As with the MPO, the state department of transportation affords opportunities for many projects, with the exception of collector street facilities that "fall below the radar" of the state's purview (although their design and connections to major arterials will still involve state officials).

The following is a detailed list of prioritized projects (by tiers) for ALL modes including Roadway, Intersection/ Interchange, Bike, Pedestrian, and Transit. The City of Mt. Juliet and their elected officials should re-prioritize this list of projects on an annual basis. Community priorities may change based on transportation needs, technology, demographics, and public support.

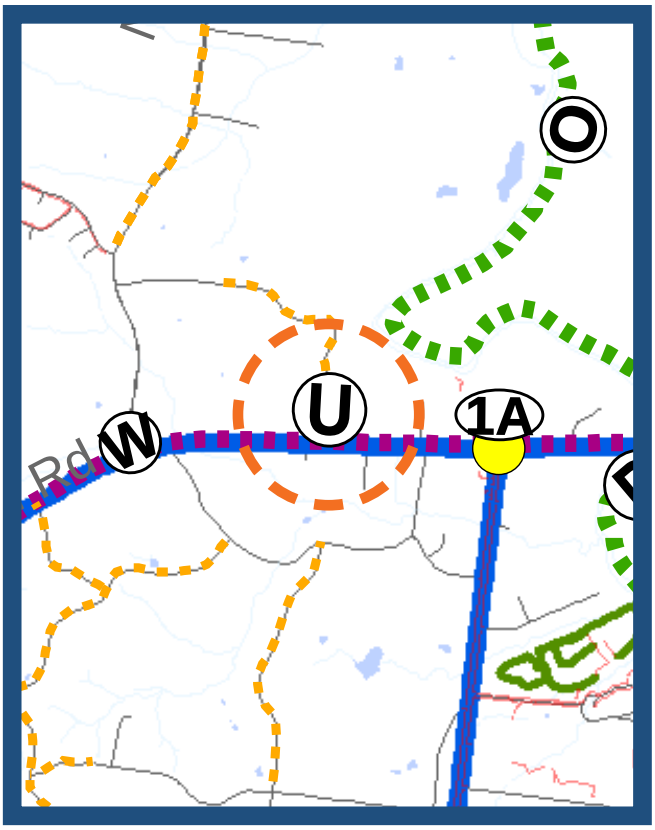
Action Plan: Project Recommendations and Funding

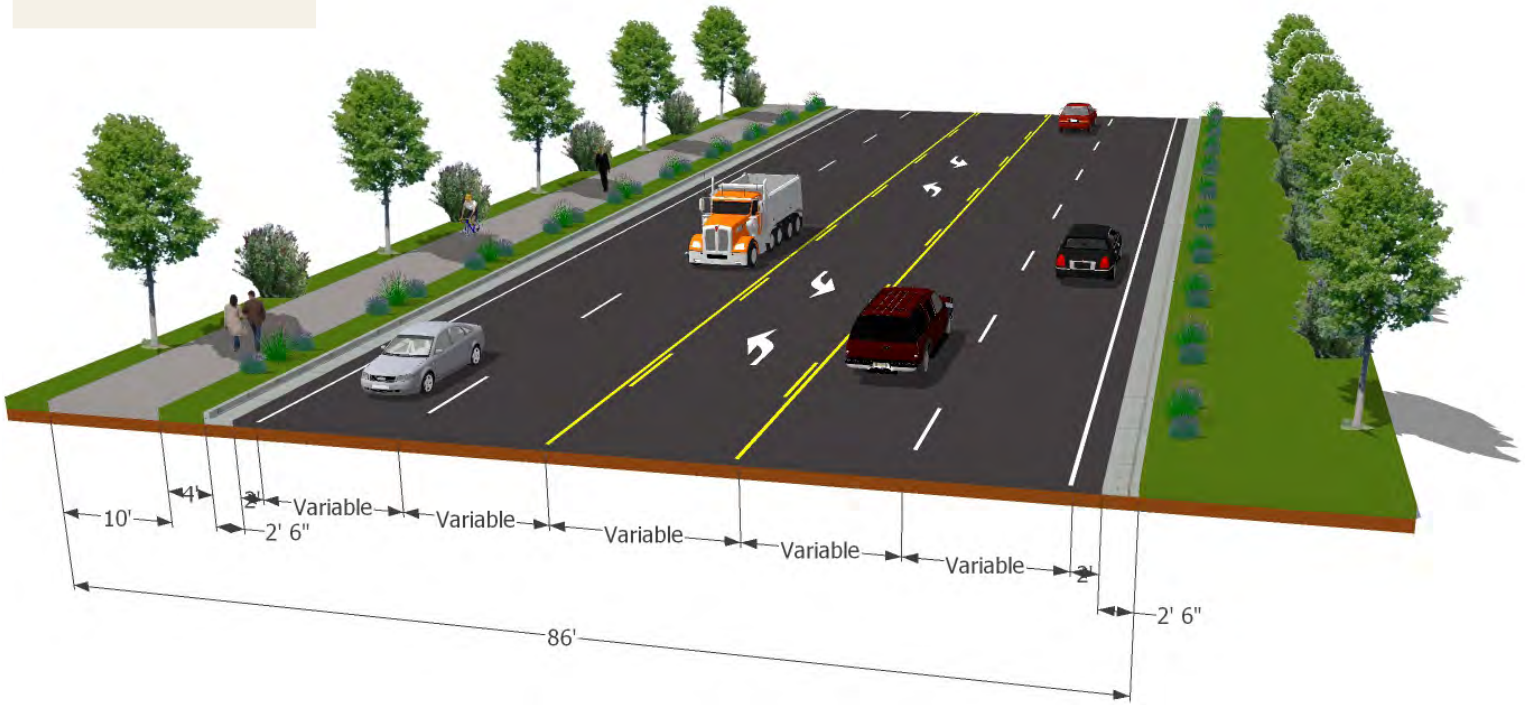
Map ID	Priority	Type	Location	Cost Est.	Funding
A - K	Vision	Greenway	Several locations	Various	
L	Vision	10' Sidepath	Central Pike from County Line to Tillman Rd	$2,570,204	
M	Low	10' Sidepath	Adams Ln from Mt. Juliet Rd to Central Pike	$1,364,000	
N	High	Sidewalk	Belinda Pkwy from Stoner's Creek to Mt. Juliet Rd	$448,000	
O	Medium	12' Greenway	Cedar Creek from Lebanon Rd to Saundersville Rd	$3,821,000	
P	High	12' Greenway	Cedar Creek from Golden Bear Gateway to Lebanon Rd	$1,700,160	
Q	High	10' Sidepath	Central Pike from S. Mt. Juliet Rd to Tillman Rd	$1,543,000	
R	Medium	10' Sidepath	Clemmons Rd from Curd Rd to E. Division St	$882,000	
S	Medium	10' Sidepath	E. Division St from Clemmons Dr to Music City Star station	$661,000	
T	High	10' Sidepath	Golden Bear Gateway from Lebanon Rd to south of Stoner's Creek	$517,000	
U	Medium	10' Sidepath	Lebanon Rd from Benton Douglas Pkwy to Park Glen Dr	$700,000	
V	Vision	5' Bike Lane	Lebanon Rd from Matterhorn Dr to Andrew Jackson Pkwy	$50,000	
W	Low	10' Sidepath	Lebanon Rd from Nonaville Rd to Tate Lane	$992,000	
X	Medium	10' Greenway	New Location from S. Greenhill Rd to Cedar Creek Greenway	$220,000	
Y	High	Sidewalk	NW Rutland Road from Mt. Juliet Rd to Hunting Hills Dr	$500,000	
Z	High	10' Sidepath	Old Lebanon Dirt Rd from Kelsey Glen Rd to Moreland Dr	$882,000	
AA	High	Sidewalk	Pleasant Grove Rd from Triple Crown Ln to Central Pike	$280,000	
AB	Medium	Sidewalk	Pleasant Grove Rd from Triple Crown Pl to Old Pleasant Grove Rd	$276,000	
AC	High	5' Bike Lane	S. Mt. Juliet Rd from Providence Pkwy to Central Pike	$300,000	
AD	Low	12' Greenway	Stoner's Creek Greenway from Greenhill Greenway Stub to Cobblestone Landing	$2,205,000	
AE	Medium	12' Greenway	Stoner's Creek Greenway from Existing Greenway to Stoner's Creek	$1,764,000	
AF	Low	12' Greenway	Stoner's Creek Greenway from Tate Lane Greenway Stub to Greenhill Greenway Stub	$1,433,000	
AG	Vision	12' Greenway	Stoner's Creek Greenway from NW Rutland Rd to Belinda Pkwy	$661,000	
AH	High	12' Greenway	Stoner's Creek Greenway from Mt. Juliet Rd to NW Rutland Rd	$1,433,000	
AI	Medium	Shared	Tate Lane from Division St to Lebanon Rd	$4,000	
1	Low	Widening 2/3 Lanes	Benders Ferry Rd from Lebanon Rd to Mays Chapel Rd	$8,923,000	
2	Low	Widening 2/3 Lanes	Nonaville Rd from Windtree Trace to Saundersville Rd	$9,784,000	
3	Low	Widening 2/3 Lanes	Nonaville Rd from Lebanon Rd to Windtree Trace	$1,846,000	
4	Low	Widening 2/3 Lanes	John Wright Rd from Central Pike to New Collector Street	$8,664,000	
5	High	Access Management	Mt. Juliet Rd from Providence Pkwy to NW Rutland Rd	$9,100,000	

Map ID	Priority	Type	Location	Cost Est.	Funding
6	High	Access Management	N. Mt. Juliet Rd from W. Division St to Lebanon Rd	**$1,900,000**	
7	Medium	Access Management	Lebanon Rd from Devonshire Dr to Nonaville Rd	**$18,644,000**	
8	Low	Access Management	Lebanon Rd from Nonaville Rd to York Rd	**$8,663,000**	
9	High	Widening 4 Lanes	Central Pike from County Line to Tillman Dr	**$5,964,000**	
10	High	Widening 4 Lanes	Central Pike from N. Mt. Juliet Rd to Tillman Dr	**$8,771,000**	
11	High	Widening 4 Lanes	Mt. Juliet Rd from Central Pike to Providence Pkwy	**$4,200,000**	
12	Medium	Widening 4 Lanes	E. Division St from N. Mt. Juliet Rd to Golden Bear Pkwy (future)	**$15,304,000**	
13	Low	Widening 4 Lanes	Lebanon Rd from York Rd to Dogwood Trail	**$13,513,000**	
14	Medium	Widening 4 Lanes	S. Greenhill Rd from Division St to Lebanon Rd	**$8,582,000**	
15	High	Widening 4 Lanes	Central Pike from Mt. Juliet Rd to Stockbridge Way	**$7,438,000**	
16	Low	Widening 4 Lanes	Beckwith Rd from S. Rutland Rd to I-40 EB Ramp	**$3,963,000**	
17	High	New Location 4 Lanes	New Location from Golden Bear Gateway to Eastgate Blvd	**under construction**	
18	High	Widening 4 Lanes	Golden Bear Gateway from Curd Rd to Lebanon Rd	**$12,324,000**	
19	High	Access Management	N. Mt. Juliet Rd from NW Rutland Rd to Division St	**$9,371,000**	
20	Low	Widening 4 Lanes	W. Division St from Greenhill Rd to N. Mt. Juliet Rd	**$13,110,000**	
1A	High	Intersection	Mt. Juliet/Lebanon Road	**$750,000**	
1B	High	Intersection	Mt. Juliet/Division Street	**$250,000**	
1C	High	Intersection	Mt. Juliet/Old Lebanon Dirt Road	**$250,000**	
1D	Medium	Intersection	Mt. Juliet/NW Rutland Road	**$500,000**	
1E	Medium	Interchange	Mt. Juliet/I-40 Interchange	**$250,000**	
1F	Medium	Intersection	Mt. Juliet/Central Pike	**$2,000,000**	
1G	Medium	Intersection	Mt. Juliet/Providence Way	**$250,000**	
1H	Medium	Interchange	I-40/Central Pike	**$30,000,000**	
1I	High	Interchange	Golden Bear/E. Division St (under construction)	**under construction**	
1J	Low	Mid-Block	Tate Ln/W. Division St; w/Stoner's Creek Greenway	**$50,000**	
2A	Low	Transit: Service	Circulator (30-minute headway, 2 vehicles)	**$170,000/$130,000**	
2B	Medium	Transit: Service	Add 2 additional peak-period runs (4 total)	**$1,560,000**	
2C	Medium	Transit: Sidewalk	Industrial Drive (to Music City Star terminal)	**$140,000**	
2D	High	Transit: Park-and-Ride	Various (south of Music City Star)	**$454,000**	
N/A	High	Transit: Service	Subsidize Peer Ridesharing	**$325,000**	

Lebanon Rd from Benton Douglas Pkwy to Park Glen Dr-Map Id U

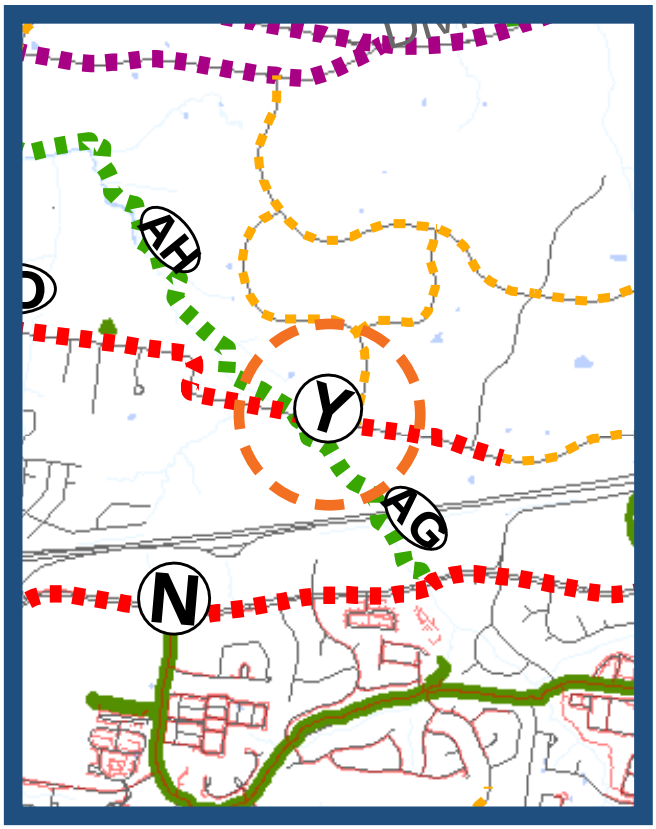
Lead Agency	Mt. Juliet
Type	10’ Sidepath (Multiuse)
Length (miles)	1.4
Estimated Cost to Construct	**$1,100,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Construct a 10’ wide multiuse path (Sidepath) on the north side of Lebanon Road, in back of the curb and gutter. This includes a four (4) foot planting strip (where allowed) and street trees, and curb ramps.
Project Notes	





NW Rutland Road from Mt. Juliet Rd to Hunting Hills Dr–Map Id Y

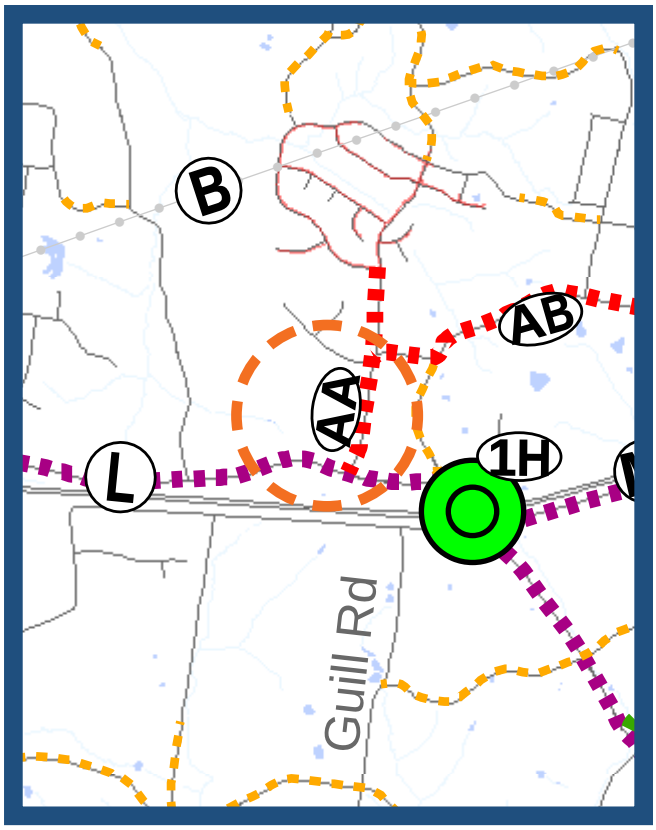
Lead Agency	Mt. Juliet
Type	Sidewalk
Length (miles)	1.5
Estimated Cost to Construct	**$500,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	6’ Sidewalk on both sides of the street
Project Notes	• 6’ sidewalk with planting strip between curb and gutter and sidewalk • Street trees provide shade and extend life of pavement





Pleasant Grove Rd from Triple Crown Ln to Central Pike–Map Id AA

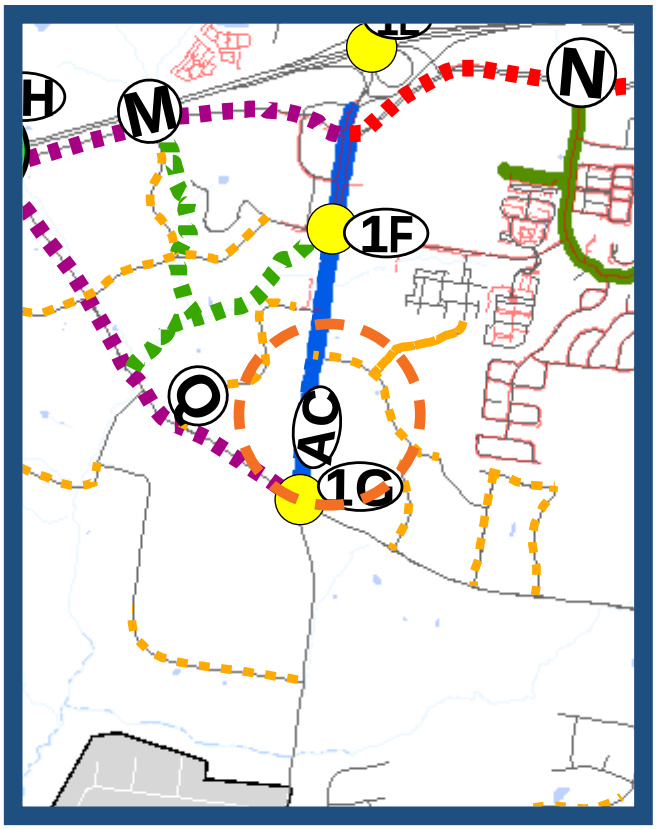
Lead Agency	Mt. Juliet
Type	Sidewalk
Length (miles)	0.6
Estimated Cost to Construct	**$280,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	6’ Sidewalk on one side of the street
Project Notes	• 6’ sidewalk with planting strip between roadway and sidewalk • Street trees provide shade and extend life of pavement

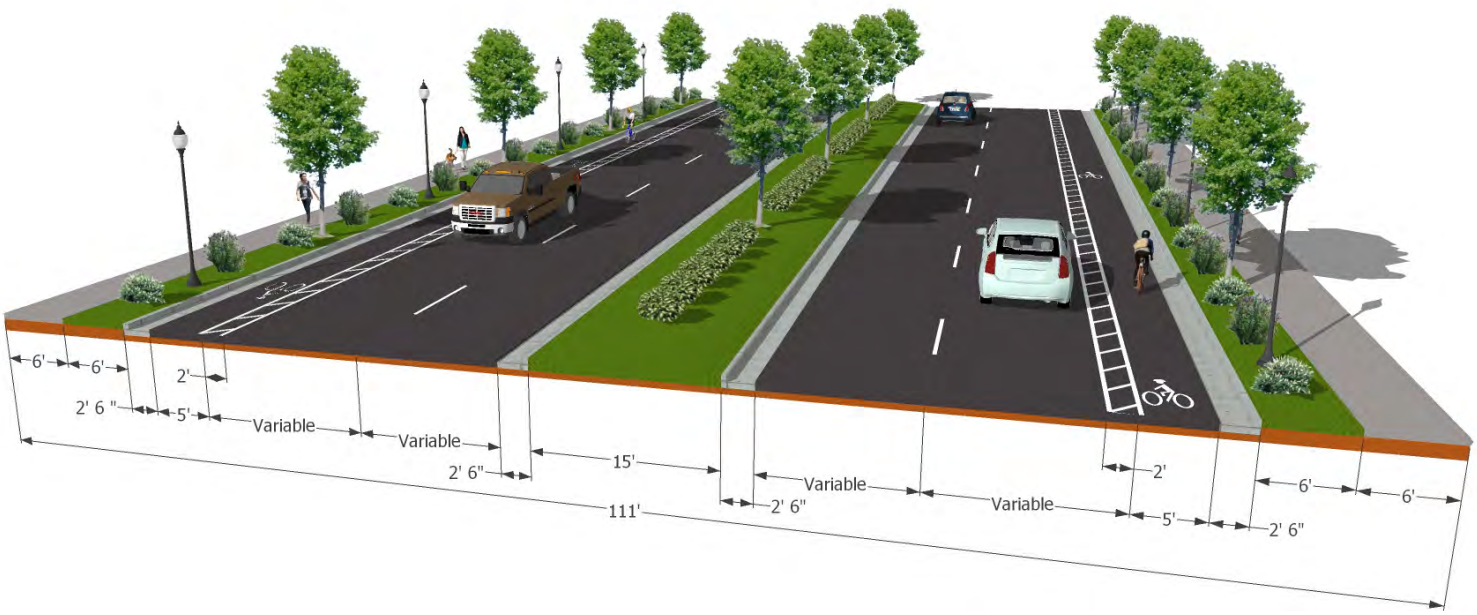




S. Mt. Juliet Rd from Providence Pkwy to Central Pike -Map Id AC

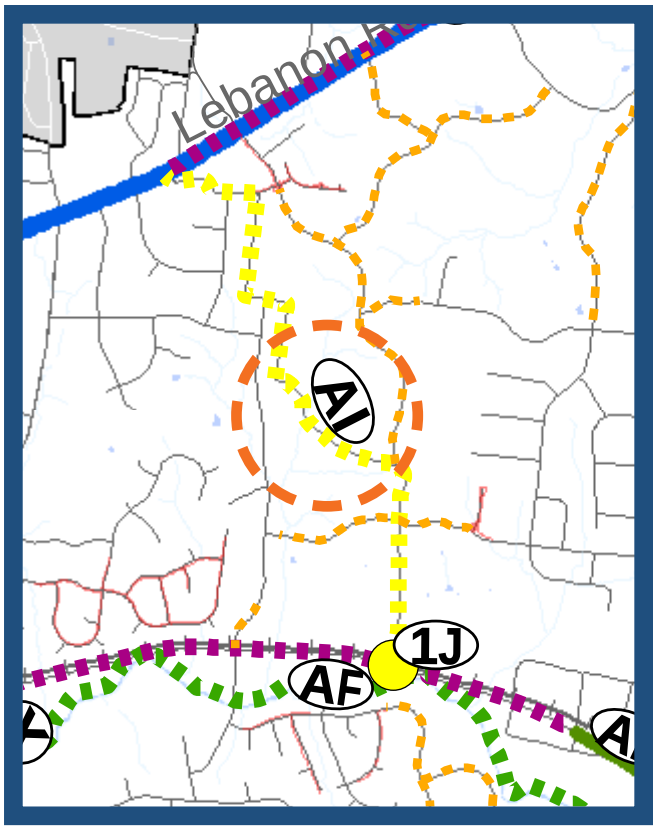
Lead Agency	Mt. Juliet
Type	5’ Bike Lane
Length (miles)	0.7
Estimated Cost to Construct	**$300,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	5’ Buffered Bike Lane on both sides of the street
Project Notes	• Bike lane would connect North Mt. Juliet Road to south side and Providence Development • May require simple widening and restriping • Incorporated with widening project





Tate Lane from Division St to Lebanon Rd- Map Id AI

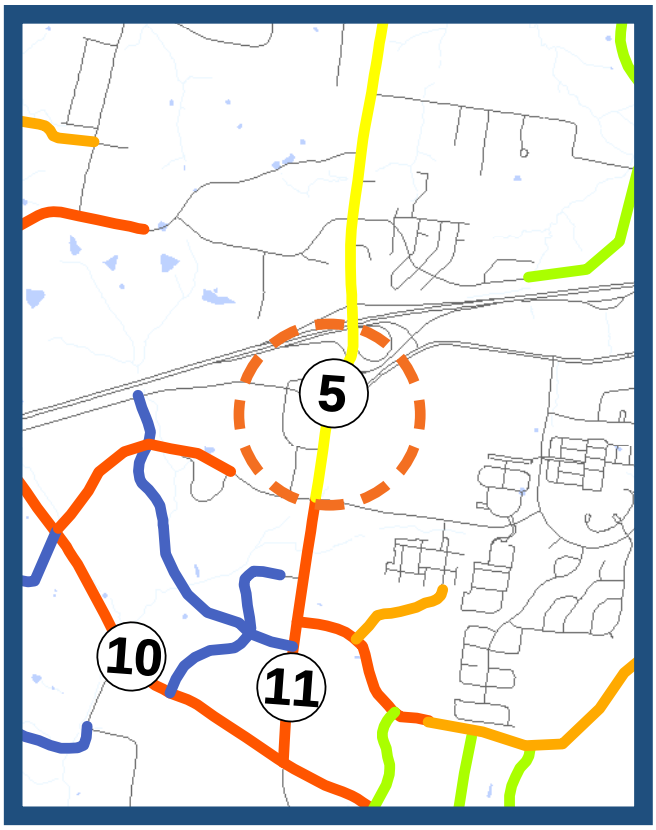
Lead Agency	Mt. Juliet
Type	Shared Bikeway/Road
Length (miles)	1.9
Estimated Cost to Construct	**$560,000**
Air Quality Status	Exempt
Funding Status	Local
Project Description	Bikes share the roadway
Project Notes	• Signage and bike lane stenciling • Sidewalk on one side of roadway

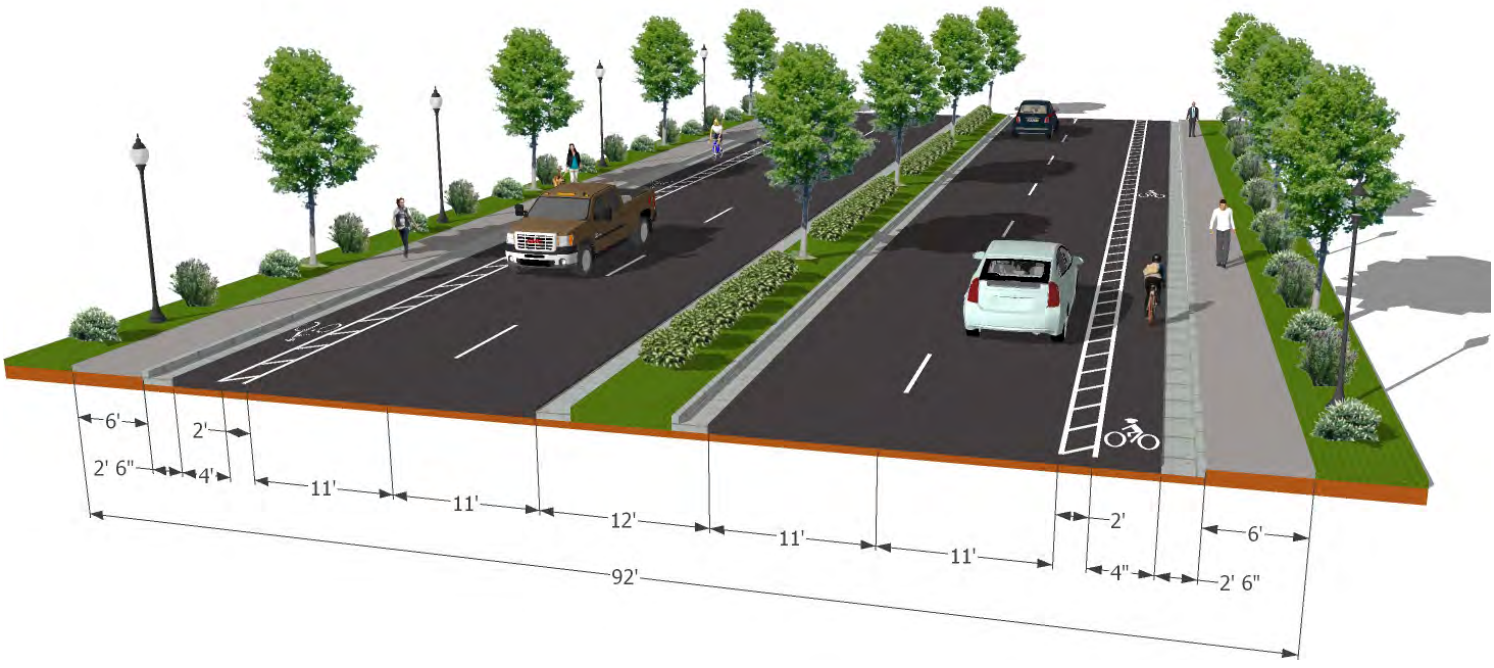




Mt. Juliet Rd from Providence Pkwy to Rutland Rd – Map ID 5

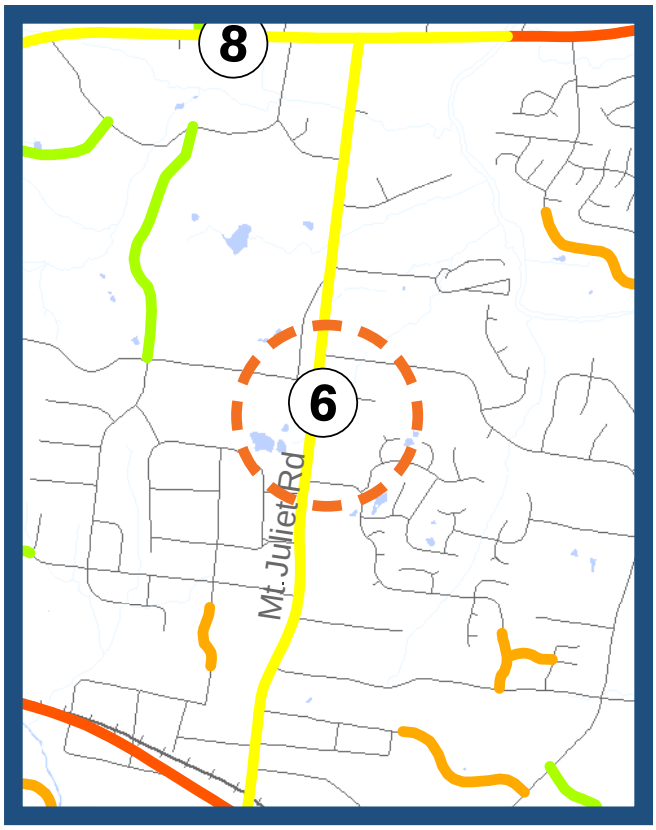
Lead Agency	Mt. Juliet
Type	Access Management
Length (miles)	1.54
Estimated Cost to Construct	**$9,100,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Plantable median pockets with buffered bike lanes and sidewalks on both sides
Project Notes	Assumes a modified or new bridge over I-40. This includes plantable, curbed median pockets along the entire section. Also, this includes driveway consolidation and cross access improvements.

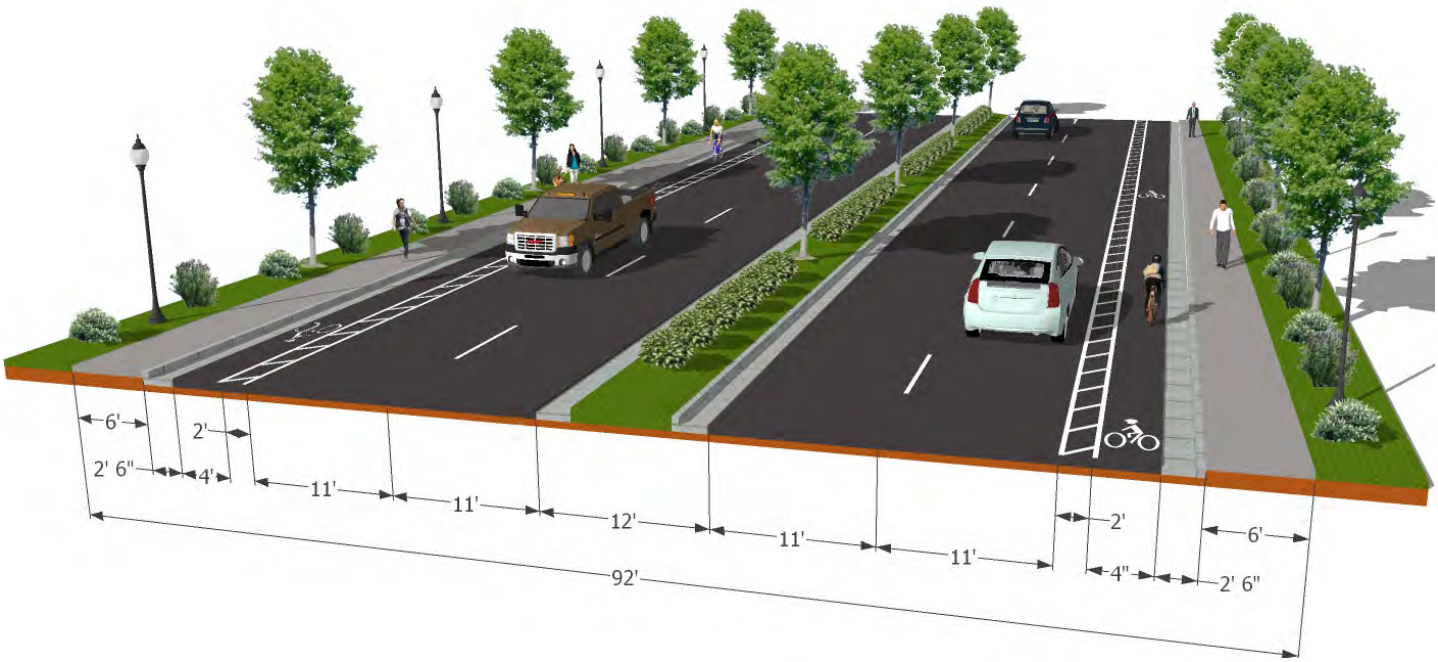




N. Mt. Juliet Rd from W. Division St to Lebanon Rd–Map ID 6

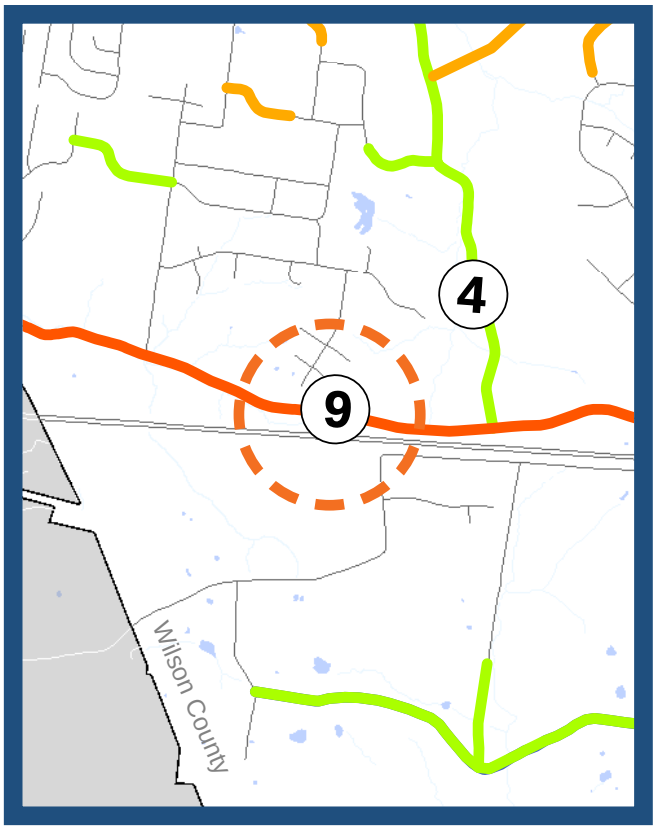
Lead Agency	Mt. Juliet
Type	Access Management
Length (miles)	2.19
Estimated Cost to Construct	**$1,900,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Plantable median pockets with buffered/ protected bike lanes and sidewalks on both sides
Project Notes	• Includes driveway consolidation • Cross access and back-door access

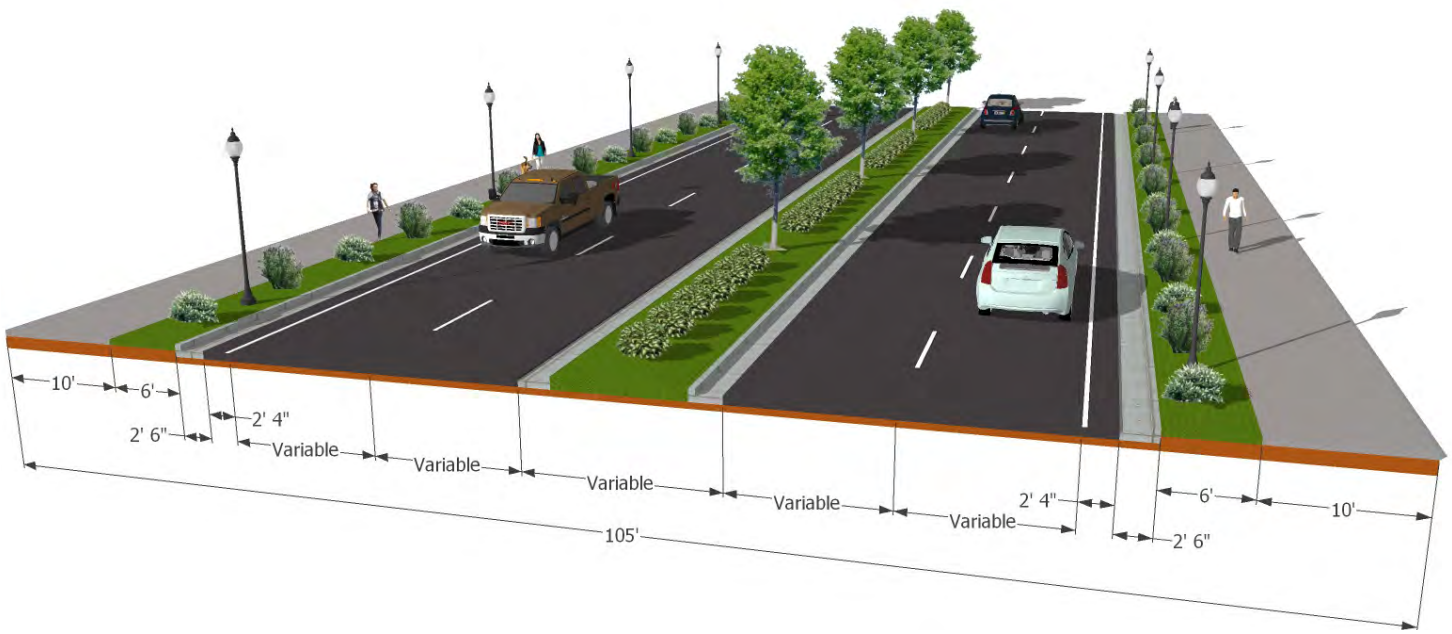




Central Pike from Davidson County Line to Tillman Dr-Map ID 9

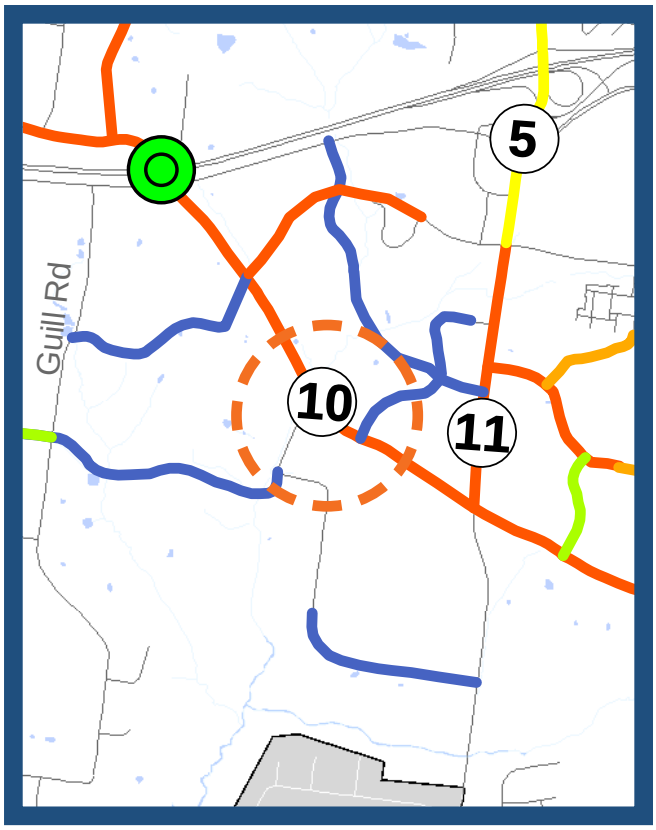
Lead Agency	Mt. Juliet
Type	Widening to 4 lanes divided
Length (miles)	1.73
Estimated Cost to Construct	**$5,964,000**
Air Quality Status	Exempt
Funding Status	IMPROVE Act
Project Description	Minor arterial providing direct access to future I-40/Central Pike Interchange
Project Notes	• Connect residential development to future mixed use node at interchange • Widening should include curb and gutter, sidewalks both sides and street trees.

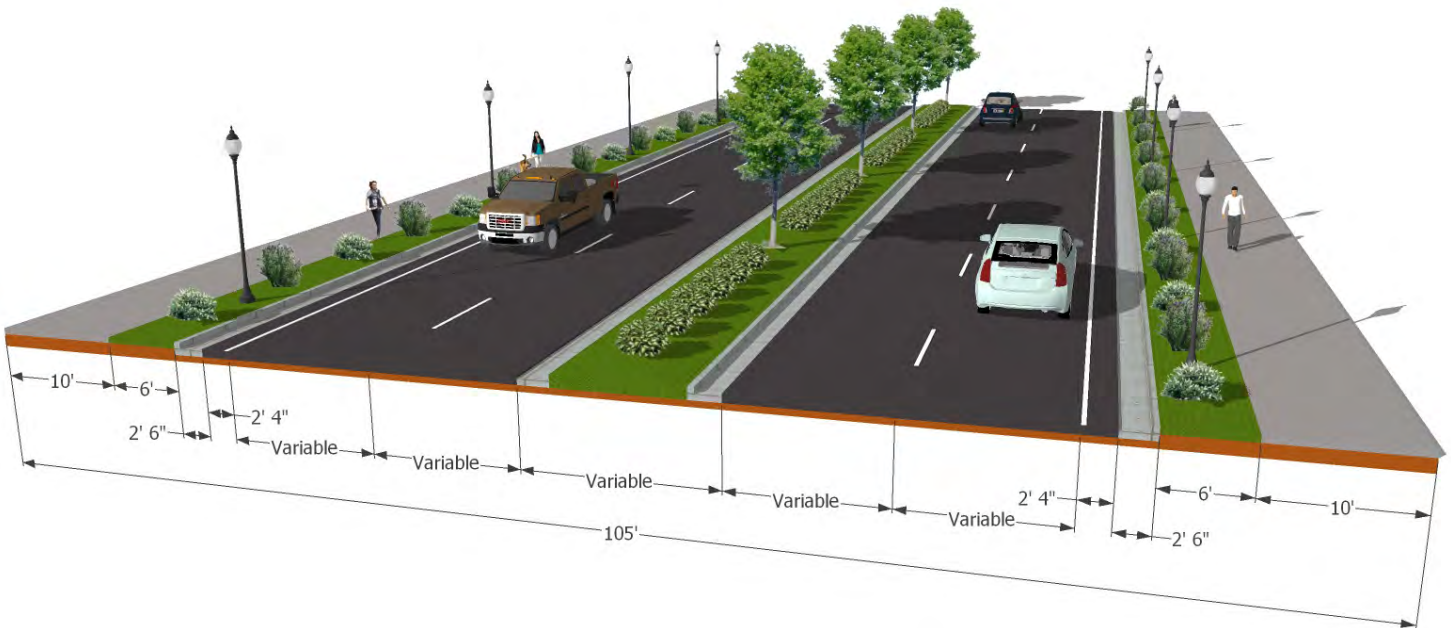




Central Pike from N. Mt. Juliet Rd to Tillman Dr–Map ID 10

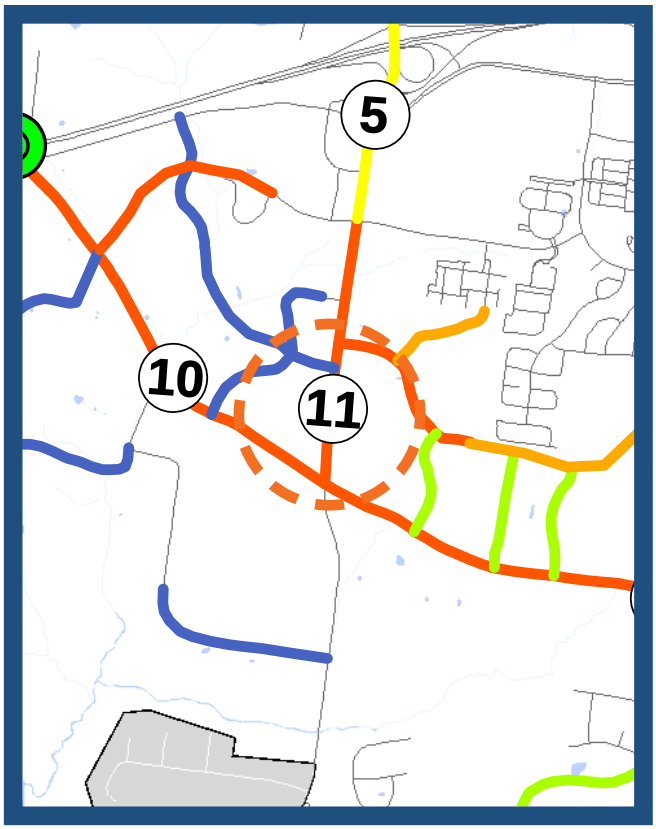
Lead Agency	Mt. Juliet
Type	Widening to 4 Lanes Divided
Length (miles)	1.38
Estimated Cost to Construct	**$8,771,000**
Air Quality Status	Exempt
Funding Status	IMPROVE Act
Project Description	This boulevard will be a vital spine road to the future mixed-use development at the proposed I-40 interchange. Design features should include pedestrian and vehicle lighting, street trees and high quality intersection treatments.
Project Notes	• Limiting or restricting curb cuts should be a priority to protect the mobility and safety of the corridor.

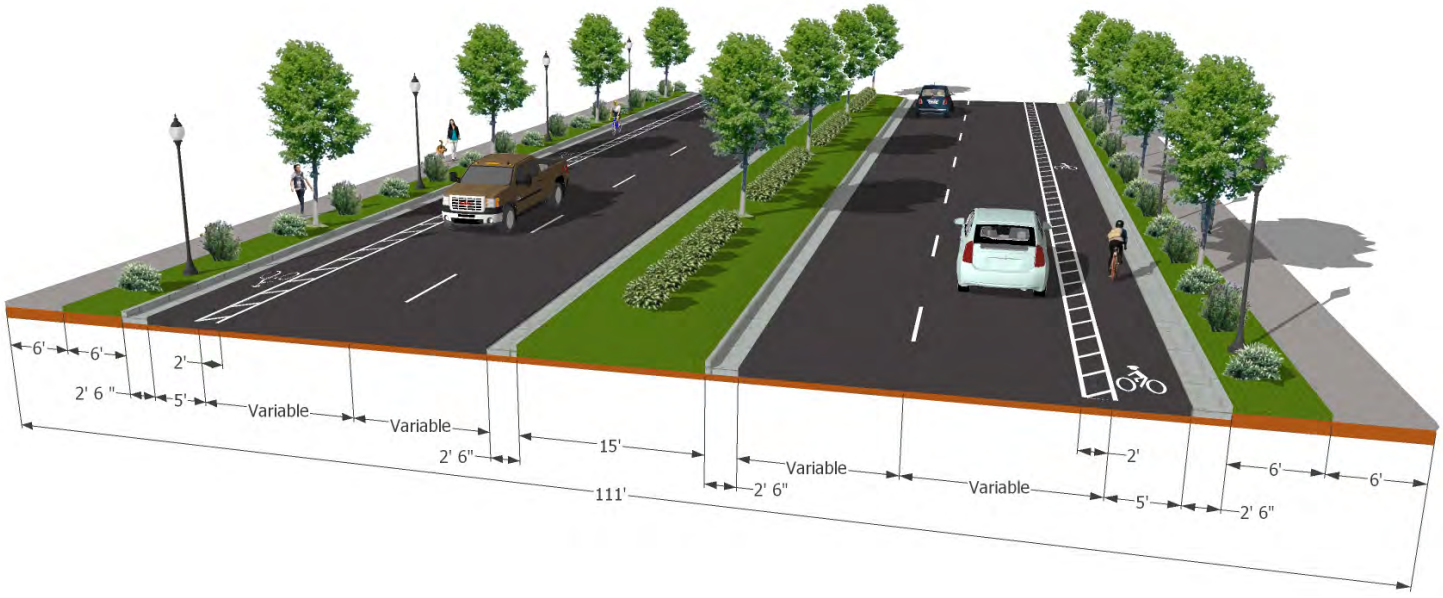




Mt. Juliet Rd from Central Pike to Providence Pkwy- Map Id 11

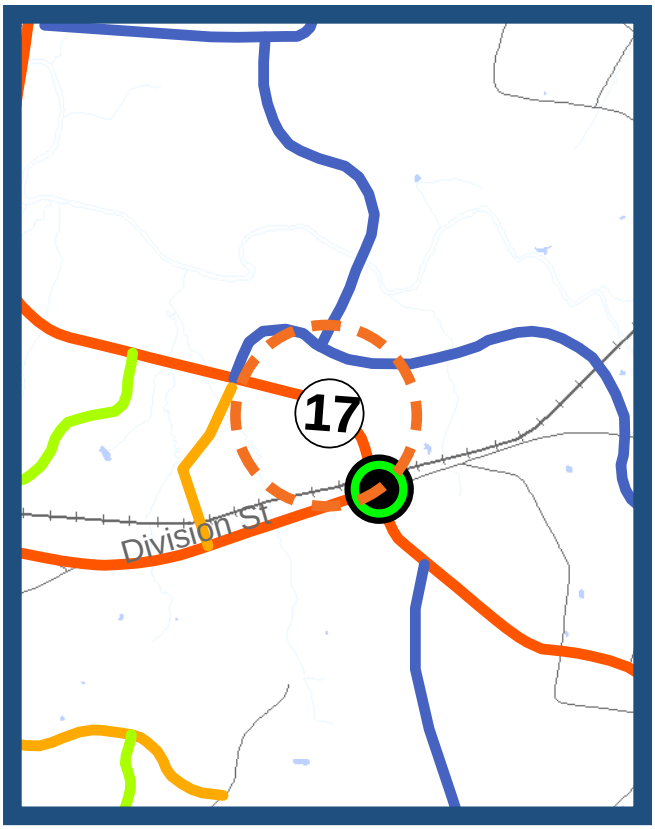
Lead Agency	Mt. Juliet
Type	Widening to 4 Lanes Divided
Length (miles)	0.73
Estimated Cost to Construct	**$4,200,000**
Air Quality Status	Exempt
Funding Status	IMPROVE Act
Project Description	Main North-South mobility corridor
Project Notes	• Connects I-40 to Providence development • Access management will be critical

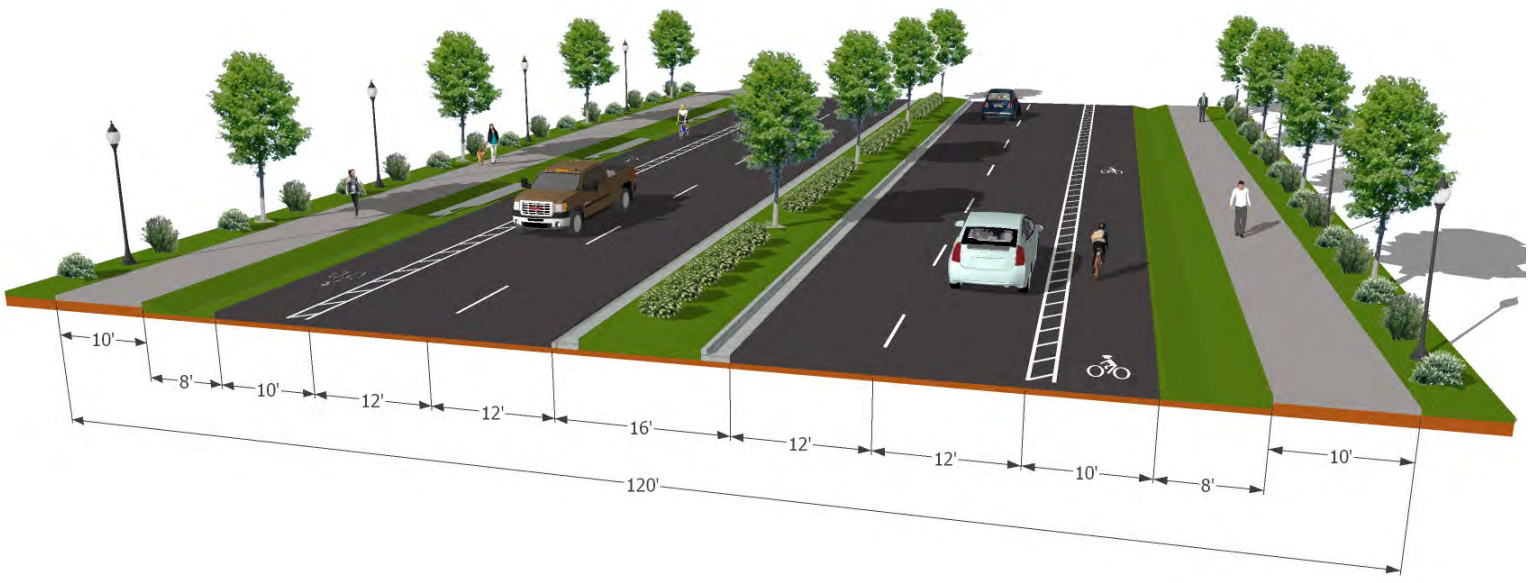




New Location from Golden Bear to Eastgate Blvd–Map Id 17

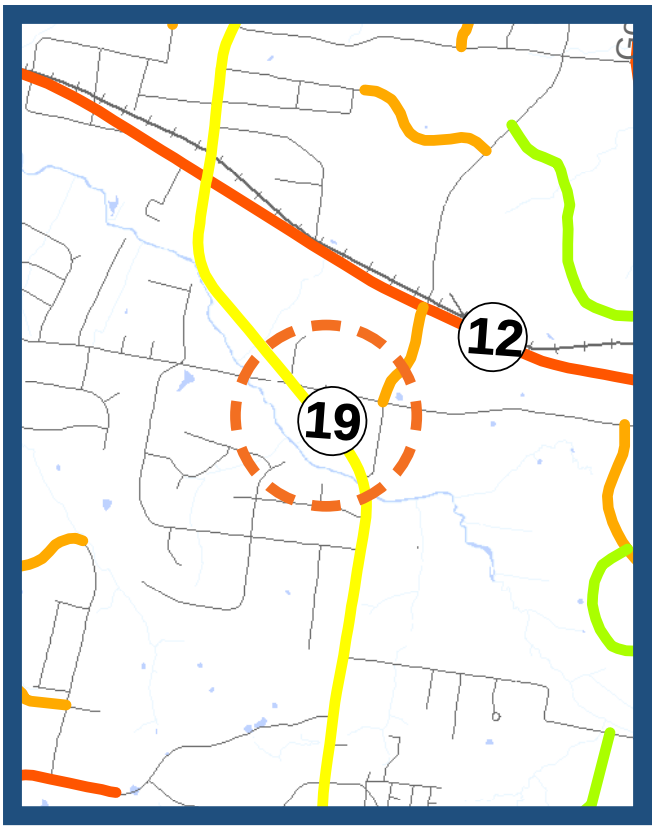
Lead Agency	Mt. Juliet
Type	Widening to 4 Lanes Divided
Length (miles)	2.49
Estimated Cost to Construct	**$18,516,000**
Air Quality Status	Exempt
Funding Status	Funded
Project Description	This boulevard will be a vital spine road through the future Golden Bear Gateway development. Design features should include plantable median pockets, pedestrian and vehicle lighting, street trees and high quality intersection treatments.
Project Notes	• Limiting or restricting curb cuts should be a priority to protect the mobility and safety of the corridor.

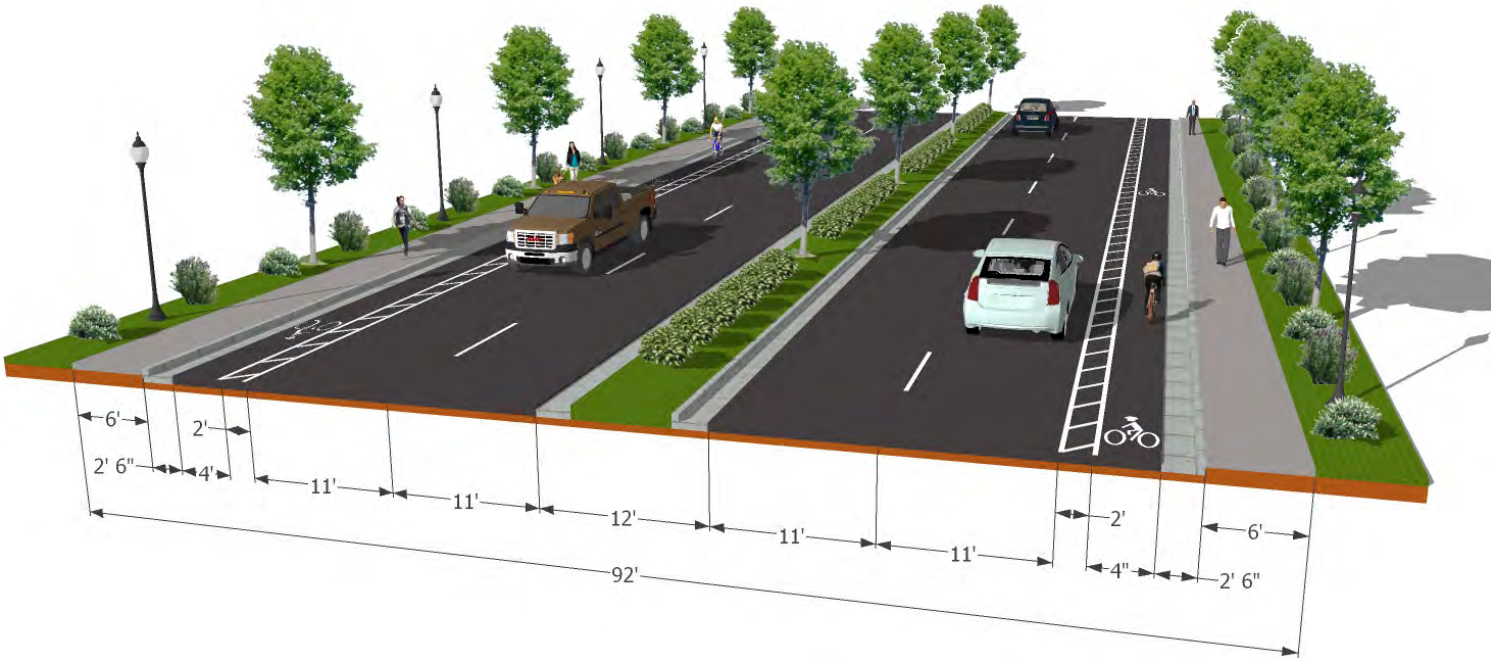




N. Mt. Juliet Rd from NW Rutland Rd to Division St–Map Id 19

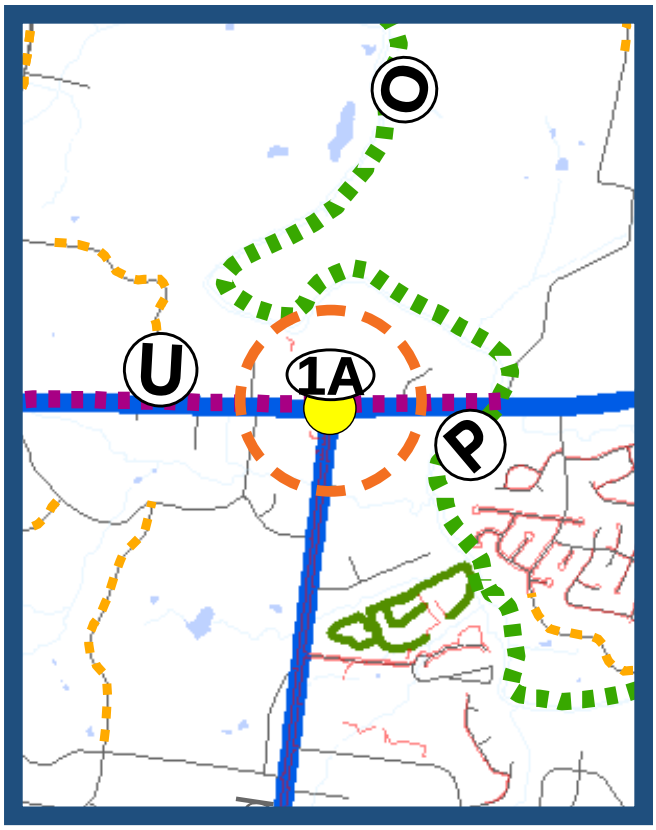
Lead Agency	Mt. Juliet
Type	Access Management
Length (miles)	0.8
Estimated Cost to Construct	**$9,371,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	
Project Notes	

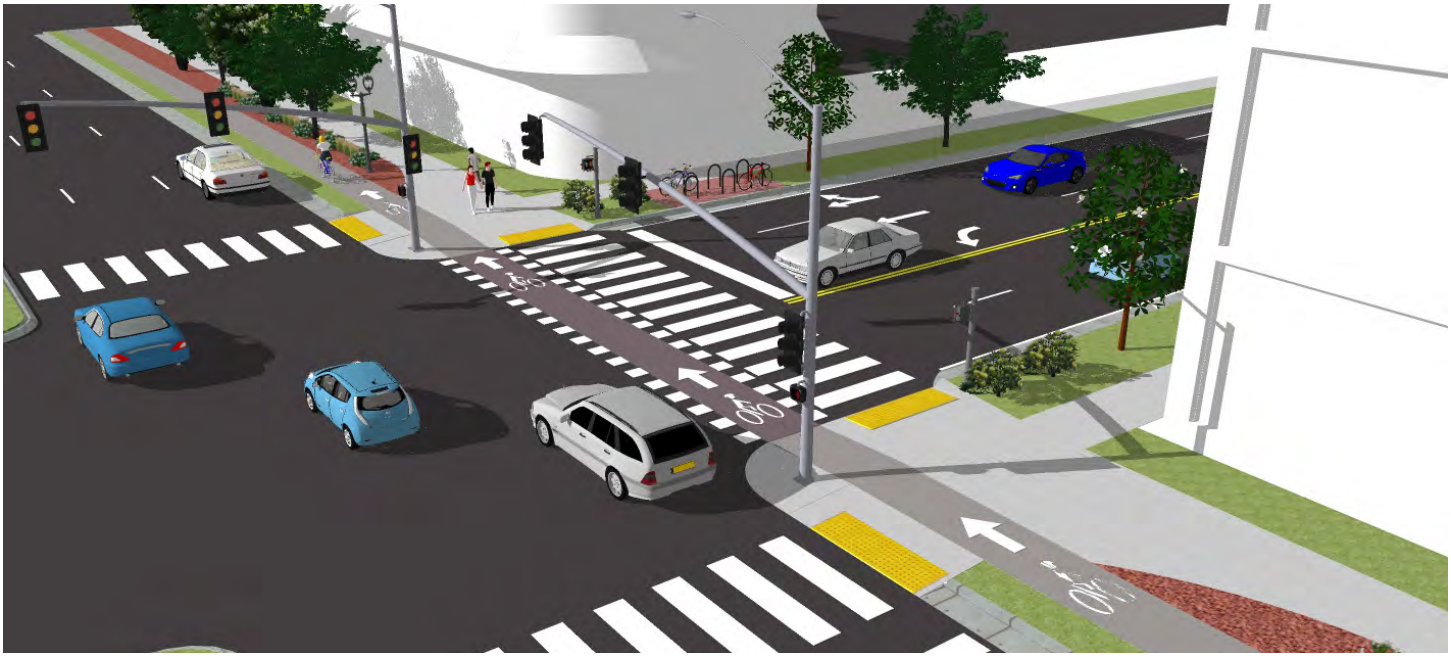




Mt. Juliet & Lebanon Road Intersection-Map Id 1A

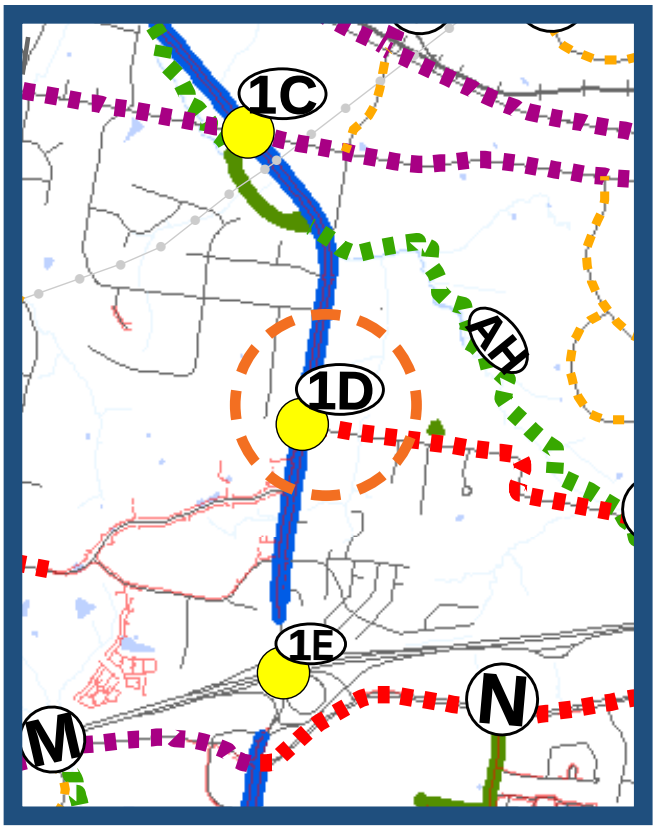
Lead Agency	Mt. Juliet
Type	Intersection
Length (miles)	N/A
Estimated Cost to Construct	**$750,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Intersection is a highly congested, commercial node. Lebanon Road and Mt. Juliet Road both have dedicated bikeways. There is a need to enhance safety and crossings.
Project Notes	• High-Visibility Crosswalks • Pedestrian Countdown Signals • Delineated Bike Boxes and Lane Crossings • Pedestrian-Level Lighting • Street Trees





Mt. Juliet & NW Rutland Road Intersection-Map Id 1D

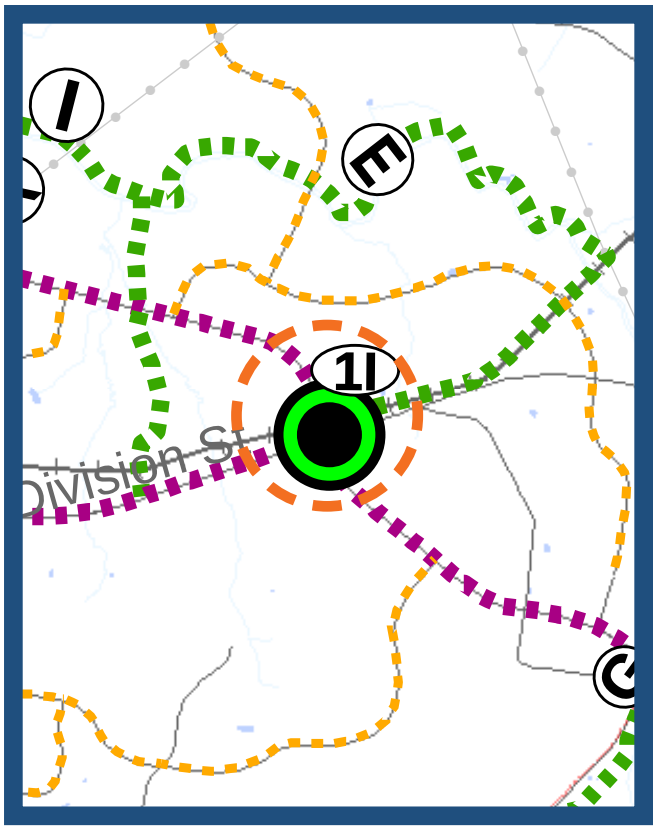
Lead Agency	Mt. Juliet
Type	Intersection
Length (miles)	N/A
Estimated Cost to Construct	**$500,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Crossing improvements, potential signal with extension of Rutland Road.
Project Notes	• Adjacent to Mt. Juliet Christian Academy • High visibility crosswalks • Sidewalk extension along NW Rutland Road • Pedestrian-Level Lighting • Traffic Signal

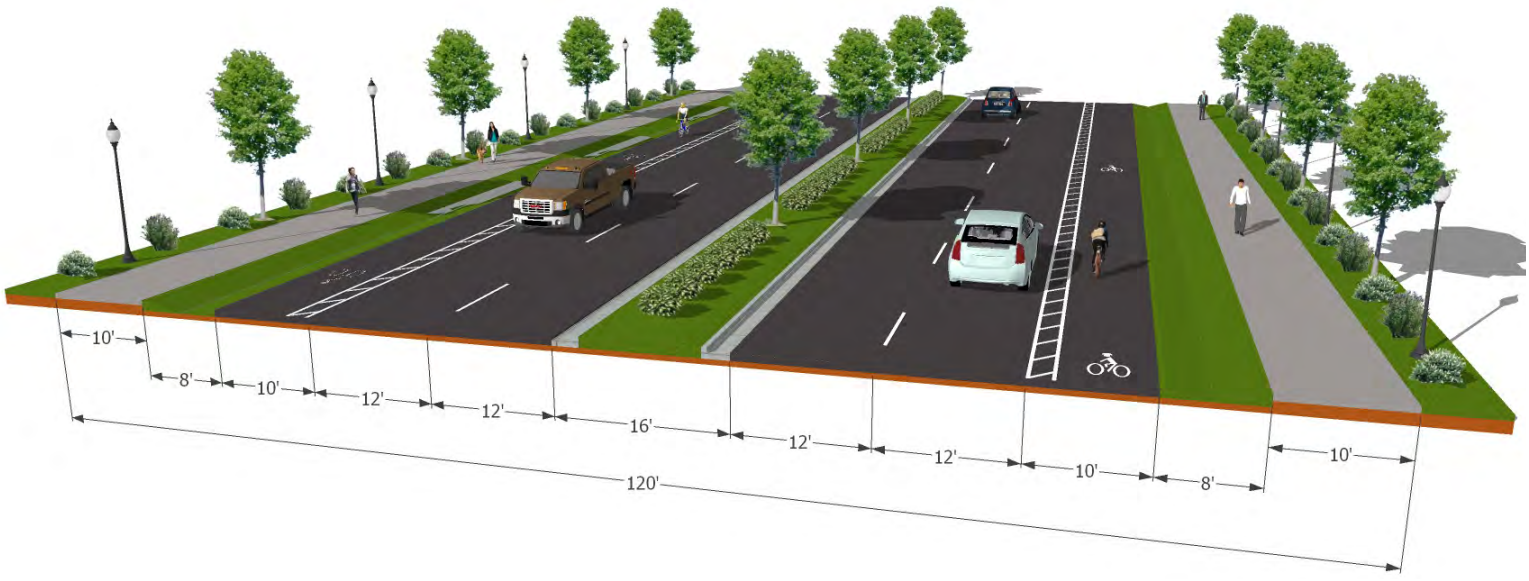




Golden Bear Gateway Interchange-Map Id 1I

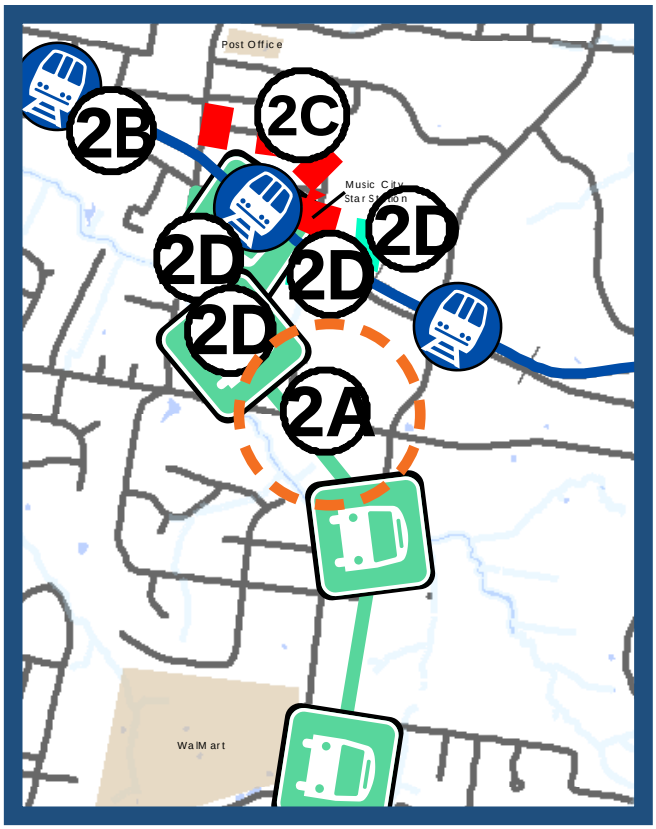
Lead Agency	Mt. Juliet
Type	Interchange
Length (miles)	N/A
Estimated Cost to Construct	-----
Air Quality Status	Exempt
Funding Status	State Government
Project Description	Provides North-South connectivity across railroad
Project Notes	• Currently Under Construction • Need for bicycle and pedestrian amenities across bridge

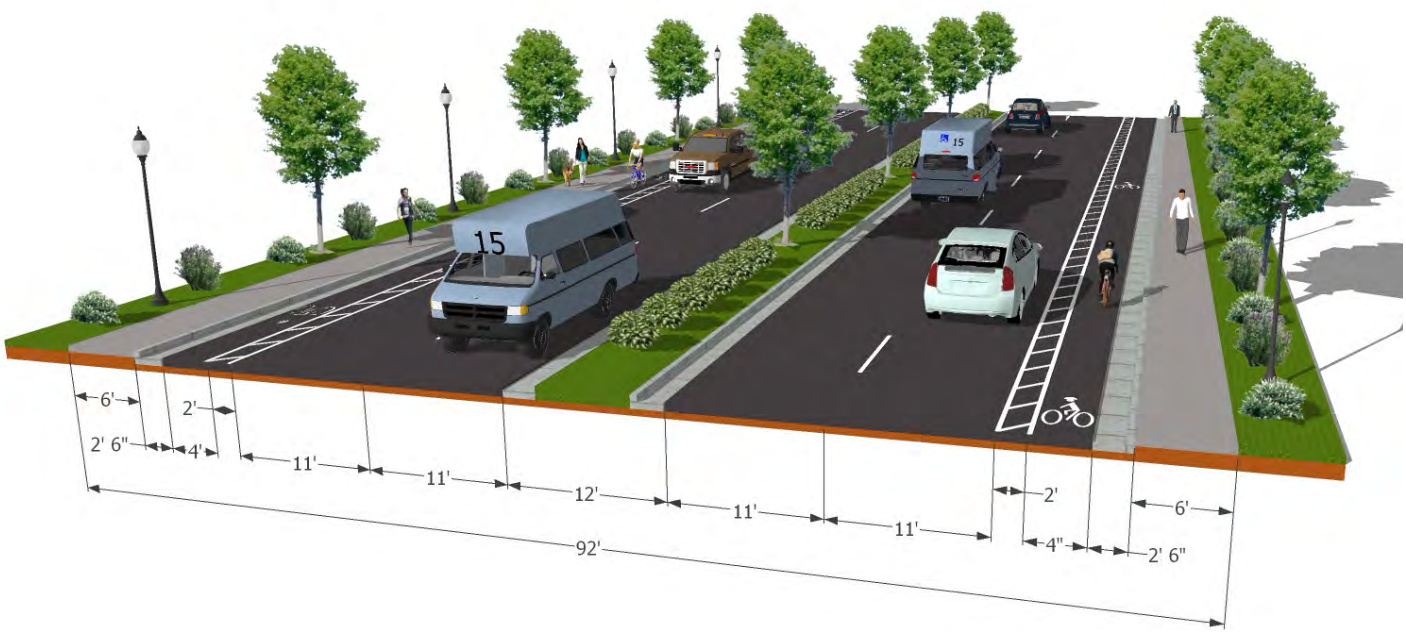




Circulator (30-minute headway, 2 vehicles)–Map Id 2A

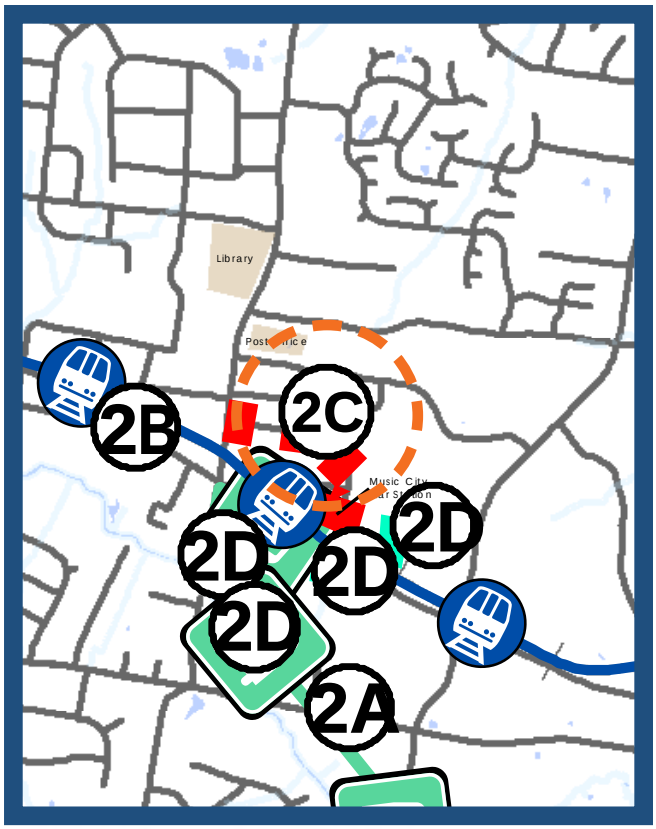
Lead Agency	Mt. Juliet
Type	Transit: Service
Length (miles)	N/A
Estimated Cost to Construct	**$170,000 startup cost; $130,000 annual operational costs**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Provides connectivity from the Providence development to Music City Star along Mt. Juliet Road
Project Notes	• Small Circulator Vehicle (seats 20 persons) • Potential for long term deviated route





Industrial Drive (to Music City Star Terminal)-Map Id 2C

Lead Agency	Mt. Juliet
Type	Transit: Sidewalk
Length (miles)	.42 miles
Estimated Cost to Construct	**$140,000**
Air Quality Status	Exempt
Funding Status	Unfunded
Project Description	Provides pedestrian access to rail station and future transit oriented development
Project Notes	• Improves bicycle and pedestrian connectivity







MJ

APPENDIX B: SR 265 SUBAREA STUDY

Prepared for the City of Mt. Juliet, Tennessee



STATE ROUTE 265 SUBAREA STUDY

Mt. Juliet, Wilson County, TN

Gresham, Smith and Partners
511 Union Street
Suite 1100
Nashville, TN 37219

June 2017

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1.0 INTRODUCTION

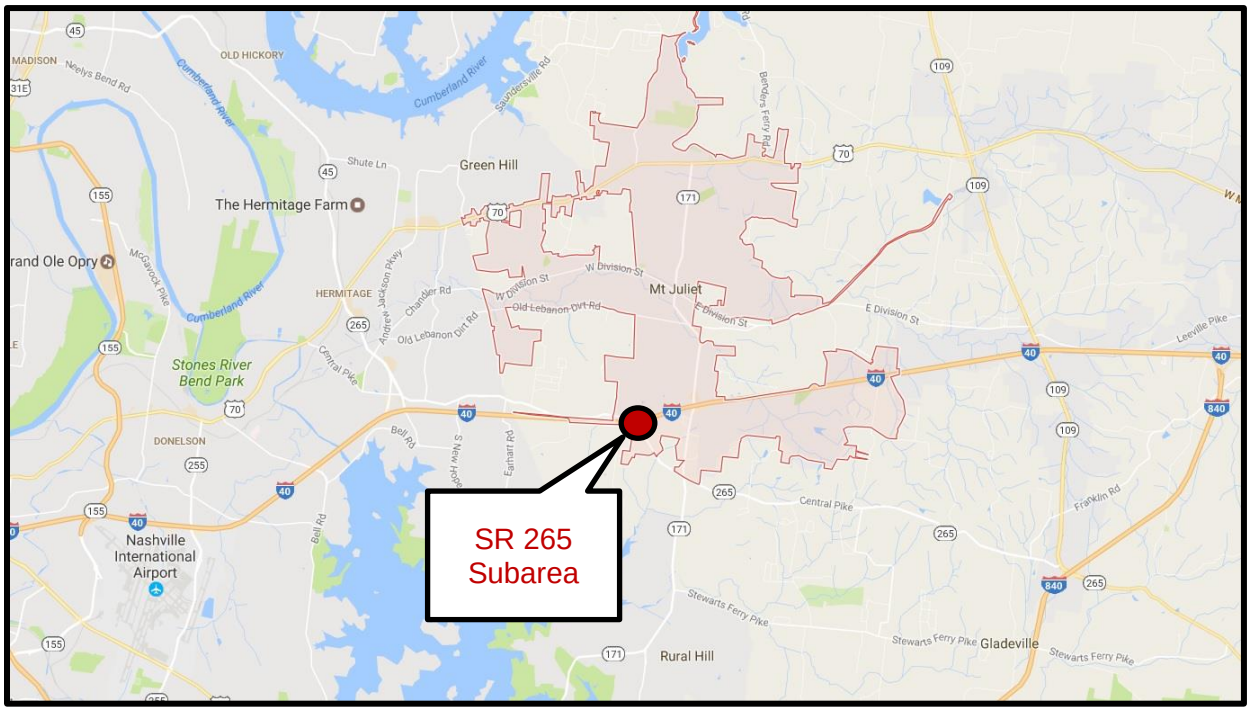
1.1 BACKGROUND

In coordination with the City of Mt. Juliet and the Nashville Area Metropolitan Planning Organization (MPO), it was requested that Gresham, Smith and Partners develop a subarea study for the area of Mt. Juliet located in close proximity to the proposed Central Pike/State Route 265 (SR 265) Interchange with Interstate 40 (I-40). The City of Mt. Juliet has experienced rapid growth in the last 25 years. The Mt. Juliet area has potential for additional development both north and south of the I-40 corridor, particularly surrounding SR 265. This rapid growth, and associated increase in traffic volumes, support the need for transportation network improvements in order to maintain acceptable traffic operations, provide additional connectivity in the area, and permit the proposed interchange to function adequately throughout its design life. This study examines current conditions and future demand on the transportation network within the study area and makes recommendations for projects that will address existing capacity and safety needs and also help manage future congestion due to growth.

1.2 STUDY LOCATION

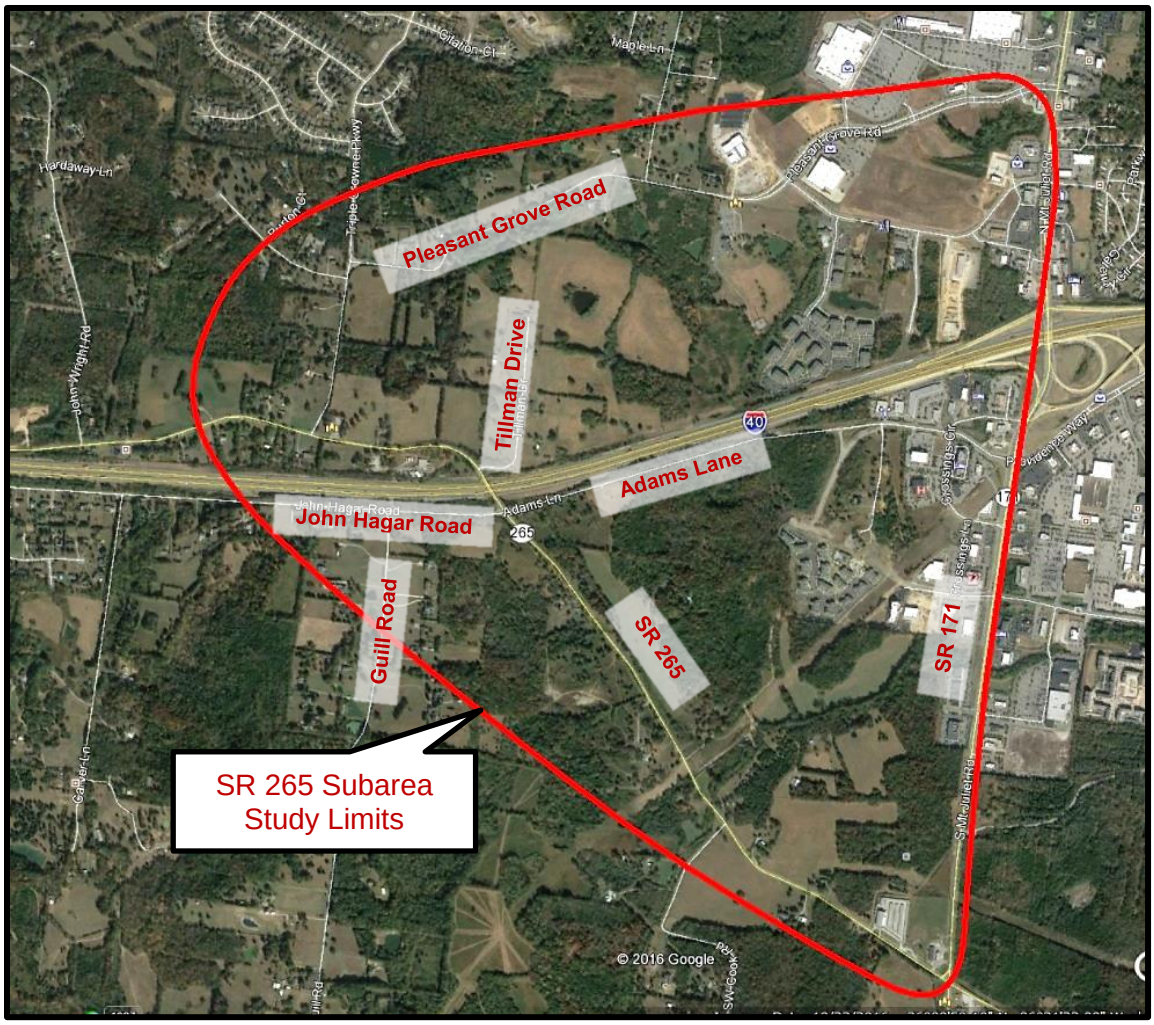
The project location of the SR 265 Subarea Study is shown conceptually in Exhibit 1-1. As shown, the area focuses on the proposed SR 265 interchange with I-40 and the adjacent roadway network and development within the City of Mt. Juliet in Wilson County.

EXHIBIT 1-1 PROJECT LOCATION OF SR 265 SUBAREA STUDY



The study limits of this SR 265 Subarea Study are shown conceptually in Exhibit 1-2. As shown, the area focuses on the proposed SR 265 interchange with I-40 and the adjacent roadway network to the east towards SR 171 and its existing interchange with I-40.

EXHIBIT 1-2 SR 265 SUBAREA STUDY LIMITS



1.3 STUDY OBJECTIVE

The City of Mt. Juliet has developed a future land use plan for the City, which accounts for the proposed SR 265 interchange at I-40. The future land use varies fairly significantly compared to the current zoning within the SR 265 Subarea. In anticipation of the proposed SR 265 interchange, this study will specifically address the existing and future transportation, land use, and multimodal issues, concerns, and opportunities within the Subarea.

This study examines existing and projected traffic volumes, roadway capacity needs, roadway connectivity, existing and planned bicycle and pedestrian facilities, existing land use and zoning, and development trends. Transportation system needs are identified as part of the analysis, and infrastructure improvements are identified to address the needs. Previously completed transportation and land use studies within the City of Mt. Juliet and Wilson County were reviewed and considered as part of this study. The recommended transportation system improvements are discussed and cost estimates developed.

2.0 EXISTING CONDITIONS

To establish a baseline for analysis, existing conditions within the SR 265 Subarea were inventoried. Existing roadways, bicycle and pedestrian facilities, public transit, railways, land use and zoning within the study area have been identified and described as follows.

2.1 ROADWAY NETWORK

Interstate 40 is classified by the Mt. Juliet Major Thoroughfare Plan (MTP) as an interstate. I-40, shown in Exhibit 2-1, generally travels in an east-west direction and provides local connectivity between Metro Nashville and Wilson County and regional access between Little Rock, Arkansas and Asheville, North Carolina. Within the study area, I-40 is an eight-lane, controlled access facility with eastbound and westbound traffic divided by a concrete median.

EXHIBIT 2-1 EASTBOUND I-40



EXHIBIT 2-2 WESTBOUND SR 265 NEAR S. MT. JULIET ROAD



SR 265 generally travels in an east-west direction and provides access between Highway 70 in Hermitage and Highway 70 in Watertown. The Mt. Juliet MTP classifies SR 265 as a collector. SR 265 is functionally classified as a minor arterial by TDOT's Long Range Planning Division. Within the Subarea, SR 265 is a two-lane roadway with 11-foot travel lanes and minimal shoulder. The speed limit is posted at 35 mph. Currently, there are no sidewalks or bike lanes along SR 265 within the Subarea.

Pleasant Grove Road extends north from SR 265 approximately 1,800 feet west of I-40. At the intersection with Triple Crown Parkway, Pleasant Grove Road turns to the east and provides a connection to N. Mt. Juliet Road (SR 171). Pleasant Grove Road is functionally classified as a major collector by TDOT's Long Range Planning Division and as a local access street in the City of Mt. Juliet's MTP. Pleasant Grove Road, shown in Exhibit 2-3, has 11-foot travel lanes in each direction and minimal shoulder. The speed limit is posted at 35 mph. There are no sidewalks; however, there is a sign posted for drivers to give adequate distance for cyclists. Near N. Mt. Juliet Road, Pleasant Grove Road widens to four-lanes with a median and left turn lanes. There is sidewalk and curb-and-gutter provided, and the speed limit is reduced to 30 mph.

EXHIBIT 2-3 WESTBOUND PLEASANT GROVE ROAD

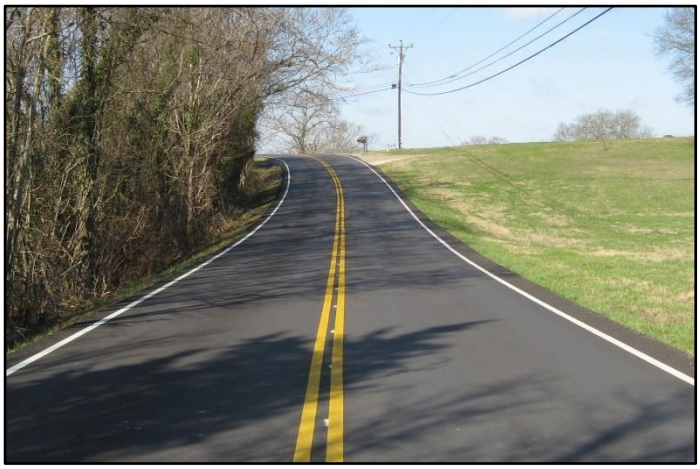


EXHIBIT 2-4 WESTBOUND JOHN HAGAR ROAD



John Hagar Road extends west from SR 265 just south of I-40 and provides access to New Hope Road near Percy Priest Lake in Davidson County. John Hagar Road intersects SR 265 directly across from Adams Lane. John Hagar Road, shown in Exhibit 2-4, has one 11-foot travel lane in each direction with no shoulder. There are no bicycle or pedestrian accommodations along John Hagar Road within the Subarea. It is classified as a local access street according to the Mt. Juliet MTP. The speed limit is posted at 40 mph.

Adams Lane extends east from SR 265 directly across from John Hagar Road and provides access to S. Mt. Juliet Road at Providence Way. The Mt. Juliet MTP classifies Adams Lane as a local access street. Adams Lane has one 11-foot travel lane in each direction with no shoulder. There is a weight limit sign for large trucks. There are no bicycle or pedestrian accommodations. The speed limit is posted at 40 mph. However, near S. Mt. Juliet Road, the speed limit is reduced to 20 mph.

EXHIBIT 2-5 EASTBOUND ADAMS LANE



EXHIBIT 2-6 NORTHBOUND TILLMAN DRIVE



Tillman Drive extends east from SR 265 just north of I-40 and provides access to private residential properties. Tillman Road is very narrow, with a total pavement width of approximately 15-16 feet. Just east of SR 265, Tillman Road turns north and is a gravel road, as shown in Exhibit 2-6. It is classified as a local access street according to the Mt. Juliet MTP. The speed limit is not posted.

EXHIBIT 2-7 SOUTHBOUND GUILL ROAD



Guill Road is a local access street that provides access to residential homes. Guill Road extends south from John Hagar Road just west of SR 265 and provides a connection to Alvin Sperry Road. Guill Road has one travel lane in each direction with a total pavement width of approximately 20 feet. The speed limit is not posted and there are no pedestrian or bicycle facilities.

EXHIBIT 2-8 NORTHBOUND SR 171



SR 171 (Mt. Juliet Road) is functionally classified as a minor arterial by TDOT's Long Range Planning Division and as an arterial in the City of Mt. Juliet's MTP. SR 171 provides a connection between Highway 70 in north Mt. Juliet and I-24 near LaVergne. Near I-40, SR 171 has two travel lanes in each direction with center turn lanes. The speed limit is posted at 30 mph. There is sidewalk, paved shoulder, and curb-and-gutter along this portion of SR 171. South of the Providence Marketplace, SR 171 narrows to one travel lane in each direction and the speed limit increases to 45 mph. Along this portion of SR 171, shown in Exhibit 2-8, there is a wide paved shoulder and it is signed as a route with a bike lane. It should be noted that within the Subarea, SR 171 is designated as N. Mt. Juliet Road north of I-40 and S. Mt. Juliet Road south of I-40.

The **intersection of SR 265 and John Hagar Road/Adams Lane** is a four-legged intersection that is controlled by a stop sign on John Hagar Road and Adams Lane. In addition to the stop signs, there are pavement markings/strips and flashing red lights, shown in Exhibit 2-9, on John Hagar Road and Adams Lane. There are also intersection signs and flashing yellow lights on SR 265. This intersection is located just south of the I-40 overpass. As a result, sight distance when looking toward the overpass is limited, as shown in Exhibit 2-10.

EXHIBIT 2-9 WESTBOUND ADAMS LANE AT SR 265

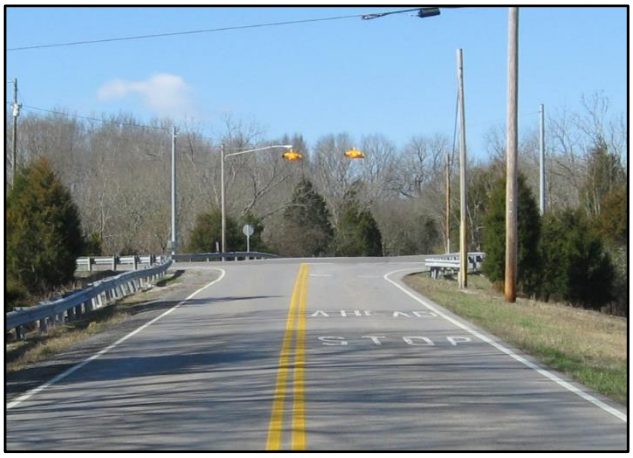


EXHIBIT 2-10 NORTHBOUND VIEW OF SR 265 FROM JOHN HAGAR ROAD



The **intersection of SR 265 and Tillman Drive** is a T-intersection that is controlled by a stop sign on Tillman Drive, shown in Exhibit 2-11. This intersection is located just north of the I-40 overpass. Just north of the intersection, SR 265 curves to the west, as shown in Exhibit 2-12. Sight distance is limited when looking both ways from Tillman Drive.

EXHIBIT 2-11 WESTBOUND TILLMAN DRIVE AT SR 265



EXHIBIT 2-12 NORTHBOUND VIEW OF SR 265 FROM TILLMAN DRIVE



The **intersection of SR 265 and Pleasant Grove Road** is a T-intersection that is controlled by a stop sign on Pleasant Grove Road. In addition to the stop sign, there are flashers on all three approaches. Sight distance is an issue due to Pleasant Grove Road being hidden from view for drivers traveling westbound on SR 265, as shown in Exhibit 2-13. There are no turn lanes provided along SR 265. The southbound approach on Pleasant Grove Road, shown in Exhibit 2-14 includes a shared lane for left and right turns.

EXHIBIT 2-13 WESTBOUND SR 265 AT PLEASANT GROVE ROAD



EXHIBIT 2-14 SOUTHBOUND PLEASANT GROVE ROAD AT SR 265



The **intersection of Pleasant Grove Road and Triple Crowne Parkway** is a T-intersection that is all-way stop controlled. Pleasant Grove Road forms the westbound and northbound approaches. The northbound approach on Pleasant Grove Road, shown in Exhibit 2-15, has a channelized right turn lane, but no storage length. The westbound approach on Pleasant Grove Road, shown in Exhibit 2-16, consists of a shared left and right turn lane. The southbound approach on Triple Crown Parkway has a left turn lane.

EXHIBIT 2-15 NORTHBOUND PLEASANT GROVE ROAD AT TRIPLE CROWN PARKWAY



EXHIBIT 2-16 WESTBOUND PLEASANT GROVE ROAD AT TRIPLE CROWN PARKWAY



EXHIBIT 2-17 EASTBOUND SR 265 AT SR 171



The **intersection of SR 265 and SR 171** is a four-legged intersection that is controlled by a traffic signal. The northbound and southbound approaches on SR 171 include a left turn lane and a shared through and right turn lane. The eastbound and westbound approaches on SR 265 includes a shared left, through, and right turn lane, as shown in Exhibit 2-17.

2.2 BICYCLE & PEDESTRIAN FACILITIES

There are currently very limited bicycle and pedestrian facilities within the SR 265 Subarea. The only sidewalks are located along SR 171 in the vicinity of Providence Marketplace. The only marked bicycle facility is along SR 171 south of I-40. It is signed as a bike lane. However, it is actually just a wide shoulder with no pavement markings.

2.3 PUBLIC TRANSIT

There is no existing fixed-route public transportation within the City of Mt. Juliet. Mid Cumberland Public Transit does offer on-demand van service, but it is not regularly-scheduled and reservations must be made in advance. SR 171 is signed with directions to the Music City Star commuter train stop.

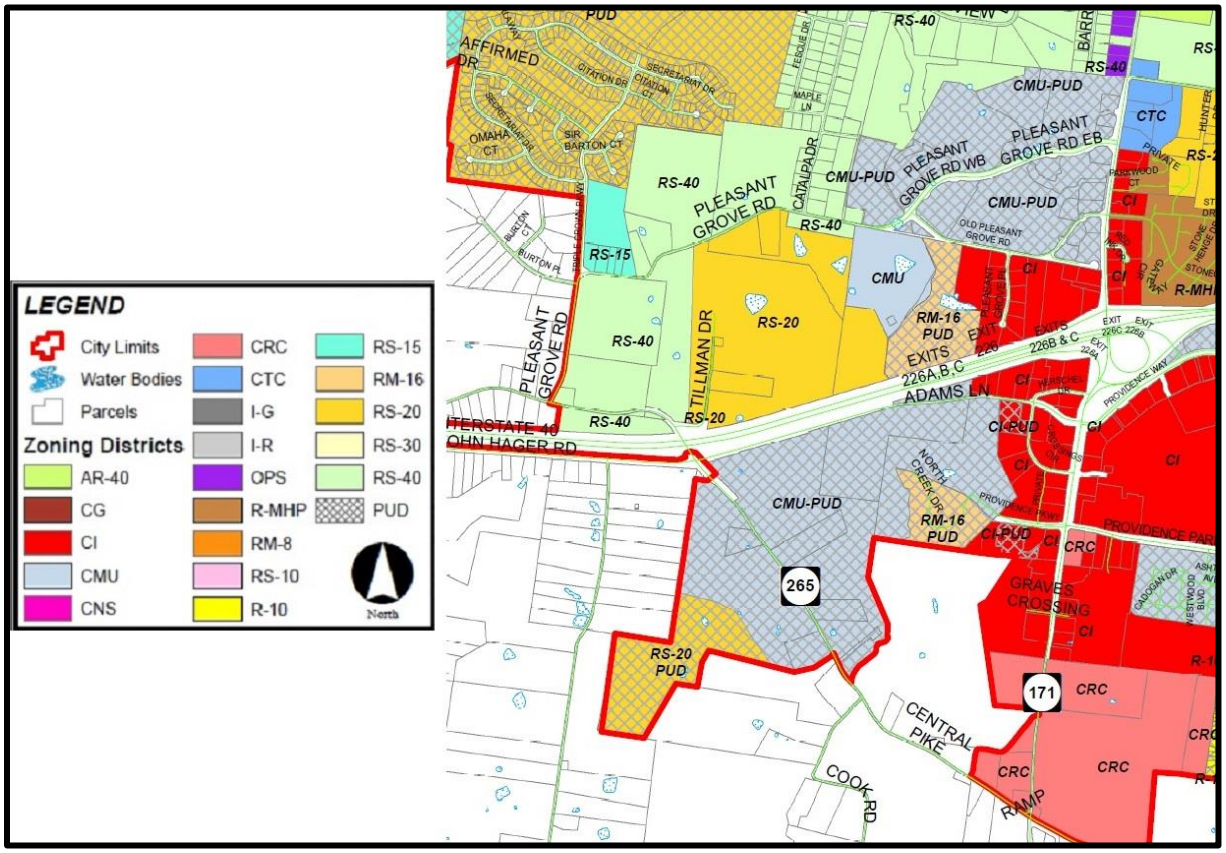
2.4 RAILWAYS

There are no railways within the SR 265 Subarea. However, the Music City Star links Nashville to Mt. Juliet and Lebanon. This service has a stop north of the Subarea near downtown Mt. Juliet. While the Music City Star does not directly impact the SR 265 Subarea, it does represent a rail corridor with potential to generate new population centers within the City.

2.5 LAND USE & ZONING

Currently, there is a mix of residential and commercial and uses within the SR 265 Subarea. North of I-40, the majority of the area is zoned low-density single-family residential. South of I-40, much of the area is currently undeveloped, but zoned as a Planned Unit Development (PUD). There are two newly-constructed multi-family developments within the Subarea. Glass Creek Apartment complex is located on the north side of I-40, and Creekside at Providence is located on the south side of I-40. The commercial development within the Subarea is located along the eastern portion of the study area along SR 171 and concentrated near the SR 171 interchange with I-40. The existing zoning within the SR 265 Subarea is shown in Exhibit 2-18 shows the city's recent growth trend.

EXHIBIT 2-18: SR 265 SUBAREA EXISTING ZONING



The existing land use within the SR 265 Subarea reflects potential to grow and develop, especially as traffic and access accommodations improve. The City of Mt. Juliet has seen high population and development growth over the past 25 years with a special census population of 28,159 in 2015. Exhibit 2-19 shows the city's recent growth trend.

EXHIBIT 2-19: MT. JULIET POPULATION GROWTH TRENDS (1990 – 2015)

Year	Population	Average Change Per Year
1990	5,389	
2000	12,366	12.9%
2010	24,548	9.9%
2015*	28,159	3.3%

Source: U.S. Census Bureau
**Based on Special Census*

Several factors influence this growth trend. As previously mentioned, I-40 is included within the SR 265 Subarea. In addition, SR 840, I-65, and I-24 are all within close proximity to Mt. Juliet. There are several major retail and mixed use developments located within or in close proximity to the study area, including Providence Marketplace, Providence Commons, and The Paddocks. Also, given that Mt. Juliet is seated approximately 12 miles east of Metro Nashville, it is quickly becoming a popular suburb for those relocating to the Nashville area.

3.0 KEY TRANSPORTATION ISSUES

3.1 REVIEW OF RELEVANT STUDIES

A review was performed of relevant planning, traffic, multi-modal, and roadway network studies and reports within the SR 265 Subarea. The following is a summary of the relevant studies reviewed. Key pages from each of the relevant studies are included in the Attachments.

Nashville Area Metropolitan Planning Organization (MPO)

- Tri-County Transportation & Land Use Study, February 2012: This document identifies US 70/SR 24 (Lebanon Road) as a growth corridor, with an associated growth center located between US 70/SR24 and I-40 immediately east of the Davidson/Wilson County line, an area that includes SR 265 Subarea. The growth center is projected to be primarily suburban in character with an activity center located in the southern portion of the study area. Specifically, SR 171 within the SR 265 Subarea is identified as a gateway but with significant transportation issues. The 2030 corridor vision is shown to widen this portion of SR 171 to a four-lane median-divided corridor from I-40 through the intersection with SR 265.
- 2040 Regional Transportation Plan, February 2016: This plan recommends a series of improvements to the SR 265 and Mt. Juliet Road corridors. Proposed improvements include the reconstruction and widening of Central Pike from Old Hickory Boulevard in Nashville to Mt. Juliet Road in Mt. Juliet, with a new interchange at I-40. Mt. Juliet Road is planned to be enhanced from two lanes to five lanes to improve traffic operations and roadway safety for all users including a more appropriate bridge design over I-40 and the extension of progressive signalization technology along the corridor.
- Nashville Area MPO Bicycle and Pedestrian Study, November 2009: The Wilson County Map included in this report shows SR 265 as a route with a future bike lane.
- Transportation Improvement Program (FY 2008-2011), December 2010: The Transportation Improvement Program (TIP) identifies the new interchange at SR 265 and I-40. Construction funds are programmed for Fiscal Year 2016.
- Transportation Improvement Program (FY 2014-2017), December 2013: This TIP identifies one project within the study area: TIP # 2013-77-218; SR 171 (Mt. Juliet Road) Traffic Adaptive Signal Control System Corridor Optimization Project. The project description states that the project involves the "implementation of a fully functioning, reliable adaptive signal control system through the installation of a master signal controller, wireless communication devices, and radar detection for both vehicular and bicycle (self-propelled) traffic." Right-of-way funds were programmed for Fiscal Year 2008.

Nashville Metropolitan Transit Authority (MTA)

- nMotion Transit Plan Recommendations, August 2016: The plan recommends continued Music City Star commuter rail service to Mt. Juliet with expanded weekday operating hours and additional service on Saturdays. The plan recommends local service within the Mt. Juliet area, including the study area, to support the increased service and encourage higher ridership on the rail service.

City of Mt. Juliet

- Mt. Juliet Major Thoroughfare Plan (MTP), 2010: SR 265 is classified as a collector route, while I-40 is shown as Interstate. SR 171 is shown as an arterial route. All other roadways within the SR 265 Subarea are considered local roads, according to the MTP.

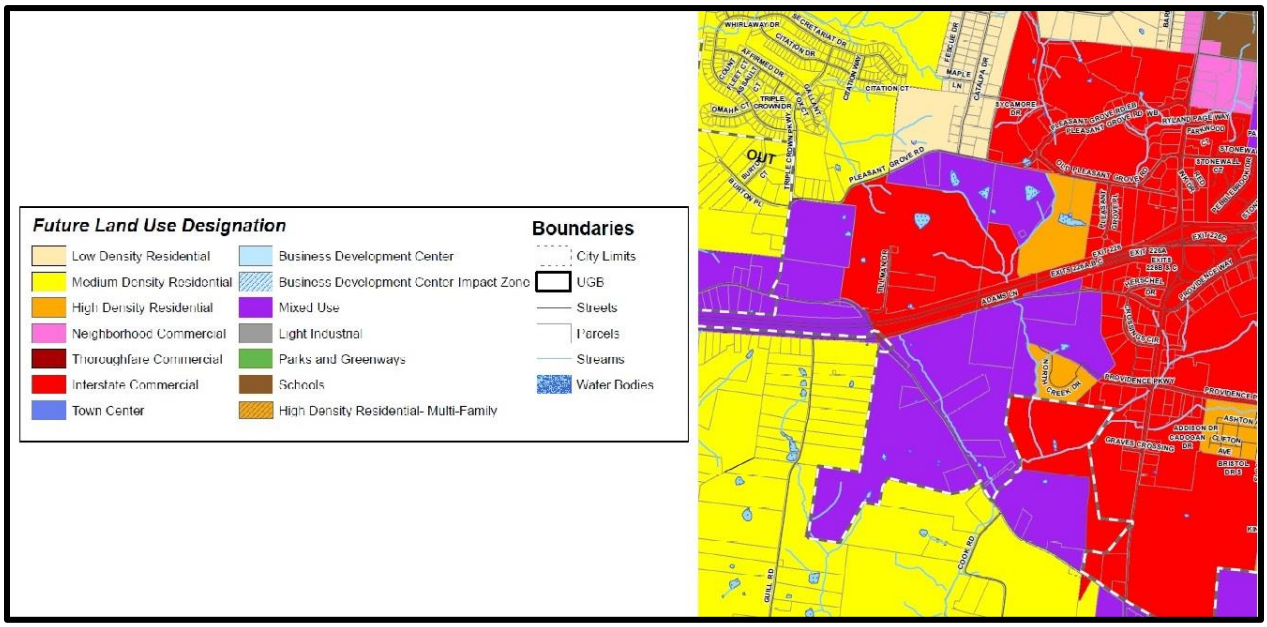
- Mt. Juliet Master Greenway Plan, 2010: Within the SR 265 Subarea, this plan shows a future bike lane along SR 265 as well as SR 171. Additionally, a future greenway trail is shown to extend from the intersection of SR 171 and Adams Lane to the southwest crossing SR 265 and extending on to the southwest towards Davidson County.

The key recommendations from each of the previously listed planning documents indicates a need for improved connectivity, access, safety, and multimodal options within the study area. Not only do they indicate a need, they also specify plans and even funding for improvements to SR 265, including a new interchange at I-40.

3.2 FUTURE GROWTH

The SR 265 Subarea today is characterized by a continuously evolving mix of agricultural and rural land, suburban residences and a strong presence of large scale retail development and commercial uses along SR 171 near the interchange with I-40. The SR 265 Subarea from the City of Mt. Juliet's Future Land Use Map is shown in Exhibit 3-1. Interstate commercial development is shown to extend west from SR 171 to SR 265, and mixed-use development is likely to occur along SR 265 near the proposed interchange at I-40. Two areas of high-density residential development is also planned within the SR 265 Subarea – one north of I-40 and one south of I-40.

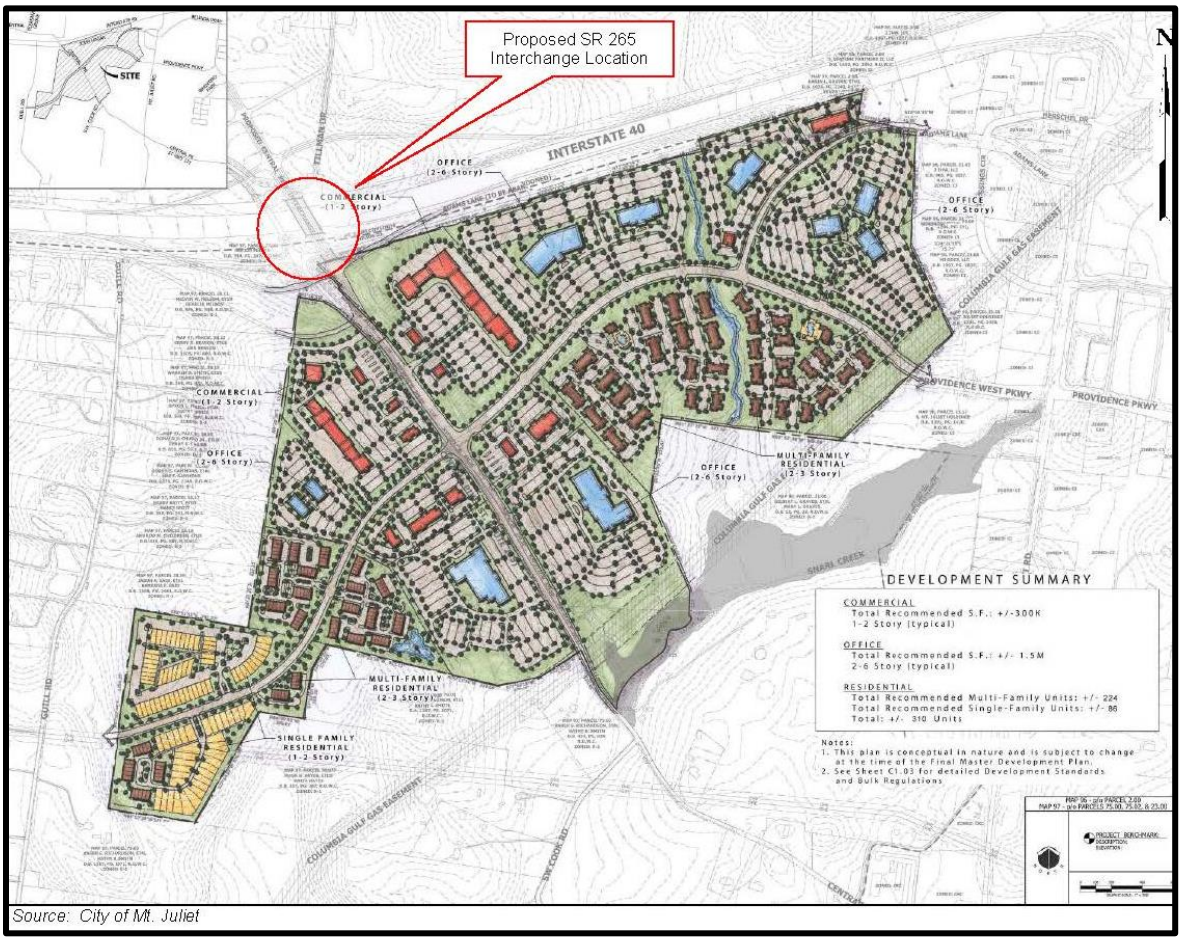
EXHIBIT 3-1 SR 265 SUBAREA FUTURE LAND USE



Providence Central is an approved master development plan in the SR 265 Subarea that will be located west of the existing Providence Marketplace. It will be east of SR 265 and south of Adams Lane. The master plan will include a mix of high end office, retail, and residential uses. The majority of it will be office and retail, which will front SR 265 and along Adams Lane. The ultimate plan is to extend Providence Parkway to the west and eventually connect to Adams Lane. Future phases are planned once the proposed SR 265 interchange at I-40 is constructed.

The proposed development scenario provided by the City of Mt. Juliet is shown in Exhibit 3-2. This development shows the extension of Providence Parkway discussed above and the realignment of Adams Lane. Also shown, a slight realignment of John Hagar Road and new development west of SR 265.

EXHIBIT 3-2 FUTURE DEVELOPMENT ALONG SR 265



Source: City of Mt. Juliet

3.3 TRAFFIC OPERATIONS & NEEDS

Based on the data and the future land use plans for the SR 265 Subarea discussed above, there is a definite need for roadway and access improvements within the Subarea. SR 265 needs additional travel lanes to accommodate the expected traffic from the proposed interchange and future growth. SR 265 is expected to be a major route between Nashville and Mt. Juliet, and one travel lane in each direction will not meet the future capacity needs.

In addition to SR 265, there are several local roads that access SR 265 near I-40 that will need improvements and future realignments. As discussed in Section 2.1 of this Study, the intersections of SR 265 with John Hagar Road/Adams Lane and with Tillman Drive are currently located very close to I-40. In fact, there are existing sight distance issues due to the proximity of the overpass. It is recommended that once the new interchange at SR 265 is constructed that John Hagar Road, Adams Lane, and Tillman Drive all be realigned or rerouted. North of I-40, SR 265 is not currently planned for specific development, but future consideration should be given for the potential commercial growth, especially once the new interchange is present.

4.0 CAPACITY ANALYSIS

GS&P has developed traffic projections and performed traffic analysis for the roadways within the SR 265 Subarea. The projected (2020 and 2040) daily traffic volumes are included in the Attachments. For 2020, the traffic volumes assume roadway conditions and lane configurations will remain as existing – no-build conditions. For 2040, traffic volumes are projected for no-build conditions as well as if a new interchange at I-40 and SR 265 is constructed. For the purposes of this study, an interim condition was used which assumes the interchange is constructed with no major roadway or intersection improvements to SR 265 and the surrounding subarea. The full build condition assumes the new interchange is constructed along with improvements to the entire SR 265 Subarea.

The 2020 and 2040 volumes and lane configurations were analyzed using TDOT Strategic Transportation Investments Division's *Daily Service Volumes Related to Level of Service* to determine the Level of Service (LOS) for each roadway segment. Levels of service range from LOS A (free-flow conditions, no delay) to LOS F (severe congestion and delay). LOS A, B and C generally indicate satisfactory driving conditions. LOS D indicates conditions in which there is a noticeable delay. For the analyses, it was assumed SR 265 is a two-lane urban arterial under no-build and interim conditions and a five-lane urban arterial under build conditions. It was also assumed SR 171 is a five-lane urban arterial near I-40 under both conditions. Near SR 265, it was assumed SR 171 is a two-lane urban arterial under no-build and interim conditions and a five-lane urban arterial under build conditions.

As shown in Exhibit 3-1, SR 265 is expected to operate at LOS C or better in 2020 and LOS D in 2040 under no-build conditions. If the new interchange is constructed, and SR 265 remains as a two-lane arterial, the roadway will operate at LOS F and is not expected to function adequately. If SR 265 is widened to include two travel lanes in each direction, SR 265 south of I-40 is expected to operate at LOS F south of the new interchange. North of the new interchange, SR 265 will operate at LOS C. Near SR 171, SR 265 will operate at LOS D as a five-lane urban arterial. It should be noted that SR 265 within the Subarea is envisioned as a multimodal route that will accommodate all users. As a result, although future volumes may indicate poor levels of service, a six-lane cross section is not desirable. Limiting access near the new interchange will help improve traffic operations and preserve the functionality of the proposed interchange. Also, individual intersections should be analyzed with more detailed analysis as specific construction plans are completed. SR 171 is shown to operate at LOS F under all no-build and interim conditions. This further supports the need for a new interchange at SR 265 to help alleviate some of the traffic on SR 171.

EXHIBIT 4-1: ROADWAY LEVELS OF SERVICE

Route	2020 (No-build) AADT/LOS	2040 (No-build) AADT/LOS	2040 (Interim) AADT/LOS	2040 (Build) AADT/LOS
SR 265 north of I-40	10,090 / C	13,570 / D	19,985 / F	19,985 / C
SR 265 south of I-40	10,090 / C	13,570 / D	40,190 / F	40,190 / F
SR 265 near SR 171	6,690 / B	12,295 / D	22,000 / F	22,000 / D
SR 171 south of I-40	51,400 / F	71,150 / F	44,535 / F	44,535 / F
SR 171 near SR 265	26,015 / F	30,875 / F	28,860 / F	28,860 / E

Source: TDOT STID's *Daily Service Volumes Related to Level of Service* – see Attachments

5.0 RECOMMENDED SYSTEM IMPROVEMENTS

5.1 ROADWAY NETWORK

As discussed throughout this report, a new interchange at I-40 and SR 265 is needed and proposed. Once that new interchange is constructed and open to traffic, the roadways within the SR 265 Subarea will need major improvements to accommodate the expected traffic volume demands. The detailed network improvements are listed below:

- **SR 265** is recommended to include two travel lanes in each direction within the study area. This can include a five-lane cross-section from Pleasant Grove Road to the intersection with SR 171. However, with the new interchange and the associated proposed development, it is recommended SR 265 be a limited access route near I-40. This can be accomplished with a four-lane median divided roadway and limited right-in/right-out access only. This limited access with no major intersections or private driveways is recommended for 1,000 feet on each side of the new interchange. As future development is planned and constructed, it is recommended that the City of Mt. Juliet require individual Traffic Impact Studies to determine the specific access and traffic control necessary.

  It should be noted that making SR 265 a limited access route near I-40 will also provide improved traffic operations, as discussed in Section 3.2. By prohibiting and/or limiting turning movements, it will help move higher traffic volumes without causing significant conflicts and delays.

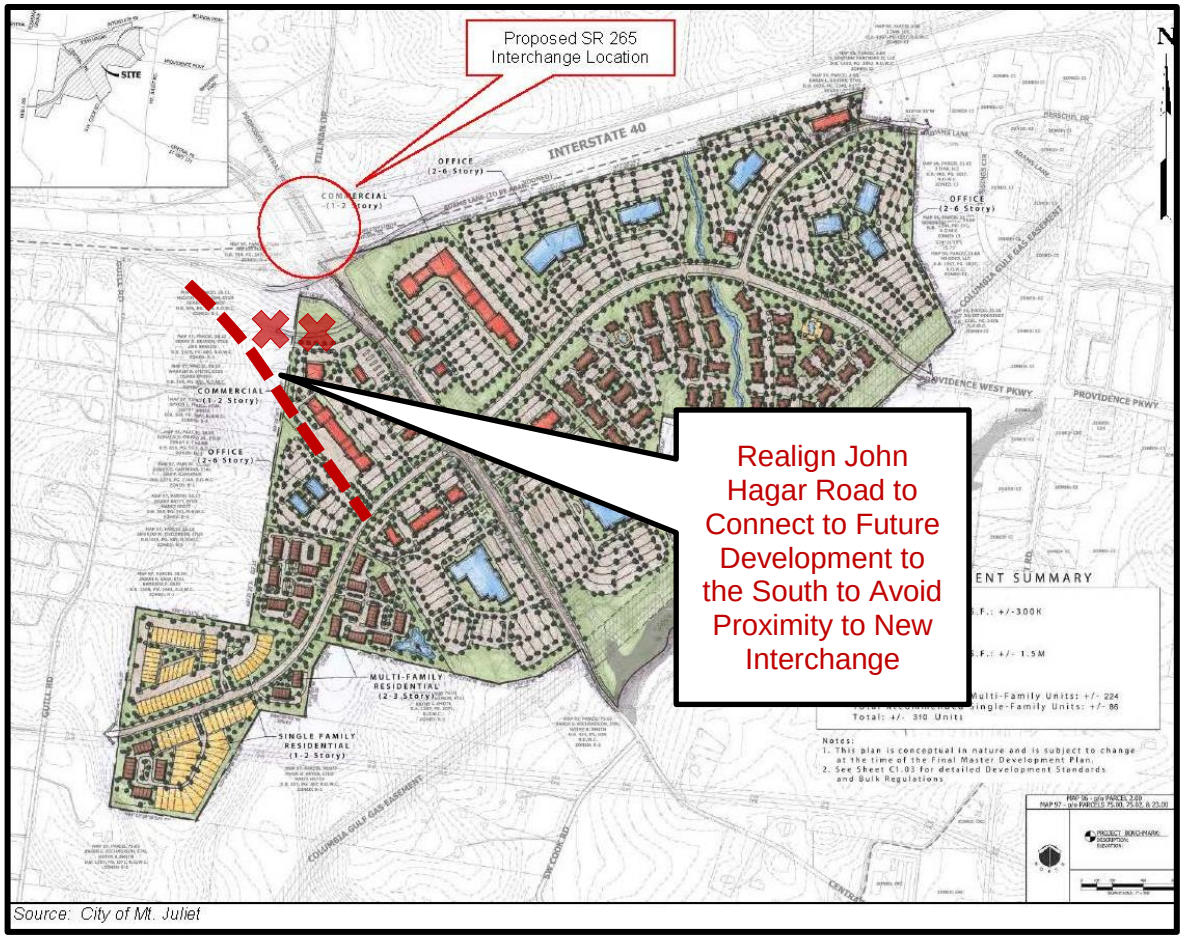
  With the recommended widening of SR 265 and the future widening of SR 171, the existing signalized intersection of SR 265 and SR 171 will need to be modified to accommodate the additional through and turn lanes.

  Sidewalks are recommended along both sides of SR 265. In addition, per the Nashville Area MPO Bicycle and Pedestrian Study, bike lanes and/or a separated shared-use path are recommended for SR 265.

- **John Hagar Road** is recommended to be realigned to the south to connect to future development west of SR 265. Exhibit 3-2 shows John Hagar Road to connect to SR 265 just south of the new interchange. However, as discussed above, the traffic volumes along this segment of SR 265 are expected to be relatively high and limited access is recommended. As a result, it is recommended that John Hagar Road connect to a new road within future development to the south that would then provide access to SR 265, shown conceptually in Figure 5-1.

  All new construction along John Hagar Road is recommended to include sidewalks on both sides of the roadway.

EXHIBIT 5-1 CONCEPTUAL REALIGNMENT OPTION FOR JOHN HAGAR ROAD



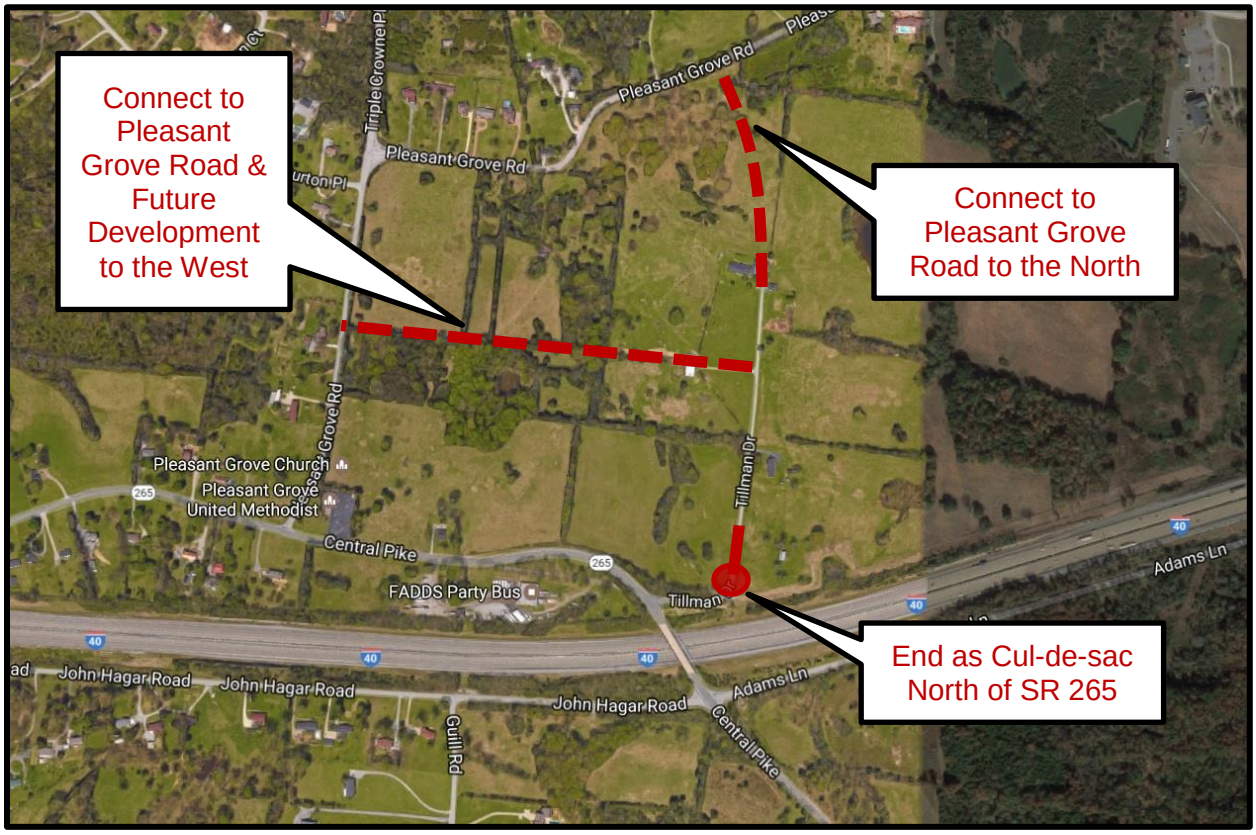
- **Adams Lane** is recommended to be realigned to connect to the extension of Providence Parkway, similar to the concept shown in Exhibit 5-1. The extension of Providence Parkway will be part of future development and is shown to connect to SR 265 at a four-legged intersection. It is recommended that this four-legged intersection be at least 1,000 feet south of I-40, as discussed above.

  All new construction along Adams Lane is recommended to include sidewalks on both sides of the roadway.

- **Tillman Drive** is recommended to be realigned to intersect SR 265 to the north of its current location. Any future development has not been established on a concept-level at this time. However, depending on specific site plans, a conceptual realignment could connect to Pleasant Grove Road to the north or to the west, as shown in Exhibit 5-2. The existing Tillman Drive could end as cul-de-sac just north of SR 265 while still providing access to the current properties and/or future development.

  All new construction along Tillman Drive is recommended to include sidewalks on both sides of the roadway.

EXHIBIT 5-2 CONCEPTUAL REALIGNMENT OPTIONS FOR TILLMAN DRIVE



5.2 PRELIMINARY ENVIRONMENTAL SCREENING

A high-level review of potential environmental impact of projects within the study area was conducted. Based on a desktop review of Geographic Information Systems (GIS) data and state/federal database searches, potential environmental issues are summarized below by topic.

- **Air Quality:** Wilson County is in attainment for all regulated criteria pollutants. A qualitative Mobile Air Toxics Analysis (MSATs) evaluation, conducted in accordance with the Federal Highway Administration's (FHWA) Interim Guidance Update on Air Toxic Analysis in NEPA Documents dated December 2012, will need to be completed for any projects eligible for federal funding.
- **Noise:** Projects consisting of new location construction, roadway widening, or an increase or addition of interchange capacity are likely to cause noise impacts, though the severity of these impacts is unknown. Noise impacts will need to be evaluated and determined on a project-by-project basis.
- **Ecology:** One stream, North Creek is located within the study area. North Creek is listed on the Tennessee Department of Environment and Conservation's (TDEC) 303d list for loss of biological integrity due to siltation from land development.

  The National Wetland Inventory Mapper identified seven small wetlands distributed throughout the study area. The total acreage of these wetlands combined is approximately 5.31 acres. There are also numerous freshwater ponds identified in the area.

A review of the Tennessee Department of Environment and Conservation (TDEC) database for threatened and endangered species was conducted for the Hermitage Quadrangle, which contains the project area. The database lists nine flowering plants, one fish, and one reptile species. Presence of the potential habitat for these species will be determined during the ecological review during the NEPA phase of any projects proposed within the study area.

- **Archaeology:** The presence of archaeological resources located within the project area is unknown. Archaeological review and Native American coordination will be conducted prior to any construction activities receiving state or federal funding.
- **Historic/Parks:** A search of the National Park Service database did not indicate the presence of any National Register of Historic Places (NRHP) sites within the project area.

  Historic resources within Wilson County that have been previously surveyed were reviewed on a Tennessee Historical Commission map. Three sites that are potentially eligible for listing are within or near the project area. A review of these resources will be required during the NEPA phase of any proposed projects.

  No parks or other recreational resources are currently located within the study area.
- **Social/Environmental Justice:** Using the latest TDOT guidance, dated December 2015, for identifying Environmental Justice (EJ) populations, was applied to the study area. Data was collected from the American Community Survey (ACS) 5-Year Estimates. The study area contains three Census Block Groups. At the Block Group level, no minority or low-income populations were identified that meet TDOT's criteria.

  More detailed EJ analysis will be required at the project impact area level during the NEPA phase of any proposed projects. However, based on the results of this preliminary analysis, the high-level potential for EJ impacts is low.
- **Hazardous Materials:** No EPA National Priorities List (NPL) sites are located within the project area. Additional review of other potential hazardous materials sites, such as underground storage tanks (USTs), will be required during the NEPA phase of any proposed project.

5.3 COST ESTIMATES

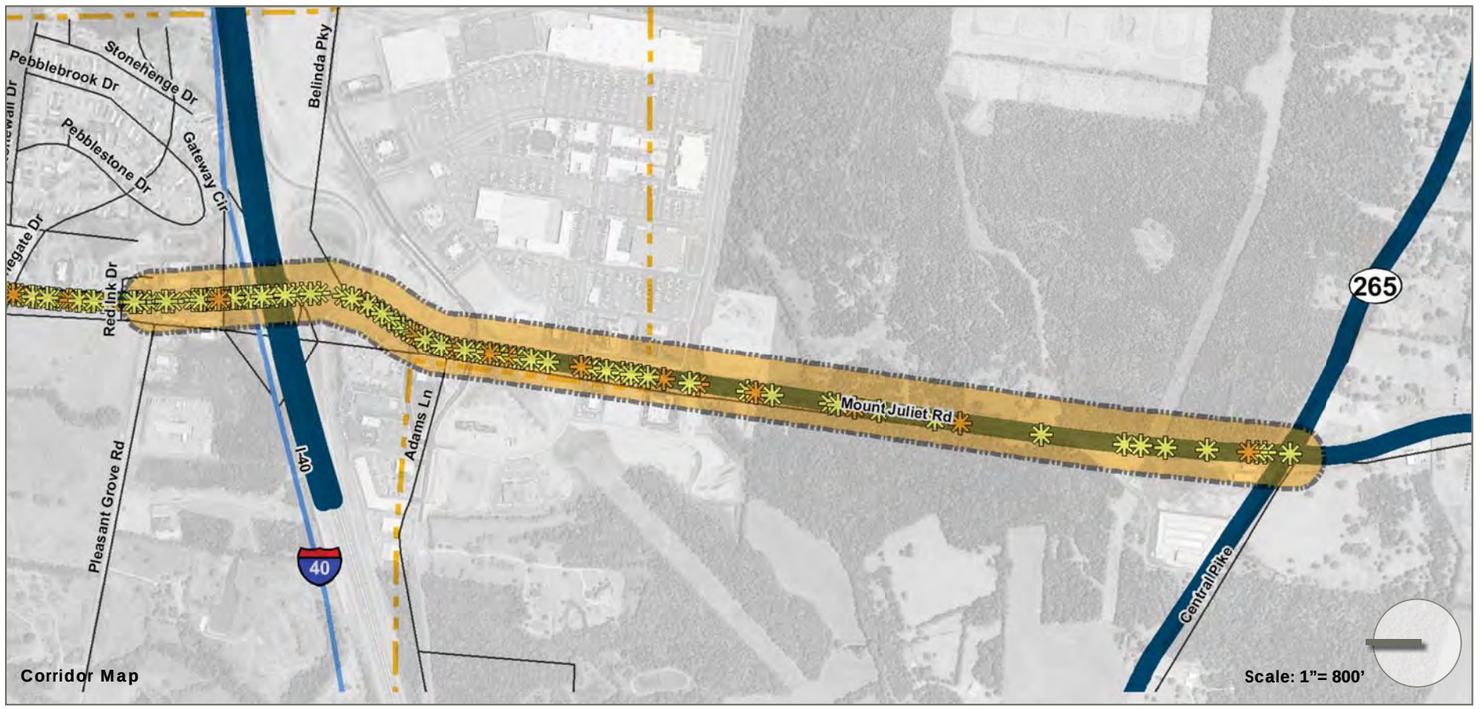
A preliminary cost estimate was developed for the roadway improvements listed in Section 5.1. These preliminary estimates do not include the construction of a new interchange at I-40. The estimated cost of the improvements listed in Section 5.1 is $12,977,000. Specific cost estimate worksheets are included in the Attachments.

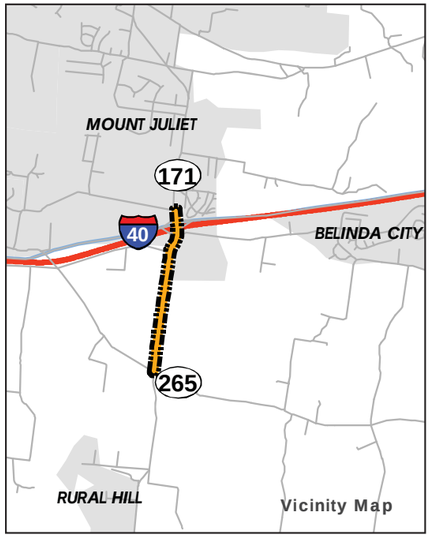
5.4 IMPLEMENTATION

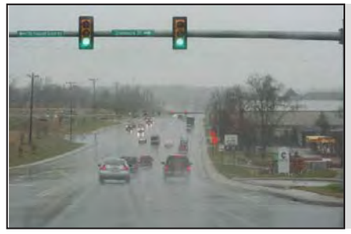
The impetus for the majority of roadway improvements discussed in this Subarea Study are future development and the construction of a new interchange at SR 265 and I-40. Implementation of the roadway improvements are recommended in coordination with a new interchange and as development is planned, approved, and constructed. SR 265 and nearby roadways and intersections will not function adequately with the traffic volumes expected once the new interchange is constructed. Commitments for improvements should be procured from the City of Mt. Juliet and/or future developers to ensure adequate infrastructure will be in place once traffic capacity is needed due to the new interchange. The improvements listed in this Subarea Study are conceptual in nature. Detailed analyses and comprehensive plans are recommended as specific projects are prepared and approved.

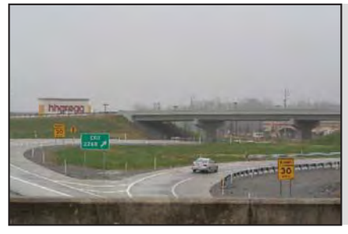
ATTACHMENTS

Relevant Studies, Traffic Projections, Cost Estimates













Tri-County Transportation & Land Use Study

3

Legend

Accident Type

- Fatal
- Injury
- Property Damage Over $400

- Streets
- Major Roadways
- 2030 Road Widening
- Strategic Corridor Limits

Corridor Description and Issues Identified

The corridor runs from Central Pike to Pleasant Grove Road and covers a length of 1.38 miles. The corridor has a 2-lane shoulder with swale section from Central Pike to Providence Parkway and a 5-lane section (with curb and gutter) from Providence Parkway to Pleasant Grove Road. The corridor carried 14,900 vehicles per day (vpd) in 2008. Other roadway characteristics include:

- 45 speed limit
- modified diamond interchange with I-40
- rolling topography
- vertical and horizontal curvature leading to and from the interchange with I-40
- coordinated signals throughout corridor
- high property damage crash volume
- traffic congestion due to lack of turn lanes on Central Pike
- serves as a major gateway into Mount Juliet

Mt. Juliet Road

Central Pike to Pleasant Grove Road - *Wilson County, TN*

Kimley-Horn and Associates, Inc URBAN RESOURCE GROUP

NOT TO SCALE

EXHIBIT 6.3A: CENTRAL PIKE TO PLEASANT GROVE ROAD

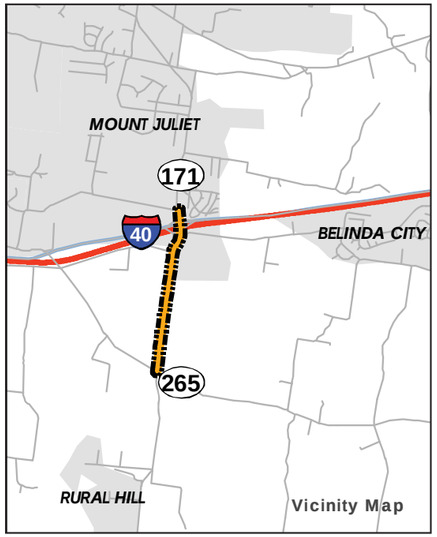
TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

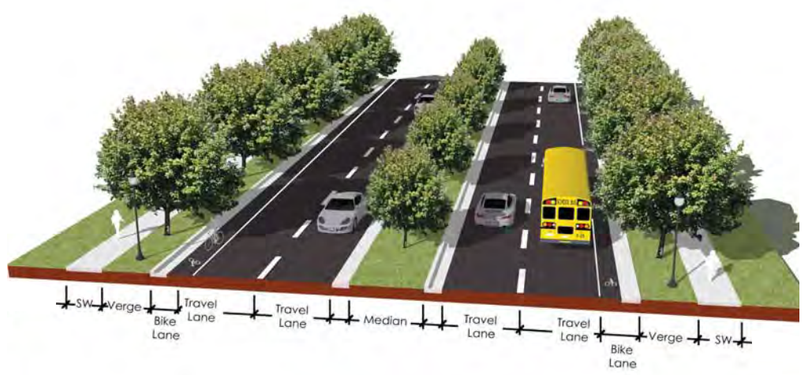
NASHVILLE, TN

NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES







Tri-County Transportation & Land Use Study

3

Legend

- Major Highways
- 2030 Road Widening
- Streets
- Strategic Corridor Limits

Corridor Vision

Traffic along the corridor is projected to increase to 19,200 vehicles per day (vpd) by 2035. In order to acommodate the projected traffic volumes and ensure that the roadway continues to serve as a primary gateway, the following recommendations are suggested:

- widen roadway to a 4-lane median divided section
- increase gateway features leading into downtown
- provide sidewalks to enhance pedestrian access to commercial development
- limit future and existing driveway access to Mt. Juliet Road
- consolidate driveways where possible
- provide strategic right and left turn lanes throughout the corridor
- include dedicated bike lanes to accomodate cyclists

Mt. Juliet Road

Central Pike to Pleasant Grove Road - *Wilson County, TN*

NOT TO SCALE

EXHIBIT 6.3B: FUTURE CENTRAL PIKE TO PLEASANT GROVE ROAD

TRI-COUNTY TRANSPORTATION AND LAND USE STUDY

NASHVILLE, TN

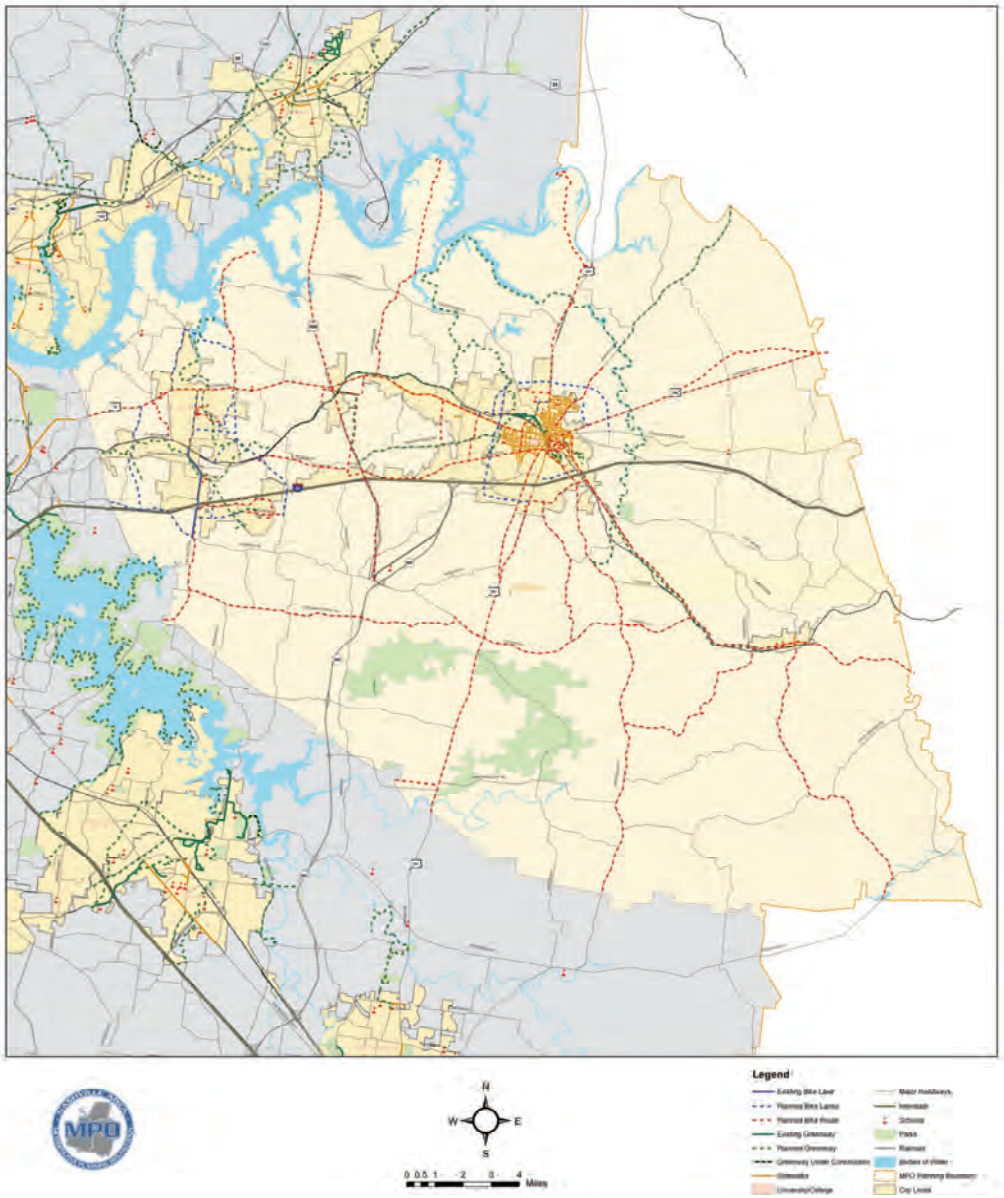
NASHVILLE AREA Metropolitan Planning Organization

LandDesign. Kimley-Horn and Associates, Inc. Sterling COMMUNICATION bbpc ASSOCIATES

Regional Bicycle and Pedestrian Plan

A Strategic Vision for Bicycle and Pedestrian Transportation in the Greater Nashville Region

Existing and Planned Bicycle and Pedestrian Facilities in Wilson County



Wilson County

Existing Facilities

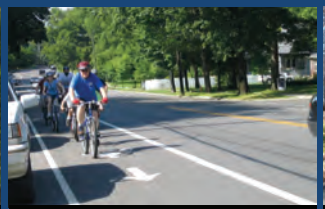
- ❑ 500 Miles of Major Roadways
- ❑ 15 Miles of Signed Bike Routes
- ❑ 3 Miles of Signed Bike Lanes
- ❑ 3 Miles of Greenways & Multi-Use Paths
- ❑ Hundreds of Miles of Sidewalk

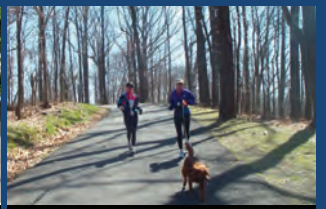
Important Facts

- ❑ 106,000 - Estimated Population
- ❑ 15,000 (14%) Children Between the Age 5 and 14
- ❑ 11,000 (11%) Adults Over 65
- ❑ 1,400 (4.1%) Households Without an Automobile
- ❑ Music City Star – Region's 1st Commuter Rail Line



Bike Route


Bike Lane

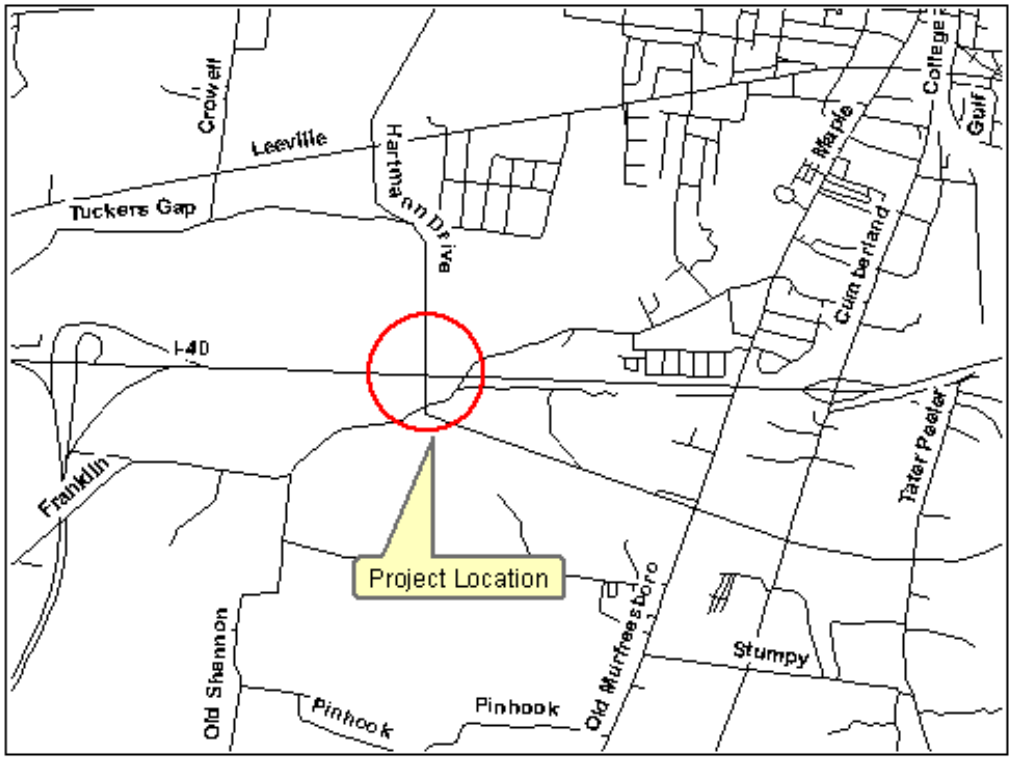

Greenway

Fiscal Years 2008-2011
Transportation Improvement Program

TIP #	2008-74-060	**TDOT PIN #**		**Improvement Type**	Interchange	**Lead Agency**	Lebanon
County	Wilson	**Length**	0.0 mi	**LRTP#**	8004	**Conformity Status**	Non-Exempt
Route/Project Name	I-40 Interchange Lighting					**Total Project Cost**	$312,500
Termini or Intersection	I-40 at S. Hartmann Drive						
Project Description	Interchange Lighting						

Fiscal Year	Type of Work	Funding Type	Total Funds	Fed Funds	State Funds	Local Funds
2008	PE	L-STP	$20,000	$16,000		$4,000
2008	CONST	L-STP	$292,500	$234,000		$58,500

Amendment 1 #		**Adjustment 1 #**		**Remarks**
Amended on		**Adjusted on**		
Amendment 2 #		**Adjustment 2 #**		
Amended on		**Adjusted on**		

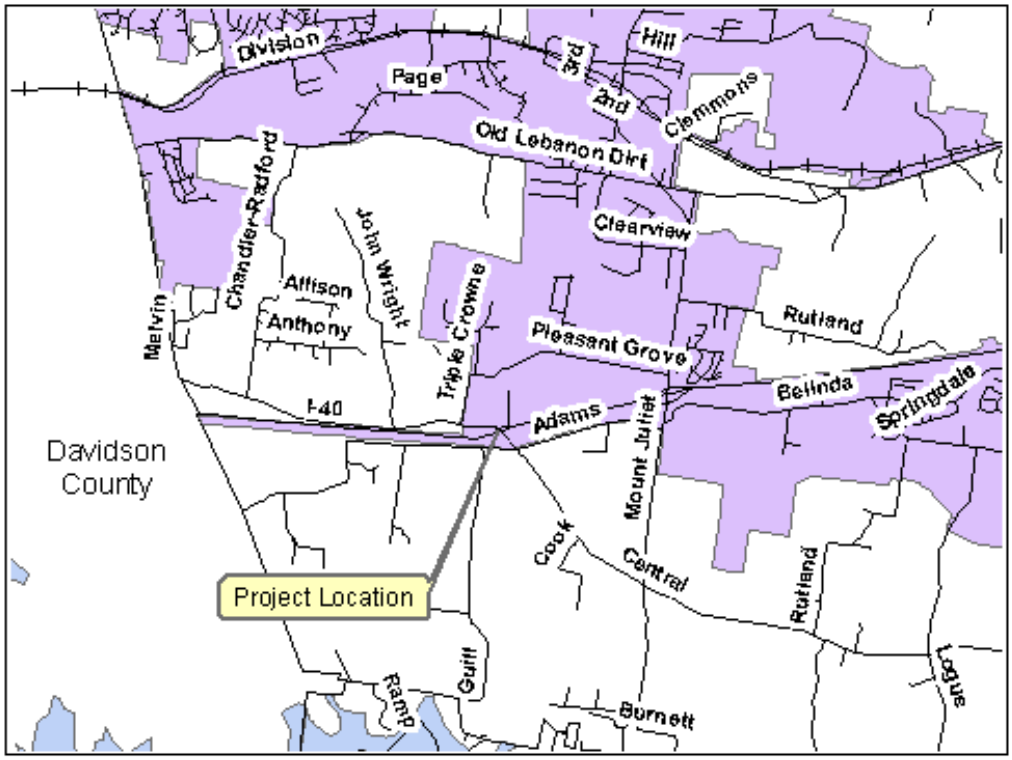


Fiscal Years 2008-2011
Transportation Improvement Program

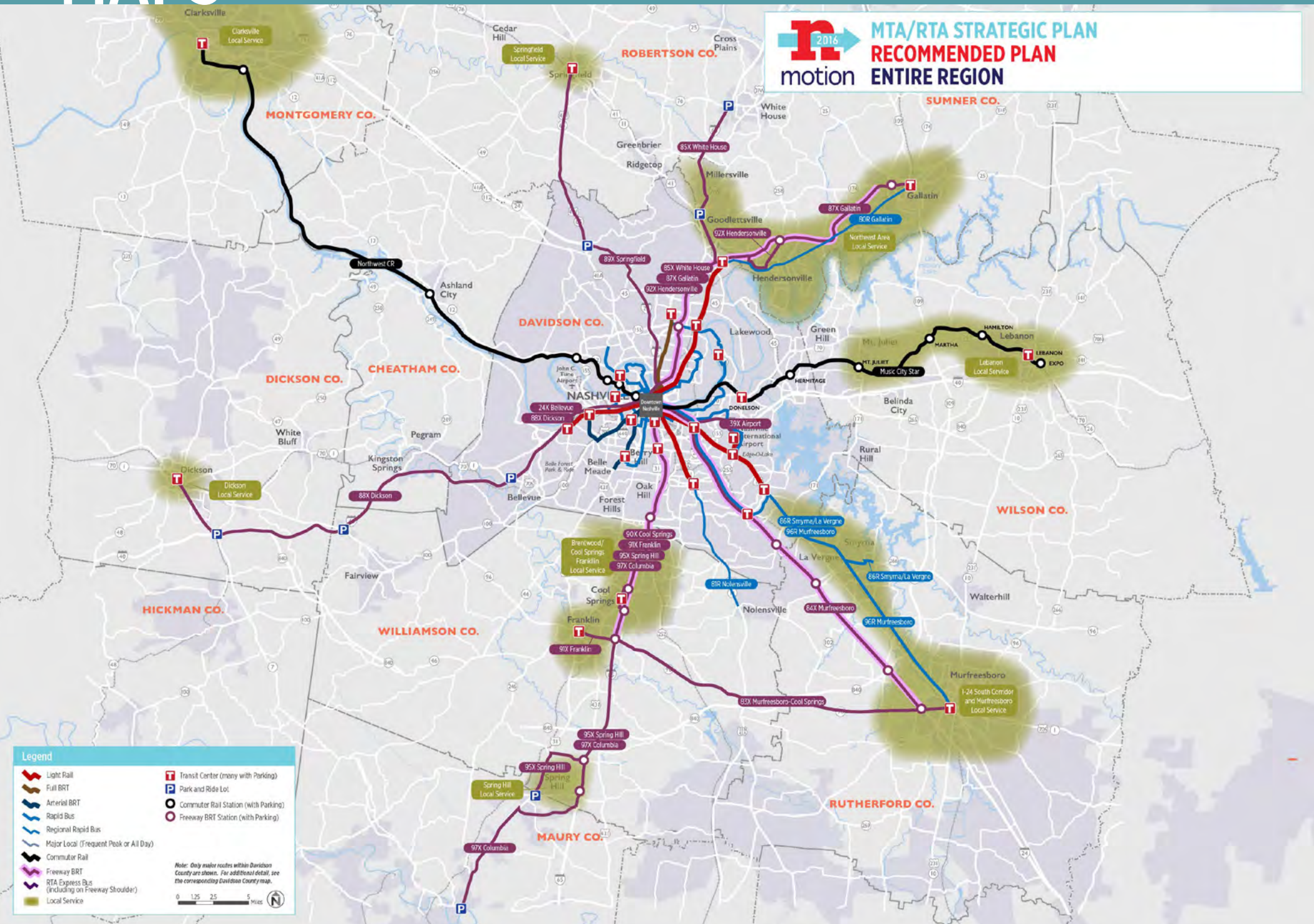
TIP #	2004-059	**TDOT PIN #**		**Improvement Type**	Interchange	**Lead Agency**	Mt. Juliet
County	Wilson	**Length**	0.0 mi	**LRTP#**	7020	**Conformity Status**	Non-Exempt
Route/Project Name	I-40					**Total Project Cost**	$8,000,000
Termini or Intersection	Central Pike						
Project Description	Construct new interchange at I-40 and Central Pike						

Fiscal Year	Type of Work	Funding Type	Total Funds	Fed Funds	State Funds	Local Funds
2008	ROW	LOCAL	$1,600,000			$1,600,000

Amendment 1 #		**Adjustment 1 #**		**Remarks**
Amended on		**Adjusted on**		
Amendment 2 #		**Adjustment 2 #**		
Amended on		**Adjusted on**		



MAPS


MTA/RTA STRATEGIC PLAN
RECOMMENDED PLAN
ENTIRE REGION
2016
motion
Clarksville
Clarksville Local Service
MONTGOMERY CO.
Cedar Hill
Springfield Local Service
Springfield
ROBERTSON CO.
Cross Plains
White House
SUMNER CO.
Greenbrier
Ridgetop
85X White House
Millersville
Gallatin
87X Gallatin
80R Gallatin
Goodlettsville
92X Hendersonville
Northwest Area Local Service
Hendersonville
89X Springfield
85X White House
87X Gallatin
92X Hendersonville
Northwest CR
Ashland City
DAVIDSON CO.
Lakewood
Green Hill
Mt. Juliet
HAMILTON
MARTHA
Lebanon
LEBANON
EXPO
MT. JULIET
Music City Star
Lebanon Local Service
HERMITAGE
DICKSON CO.
CHEATHAM CO.
John C. Tune Airport
NASHVILLE
Downtown Nashville
DONELSON
Belinda City
24X Bellevue
88X Dickson
39X Airport
International Airport
White Bluff
Pegram
Kingston Springs
Belle Meade
Berry Hill
Rural Hill
Dickson
Dickson Local Service
88X Dickson
Bellevue
Forest Hills
Oak Hill
WILSON CO.
86R Smyrna/La Vergne
96R Murfreesboro
Smyrna
La Vergne
Brentwood/ Cool Springs Franklin Local Service
90X Cool Springs
91X Franklin
95X Spring Hill
97X Columbia
Fairview
81R Nolensville
86R Smyrna/La Vergne
Walterhill
Cool Springs
Nolensville
84X Murfreesboro
96R Murfreesboro
HICKMAN CO.
Franklin
WILLIAMSON CO.
91X Franklin
Murfreesboro
I-24 South Corridor and Murfreesboro Local Service
83X Murfreesboro-Cool Springs
95X Spring Hill
97X Columbia
95X Spring Hill
Spring Hill
Spring Hill Local Service
RUTHERFORD CO.
MAURY CO.
97X Columbia
Legend
Light Rail
Full BRT
Arterial BRT
Rapid Bus
Regional Rapid Bus
Major Local (Frequent Peak or All Day)
Commuter Rail
Freeway BRT
RTA Express Bus (including on Freeway Shoulder)
Local Service
Transit Center (many with Parking)
Park and Ride Lot
Commuter Rail Station (with Parking)
Freeway BRT Station (with Parking)
Note: Only major routes within Davidson County are shown. For additional detail, see the corresponding Davidson County map.
0 1.25 2.5 5 Miles
N

Major Thoroughfare Plan

DRAFT COPY ONLY

Currently under Review

LEGEND

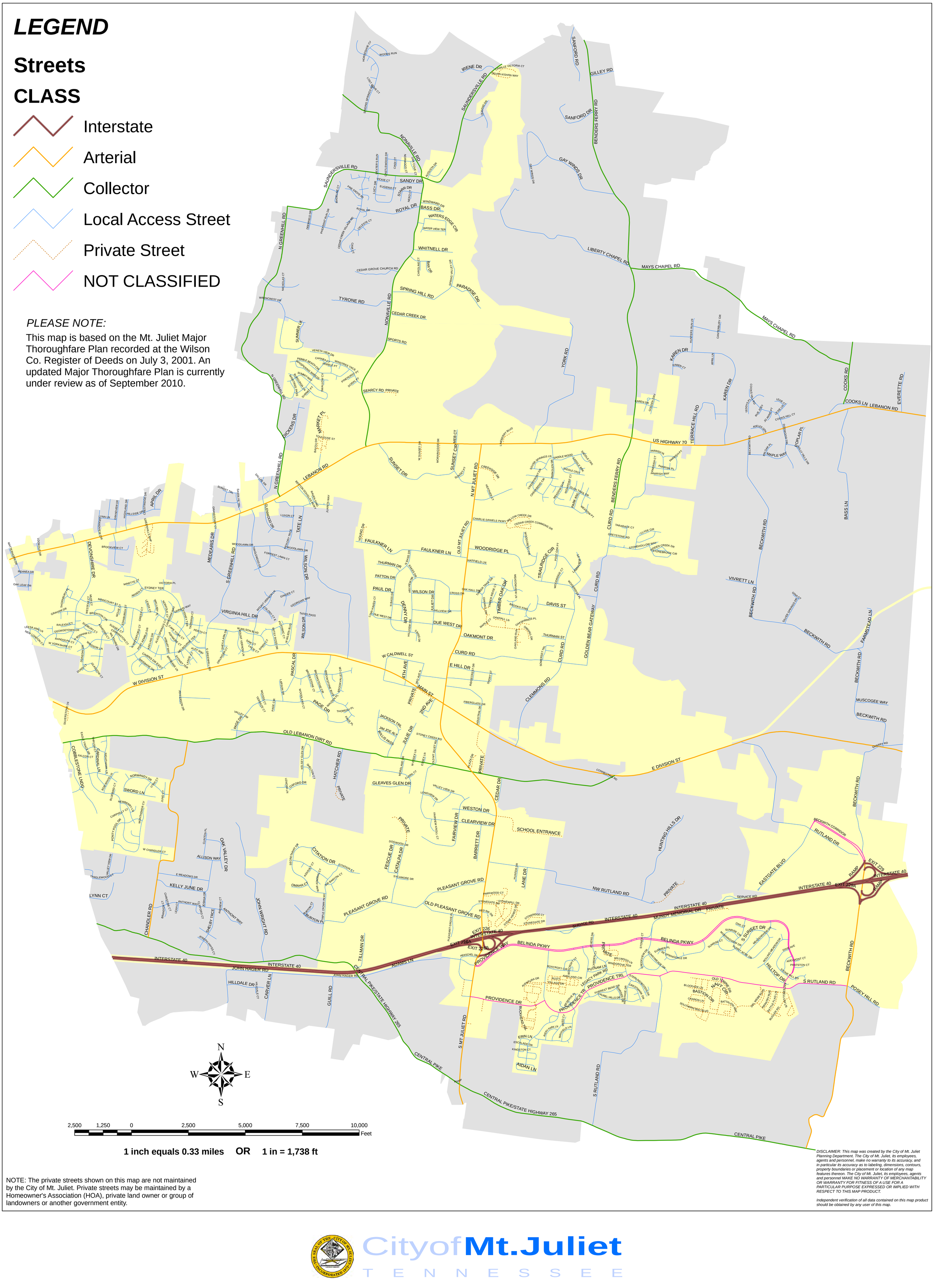
Streets

CLASS

- Interstate
- Arterial
- Collector
- Local Access Street
- Private Street
- NOT CLASSIFIED

PLEASE NOTE:

This map is based on the Mt. Juliet Major Thoroughfare Plan recorded at the Wilson Co. Register of Deeds on July 3, 2001. An updated Major Thoroughfare Plan is currently under review as of September 2010.



NOTE: The private streets shown on this map are not maintained by the City of Mt. Juliet. Private streets may be maintained by a Homeowner's Association (HOA), private land owner or group of landowners or another government entity.

DISCLAIMER: This map was created by the City of Mt. Juliet Planning Department. The City of Mt. Juliet, its employees, agents and personnel, make no warranty to its accuracy, and in particular its accuracy as to labeling, dimensions, contours, property boundaries or placement or location of any map features thereon. The City of Mt. Juliet, its employees, agents and personnel MAKE NO WARRANTY OF MERCHANTABILITY OR WARRANTY FOR FITNESS OF A USE FOR A PARTICULAR PURPOSE EXPRESSED OR IMPLIED WITH RESPECT TO THIS MAP PRODUCT.

Independent verification of all data contained on this map product should be obtained by any user of this map.

City of Mt. Juliet
TENNESSEE

Master Greenway Plan

including Trails, Sidewalks and Bike Routes

Dedicated to Date

Num	Name	Length
1	Silverstone Senior Living	320 FT
2	Cole Preschool	75 FT
3	Cedar Creek Commons	635 FT
4	Willoughby Station, Phases VII, IX, X	3284 FT
5	Providence Marketplace	4576 FT
6	Providence Residential	14048 FT
7	West Division Street, Pedestrian Trail & Bikeway	11090 FT
8	Park Glen Soccer Complex	2600 FT
9	Heatherly Property	831 FT
10	Thompson Property	363 FT

TOTAL - 37,822 Feet / 7.163 Miles

Prepared by City of Mt. Juliet
Planning Department
Bo Logan, GIS Coordinator

C:\Projects\Main\Greenways_10_1105.mxd
Map Created: 29 Sep 2010
Map Updated: 05 Nov 2010
Map Plotted: 05 Nov 2010

N

0 0.125 0.25 0.5 0.75 1
Miles

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LEGEND

Streets
Water Bodies
County Roads
City Limits
UGB

EXISTING
Greenway
Sidewalk

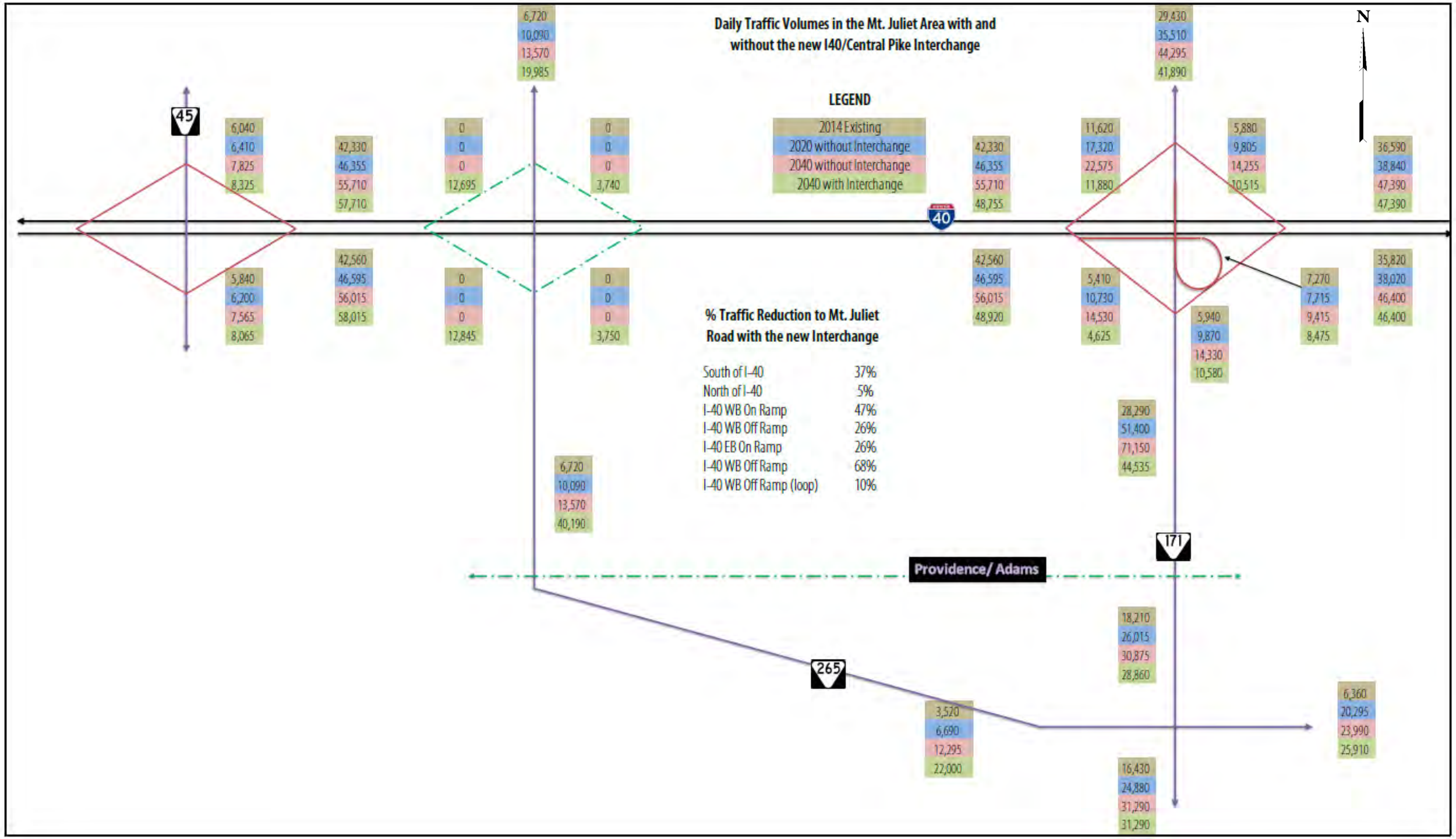
ADDITIONS
Trail not included in original plan

FUTURE*
Greenway
Sidewalk
Bike Lane
Bike Route
Trailhead

* All future elements are taken from Greenway, Bike & Pedestrian Master Plan by Fisher & Arnold, Inc., dated April 3, 2003.

November 17, 2010

City of Mt. Juliet
TENNESSEE



Source: Gresham, Smith and Partners Traffic Forecasting Study (Appendix A)

Daily Service Volumes Related To Level of Service															
Road Type	**LOS A**			**LOS B**			**LOS C**			**LOS D**			**LOS E**		
4 Lane Freeway	0	31,700		31,701	45,300		45,301	56,200		56,201	68,000		68,801	90,700	
6 Lane Freeway	0	47,600		47,601	68,000		68,001	84,300		84,301	102,000		102,001	136,000	
8 Lane Freeway	0	63,500		63,501	90,600		90,601	112,400		112,401	136,000		136,001	181,300	
10 Lane Freeway	0	79,300		79,301	113,400		113,401	140,600		140,601	170,000		170,001	226,700	
12 Lane Freeway	0	95,200		95,201	136,000		136,001	168,600		168,601	204,000		204,001	272,000	
4 Lane Expressway	0	23,300		23,301	33,400		33,401	41,400		41,401	50,000		50,001	66,700	
6 Lane Expressway	0	35,000		35,001	50,000		50,001	62,000		62,001	75,000		75,001	100,000	
8 Lane Expressway	0	47,000		47,001	66,000		66,001	82,000		82,001	100,000		100,001	133,000	
2 Lane Arterial Urban	0	6,500		6,501	9,400		9,401	11,600		11,601	14,000		14,001	18,700	
3 Lane Arterial Urban	0	8,200		8,201	11,600		11,601	14,400		14,401	17,500		17,501	23,300	
4 Lane Arterial Urban	0	10,700		10,701	15,400		15,401	19,000		19,001	23,000		23,001	30,700	
5 Lane Arterial Urban	0	12,400		12,401	17,600		17,601	21,900		21,901	28,500		28,501	35,300	
6 Lane Arterial Urban	0	20,500		20,501	29,400		29,401	36,400		36,401	44,000		44,001	58,700	
7 Lane Arterial Urban	0	22,400		22,401	32,000		32,001	39,700		39,701	48,000		48,001	64,000	
8 Lane Arterial Urban	0	25,700		25,701	36,600		36,601	45,400		45,401	55,000		55,001	73,300	
2 Lane Arterial Rural	0	8,400		8,401	12,000		12,001	14,900		14,901	18,000		18,001	24,000	
3 Lane Arterial Rural	0	10,500		10,501	15,000		15,001	18,600		18,601	22,500		22,501	30,000	
4 Lane Arterial Rural	0	13,100		13,101	18,600		18,601	23,100		23,101	28,000		28,001	37,300	
5 Lane Arterial Rural	0	15,200		15,201	21,600		21,601	26,800		26,801	32,500		32,501	43,300	
2 Lane Collector Urban	0	5,100		5,101	7,400		7,401	9,100		9,101	11,000		11,001	14,700	
3 Lane Collector Urban	0	6,400		6,401	9,200		9,201	11,300		11,301	13,700		13,701	18,300	
4 Lane Collector Urban	0	8,400		8,401	12,000		12,001	14,900		14,901	18,000		18,001	24,000	
5 Lane Collertor Urban	0	10,700		10,701	15,400		15,401	19,000		19,001	23,000		23,001	30,700	
2 Lane Collector Rural	0	6,500		6,501	9,400		9,401	11,600		11,601	14,000		14,001	18,700	
3 Lane Collector Rural	0	8,200		8,201	11,600		11,601	14,500		14,501	17,500		17,501	23,300	
2 Lane One-Way Roadway	0	6,500		6,501	9,400		9,401	11,600		11,601	14,000		14,001	18,700	
3 Lane One-Way Roadway	0	8,400		8,401	12,000		12,001	14,900		14,901	18,000		18,001	24,000	
4 Lane One-Way Roadway	0	11,200		11,201	16,000		16,001	19,800		19,801	24,000		24,001	32,000	
1 Lane Ramp One-Way	0	4,200		4,201	6,000		6,001	7,400		7,401	9,000		9,001	12,000	
2 Lane Ramp One-Way	0	6,400		6,401	12,000		12,001	14,900		14,901	18,000		18,001	24,000	
3 Lane Ramp One-Way	0	12,600		12,601	18,000		18,001	22,300		22,301	27,000		27,001	36,000	

COST ESTIMATE SUMMARY

Route:	**State Route 265**
Description:	**SR 265 Subarea Study**
County:	**Wilson**
Length:	**1.9 miles**
Date:	**May 25, 2017**

DESCRIPTION	LOCAL 0%	STATE 100%	FEDERAL 0%	TOTAL
Construction Items				
Pavement Removal	$0	$122,600	$0	$122,600
Asphalt Paving	$0	$1,189,300	$0	$1,189,300
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$1,101,900	$0	$1,101,900
Appurtenances	$0	$901,800	$0	$901,800
Structures	$0	$0	$0	$0
Fencing	$0	$0	$0	$0
Signalization	$0	$0	$0	$0
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$1,001,900	$0	$1,001,900
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$13,600	$0	$13,600
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$20,600	$0	$20,600
Signing	$0	$28,500	$0	$28,500
Pavement Markings	$0	$45,500	$0	$45,500
Maintenance of Traffic	$0	$14,900	$0	$14,900
Mobilization (5%)	$0	$222,000	$0	$222,000
Other Items = 25%	$0	$1,165,700	$0	$1,165,700
Const. Contingency = 15%	$0	$874,200	$0	$874,200
Construction Estimate	$0	$6,702,500	$0	$6,702,500
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$0	$0
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$670,300	$0	$670,300
Const. Eng. & Inspec. 10%	$0	$670,300	$0	$670,300
Total Project Cost	$0	$8,043,100	$0	$ 8,043,000

COST ESTIMATE SUMMARY

Route:	**John Hagar Road**
Description:	**SR 265 Subarea Study**
County:	**Wilson**
Length:	**0.4 miles**
Date:	**May 25, 2017**

DESCRIPTION	LOCAL 0%	STATE 100%	FEDERAL 0%	TOTAL
Construction Items				
Pavement Removal	$0	$6,300	$0	$6,300
Asphalt Paving	$0	$212,500	$0	$212,500
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$209,800	$0	$209,800
Appurtenances	$0	$189,900	$0	$189,900
Structures	$0	$0	$0	$0
Fencing	$0	$0	$0	$0
Signalization	$0	$0	$0	$0
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$197,400	$0	$197,400
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$2,900	$0	$2,900
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$4,900	$0	$4,900
Signing	$0	$6,000	$0	$6,000
Pavement Markings	$0	$5,900	$0	$5,900
Maintenance of Traffic	$0	$3,200	$0	$3,200
Mobilization (5%)	$0	$41,900	$0	$41,900
Other Items = 25%	$0	$220,200	$0	$220,200
Const. Contingency = 15%	$0	$165,100	$0	$165,100
Construction Estimate	$0	$1,266,000	$0	$1,266,000
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$0	$0
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$126,600	$0	$126,600
Const. Eng. & Inspec. 10%	$0	$126,600	$0	$126,600
Total Project Cost	$0	$1,519,200	$0	$ 1,519,000

COST ESTIMATE SUMMARY

Route:	**Adams Lane**
Description:	**SR 265 Subarea Study**
County:	**Wilson**
Length:	**0.4 miles**
Date:	**May 25, 2017**

DESCRIPTION	LOCAL 0%	STATE 100%	FEDERAL 0%	TOTAL
Construction Items				
Pavement Removal	$0	$16,300	$0	$16,300
Asphalt Paving	$0	$185,900	$0	$185,900
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$183,600	$0	$183,600
Appurtenances	$0	$166,200	$0	$166,200
Structures	$0	$0	$0	$0
Fencing	$0	$0	$0	$0
Signalization	$0	$0	$0	$0
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$176,800	$0	$176,800
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$2,500	$0	$2,500
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$4,700	$0	$4,700
Signing	$0	$5,300	$0	$5,300
Pavement Markings	$0	$5,200	$0	$5,200
Maintenance of Traffic	$0	$2,800	$0	$2,800
Mobilization (5%)	$0	$37,500	$0	$37,500
Other Items = 25%	$0	$196,700	$0	$196,700
Const. Contingency = 15%	$0	$147,500	$0	$147,500
Construction Estimate	$0	$1,131,000	$0	$1,131,000
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$0	$0
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$113,100	$0	$113,100
Const. Eng. & Inspec. 10%	$0	$113,100	$0	$113,100
Total Project Cost	$0	$1,357,200	$0	$ 1,357,000

COST ESTIMATE SUMMARY

Route:	**Tillman Drive**
Description:	**SR 265 Subarea Study**
County:	**Wilson**
Length:	**0.55 miles**
Date:	**May 25, 2017**

DESCRIPTION	LOCAL 0%	STATE 100%	FEDERAL 0%	TOTAL
Construction Items				
Pavement Removal	$0	$1,800	$0	$1,800
Asphalt Paving	$0	$292,100	$0	$292,100
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$288,400	$0	$288,400
Appurtenances	$0	$261,100	$0	$261,100
Structures	$0	$0	$0	$0
Fencing	$0	$0	$0	$0
Signalization	$0	$0	$0	$0
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$259,100	$0	$259,100
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$4,000	$0	$4,000
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$8,600	$0	$8,600
Signing	$0	$8,300	$0	$8,300
Pavement Markings	$0	$8,100	$0	$8,100
Maintenance of Traffic	$0	$4,400	$0	$4,400
Mobilization (5%)	$0	$56,800	$0	$56,800
Other Items = 25%	$0	$298,200	$0	$298,200
Const. Contingency = 15%	$0	$223,600	$0	$223,600
Construction Estimate	$0	$1,714,500	$0	$1,714,500
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$0	$0
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$171,500	$0	$171,500
Const. Eng. & Inspec. 10%	$0	$171,500	$0	$171,500
Total Project Cost	$0	$2,057,500	$0	$ 2,058,000

APPENDIX C: TRAFFIC PROJECTIONS

Supplemented and Revised Traffic Forecasting Study

I-40 at State Route 265 (Central Pike) Interchange Access Request

Supplement to the Revised Traffic Forecasting Study Technical Memorandum

SUPPLMENT INTRODUCTION

Gresham, Smith and Partners (GS&P) previously developed traffic forecasts for the I-40 at SR 265 IAR in Wilson County. TDOT approved the forecasts on April 6, 2016. The forecasts included the following scenarios:

1. 2014 Existing
2. 2020 without Interchange
3. 2040 without Interchange
4. 2040 with Interchange

FHWA reviewed the draft IAR in October 2016. As a result of comments received, the following forecast scenario was developed and included in this supplement:

1. 2020 with Interchange

Also, forecasts (for all scenarios) were needed along two additional roadways within the study area:

1. Pleasant Grove Road
2. Tillman Drive

Lastly, this supplement provides turning movement schematics at the intersections within the study area.

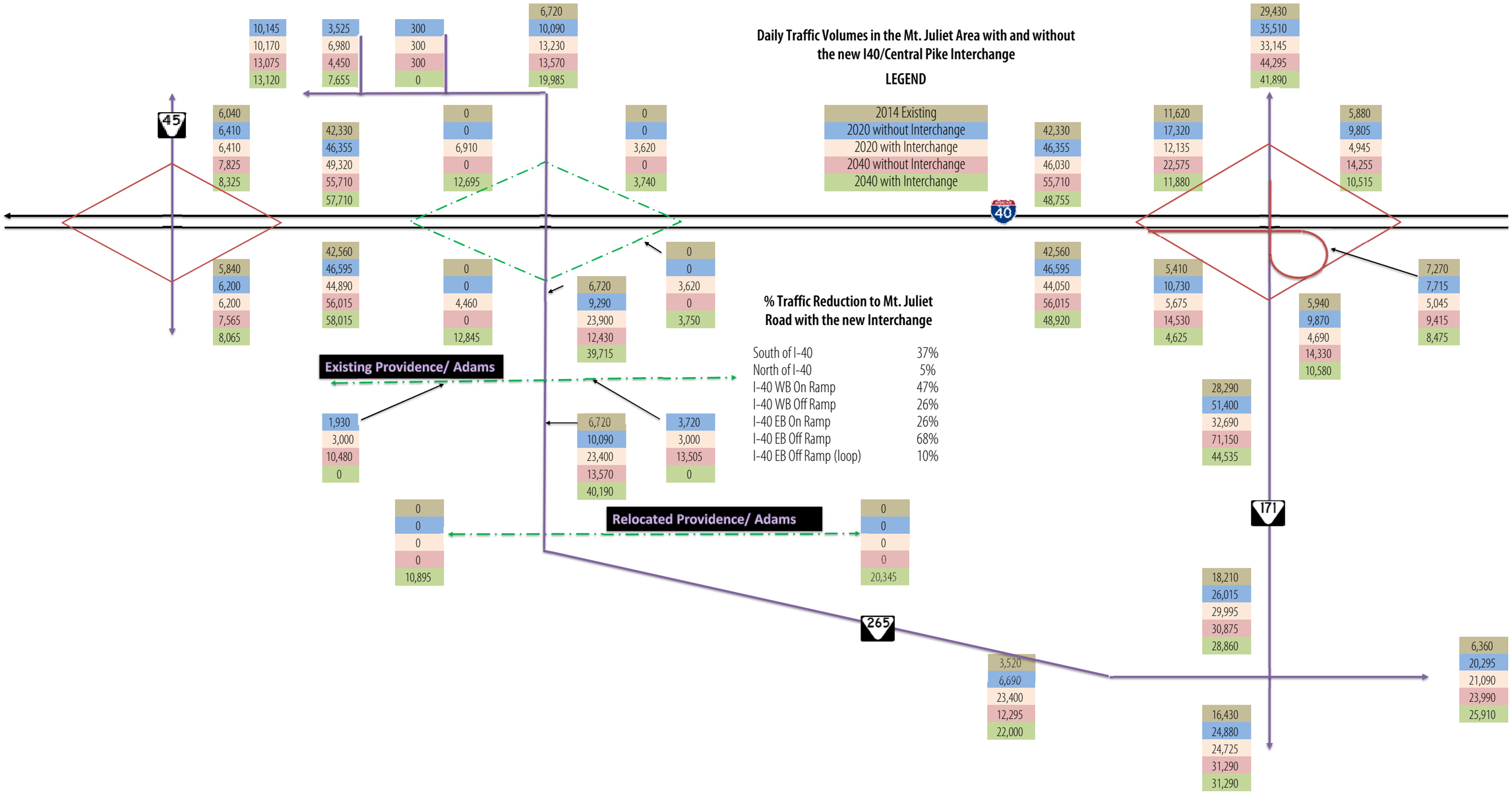
Daily Traffic Volumes in the Mt. Juliet Area with and without the new I40/Central Pike Interchange

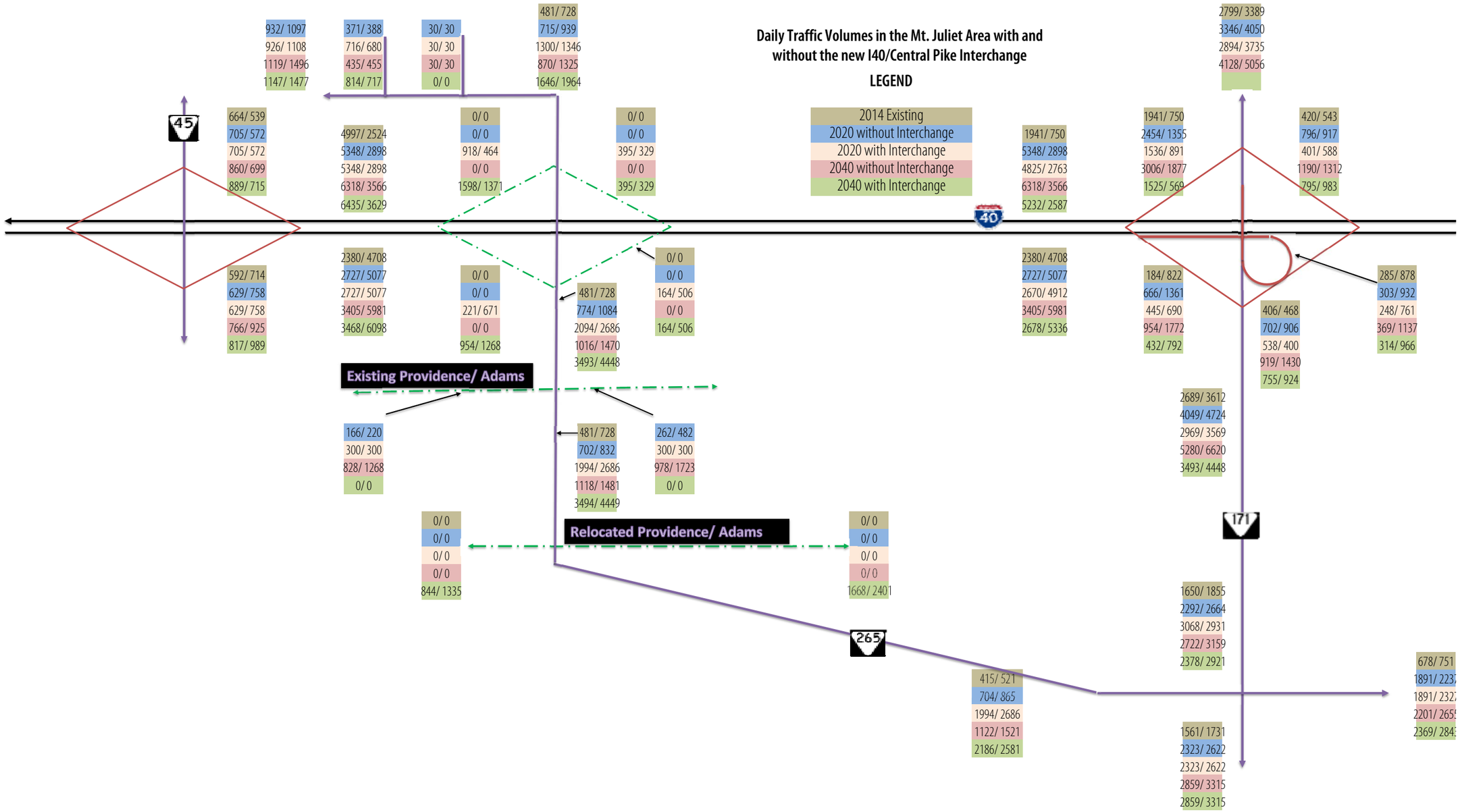
LEGEND

2014 Existing
2020 without Interchange
2020 with Interchange
2040 without Interchange
2040 with Interchange

% Traffic Reduction to Mt. Juliet Road with the new Interchange

South of I-40	37%
North of I-40	5%
I-40 WB On Ramp	47%
I-40 WB Off Ramp	26%
I-40 EB On Ramp	26%
I-40 EB Off Ramp	68%
I-40 EB Off Ramp (loop)	10%

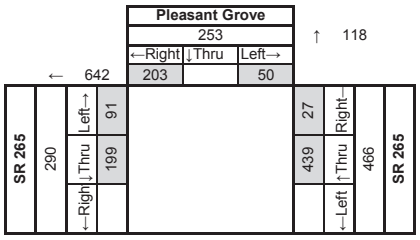



Daily Traffic Volumes in the Mt. Juliet Area with and without the new I40/Central Pike Interchange
LEGEND
2014 Existing
2020 without Interchange
2020 with Interchange
2040 without Interchange
2040 with Interchange
45
40
171
265
Existing Providence/ Adams
Relocated Providence/ Adams
932/ 1097
926/ 1108
1119/ 1496
1147/ 1477
371/ 388
716/ 680
435/ 455
814/ 717
30/ 30
30/ 30
30/ 30
0/ 0
481/ 728
715/ 939
1300/ 1346
870/ 1325
1646/ 1964
664/ 539
705/ 572
705/ 572
860/ 699
889/ 715
4997/ 2524
5348/ 2898
5348/ 2898
6318/ 3566
6435/ 3629
0/ 0
0/ 0
918/ 464
0/ 0
1598/ 1371
0/ 0
0/ 0
395/ 329
0/ 0
395/ 329
1941/ 750
5348/ 2898
4825/ 2763
6318/ 3566
5232/ 2587
2799/ 3389
3346/ 4050
2894/ 3735
4128/ 5056
1941/ 750
2454/ 1355
1536/ 891
3006/ 1877
1525/ 569
420/ 543
796/ 917
401/ 588
1190/ 1312
795/ 983
592/ 714
629/ 758
629/ 758
766/ 925
817/ 989
2380/ 4708
2727/ 5077
2727/ 5077
3405/ 5981
3468/ 6098
0/ 0
0/ 0
221/ 671
0/ 0
954/ 1268
481/ 728
774/ 1084
2094/ 2686
1016/ 1470
3493/ 4448
0/ 0
0/ 0
164/ 506
0/ 0
164/ 506
2380/ 4708
2727/ 5077
2670/ 4912
3405/ 5981
2678/ 5336
184/ 822
666/ 1361
445/ 690
954/ 1772
432/ 792
285/ 878
303/ 932
248/ 761
369/ 1137
314/ 966
406/ 468
702/ 906
538/ 400
919/ 1430
755/ 924
166/ 220
300/ 300
828/ 1268
0/ 0
481/ 728
702/ 832
1994/ 2686
1118/ 1481
3494/ 4449
262/ 482
300/ 300
978/ 1723
0/ 0
2689/ 3612
4049/ 4724
2969/ 3569
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2292/ 2664
3068/ 2931
2722/ 3159
2378/ 2921
415/ 521
704/ 865
1994/ 2686
1122/ 1521
2186/ 2581
1561/ 1731
2323/ 2622
2323/ 2622
2859/ 3315
2859/ 3315
678/ 751
1891/ 223
1891/ 232
2201/ 265
2369/ 284

SR 265 IAR

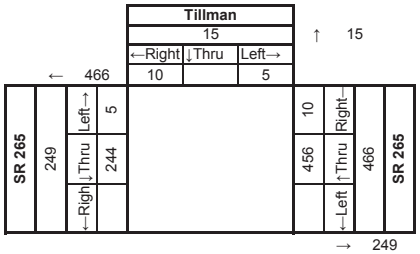
Condition: 2020 AM No Build

Pleasant Grove



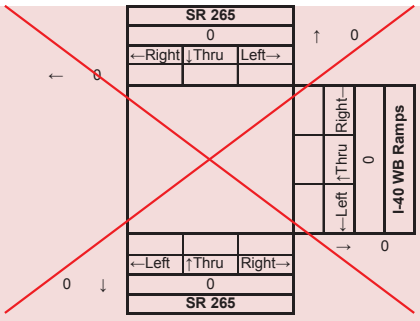
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715 =E
0 =S
932 =W

Tillman



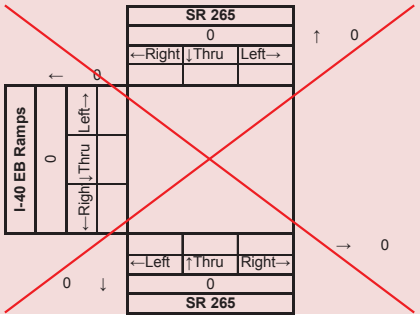
Approach Totals
30 =N
715 =E
0 =S
715 =W

WB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

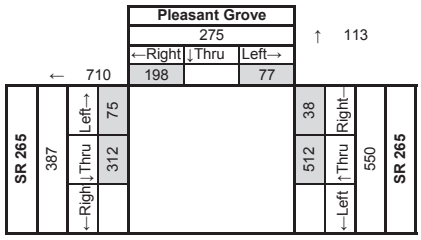
EB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

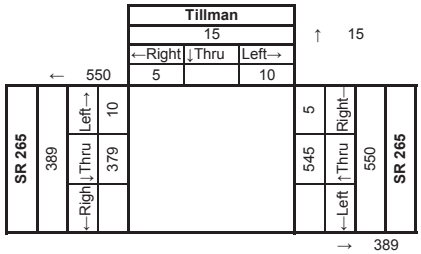
Condition: 2020 PM No Build

Pleasant Grove



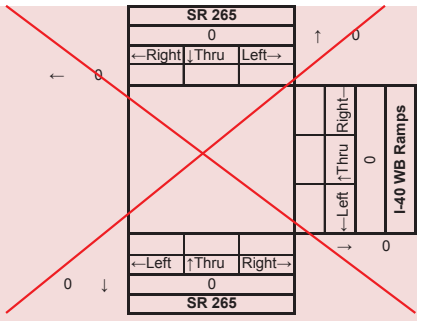
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939 =E
0 =S
1097 =W

Tillman



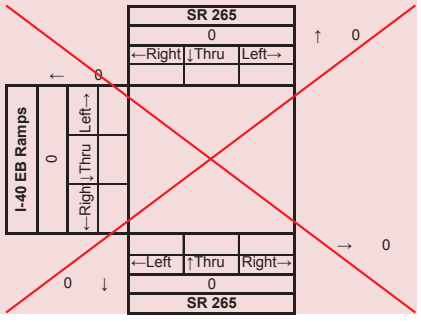
Approach Totals
30 =N
939 =E
0 =S
939 =W

WB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

EB Ramps

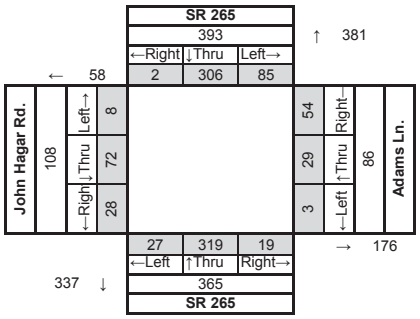


Approach Totals
0 =N
0 =E
0 =S
0 =W

SR 265 IAR

Condition: 2020 AM No Build

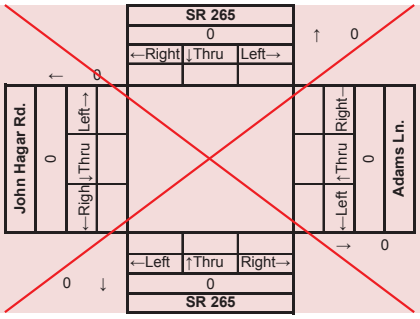
Exist Adams



Approach Totals

774 =N
262 =E
702 =S
166 =W

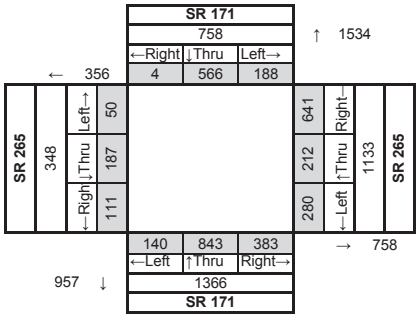
Proposed Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

SR 171



Approach Totals

2292 =N
1891 =E
2323 =S
704 =W

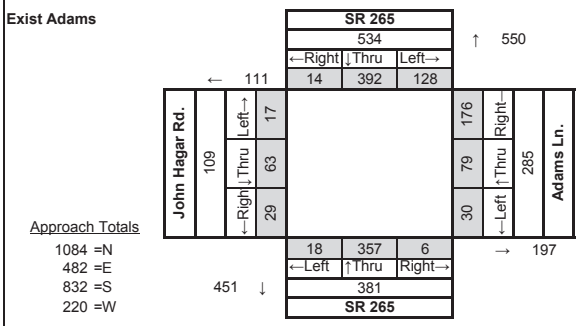
Legend:

N/A for Condition

From previously approved traffic projections

Condition: 2020 PM No Build

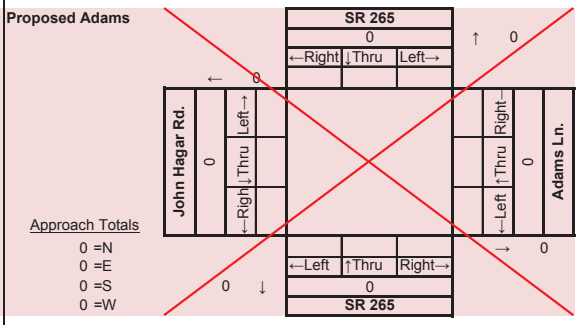
Exist Adams



Approach Totals

1084 =N
482 =E
832 =S
220 =W

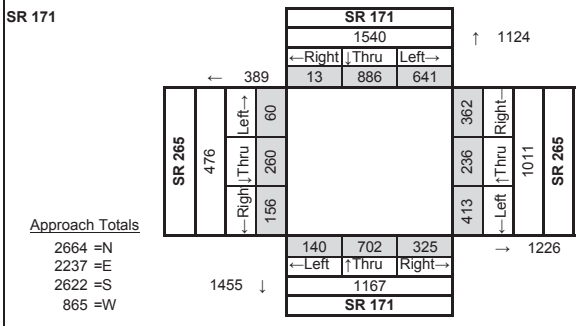
Proposed Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

SR 171



Approach Totals

2664 =N
2237 =E
2622 =S
865 =W

Legend:

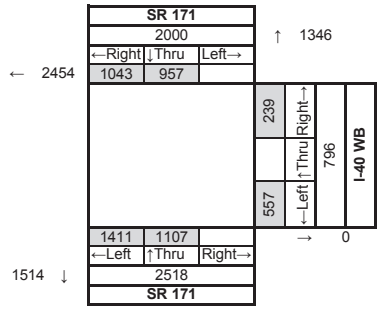
N/A for Condition

From previously approved traffic projections

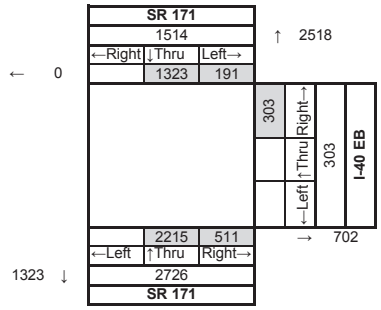
SR 265 IAR

Condition: 2020 AM No Build

I-40 WB at SR 171

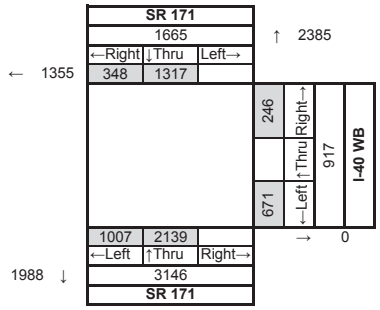


I-40 EB at SR 171

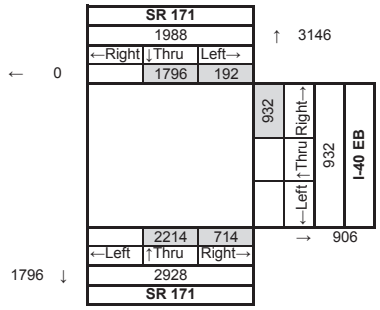


Condition: 2020 PM No Build

I-40 WB at SR 171



I-40 EB at SR 171



Legend:

	N/A for Condition
	From previously approved traffic projections

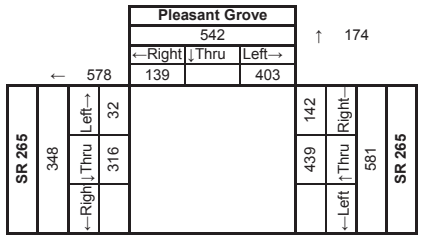
Legend:

	N/A for Condition
	From previously approved traffic projections

SR 265 IAR

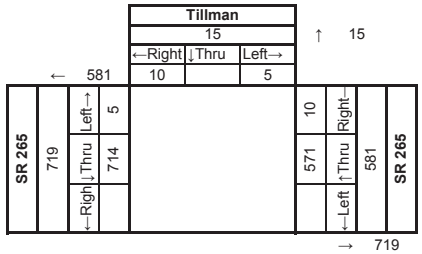
Condition: 2020 AM Build

Pleasant Grove



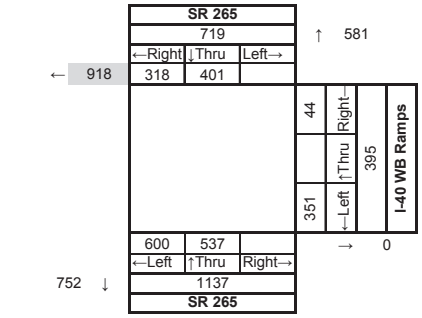
Approach Totals
716 =N
1300 =E
0 =S
926 =W

Tillman



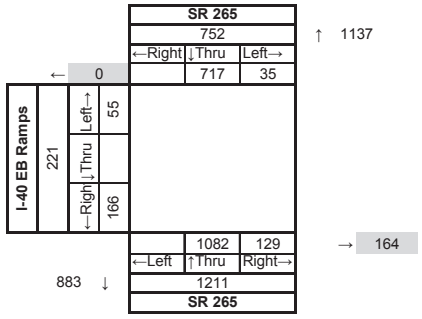
Approach Totals
30 =N
1300 =E
0 =S
1300 =W

WB Ramps



Approach Totals
1300 =N
395 =E
1889 =S
918 =W

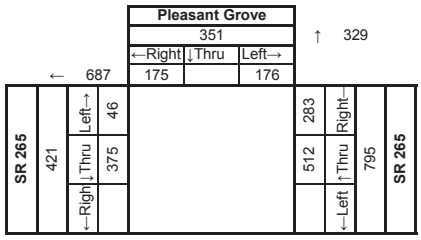
EB Ramps



Approach Totals
1889 =N
164 =E
2094 =S
221 =W

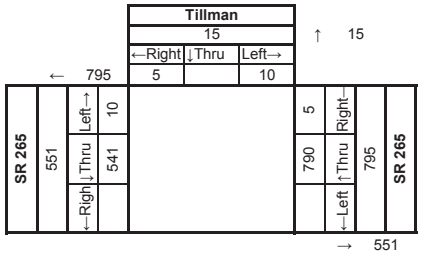
Condition: 2020 PM Build

Pleasant Grove



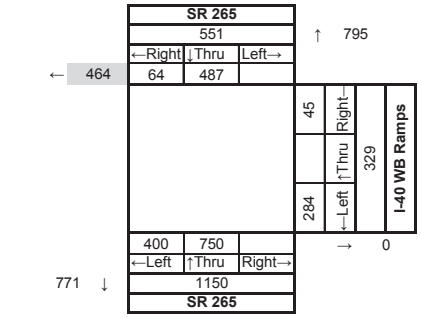
Approach Totals
680 =N
1346 =E
0 =S
1108 =W

Tillman



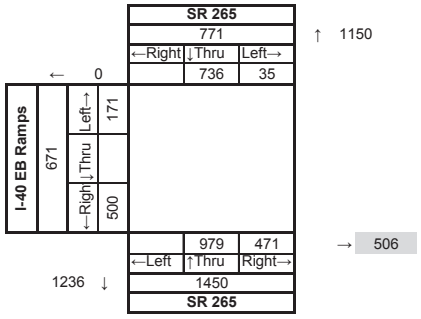
Approach Totals
30 =N
1346 =E
0 =S
1346 =W

WB Ramps



Approach Totals
1346 =N
329 =E
1921 =S
464 =W

EB Ramps

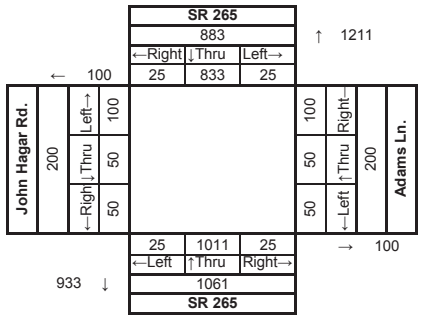


Approach Totals
1921 =N
506 =E
2686 =S
671 =W

SR 265 IAR

Condition: 2020 AM Build

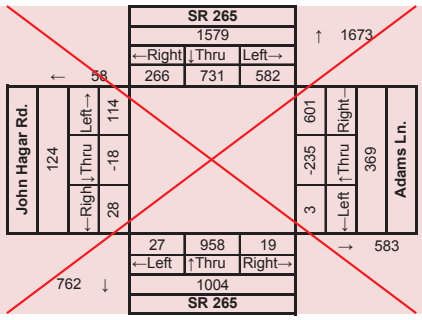
Exist Adams



Approach Totals

2094 =N
300 =E
1994 =S
300 =W

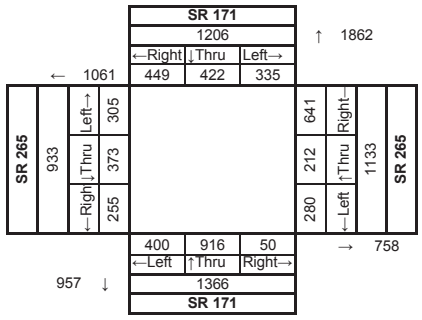
Proposed Adams



Approach Totals

3252 =N
952 =E
1766 =S
182 =W

SR 171



Approach Totals

3068 =N
1891 =E
2323 =S
1994 =W

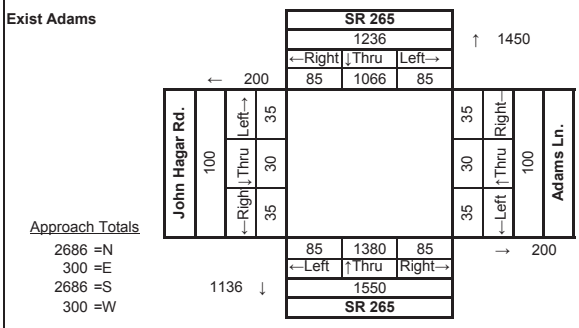
Legend:

N/A for Condition

From previously approved traffic projections

Condition: 2020 PM Build

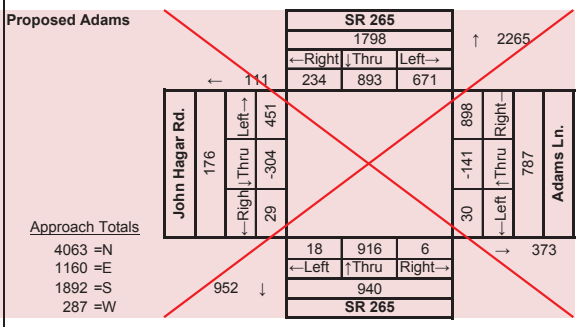
Exist Adams



Approach Totals

2686 =N
300 =E
2686 =S
300 =W

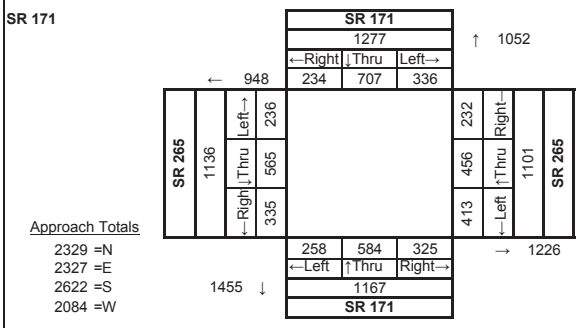
Proposed Adams



Approach Totals

4063 =N
1160 =E
1892 =S
287 =W

SR 171



Approach Totals

2329 =N
2327 =E
2622 =S
2084 =W

Legend:

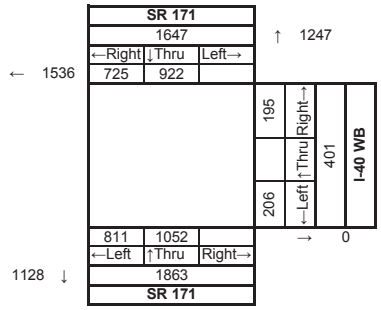
N/A for Condition

From previously approved traffic projections

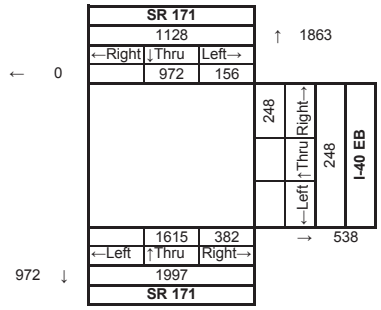
SR 265 IAR

Condition: 2020 AM Build

I-40 WB at SR 171



I-40 EB at SR 171

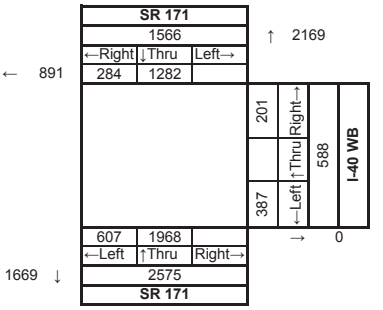


Legend:

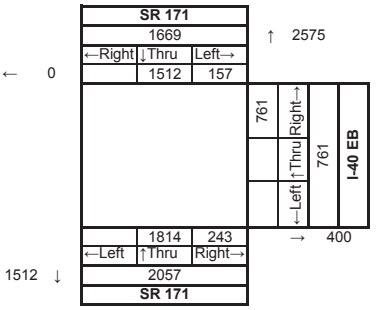
	N/A for Condition
	From previously approved traffic projections

Condition: 2020 PM Build

I-40 WB at SR 171



I-40 EB at SR 171



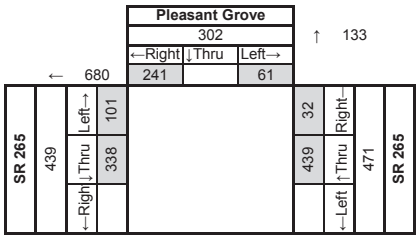
Legend:

	N/A for Condition
	From previously approved traffic projections

SR 265 IAR

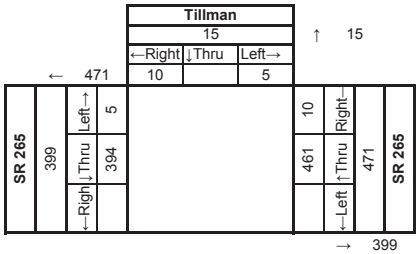
Condition: 2040 AM No Build

Pleasant Grove



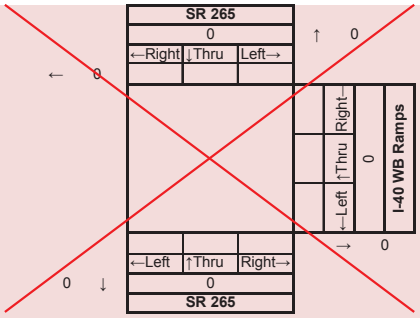
Approach Totals
435 =N
870 =E
0 =S
1119 =W

Tillman



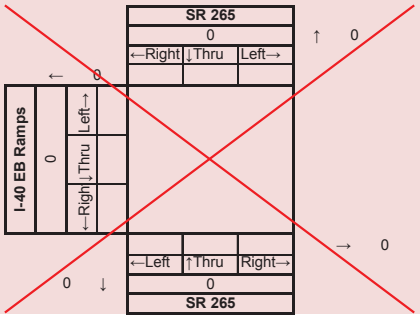
Approach Totals
30 =N
870 =E
0 =S
870 =W

WB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

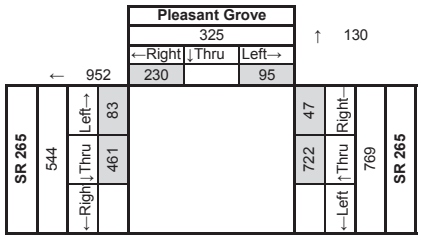
EB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

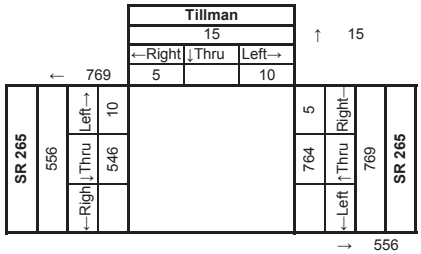
Condition: 2040 PM No Build

Pleasant Grove



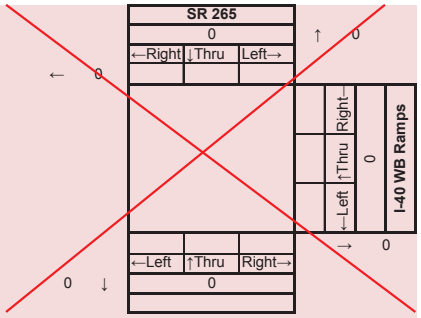
Approach Totals
455 =N
1325 =E
0 =S
1496 =W

Tillman



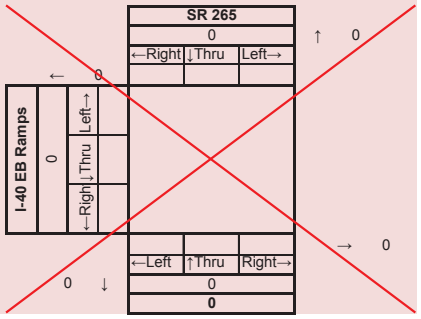
Approach Totals
30 =N
1325 =E
0 =S
1325 =W

WB Ramps



Approach Totals
0 =N
0 =E
0 =S
0 =W

EB Ramps

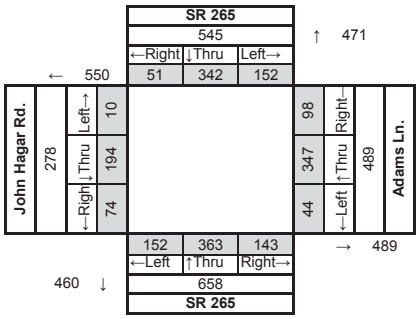


Approach Totals
0 =N
0 =E
0 =S
0 =W

SR 265 IAR

Condition: 2040 AM No Build

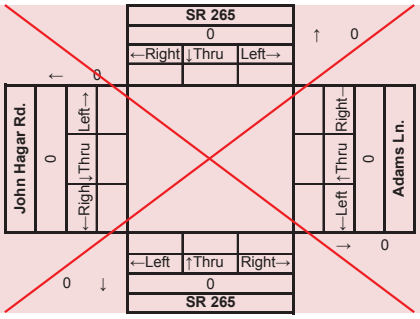
Exist Adams



Approach Totals

1016 =N
978 =E
1118 =S
828 =W

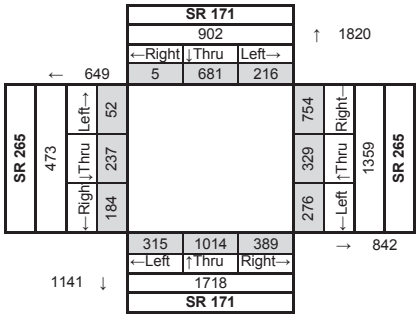
Proposed Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

SR 171

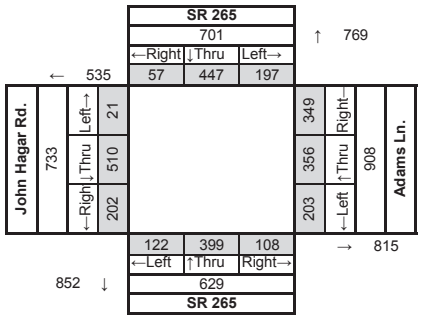


Approach Totals

2722 =N
2201 =E
2859 =S
1122 =W

Condition: 2040 PM No Build

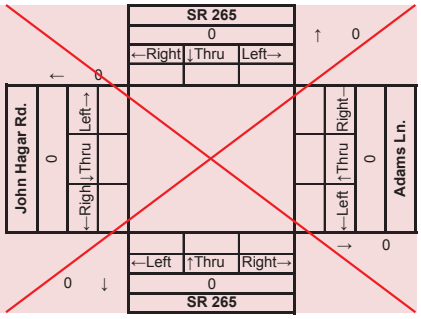
Exist Adams



Approach Totals

1470 =N
1723 =E
1481 =S
1268 =W

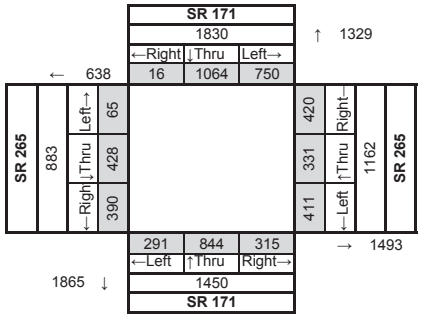
Proposed Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

SR 171



Approach Totals

3159 =N
2655 =E
3315 =S
1521 =W

Legend:

N/A for Condition

From previously approved traffic projections

Legend:

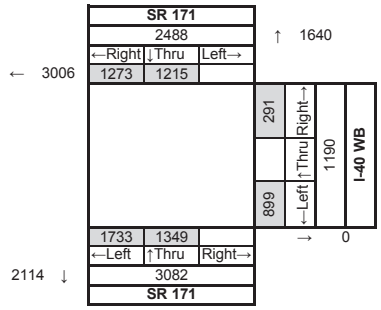
N/A for Condition

From previously approved traffic projections

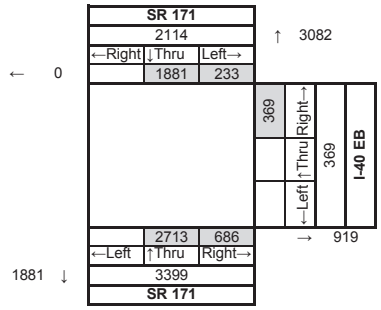
SR 265 IAR

Condition: 2040 AM No Build

I-40 WB at SR 171



I-40 EB at SR 171

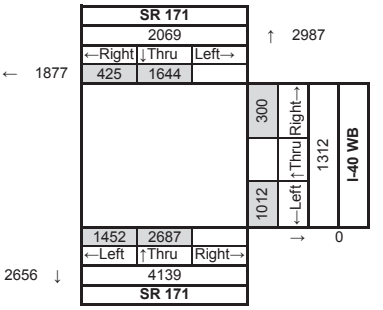


Legend:

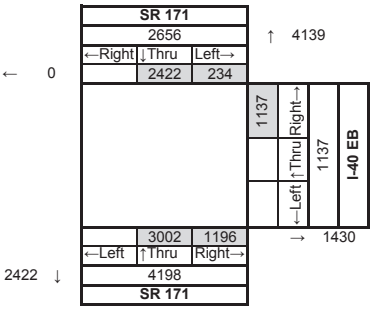
	N/A for Condition
	From previously approved traffic projections

Condition: 2040 PM No Build

I-40 WB at SR 171



I-40 EB at SR 171



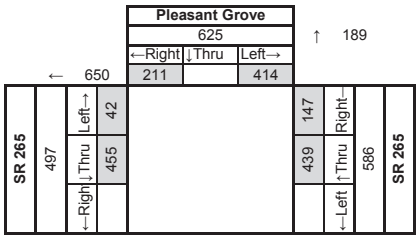
Legend:

	N/A for Condition
	From previously approved traffic projections

SR 265 IAR

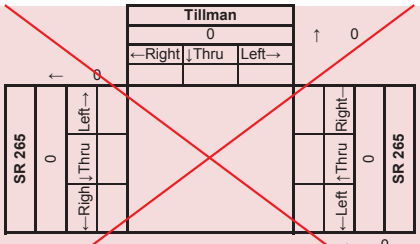
Condition: 2040 AM Build

Pleasant Grove



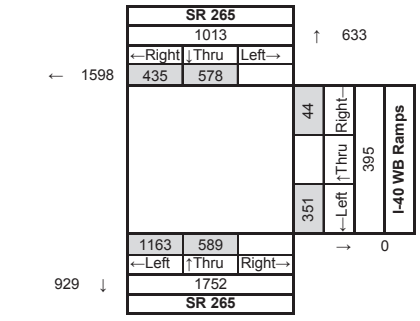
Approach Totals
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1455 =E
0 =S
1147 =W

Tillman



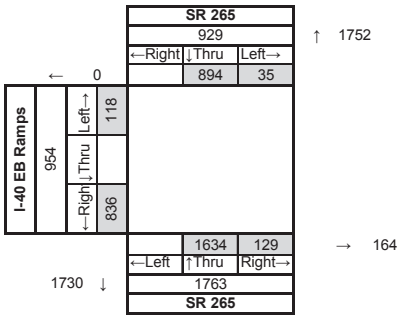
Approach Totals
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0 =E
0 =S
0 =W

WB Ramps



Approach Totals
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395 =E
2681 =S
1598 =W

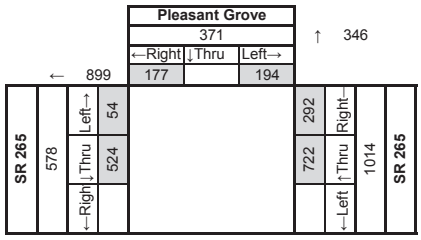
EB Ramps



Approach Totals
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164 =E
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954 =W

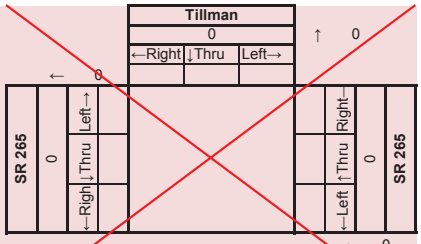
Condition: 2040 PM Build

Pleasant Grove



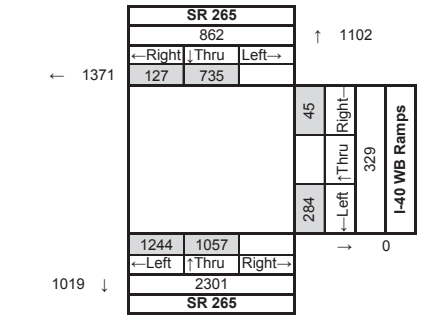
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1732 =E
0 =S
1477 =W

Tillman



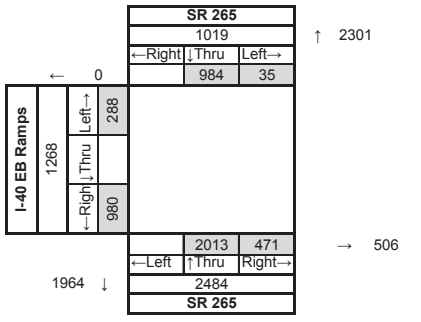
Approach Totals
0 =N
0 =E
0 =S
0 =W

WB Ramps



Approach Totals
1964 =N
329 =E
3320 =S
1371 =W

EB Ramps

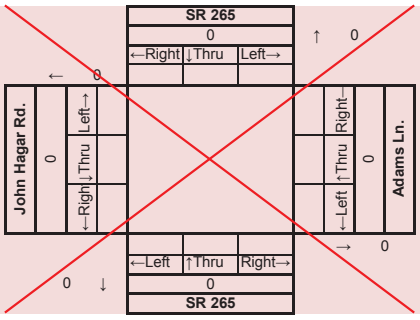


Approach Totals
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506 =E
4448 =S
1268 =W

SR 265 IAR

Condition: 2040 AM Build

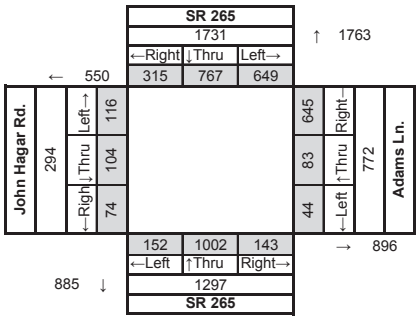
Exist Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

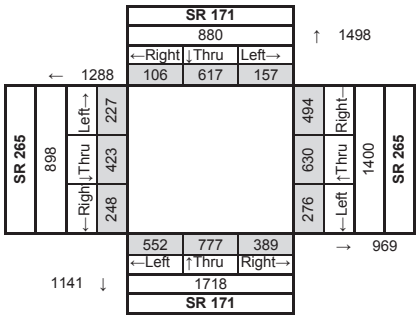
Proposed Adams



Approach Totals

3494 =N
1668 =E
2182 =S
844 =W

SR 171



Approach Totals

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2369 =E
2859 =S
2186 =W

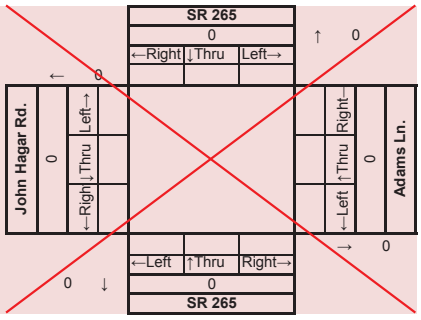
Legend:

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From previously approved traffic projections

Condition: 2040 PM Build

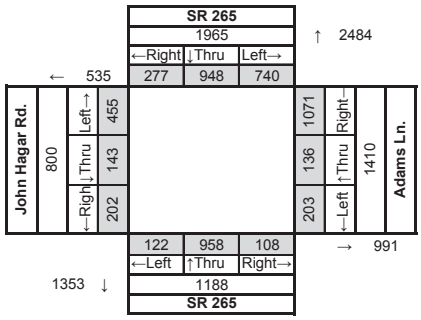
Exist Adams



Approach Totals

0 =N
0 =E
0 =S
0 =W

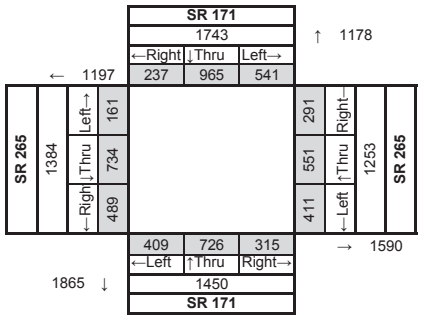
Proposed Adams



Approach Totals

4449 =N
2401 =E
2541 =S
1335 =W

SR 171



Approach Totals

2921 =N
2843 =E
3315 =S
2581 =W

Legend:

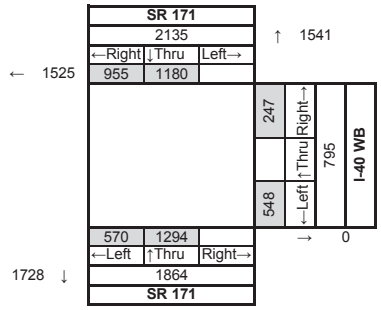
N/A for Condition

From previously approved traffic projections

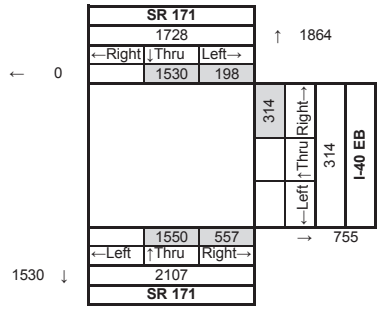
SR 265 IAR

Condition: 2040 AM Build

I-40 WB at SR 171



I-40 EB at SR 171

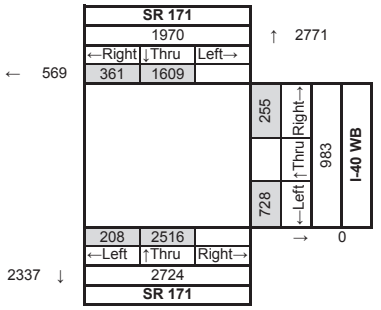


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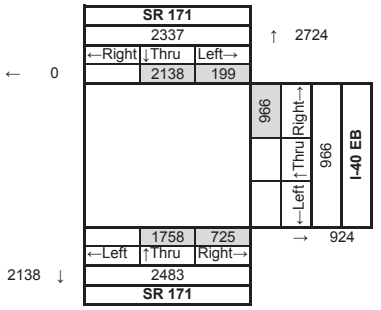
	N/A for Condition
	From previously approved traffic projections

Condition: 2040 PM Build

I-40 WB at SR 171



I-40 EB at SR 171



Legend:

	N/A for Condition
	From previously approved traffic projections

REVISED TRAFFIC FORECASTING STUDY (WITH APPROVAL LETTER)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-1402
(615) 741-2208

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

April 6, 2016

Mr. J. Shap Stiles P.E.
Gresham, Smith and Partners
2095 Lakeside Centre Way, Suite 120
Knoxville TN 37922

RE: Traffic Forecasting Study Technical Memorandum
I-40 @ S.R. 265 [Central Pike] IAR
Mt. Juliet TN, Wilson county County

Dear Mr. Stiles,

Our office has reviewed the revised traffic schematics and methodology you submitted on April 6, 2016 for the subject project. These traffic schematics and volumes have our approval for use in the study. If I can be of futher assisitance, please contact me.

Sincerely,

Tony Armstrong
Transportation Manager 1

cc : Shaun Armstrong
file

I-40 AT STATE ROUTE 265 (CENTRAL PIKE) INTERCHANGE ACCESS REQUEST

REVISED TRAFFIC FORECASTING STUDY TECHNICAL MEMORANDUM

INTRODUCTION

Gresham, Smith and Partners (GS&P) had conducted a preliminary traffic forecasting study to support the I-40 at SR 265 (Central Pike) Interchange Access Request (IAR). This preliminary traffic forecasting study was based on the traffic volumes projected by the Nashville MPO's travel demand model. The preliminary traffic forecasting study was included in the DRAFT IAR document submitted to the Tennessee Department of Transportation (TDOT) on February 2, 2015. Based on additional information received from the City of Mt. Juliet subsequent to the DRAFT IAR submittal, the preliminary traffic forecasting study was revised to reflect the traffic generated by the various approved developments in the area. This Technical Memorandum details the methodology followed by GS&P to prepare the revised traffic forecasting study.

STUDY OBJECTIVES

The objectives of this revised traffic forecasting study are as follows:

1. Establish the existing condition traffic volumes (Year 2014) in the study area.
2. Forecast the future condition traffic volumes (Year 2040) in the study area without the I-40/ Central Pike interchange to represent the "Without Interchange" traffic forecasts.
3. Redistribute/reroute the above forecasted future condition traffic volumes to account for the new I-40/ Central Pike interchange to represent the "With Interchange" traffic forecasts.
4. Evaluate the shift in traffic from Mt. Juliet Road to Central Pike and also the shift in traffic from the I-40/ Mt. Juliet Road interchange to the I-40/ Central Pike interchange.
5. Conduct peak-hour operational analysis at the existing I-40/ Mt. Juliet Road interchange and at the proposed I-40/ Central Pike interchange. The proposed I-40/ Central Pike interchange will be analyzed as both a traditional diamond and a diverging diamond interchange.

STUDY AREA

The study area for the traffic forecasting is shown in **Figure 1**. The study area includes I-40 from west of Central Pike to East of Mt. Juliet Road, Central Pike from north of I-40 to east of Mt. Juliet Road and Mt. Juliet Road from south of Central Pike to north of Providence Parkway. In addition to these roadway sections, the following intersections were also included in the study area,

1. Mt Juliet Rd/ I-40 EB Ramps
2. Mt Juliet Rd/ I-40 WB Ramps
3. Central Pike/ I-40 EB Ramps
4. Central Pike/ I-40 WB Ramps

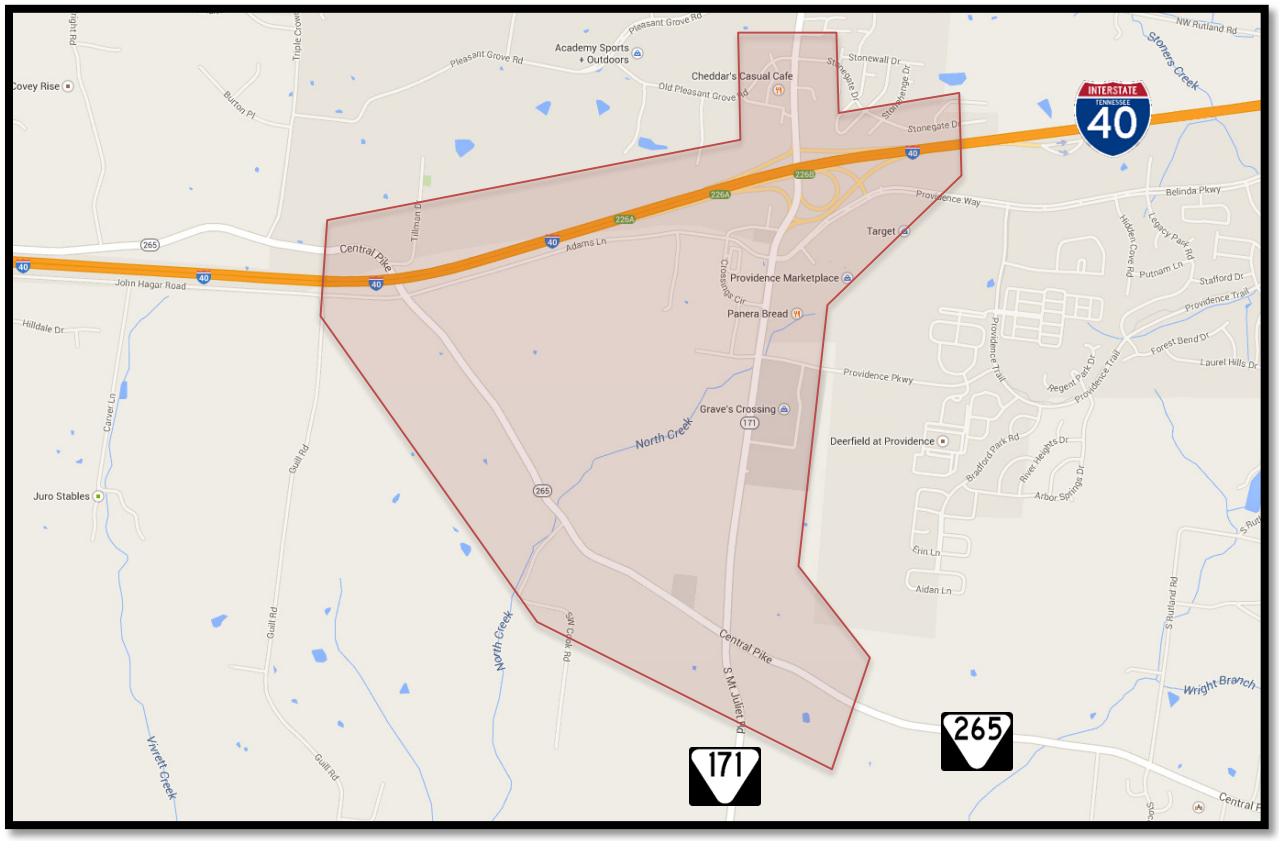


Figure 1. Study Area

EXISTING CONDITION TRAFFIC VOLUMES

The existing condition traffic volumes (Year 2014) along I-40, Mt. Juliet Road and Central Pike was established based on traffic counts collected by GS&P, traffic counts obtained from the approved traffic impact studies in the area (Providence Central, Mt. Juliet, TN), and TDOT's traffic counters in the vicinity of the study area. The raw count worksheets are provided in Appendix A.

The daily and peak hour link volumes along the study area roadway network is presented in Figure 2 and Figure 3 respectively. Though this forecasting study focused on the study area shown in Figure 1, traffic volumes at the Old Hickory Blvd interchange along I-40 is also reported in Figure 2.

Additionally the intersection turning movement volumes at the interchange ramp termini intersections for the Old Hickory Blvd and Mt. Juliet Road interchanges along I-40 is provided in Figure 4.

FUTURE CONDITION TRAFFIC VOLUMES

To evaluate the traffic conditions at the interchanges along I-40 at Mt. Juliet Road and Central Pike and also along Mt. Juliet Road and Central Pike, future year (Year 2040) traffic forecasts were developed for the "without interchange" and "with interchange" scenarios. The methodology followed to develop these traffic forecasts are detailed in the following sections.

"WITHOUT INTERCHANGE" TRAFFIC FORECASTS

The "Without Interchange" traffic forecasts were developed by growing the existing condition traffic volumes based on an expected annual background traffic growth rate and also adding the traffic generated by approved developments in the vicinity of the study area.

The expected annual background traffic growth rate was based on historical trends in traffic growth in the study area. The historical growth rate was calculated based on traffic count data obtained from TDOT at several permanent count stations in the vicinity of the study area. For the purposes of this study, nine count stations (17, 89, 90, 18, 19, 50, 345, 198, and 215) were identified to determine the traffic growth rate. The five-year, ten-year, and fifteen-year growth rates calculated at each of these count stations indicated an average historical growth rate of 3.0% in the study area. Though the calculated historical growth rate in the study area is 3%, GS&P recommends using an annual growth rate of 1% as a background growth rate for the purposes of estimating traffic for the year 2040 conditions because the traffic generated by the identified approved developments in the vicinity of the study area is proposed to be included in this study. GS&P recommends that this 1% background growth rate is adequate to account for all other growth in traffic in the study area due to developments not identified as part of this study. The list of all identified approved developments in the vicinity of the study area is included in **Table 1**. The approximate location of these developments with respect to the study area is presented in Figure 5. The traffic generated by these developments were obtained from the approved Traffic Impact Studies conducted for these developments and were used to develop the traffic forecasts in this study. The growth rate calculations and traffic studies for all the approved developments used in this forecasting study is included in Appendix B.

Table 1. Traffic Generated by Identified Approved Developments the Study Area

		AM Peak			PM Peak		
Development Name	**Daily**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Providence Central - Phase 1	1,482	23	91	114	92	49	141
Providence Central - Phase 2	7,142	414	207	621	295	475	770
Providence Central - Phase 3	19,126	960	323	1,283	800	1,336	2,136
Boyle Retail Center	22,876	775	662	1,437	1,096	1,062	2,158
Baird Farm Residential Development	2,408	47	142	189	159	94	253
Shankle Property Residential Development	4,066	80	240	320	269	158	427
Hamilton Hills - Phase 1	7,926	338	230	568	309	338	647
Hamilton Hills - Phase 2	2,190	239	35	274	52	227	279
Hamilton Hills - Phase 3	1,790	213	54	267	64	196	260
Hamilton Hills - Phase 4	2,372	46	141	187	144	87	231
Hamilton Hills - Phase 5	4,998	391	115	506	206	409	615
Covey Rise Residential Development	2,855	56	168	224	189	111	300
Cowden Property Residential Development	3,008	59	177	236	199	117	316
Total	**82,239**	**3,641**	**2,585**	**6,226**	**3,874**	**4,659**	**8,533**

The trips generated by the approved developments as shown in **Table 1** was added on top of the 1% background growth to calculate the "Without Interchange" traffic forecasts for the year 2040. This "other development" traffic was distributed through the study area roadway network based on the trip distribution patterns identified in the corresponding Traffic Impact Studies and also based on travel patterns identified from the Nashville MPO's travel demand model. The trip distribution percentages utilized in this study is shown in Figure 6.

The "Without Interchange" daily and peak hour link volumes along the study area roadway network is presented in Figure 2 and Figure 3 respectively. Additionally, the intersection turning movement volumes at the interchange ramp termini intersections is shown in Figure 7.

"WITH INTERCHANGE" TRAFFIC FORECASTS

The "With Interchange" traffic forecasts were developed by redistributing the "Without Interchange" traffic volumes by taking into account the traffic diversions expected due to the new I-40/ Central Pike interchange. This traffic diversions are based on travel patterns identified from the Nashville MPO's travel demand model. Several "select-link" and "select-zone" model runs were conducted using the travel demand model to estimate these travel patterns. The "With Interchange" daily and peak hour link volumes along the study area roadway network is presented in Figure 2 and Figure 3 respectively. Additionally, the intersection turning movement volumes at the interchange ramp termini intersections is shown in Figure 8.

As shown in Figure 2, based on Year 2040 Daily traffic volumes under the "With Interchange" condition, there is a **35% reduction in traffic along Mt. Juliet Road South of I-40**, 6% reduction in traffic along Mt. Juliet Road North of I-40, **44% reduction in traffic along I-40 WB On Ramp**, 20% reduction in traffic along I-40 WB Off Ramp, 20% reduction in traffic along I-40 EB On Ramp, **63% reduction in traffic along I-40 WB to Mt. Juliet Road SB Off Ramp**, and 10% reduction in traffic along I-40 WB to Mt. Juliet Road NB Off Ramp.

A detailed investigation of the Nashville MPO's travel demand model showed that the section of I-40 between Old Hickory Blvd and Mt. Juliet Road interchanges showed a modest increase in traffic volumes under the "With Interchange" condition. Based on several "select-link" model runs this increase in traffic volume was estimated to be the shift in traffic from the parallel Central Pike facility on to I-40. Under the "With Interchange" condition, some traffic along Central Pike between Old Hickory Blvd and Mt. Juliet Road shifts onto I-40 to traverse on a higher speed facility (I-40) and thus realizing some travel time savings. As shown in Figure 2, this shift in traffic was estimated to be 2,000 vehicles per day in both direction for the section of I-40 between Old Hickory Blvd and Mt. Juliet Road interchanges. This change is also reflected in the ramp volumes at the Old Hickory Blvd interchange – an increase of 500 vehicles per day along the westbound off-ramp and the eastbound on-ramp; and a decrease of 1,500 vehicles per day along the westbound on-ramp and the eastbound off-ramp. As the westbound on-ramp and the eastbound off-ramp at the Old Hickory Blvd interchange is outside the study area for the IJR, the volumes along these ramps are not shown in Figure 2; but the effect of this decrease in volumes is included in this study and is reflected in the intersection turning movement volumes at the Old Hickory Blvd interchange intersections as shown in Figures 7 and 8.

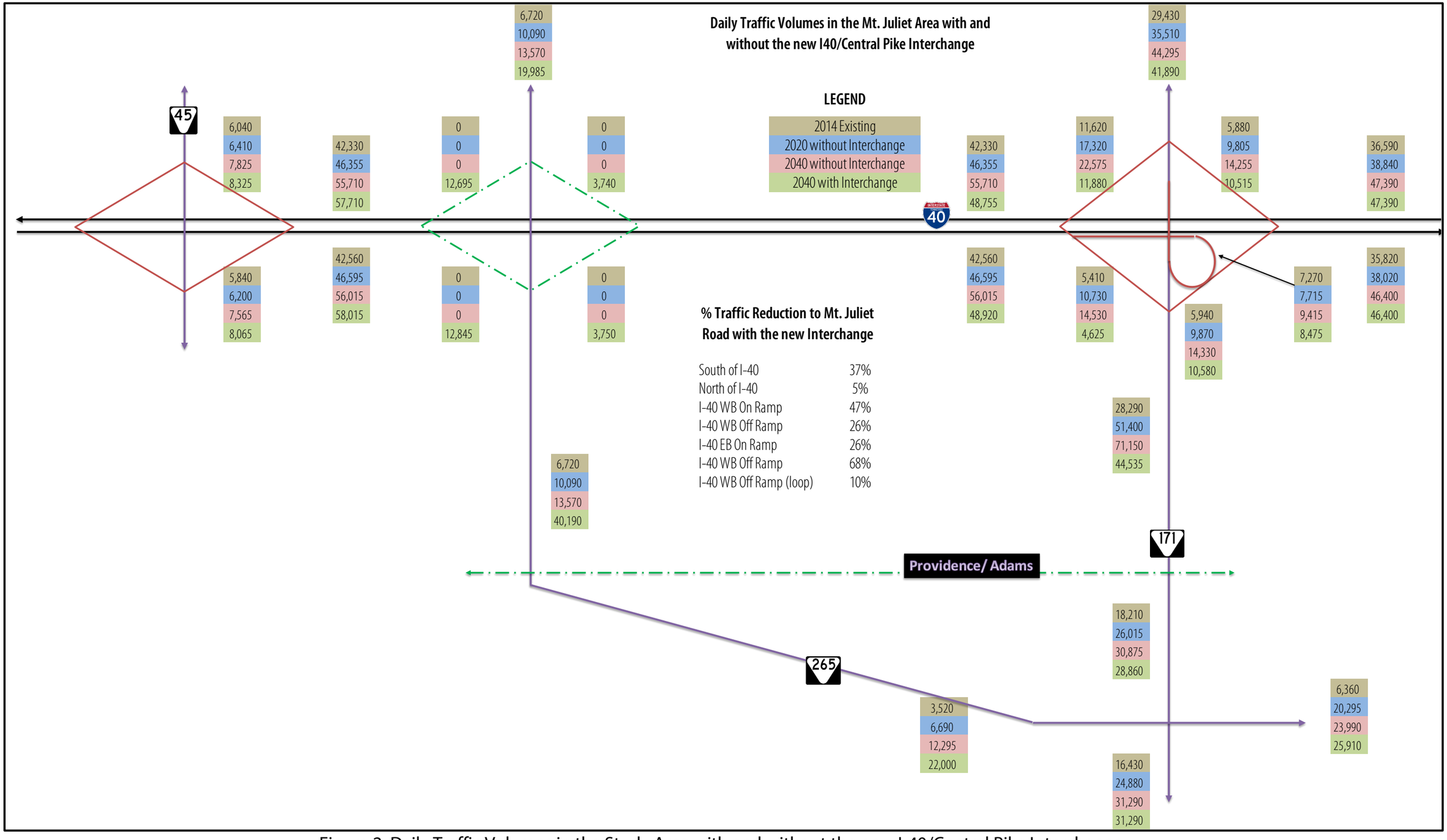


Figure 2. Daily Traffic Volumes in the Study Area with and without the new I-40/Central Pike Interchange

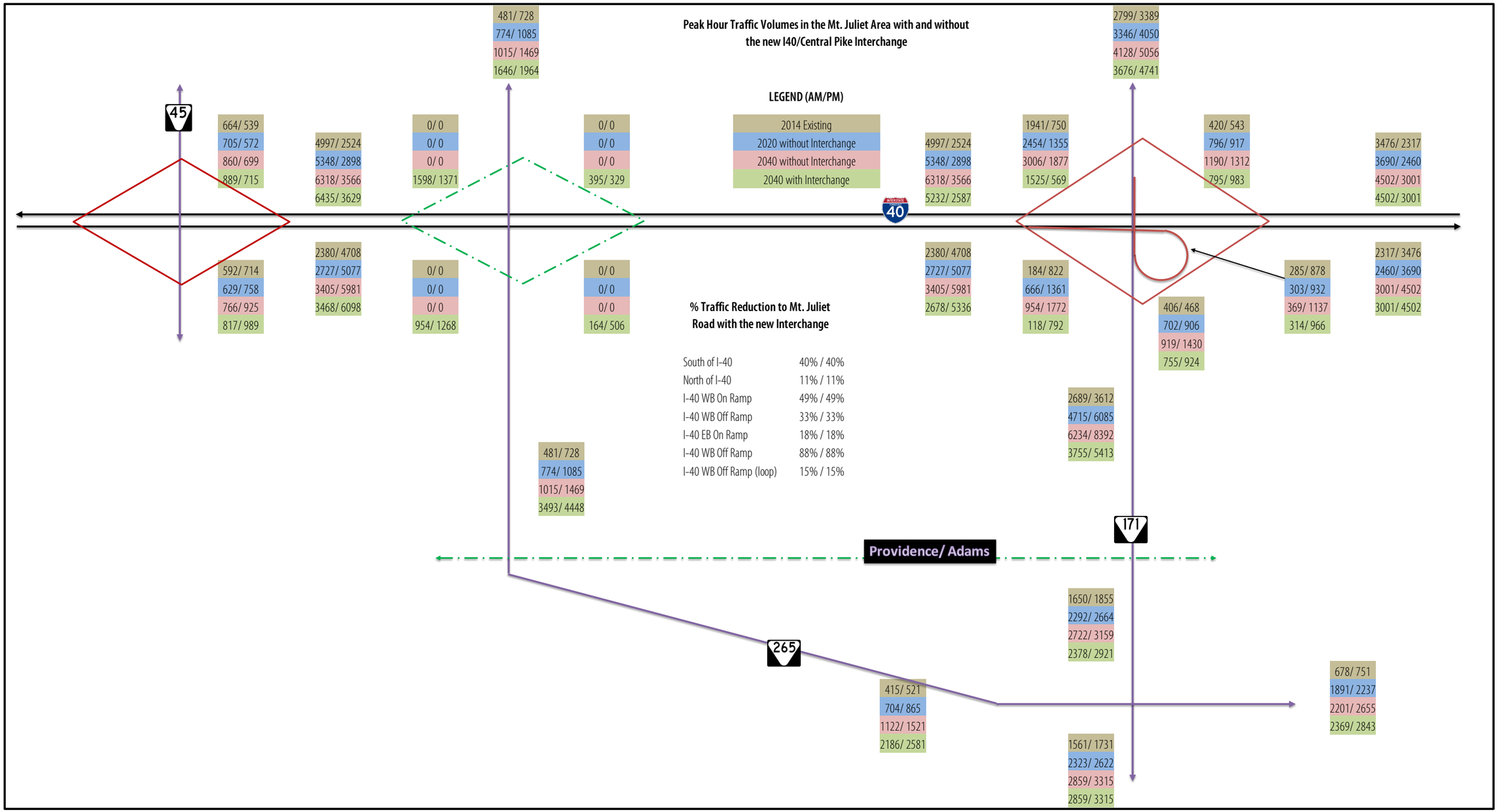


Figure 3. Peak Hour (AM/ PM) Traffic Volumes in the Study Area with and without the new I-40/Central Pike Interchange

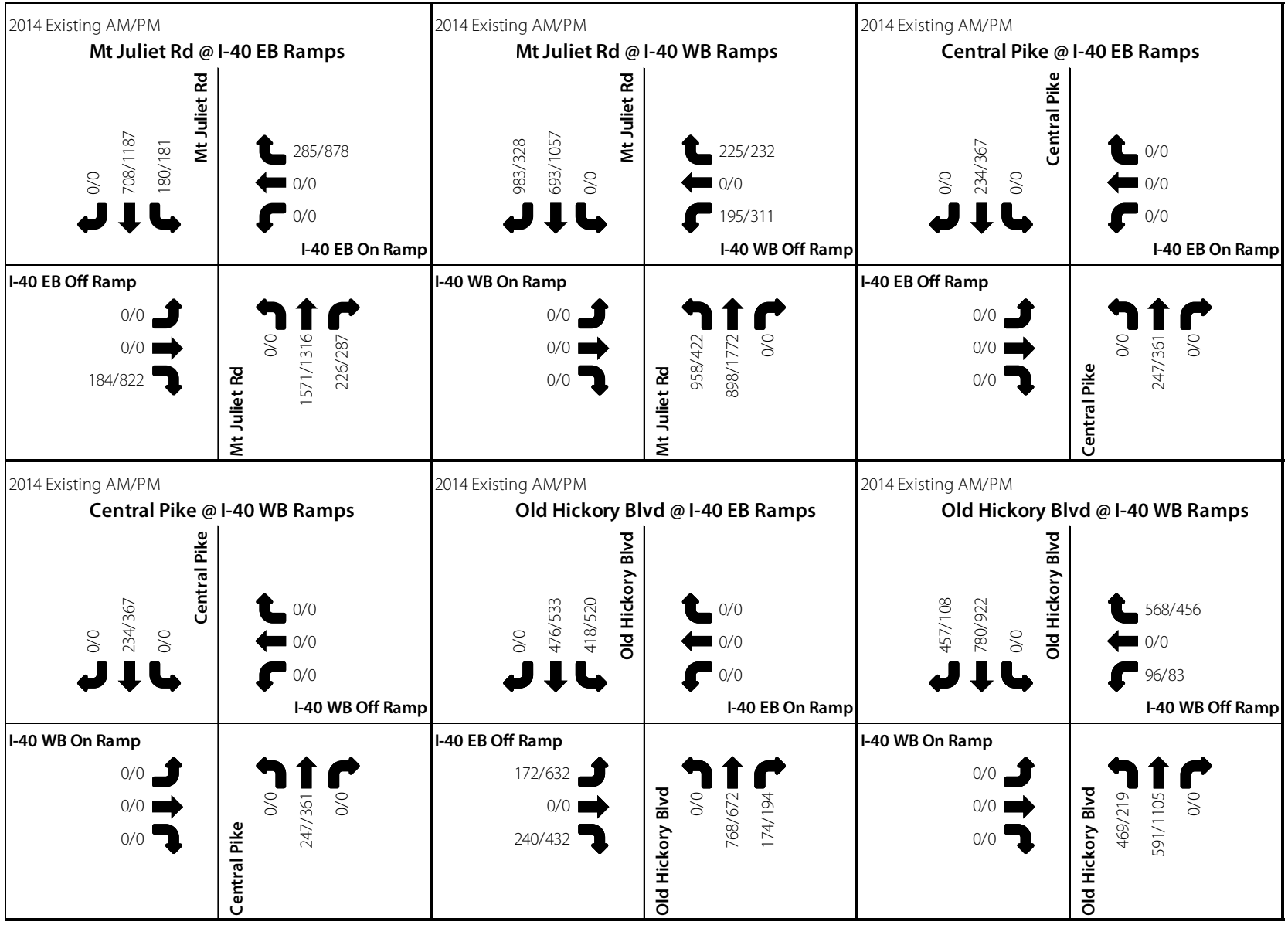


Figure 4. 2014 Existing Year Peak Hour (AM/ PM) Intersection Turning Movement Volumes

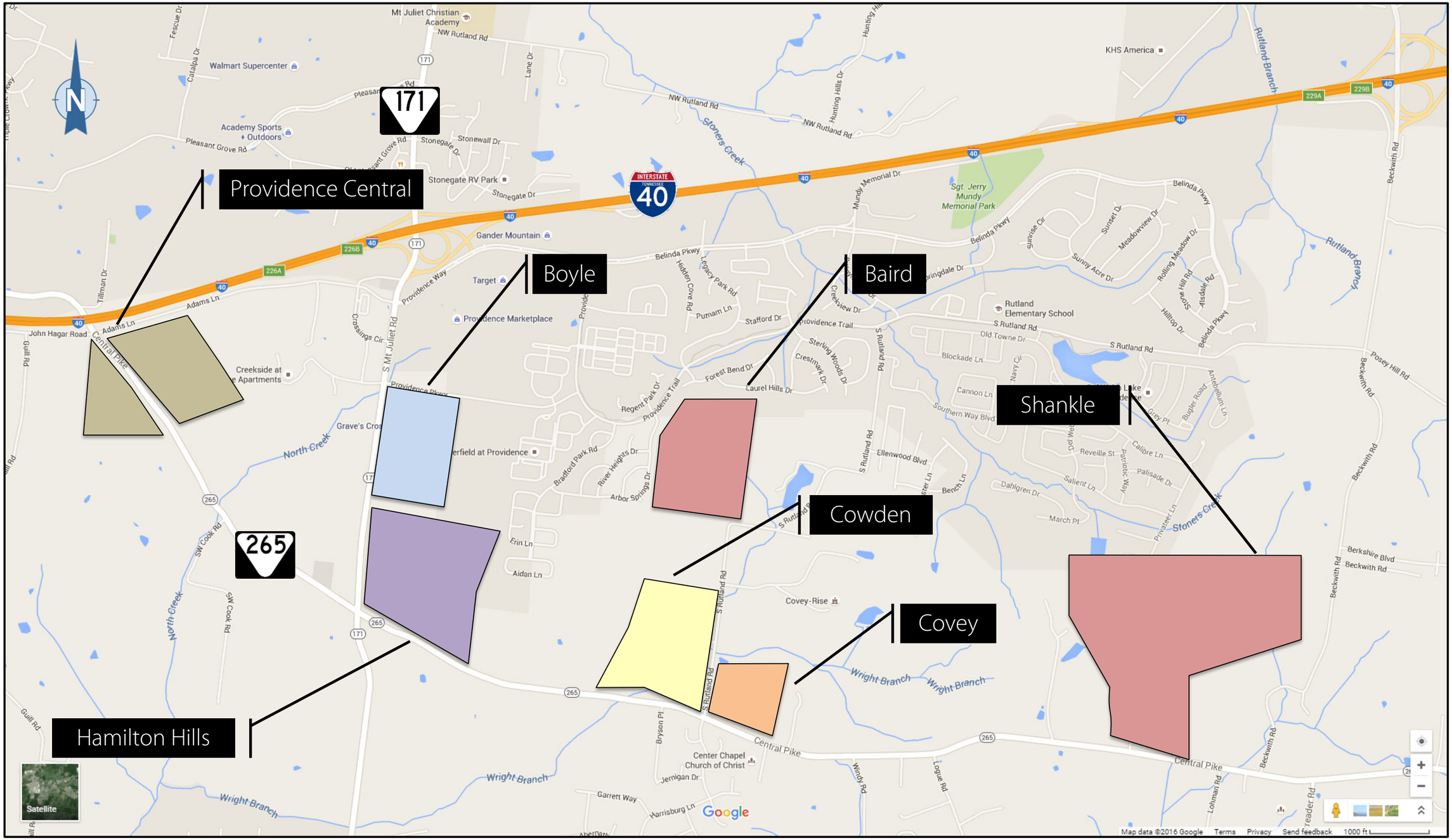


Figure 5. Approved Developments in the Study Area

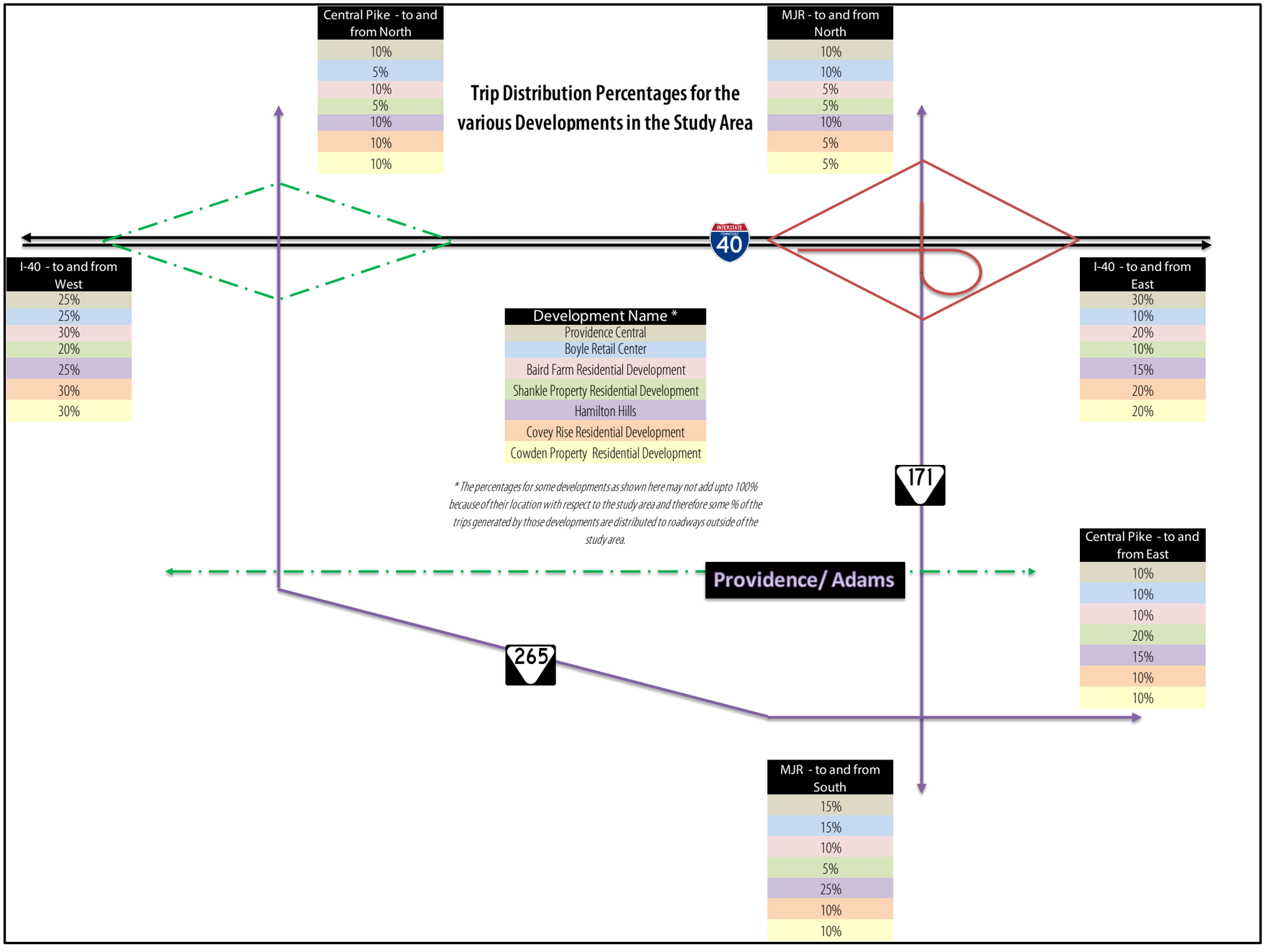


Figure 6. Trip Distribution Percentages for the Approved Developments

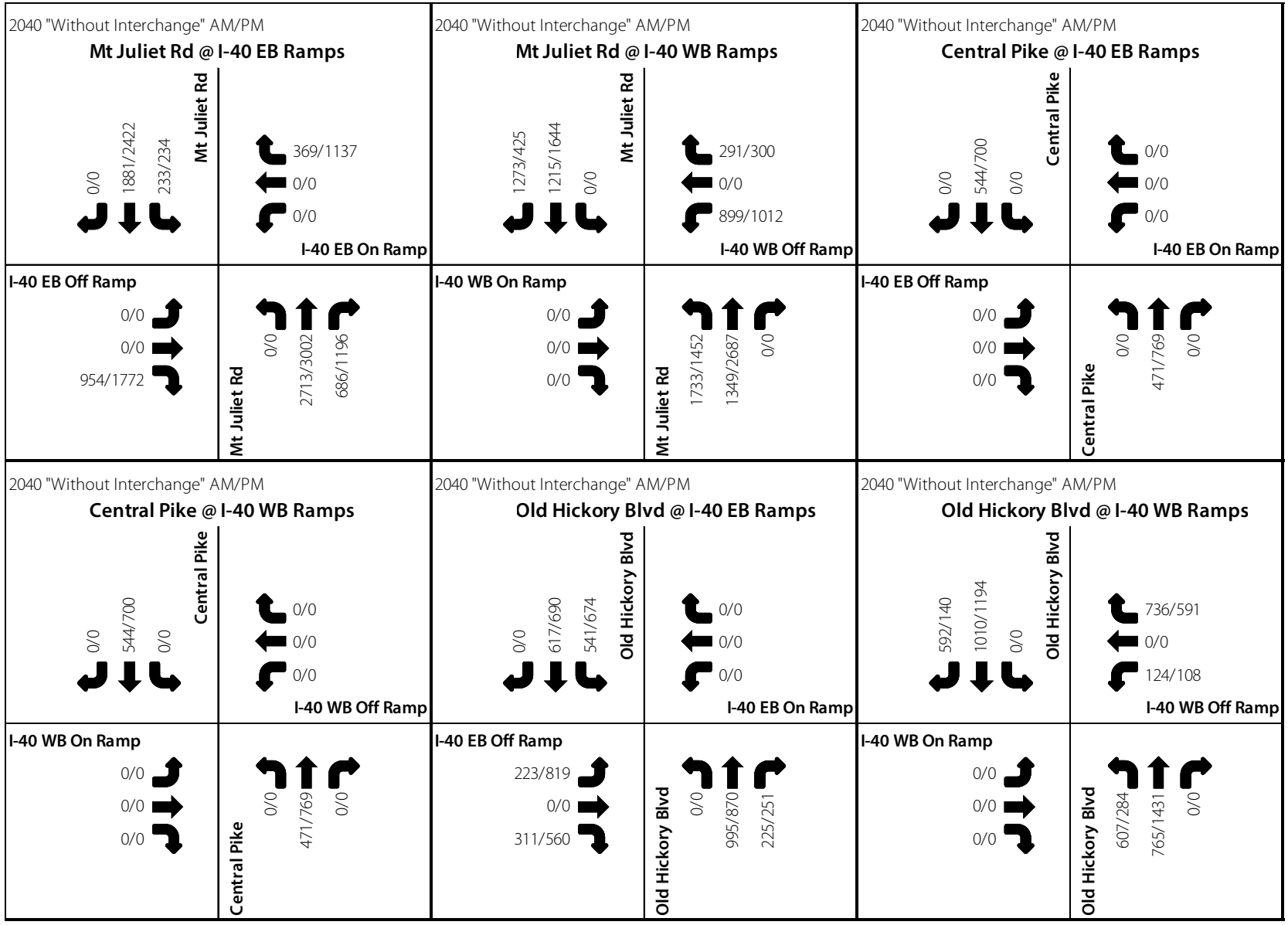


Figure 7. 2040 "Without Interchange" Peak Hour (AM/ PM) Intersection Turning Movement Volumes

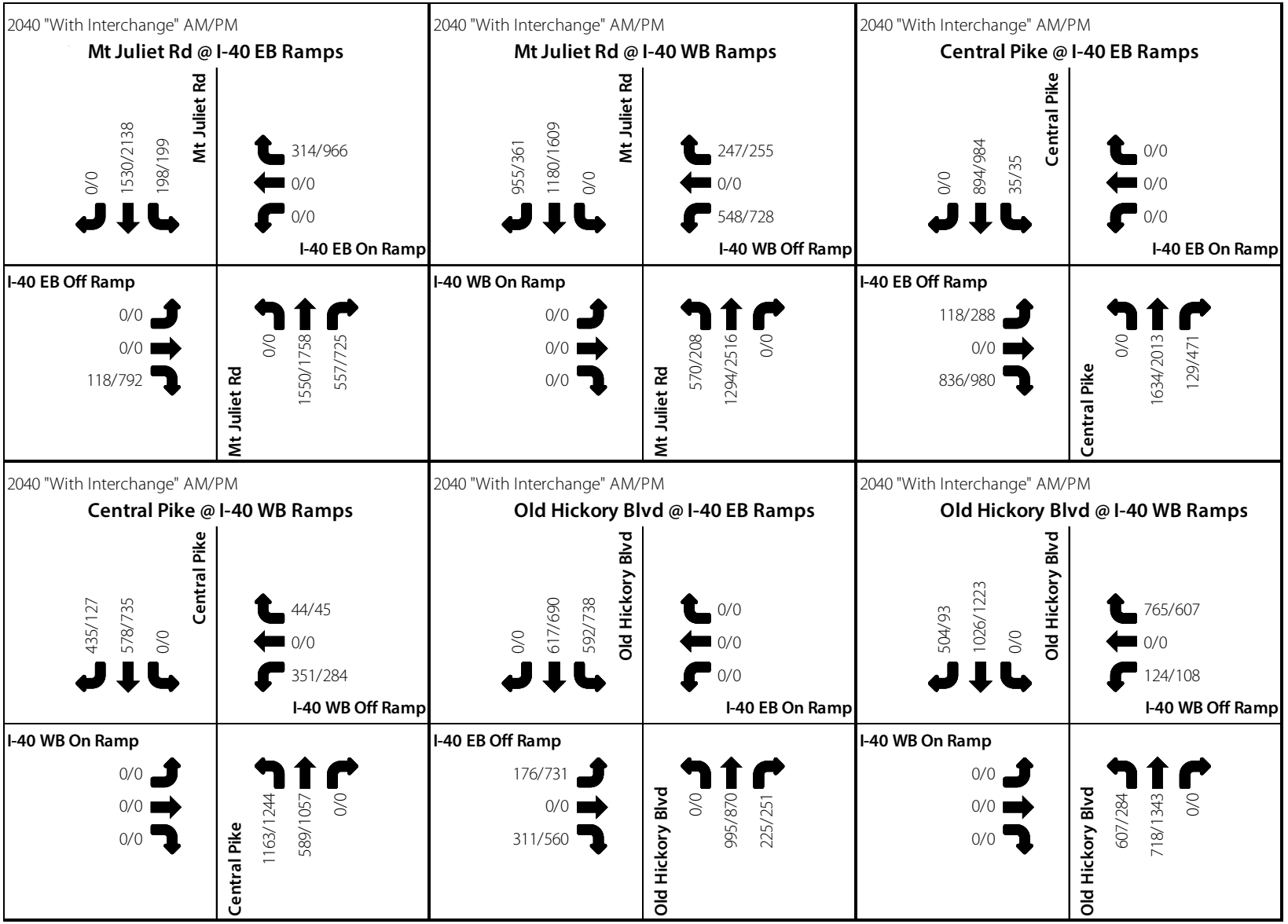


Figure 8. 2040 "With Interchange" Peak Hour (AM/ PM) Intersection Turning Movement Volumes

TRAFFIC ANALYSIS

Based on the traffic forecasts developed as part of this study peak hour traffic operations were analyzed at the interchange intersections along I-40 at Mt. Juliet Road and Central Pike. The traffic analysis was conducted using the methodologies outlined in the 2010 Highway Capacity Manual (HCM) and utilizing the Synchro 8.0 software program. The traffic analysis was conducted for the existing condition (Year 2014) and the future condition (Year 2040, without and with interchange).

The "With Interchange" condition traffic analysis at the I-40/ Central Pike interchange was conducted for both the traditional diamond configuration and the diverging diamond configuration. For the intersections at the I-40/ Central Pike interchange, the traffic analysis was based on the 2000 Highway Capacity Manual instead of the 2010 Highway Capacity Manual, because the 2010 Highway Capacity Manual methodologies does not support analyzing a diverging diamond configuration.

The intersections in this study are evaluated in terms of level of service (LOS), which is a measure of driving conditions and delay. Levels of service ranges from LOS A (free-flow conditions, no delay) to LOS F (severe congestion and delay). LOS A, B and C generally indicate satisfactory driving conditions. LOS D indicates conditions in which there is a noticeable delay. LOS E indicates traffic operating at or close to capacity, producing significant delays. LOS F indicates facilities operating above volume capacity, resulting in severe delays and queuing at signalized intersections. The results of the intersection LOS analysis are summarized in **Tables 2, 3, and 4**. The intersection capacity analysis worksheets are provided in Appendix C.

Table 2. "Without Interchange" (Year 2040) Analysis

	AM Peak Hour	PM Peak Hour
"Without Interchange" Conditions (Year 2040)	LOS	LOS
Signalized Intersections		
Mt Juliet Rd @ I-40 EB Ramps	C	C
Mt Juliet Rd @ I-40 WB Ramps	F	F

LOS = Level of service

Source: Gresham, Smith and Partners

Table 3. "With Interchange" (Year 2040) Analysis – Traditional Diamond

"With Interchange" Conditions (Year 2040)	AM Peak Hour LOS	PM Peak Hour LOS
Signalized Intersections		
Mt Juliet Rd @ I-40 EB Ramps	A	A
Mt Juliet Rd @ I-40 WB Ramps	D	E
Central Pike @ I-40 EB Ramps **– TRADITIONAL DIAMOND**	C	E
Central Pike @ I-40 WB Ramps **– TRADITIONAL DIAMOND**	D	C

LOS = Level of service

Source: Gresham, Smith and Partners

Table 4. "With Interchange" (Year 2040) Analysis – Diverging Diamond

"With Interchange" Conditions (Year 2040)	AM Peak Hour LOS	PM Peak Hour LOS
Signalized Intersections		
Central Pike @ I-40 EB Ramps **– DIVERGING DIAMOND**	C	D
Central Pike @ I-40 WB Ramps **– DIVERGING DIAMOND**	A	B

LOS = Level of service

Source: Gresham, Smith and Partners

FINDINGS AND RECOMMENDATIONS

Based on the traffic forecasting and the traffic analysis conducted as part of this study, the "With Interchange" scenario provides for better operational conditions at the I-40/ Mt. Juliet Road interchange. The **construction of the new interchange at I-40/ Central Pike is recommended** to accommodate the future growth in the study area and also to ensure adequate operation of the I-40/ Mt. Juliet Road interchange and Mt. Juliet Road within the study area. For the "With Interchange" scenario two interchange configurations were analyzed for the I-40/ Central Pike interchange. Based on the traffic analysis, **both interchange configurations provide adequate interchange operation** at the I-40/ Central Pike interchange.

APPENDIX A – TRAFFIC COUNT WORKSHEETS



Prepared by
Tennessee Dept. of Transportation
Long Range Planning Division

Date: 6/19/2014

Davidson County
Interstate 40
Exit No: 221

N
W E
S

Traffic Counter Location
Ramp Interchange Diagram
19I00400010221

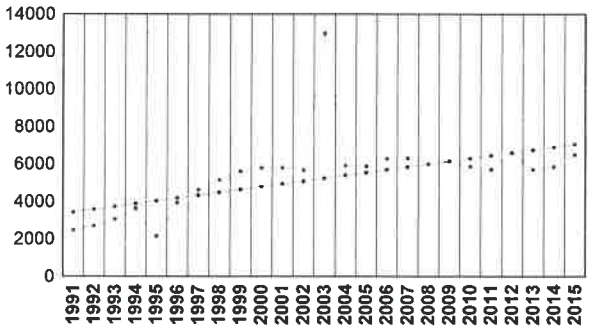
RAMP

County: Davidson **Station Number:** 000089

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: OLD HICKORY PIKE

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
05	1991	3,132	2,944	2,473	0.84	
06	1992	3,572	3,215	2,700	0.84	
06	1993	4,282	3,640	3,058	0.84	
05	1994	3,981	3,702	3,628	0.98	
03	1995	2,281	2,190	2,146	0.98	
04	1996	4,278	4,021	3,941	0.98	
04	1997	5,027	4,725	4,631	0.98	
04	1998	5,716	5,259	5,154	0.98	
05	1999	6,098	5,732	5,617	0.98	
06	2000	6,358	5,913	5,795	0.98	
03	2001	6,578	5,920	5,802	0.98	
03	2002	6,428	5,785	5,669	0.98	
01	2003	6,770	6,770	6,634	0.98	
03	2003	6,679	6,478	6,349	0.98	
02	2004	6,165	6,041	5,920	0.98	
03	2005	6,524	6,002	5,882	0.98	
03	2006	6,966	6,409	6,281	0.98	
04	2007	7,147	6,432	6,304	0.98	
02	2008	6,504	6,114	5,991	0.98	
02	2009	6,668	6,268	6,143	0.98	
02	2010	6,370	5,988	5,868	0.98	
02	2011	6,467	5,820	5,704	0.89	
03	2012	7,116	6,760	6,625	0.89	
02	2013	6,537	6,406	5,702	0.89	
02	2014	6,840	6,566	5,844	0.89	
01	2015	6,758	7,299	6,496	0.89	



Trend Line based on years 1991 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000089 (Ramp)	**County:**	19 Davidson
Start Date:	01 / 26 / 2015	**End Date:**	01 / 27 / 2015
Start Time:	14 : 00	**End Time:**	14 : 00
Direction:	5 (Ramp)		

Time	
14:00 - 15:00	400
15:00 - 16:00	571
16:00 - 17:00	633
17:00 - 18:00	676
18:00 - 19:00	369
19:00 - 20:00	260
20:00 - 21:00	167
21:00 - 22:00	129
22:00 - 23:00	93
23:00 - 24:00	58
24:00 - 01:00	50
01:00 - 02:00	14
02:00 - 03:00	19
03:00 - 04:00	24
04:00 - 05:00	84
05:00 - 06:00	175
06:00 - 07:00	392
07:00 - 08:00	450
08:00 - 09:00	321
09:00 - 10:00	318
10:00 - 11:00	372
11:00- 12:00	392
12:00 - 13:00	376
13:00 - 14:00	415

V.F.

Total: 6,758 X 1.08 X 0.89 = 6496 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
06:45 - 07:45	466	0.90	16:45 - 17:45	711	0.87

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
7	100	11	100	11	100

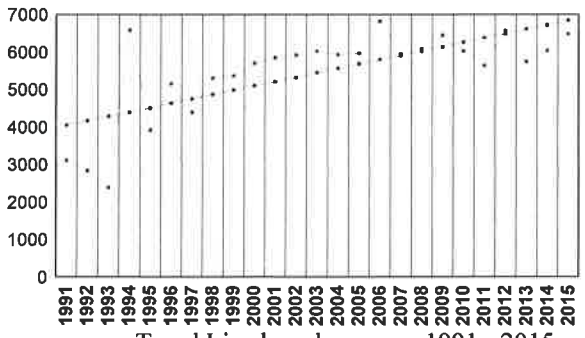
RAMP

County: Davidson **Station Number:** 000090

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: OLD HICKORY BLVD

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
05	1991	2,941	3,705	3,112	0.84	
06	1992	3,668	3,375	2,835	0.84	
06	1993	3,109	2,829	2,377	0.84	
05	1994	7,383	6,719	6,584	0.98	LOOKS HIGH
03	1995	4,161	3,995	3,915	0.98	
04	1996	5,506	5,231	5,156	0.98	
04	1997	4,763	4,477	4,388	0.98	
03	1998	5,579	5,412	5,303	0.98	
04	1999	5,946	5,470	5,361	0.98	
06	2000	6,394	5,819	5,702	0.98	
03	2001	6,149	5,965	5,845	0.98	
03	2002	6,353	6,035	5,915	0.98	
03	2003	6,335	6,144	6,022	0.98	
02	2004	6,173	6,049	5,928	0.98	
03	2005	6,632	6,101	5,979	0.98	
03	2006	7,326	6,960	6,821	0.98	
03	2007	6,984	6,076	5,955	0.98	
02	2008	6,609	6,212	6,088	0.98	
02	2009	7,000	6,580	6,448	0.98	
02	2010	6,542	6,149	6,026	0.98	
02	2011	6,393	5,754	5,639	0.88	
03	2012	7,063	6,710	6,576	0.88	
02	2013	6,660	6,527	5,744	0.88	
02	2014	7,146	6,860	6,037	0.88	
01	2015	6,823	7,369	6,485	0.88	



Trend Line based on years 1991 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

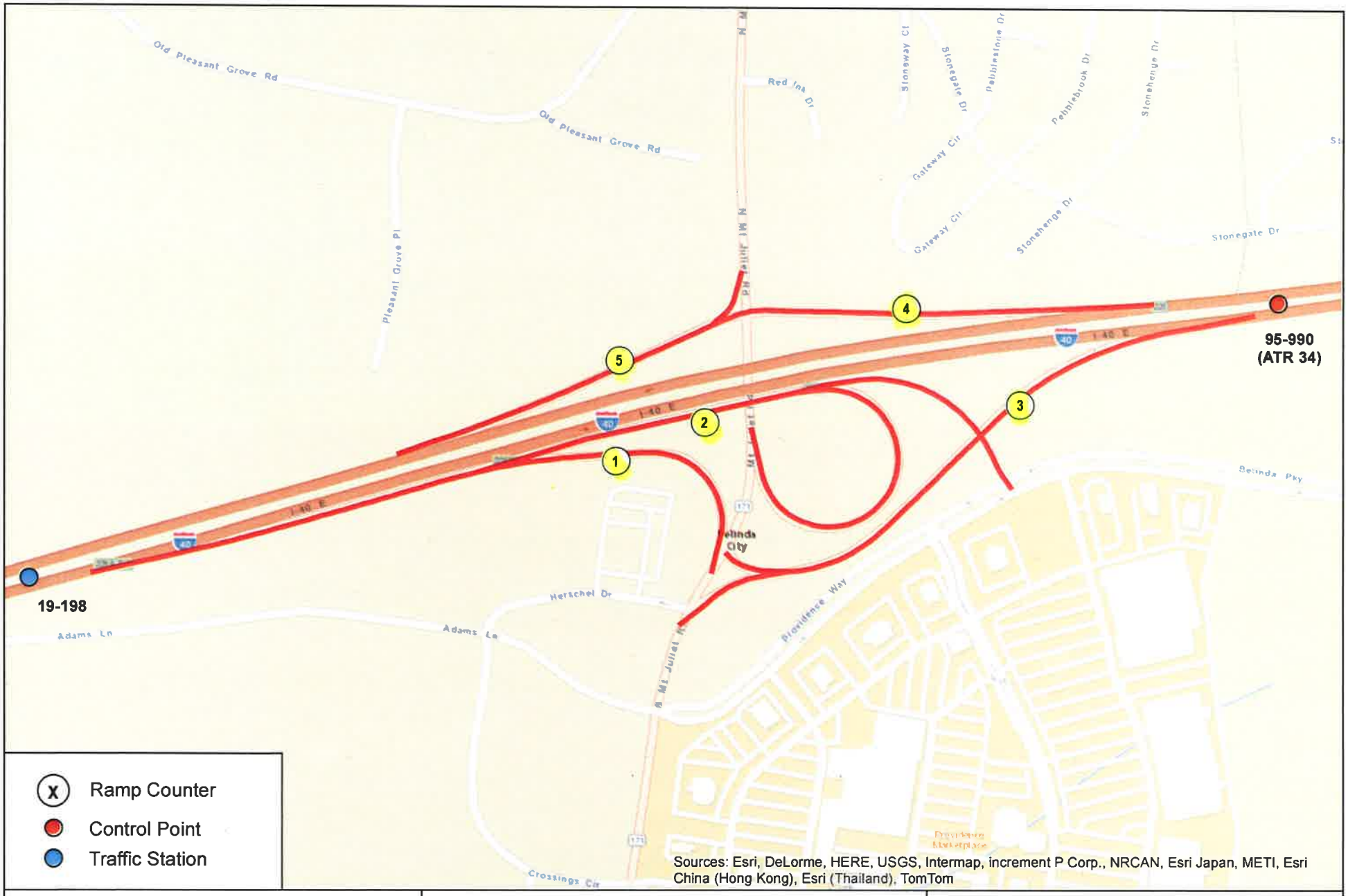
Station Number:	000090 (Ramp)	**County:**	19 Davidson
Start Date:	01 / 26 / 2015	**End Date:**	01 / 27 / 2015
Start Time:	09 : 00	**End Time:**	09 : 00
Direction:	5 (Ramp)		

Time	
09:00 - 10:00	334
10:00 - 11:00	375
11:00 - 12:00	324
12:00 - 13:00	450
13:00 - 14:00	401
14:00 - 15:00	405
15:00 - 16:00	460
16:00 - 17:00	450
17:00 - 18:00	479
18:00 - 19:00	362
19:00 - 20:00	285
20:00 - 21:00	209
21:00 - 22:00	154
22:00 - 23:00	105
23:00 - 24:00	65
24:00 - 01:00	54
01:00 - 02:00	31
02:00 - 03:00	30
03:00 - 04:00	28
04:00 - 05:00	43
05:00 - 06:00	165
06:00 - 07:00	451
07:00 - 08:00	661
08:00 - 09:00	502

		V.F.	T.F.	
Total:	6,823	X 1.08 X	0.88 =	6485 AADT

Peak AM	Peak Total	Peak Hour Factor	Peak PM	Peak Total	Peak Hour Factor
06:45 - 07:45	695	0.95	15:15 - 16:15	498	0.84

Peak AM %	Dir Dist AM %	Peak PM %	Dir Dist PM %	Daily Peak %	Daily Dir Dist %
10	100	7	100	10	100



Prepared by
Tennessee Dept. of Transportation
Long Range Planning Division

Date: 2/10/2015

Wilson County
Interstate 40
Exit No: 226

N
W E
S

Traffic Counter Location
Ramp Interchange Diagram
95I00400010226

Miles

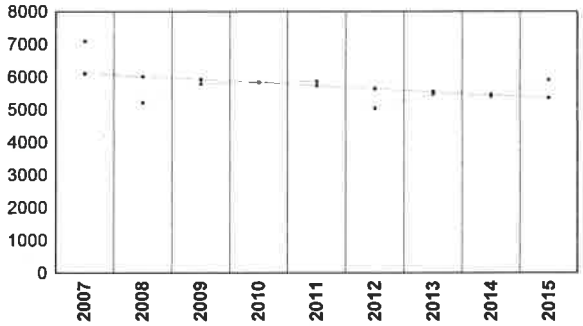
RAMP

County: Wilson **Station Number:** 000001

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: SR-171 MOVED FRON CO.19 #228

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
10	2007	8,046	7,241	7,097	0.98	
09	2008	5,596	5,316	5,210	0.98	
10	2009	6,488	5,904	5,786	0.98	
08	2010	6,386	5,939	5,820	0.98	
08	2011	6,726	5,986	5,866	0.89	
08	2012	6,095	5,668	5,045	0.89	
07	2013	0	0	5,470	0.89	EST - CONST
05	2014	7,236	6,078	5,410	0.89	
08	2015	6,993	6,643	5,913	0.89	



Trend Line based on years 2007 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000001 (Ramp)	**County:**	95 Wilson
Start Date:	08 / 03 / 2015	**End Date:**	08 / 04 / 2015
Start Time:	11 : 00	**End Time:**	11 : 00
Direction:	5 (Ramp)		

Time	
11:00 - 12:00	396
12:00 - 13:00	444
13:00 - 14:00	435
14:00 - 15:00	467
15:00 - 16:00	584
16:00 - 17:00	695
17:00 - 18:00	839
18:00 - 19:00	638
19:00 - 20:00	356
20:00 - 21:00	270
21:00 - 22:00	188
22:00 - 23:00	136
23:00 - 24:00	86
24:00 - 01:00	41
01:00 - 02:00	27
02:00 - 03:00	18
03:00 - 04:00	19
04:00 - 05:00	31
05:00 - 06:00	90
06:00 - 07:00	175
07:00 - 08:00	234
08:00 - 09:00	241
09:00 - 10:00	259
10:00 - 11:00	324

		V.F.		T.F		
Total:	6,993	X 0.95	X	0.89	=	5913 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
11:30 - 12:30	437	0.93	17:00 - 18:00	839	0.89

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
6	100	12	100	12	100

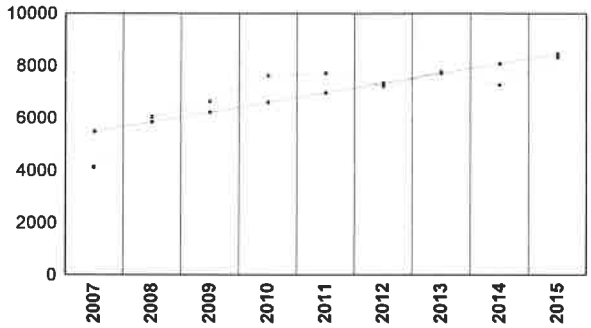
RAMP

County: Wilson **Station Number:** 000002

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: SR-171 MOVED FROM CO.19 #229

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
10	2007	4,630	4,213	4,129	0.98	
09	2008	6,495	6,170	6,047	0.98	
10	2009	7,446	6,776	6,640	0.98	
08	2010	8,361	7,776	7,620	0.98	
08	2011	8,843	7,870	7,713	0.89	
08	2012	8,717	8,107	7,215	0.89	
07	2013	9,705	8,734	7,774	0.89	CONST. IN AREA
05	2014	9,722	8,166	7,268	0.89	
08	2015	9,841	9,349	8,321	0.89	



Trend Line based on years 2007 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000002 (Ramp)	**County:**	95 Wilson
Start Date:	08 / 03 / 2015	**End Date:**	08 / 04 / 2015
Start Time:	11 : 00	**End Time:**	11 : 00
Direction:	5 (Ramp)		

Time	
11:00 - 12:00	426
12:00 - 13:00	497
13:00 - 14:00	580
14:00 - 15:00	631
15:00 - 16:00	875
16:00 - 17:00	1,231
17:00 - 18:00	1,355
18:00 - 19:00	909
19:00 - 20:00	454
20:00 - 21:00	333
21:00 - 22:00	249
22:00 - 23:00	139
23:00 - 24:00	118
24:00 - 01:00	60
01:00 - 02:00	36
02:00 - 03:00	38
03:00 - 04:00	20
04:00 - 05:00	48
05:00 - 06:00	99
06:00 - 07:00	247
07:00 - 08:00	355
08:00 - 09:00	331
09:00 - 10:00	363
10:00 - 11:00	447

		V.F.		T.F.		
Total:	9,841	X 0.95	X	0.89	=	8321 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
11:45 - 12:45	509	0.91	17:00 - 18:00	1355	0.91

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
5	100	14	100	14	100

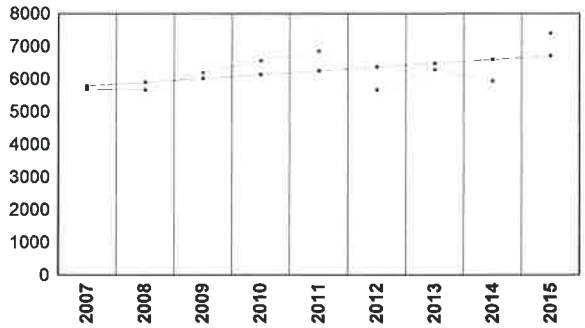
RAMP

County: Wilson **Station Number:** 000003

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: SR-171 MOVED FROM CO.19 #230

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
10	2007	6,383	5,809	5,692	0.98	
09	2008	6,081	5,777	5,661	0.98	
10	2009	6,949	6,324	6,197	0.98	
08	2010	7,200	6,696	6,562	0.98	
08	2011	7,857	6,993	6,853	0.89	
08	2012	6,839	6,360	5,661	0.89	
07	2013	7,847	7,062	6,285	0.89	CONST. IN AREA
05	2014	7,951	6,679	5,944	0.89	
08	2015	8,755	8,317	7,402	0.89	



Trend Line based on years 2007 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000003 (Ramp)	**County:**	95 Wilson
Start Date:	08 / 03 / 2015	**End Date:**	08 / 04 / 2015
Start Time:	11 : 00	**End Time:**	11 : 00
Direction:	5 (Ramp)		

Time	
11:00 - 12:00	477
12:00 - 13:00	605
13:00 - 14:00	562
14:00 - 15:00	585
15:00 - 16:00	669
16:00 - 17:00	618
17:00 - 18:00	645
18:00 - 19:00	549
19:00 - 20:00	449
20:00 - 21:00	363
21:00 - 22:00	270
22:00 - 23:00	182
23:00 - 24:00	99
24:00 - 01:00	56
01:00 - 02:00	56
02:00 - 03:00	43
03:00 - 04:00	55
04:00 - 05:00	126
05:00 - 06:00	172
06:00 - 07:00	405
07:00 - 08:00	537
08:00 - 09:00	443
09:00 - 10:00	379
10:00 - 11:00	410

		V.F.		T.F.		
Total:	8,755	X 0.95	X	0.89	=	7402 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
11:45 - 12:45	587	0.90	14:45 - 15:45	679	0.91

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
7	100	8	100	8	100

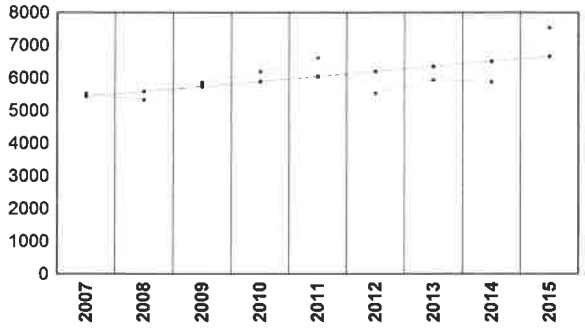
RAMP

County: Wilson **Station Number:** 000004

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: SR-171 MOVED FROM CO.19 #231

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
10	2007	6,260	5,634	5,521	0.98	
10	2008	6,325	5,440	5,331	0.98	
09	2009	6,629	5,966	5,847	0.98	
08	2010	6,787	6,312	6,186	0.98	
08	2011	7,580	6,746	6,611	0.89	
08	2012	6,685	6,217	5,533	0.89	
07	2013	7,407	6,666	5,933	0.89	CONST. IN AREA
05	2014	7,867	6,608	5,881	0.89	
08	2015	8,918	8,472	7,540	0.89	



Trend Line based on years 2007 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000004 (Ramp)	**County:**	95 Wilson
Start Date:	08 / 03 / 2015	**End Date:**	08 / 04 / 2015
Start Time:	09 : 00	**End Time:**	09 : 00
Direction:	5 (Ramp)		

Time	
09:00 - 10:00	519
10:00 - 11:00	487
11:00 - 12:00	618
12:00 - 13:00	585
13:00 - 14:00	549
14:00 - 15:00	544
15:00 - 16:00	627
16:00 - 17:00	711
17:00 - 18:00	666
18:00 - 19:00	497
19:00 - 20:00	310
20:00 - 21:00	237
21:00 - 22:00	182
22:00 - 23:00	122
23:00 - 24:00	76
24:00 - 01:00	75
01:00 - 02:00	49
02:00 - 03:00	65
03:00 - 04:00	83
04:00 - 05:00	111
05:00 - 06:00	234
06:00 - 07:00	415
07:00 - 08:00	603
08:00 - 09:00	553

		V.F.		T.F.		
Total:	8,918	X 0,95	X	0.89	=	7540 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
11:15 - 12:15	669	0.86	15:45 - 16:45	723	0.89

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
8	100	8	100	8	100

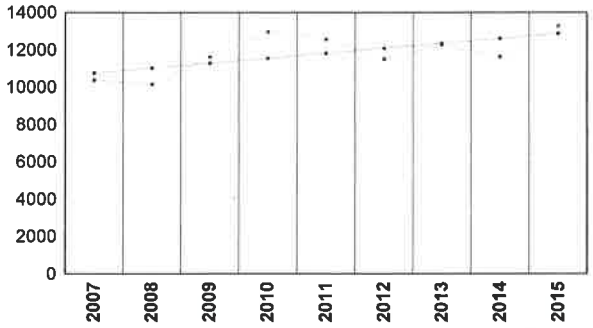
RAMP

County: Wilson **Station Number:** 000005

Route: I-40 **Station Type:** Urban **Station Out:** NO

Location: SR-171 MOVED FROM CO.19 #232

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
10	2007	11,762	10,586	10,374	0.98	
10	2008	12,053	10,366	10,158	0.98	
09	2009	13,169	11,852	11,615	0.98	
08	2010	14,222	13,226	12,962	0.98	
08	2011	14,403	12,819	12,562	0.89	
08	2012	13,899	12,926	11,504	0.89	
07	2013	15,316	13,784	12,268	0.89	
05	2014	15,549	13,061	11,624	0.89	
08	2015	15,706	14,921	13,279	0.89	



Trend Line based on years 2007 - 2015

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

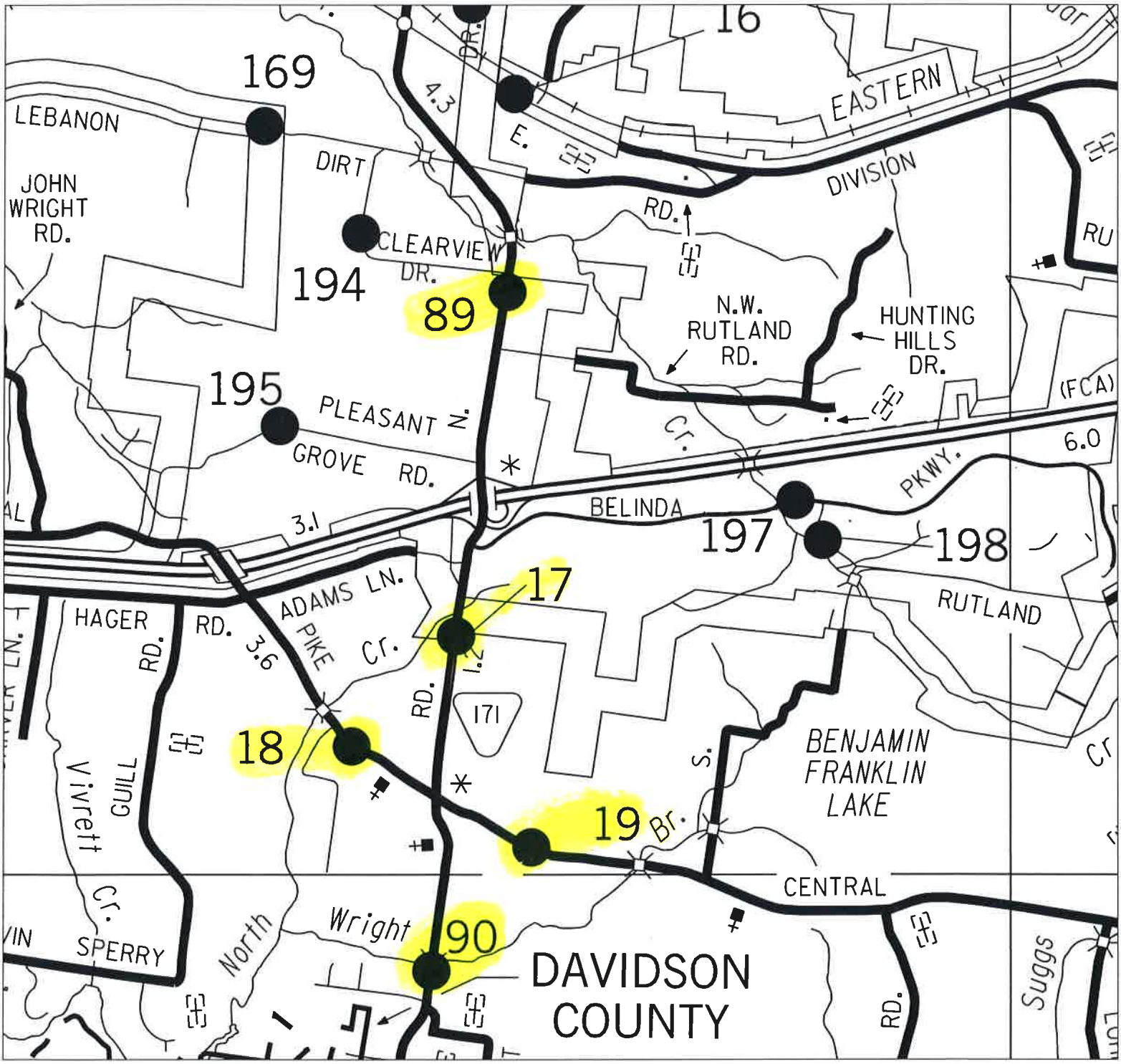
Station Number:	000005 (Ramp)	**County:**	95 Wilson
Start Date:	08 / 03 / 2015	**End Date:**	08 / 04 / 2015
Start Time:	11 : 00	**End Time:**	11 : 00
Direction:	5 (Ramp)		

Time	
11:00 - 12:00	788
12:00 - 13:00	844
13:00 - 14:00	822
14:00 - 15:00	807
15:00 - 16:00	770
16:00 - 17:00	753
17:00 - 18:00	753
18:00 - 19:00	670
19:00 - 20:00	519
20:00 - 21:00	472
21:00 - 22:00	357
22:00 - 23:00	214
23:00 - 24:00	104
24:00 - 01:00	58
01:00 - 02:00	48
02:00 - 03:00	50
03:00 - 04:00	73
04:00 - 05:00	189
05:00 - 06:00	650
06:00 - 07:00	1,958
07:00 - 08:00	1,736
08:00 - 09:00	1,257
09:00 - 10:00	943
10:00 - 11:00	871

		V.F.		T.F.		
Total:	15,706	X 0.95	X	0.89	=	13,279 AADT

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
06:15 - 07:15	2069	0.97	12:30 - 13:30	884	0.97

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
13	100	6	100	13	100


16
169
LEBANON
JOHN WRIGHT RD.
DIRT
4.3
E.
EASTERN
DIVISION
RD.
CLEARVIEW DR.
194
89
N.W. RUTLAND RD.
HUNTING HILLS DR.
195
PLEASANT N.
GROVE RD.
Cr.
(FCA)
6.0
PKWY.
BELINDA
3.1
197
198
RUTLAND
ADAMS LN.
17
HAGER
RD.
3.6
PIKE
Cr.
1.2
171
18
Vivrett
GUILL
Cr.
BENJAMIN FRANKLIN LAKE
19
Br.
CENTRAL
SPERRY
North
Wright
90
DAVIDSON COUNTY
Suggs
RD.

County: Wilson **Station Number:** 000017

Route: SR171 **Station Type:** Urban **Station Out:** NO

Location: S. OF MT. JULIET AND I-40

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
03	1985	8,254	8,750	8,574	0.97	
11	1986	9,306	9,213	8,937	0.97	
12	1987	10,877		10,867	0.97	
10	1988	10,134		9,830	0.97	
10	1989	12,071		11,592	0.97	
07	1990	6,860	0	11,200	0.97	ACTUAL = 6454
10	1991	12,828	13,212	12,816	0.97	
08	1992	14,212	13,928	13,510	0.97	
11	1993	14,682	14,829	14,384	0.97	
11	1994	16,068	15,907	15,430	0.97	
11	1995	15,588	15,120	14,666	0.97	
10	1996	15,244	14,787	14,343	0.97	
09	1997	16,198	15,712	15,241	0.97	
09	1998	16,951	16,103	15,620	0.97	
10	1999	16,881	16,375	15,884	0.97	
10	2000	17,123	16,609	16,111	0.97	
09	2001	16,271	15,457	14,993	0.97	
08	2002	16,513	15,852	15,376	0.97	
10	2003	16,391	16,063	15,581	0.97	
09	2004	16,583	15,422	14,959	0.97	
09	2005	17,839	16,590	16,093	0.97	
11	2006	17,272	16,927	16,419	0.97	
10	2007	17,532	16,655	16,156	0.97	
09	2008	18,325	17,409	16,886	0.97	
09	2009	18,789	16,722	16,221	0.97	
08	2010	19,790	19,394	18,812	0.97	NEW SHOPPING CENTER
09	2011	0	0	18,354	0.94	EST
08	2012	0	0	18,110	0.94	USED CLASS COUNT
09	2013	21,088	19,823	18,633	0.94	
05	2014	23,066	19,375	18,213	0.94	
05	2015	23,183	21,560	20,267	0.94	

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000017	**County:**	95 Wilson
Start Date:	05 / 26 / 2015	**End Date:**	05 / 27 / 2015
Start Time:	12 : 00	**End Time:**	12 : 00
Direction:	0 (Coverage)		

Time	
12:00 - 13:00	1,314
13:00 - 14:00	1,251
14:00 - 15:00	1,335
15:00 - 16:00	1,527
16:00 - 17:00	1,797
17:00 - 18:00	1,917
18:00 - 19:00	1,482
19:00 - 20:00	1,190
20:00 - 21:00	836
21:00 - 22:00	610
22:00 - 23:00	377
23:00 - 24:00	251
24:00 - 01:00	150
01:00 - 02:00	138
02:00 - 03:00	111
03:00 - 04:00	106
04:00 - 05:00	215
05:00 - 06:00	657
06:00 - 07:00	1,390
07:00 - 08:00	1,641
08:00 - 09:00	1,302
09:00 - 10:00	1,162
10:00 - 11:00	1,130
11:00 - 12:00	1,294

Total: 23,183 x Variation Factor: 0.93 = 21,560 x Truck Factor: 0.94 = AADT: 20,266.5

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
07:00 - 08:00	1641	0.98	16:45 - 17:45	1929	0.97

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
7	65	8	65	8	65

County: Wilson **Station Number:** 000018

Route: SR265 **Station Type:** Urban **Station Out:** NO

Location: S. OF MT. JULIET AND I-40

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
03	1985	987	1,050	1,025	0.97	
11	1986	1,052	1,041	1,021	0.97	
12	1987	1,258		1,257	0.97	
10	1988	1,782		1,729	0.97	
10	1989	2,257		2,167	0.97	LOOKS HIGH
07	1990	1,564		1,471	0.97	
10	1991	1,638	1,687	1,637	0.97	
08	1992	1,783	1,747	1,695	0.97	
11	1993	1,512	1,527	1,481	0.97	
11	1994	1,871	1,852	1,796	0.97	
11	1995	2,753	2,670	1,800	0.97	ACTUAL = 2590
10	1996	1,910	1,853	1,797	0.97	
09	1997	3,046	2,894	2,807	0.97	
09	1998	2,910	2,765	2,682	0.97	
10	1999	2,624	2,545	2,469	0.97	
10	2000	2,508	2,433	2,360	0.97	
09	2001	2,630	2,499	2,424	0.97	
08	2002	2,566	2,489	2,414	0.97	
10	2003	2,425	2,376	2,305	0.97	
09	2004	2,727	2,427	2,354	0.97	
09	2005	2,838	2,639	2,560	0.97	
11	2006	4,351	4,264	2,666	0.97	ACTUAL = 4136
10	2007	3,921	3,725	3,613	0.97	LAST 2 YRS HIGH
09	2008	3,436	3,264	3,166	0.97	
09	2009	3,054	2,718	2,637	0.97	SEE PREVIOUS YRS
08	2010	3,211	3,147	3,052	0.99	LAST YEAR LOW
08	2011	3,079	3,017	2,987	0.99	
08	2012	3,821	3,630	3,594	0.99	TRAFFIC UP AND DOWN, HIGH THIS YEAR
09	2013	3,754	3,566	3,531	0.99	
05	2014	4,129	3,551	3,515	0.99	
05	2015	4,303	3,916	3,877	0.99	

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000018	**County:**	95 Wilson
Start Date:	05 / 26 / 2015	**End Date:**	05 / 27 / 2015
Start Time:	12 : 00	**End Time:**	12 : 00
Direction:	0 (Coverage)		

Time	
12:00 - 13:00	235
13:00 - 14:00	196
14:00 - 15:00	262
15:00 - 16:00	323
16:00 - 17:00	395
17:00 - 18:00	489
18:00 - 19:00	289
19:00 - 20:00	157
20:00 - 21:00	110
21:00 - 22:00	73
22:00 - 23:00	61
23:00 - 24:00	38
24:00 - 01:00	19
01:00 - 02:00	11
02:00 - 03:00	11
03:00 - 04:00	9
04:00 - 05:00	29
05:00 - 06:00	88
06:00 - 07:00	265
07:00 - 08:00	460
08:00 - 09:00	213
09:00 - 10:00	194
10:00 - 11:00	159
11:00 - 12:00	217

Total: 4,303 x Variation Factor: 0.91 = 3,916 x Truck Factor: 0.99 = AADT: 3,876.57

Peak AM	**Peak Total**	**Peak Hour Factor**	**Peak PM**	**Peak Total**	**Peak Hour Factor**
06:45 - 07:45	464	0.90	17:00 - 18:00	489	0.93

Peak AM %	**Dir Dist AM %**	**Peak PM %**	**Dir Dist PM %**	**Daily Peak %**	**Daily Dir Dist %**
11	65	11	65	11	65

County: Wilson **Station Number:** 000019

Route: SR265 **Station Type:** Urban **Station Out:** NO

Location: S. OF MT. JULIET AND I-40

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
03	1985	2,005	2,130	2,083	0.97	
11	1986	2,248	2,225	2,159	0.97	
12	1987	2,611		2,611	0.97	
10	1988	2,872		2,786	0.97	
10	1989	3,715		3,568	0.97	NEW MRKT
07	1990	2,912		2,740	0.97	LOOKS LOW
10	1991	3,563	3,670	3,560	0.97	
08	1992	3,208	3,144	3,050	0.97	
11	1993	3,031	3,061	2,969	0.97	
11	1994	3,487	3,452	3,348	0.97	
11	1995	3,624	3,515	3,410	0.97	
10	1996	3,233	3,136	3,042	0.97	
09	1997	3,750	3,638	3,529	0.97	
09	1998	3,799	3,609	3,501	0.97	
10	1999	4,025	3,905	3,788	0.97	
10	2000	4,261	4,133	4,009	0.97	
09	2001	4,072	3,868	3,752	0.97	
08	2002	0	0	4,002	0.97	EST
10	2003	3,838	3,761	3,648	0.97	
09	2004	4,129	3,839	3,724	0.97	
11	2005	0	0	4,100	0.97	EST
11	2006	5,927	5,808	4,124	0.97	ACTUAL = 5634
10	2007	5,719	5,433	5,270	0.97	LAST 2 YRS HIGH
09	2008	6,310	5,994	5,815	0.97	
09	2009	6,095	5,425	5,262	0.97	
08	2010	0	0	5,600	0.95	USED CLASS COUNT
08	2011	6,450	6,321	6,005	0.95	
08	2012	8,371	7,952	6,185	0.95	ACTUAL = 7555
09	2013	7,163	6,805	6,465	0.95	
05	2014	7,787	6,697	6,362	0.95	
05	2015	0	0	6,770	0.95	USED CLASS COUNT

CLASS CT. 19 N.B.

Basic Axle Classification Report: X9500191

Station ID : X9500191
Info Line 1 : STA.19N SR.265
Info Line 2 : WILSON CO.
GPS Lat/Lon :
DB File : X9500191.DB

Last Connected Device Type : Unic-L
Version Number : 1.50
Serial Number : 91880
Number of Lanes : 1
Posted Speed Limit :

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.			Ax-Ax	10.0 ft	6.0 ft	

Lane #1 Basic Axle Classification Data From: 12:00 - 05/26/2015 To: 11:59 - 05/27/2015

(DEFAULTB) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
5/26/201	12:00	2	123	63	0	2	1	0	2	0	0	0	0	0	193
Tue	13:00	0	151	49	0	1	0	0	2	1	0	0	0	0	204
	14:00	0	139	64	0	1	0	0	2	1	0	0	0	0	207
	15:00	0	142	57	0	5	3	1	4	0	0	2	0	5	219
	16:00	0	153	39	0	2	0	0	1	2	0	0	0	0	197
	17:00	0	163	49	0	2	0	0	3	0	0	0	0	1	218
	18:00	0	152	31	0	0	1	0	1	0	0	1	0	2	188
	19:00	1	103	46	0	1	0	0	0	0	0	0	0	0	151
	20:00	1	74	28	0	0	0	0	0	0	0	0	0	0	103
	21:00	0	61	13	0	0	0	0	0	0	0	0	0	0	74
	22:00	0	32	3	0	0	0	0	0	0	0	0	0	0	35
	23:00	0	8	2	0	0	0	0	0	0	0	0	0	0	10
Daily Total :		4	1301	444	0	14	5	1	15	4	0	3	0	8	1799
Percent :		0%	72%	25%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	
Average :		0	108	37	0	1	0	0	1	0	0	0	0	1	148

CLASS CT. 19 N.B.

Date	Time	(DEFAULTB) #1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
5/27/201	00:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
Wed	01:00	0	3	4	0	0	0	0	0	0	0	0	0	0	7
	02:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
	03:00	0	9	4	0	0	0	0	0	0	0	0	0	0	13
	04:00	0	34	6	0	0	0	0	0	1	0	0	0	0	41
	05:00	0	84	36	0	0	1	0	0	0	0	0	0	0	121
	06:00	0	269	90	0	1	0	0	4	0	0	1	0	0	365
	07:00	0	245	80	0	3	0	0	3	0	1	6	0	6	344
	08:00	0	210	53	0	2	0	0	1	0	0	0	0	0	266
	09:00	0	150	52	0	1	1	0	0	0	1	0	0	0	205
	10:00	1	136	47	0	1	1	0	1	0	1	0	0	0	188
	11:00	2	167	80	0	3	0	0	1	1	1	0	0	0	255
Daily Total :		3	1322	453	0	11	3	0	10	2	4	7	0	6	1821
Percent :		0%	73%	25%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	
Average :		0	110	38	0	1	0	0	1	0	0	1	0	1	152

CLASS CT. N.B

Basic Axle Class Summary: X9500191

(DEFAULTB) Description	Lane	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
TOTAL COUNT :	#1	7	2623	897	0	25	8	1	25	6	4	10	0	14	3620
		7	2623	897	0	25	8	1	25	6	4	10	0	14	3620
Percents :	#1	0%	72%	25%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	100%
		0%	72%	25%	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	
Average :	#1	0	109	37	0	1	0	0	1	0	0	0	0	1	149
		0	109	37	0	1	0	0	1	0	0	0	0	1	149
Days & ADT :	#1	1.0	3620												
		1.0	3620												

CLASS CT, 19 S.B.

Basic Axle Classification Report: X9500192

Station ID : X9500192
Info Line 1 : STA. 19S SR.265
Info Line 2 : WILSON CO.
GPS Lat/Lon :
DB File : X9500192.DB

Last Connected Device Type : Unic-L
Version Number : 1.41
Serial Number :
Number of Lanes : 1
Posted Speed Limit :

Lane #1 Configuration

#	Dir.	Information	Vehicle Sensors	Sensor Spacing	Loop Length	Comment
1.			Ax-Ax	10.0 ft	6.0 ft	

Lane #1 Basic Axle Classification Data From: 12:00 - 05/26/2015 To: 11:59 - 05/27/2015

(DEFAULTB) Date	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
5/26/201	12:00	1	133	57	0	1	0	0	0	1	0	0	0	0	193
Tue	13:00	1	141	47	0	1	0	0	2	0	0	0	0	0	192
	14:00	0	167	69	0	3	0	0	2	0	0	0	0	0	241
	15:00	1	200	44	0	2	2	0	0	1	0	0	0	0	250
	16:00	1	271	75	0	2	0	0	2	0	1	0	0	0	352
	17:00	1	324	92	0	1	0	0	4	0	0	0	0	0	422
	18:00	1	284	56	0	2	1	0	1	1	0	0	0	0	346
	19:00	1	186	61	0	1	0	0	0	0	0	0	0	0	249
	20:00	0	149	49	0	0	0	0	2	0	0	0	0	0	200
	21:00	1	84	18	0	0	0	0	0	0	0	0	0	0	103
	22:00	0	60	15	0	0	0	0	0	0	0	0	0	0	75
	23:00	0	30	11	0	0	0	0	0	0	0	0	0	0	41
Daily Total :		8	2029	594	0	13	3	0	13	3	1	0	0	0	2664
Percent :		0%	76%	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Average :		1	169	50	0	1	0	0	1	0	0	0	0	0	222

CLASS CT. 19 S.B.

Station: X9500192 — Lane #1 Axle Data From 12:00 - 05/26/2015 To: 11:59 - 05/27/2015

Date (DEFAULTB)	Time	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
5/27/201	00:00	0	19	5	0	0	0	0	0	0	0	0	0	0	24
Wed	01:00	0	11	5	0	0	0	0	0	0	0	0	0	0	16
	02:00	0	7	0	0	0	0	0	0	0	0	0	0	0	7
	03:00	0	7	1	0	0	0	0	0	0	0	0	0	0	8
	04:00	0	2	2	0	0	0	0	0	0	0	0	0	0	4
	05:00	0	21	1	0	1	0	0	0	0	0	0	0	0	23
	06:00	0	86	38	0	2	0	0	0	0	0	0	0	0	126
	07:00	0	102	46	0	3	1	0	1	0	0	1	0	1	155
	08:00	1	88	35	0	0	1	0	0	0	0	0	0	1	126
	09:00	1	80	56	0	1	0	1	0	0	0	0	0	0	139
	10:00	1	114	60	0	2	1	0	1	0	0	0	0	0	179
	11:00	0	133	48	0	2	0	0	2	0	0	0	0	0	185
Daily Total :		3	670	297	0	11	3	1	4	0	0	1	0	2	992
	Percent :	0%	68%	30%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
	Average :	0	56	25	0	1	0	0	0	0	0	0	0	0	82

CLASS CT. 19 S.B.

Basic Axle Class Summary: X9500192

(DEFAULTB) Description	Lane	#1 Cycle	#2 Cars	#3 2A-4T	#4 Buses	#5 2A-SU	#6 3A-SU	#7 4A-SU	#8 4A-ST	#9 5A-ST	#10 6A-ST	#11 5A-MT	#12 6A-MT	#13 Other	Total
TOTAL COUNT :	#1.	11	2699	891	0	24	6	1	17	3	1	1	0	2	3656
		11	2699	891	0	24	6	1	17	3	1	1	0	2	3656
Percents :	#1.	0%	74%	24%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	100%
		0%	74%	24%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
Average :	#1.	0	112	37	0	1	0	0	1	0	0	0	0	0	151
		0	112	37	0	1	0	0	1	0	0	0	0	0	151
Days & ADT :	#1.	1.0	3656												
		1.0	3656												

County: Wilson **Station Number:** 000089

Route: SR171 **Station Type:** Urban **Station Out:** NO

Location: S. OF MT. JULIET

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
03	1985	11,650	12,350	12,103	0.97	
12	1986	11,603	11,835	11,480	0.97	
12	1987	12,612		12,478	0.97	
10	1988	14,553		14,117	0.97	
10	1989	14,287		13,720	0.97	
08	1990			13,800	0.97	EST-CONSTR
10	1991	16,139	16,623	16,124	0.97	
08	1992	16,908	16,570	16,073	0.97	
11	1993	18,171	18,353	17,802	0.97	
11	1994	18,542	18,502	17,986	0.97	
12	1995	19,498	20,083	19,481	0.97	
10	1996	21,327	20,688	20,067	0.97	
08	1997	23,718	22,769	22,086	0.97	
09	1998	21,248	20,190	19,580	0.97	
10	1999	21,898	22,336	21,666	0.97	
09	2000	21,168	20,533	19,917	0.97	
09	2001	21,544	20,467	19,853	0.97	
08	2002	20,314	19,501	18,916	0.97	
10	2003	23,614	23,141	22,447	0.97	
12	2004	0	0	23,132	0.97	EST
09	2005	24,679	22,951	22,263	0.97	
11	2006	27,522	26,972	26,162	0.97	HIGH THIS YEAR
09	2007	27,631	26,249	25,462	0.97	
09	2008	27,504	26,129	25,345	0.97	
09	2009	0	0	25,539	0.97	EST
08	2010	31,207	30,583	29,665	0.97	THIS YEAR HIGH
05	2011	31,273	29,397	28,515	0.95	
08	2012	32,520	30,894	29,349	0.95	
08	2013	34,850	32,759	31,121	0.95	
05	2014	0	0	29,431	0.95	24950 - CLASS CT.
07	2015	35,485	33,711	32,025	0.95	

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number: 000089 **County:** 95 Wilson
Start Date: 07 / 27 / 2015 **End Date:** 07 / 28 / 2015
Start Time: 12 : 00 **End Time:** 12 : 00
Direction: 1 (Coverage)
NORTH BOUND

Time	
12:00 - 13:00	1,210
13:00 - 14:00	1,166
14:00 - 15:00	1,212
15:00 - 16:00	1,365
16:00 - 17:00	1,642
17:00 - 18:00	1,658
18:00 - 19:00	1,289
19:00 - 20:00	968
20:00 - 21:00	814
21:00 - 22:00	478
22:00 - 23:00	278
23:00 - 24:00	188
24:00 - 01:00	101
01:00 - 02:00	49
02:00 - 03:00	40
03:00 - 04:00	30
04:00 - 05:00	53
05:00 - 06:00	175
06:00 - 07:00	470
07:00 - 08:00	841
08:00 - 09:00	760
09:00 - 10:00	838
10:00 - 11:00	932
11:00 - 12:00	1,092

Total: 17,649

Peak AM	Peak Total	Peak Hour Factor	Peak PM	Peak Total	Peak Hour Factor
11:30 - 12:30	2476	0.92	16:45 - 17:45	3136	0.93

Peak AM %	Dir Dist AM %	Peak PM %	Dir Dist PM %	Daily Peak %	Daily Dir Dist %
7	52	9	55	9	55

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number: 000089 **County:** 95 Wilson
Start Date: 07 / 27 / 2015 **End Date:** 07 / 28 / 2015
Start Time: 12 : 00 **End Time:** 12 : 00
Direction: 2 (Coverage)

SOUTHBOUND

Time	
12:00 - 13:00	1,256
13:00 - 14:00	1,160
14:00 - 15:00	1,019
15:00 - 16:00	1,248
16:00 - 17:00	1,272
17:00 - 18:00	1,410
18:00 - 19:00	1,112
19:00 - 20:00	795
20:00 - 21:00	528
21:00 - 22:00	331
22:00 - 23:00	167
23:00 - 24:00	89
24:00 - 01:00	57
01:00 - 02:00	31
02:00 - 03:00	35
03:00 - 04:00	55
04:00 - 05:00	118
05:00 - 06:00	425
06:00 - 07:00	1,067
07:00 - 08:00	1,190
08:00 - 09:00	1,048
09:00 - 10:00	1,061
10:00 - 11:00	1,099
11:00 - 12:00	1,263

Total: 17,836

Peak AM	Peak Total	Peak Hour Factor	Peak PM	Peak Total	Peak Hour Factor
11:30 - 12:30	2476	0.92	16:45 - 17:45	3136	0.93

Peak AM %	Dir Dist AM %	Peak PM %	Dir Dist PM %	Daily Peak %	Daily Dir Dist %
7	52	9	55	9	55

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number: 000089 **County:** 95 Wilson
Start Date: 07 / 27 / 2015 **End Date:** 07 / 28 / 2015
Start Time: 12 : 00 **End Time:** 12 : 00
Direction: 6 (Coverage)

TOTALS

Time	
12:00 - 13:00	2,466
13:00 - 14:00	2,326
14:00 - 15:00	2,231
15:00 - 16:00	2,613
16:00 - 17:00	2,914
17:00 - 18:00	3,068
18:00 - 19:00	2,401
19:00 - 20:00	1,763
20:00 - 21:00	1,342
21:00 - 22:00	809
22:00 - 23:00	445
23:00 - 24:00	277
24:00 - 01:00	158
01:00 - 02:00	80
02:00 - 03:00	75
03:00 - 04:00	85
04:00 - 05:00	171
05:00 - 06:00	600
06:00 - 07:00	1,537
07:00 - 08:00	2,031
08:00 - 09:00	1,808
09:00 - 10:00	1,899
10:00 - 11:00	2,031
11:00 - 12:00	2,355

Total: 35,485 x Variation Factor: 0.95 = 33,711 x Truck Factor: 0.95 = AADT: 32,025.2

Peak AM	Peak Total	Peak Hour Factor	Peak PM	Peak Total	Peak Hour Factor
11:30 - 12:30	2476	0.92	16:45 - 17:45	3136	0.93

Peak AM %	Dir Dist AM %	Peak PM %	Dir Dist PM %	Daily Peak %	Daily Dir Dist %
7	52	9	55	9	55

County: Wilson **Station Number:** 000090

Route: SR171 **Station Type:** Other Rural **Station Out:** NO

Location: S. OF I-40

Month	Year	Average Weekday Traffic	Average Daily Traffic	Annual Average Daily	Axle Adjustment Factor	Remarks
03	1985	7,090	7,520	7,369	0.97	
11	1986	8,423	8,339	8,089	0.97	
12	1987	10,068		10,059	0.97	
10	1988	9,785		9,492	0.97	
10	1989	7,813	0	9,500	0.97	ACTUAL = 7502
07	1990	9,487		8,926	0.97	
10	1991			9,400	0.97	EST
08	1992	13,794	13,518	13,113	0.97	
11	1993	12,994	13,124	12,730	0.97	
11	1994	14,515	14,370	13,939	0.97	
11	1995	14,689	14,248	13,821	0.97	
10	1996	14,805	14,213	13,786	0.97	
09	1997	15,455	14,991	14,541	0.97	
09	1998	16,302	15,487	15,022	0.97	
10	1999	15,789	15,315	14,856	0.97	
10	2000	16,410	15,918	15,440	0.97	
09	2001	15,508	14,733	14,291	0.97	
08	2002	14,265	13,694	13,283	0.97	
10	2003	15,543	15,232	14,775	0.97	
09	2004	16,009	14,888	14,441	0.97	
09	2005	16,258	15,120	14,666	0.97	
11	2006	16,656	16,323	15,833	0.97	
10	2007	16,237	15,425	14,962	0.97	
09	2008	16,135	15,328	14,868	0.97	
09	2009	15,549	13,840	13,840	0.97	USED CLASS COUNT
08	2010	17,064	16,723	16,221	0.97	LAST YEAR LOW
08	2011	20,564	20,153	19,548	0.96	NEW DEVELOPMENT
08	2012	18,271	17,357	16,663	0.96	TRAFFIC UP AND DOWN,
09	2013	17,931	17,034	16,353	0.96	
05	2014	0	0	16,430	0.96	USED CLASS COUNT
05	2015	20,399	18,563	17,821	0.96	

COVERAGE COUNT DATA WITH 24 HOUR TOTALS

Station Number:	000090	**County:**	95 Wilson
Start Date:	05 / 26 / 2015	**End Date:**	05 / 27 / 2015
Start Time:	13 : 00	**End Time:**	13 : 00
Direction:	0 (Coverage)		

Time	
13:00 - 14:00	1,043
14:00 - 15:00	1,156
15:00 - 16:00	1,355
16:00 - 17:00	1,656
17:00 - 18:00	1,767
18:00 - 19:00	1,270
19:00 - 20:00	948
20:00 - 21:00	654
21:00 - 22:00	501
22:00 - 23:00	325
23:00 - 24:00	239
24:00 - 01:00	132
01:00 - 02:00	126
02:00 - 03:00	101
03:00 - 04:00	95
04:00 - 05:00	212
05:00 - 06:00	610
06:00 - 07:00	1,321
07:00 - 08:00	1,625
08:00 - 09:00	1,147
09:00 - 10:00	1,012
10:00- 11:00	985
11:00 - 12:00	1,076
12:00 - 13:00	1,043

Total: 20,399 x Variation Factor: 0.91 = 18,563 x Truck Factor: 0.96 = AADT: 17,820.5

Peak AM	Peak Total	Peak Hour Factor	Peak PM	Peak Total	Peak Hour Factor
06:45 - 07:45	1639	0.89	16:45 - 17:45	1770	0.99

Peak AM %	Dir Dist AM %	Peak PM %	Dir Dist PM %	Daily Peak %	Daily Dir Dist %
8	65	9	65	9	65

55,080 2040 W/INT.

54,210 2040 W/OUT.

44950 2020 W/OUT.

ADT in the Mt. Juliet Area with and without the new I40/Central Pike Interchange

LEGEND

2014 Existing
2020 without Interchange
2040 without Interchange
2040 with Interchange

% Traffic Reduction to Mt. Juliet Road with the new Interchange

South of I-40	33%
North of I-40	6%
I-40 WB On Ramp	40%
I-40 WB Off Ramp	22%
I-40 EB On Ramp	22%
I-40 EB Off Ramp	59%
I-40 EB Off Ramp (loop)	10%

45

2014 RAMP CT. 6040

6,975
7,400
9,025
9,525

2014 RAMP CT. 5840

6,975
7,400
9,025
9,525

42,330 2014

AM	PM
50,936	33,958
54,072	36,048
65,976	43,984
66,276	44,184

AM	PM
33,958	50,936
36,048	54,072
43,984	65,976
44,184	66,276

42,560 2014

45,180 2020 W/OUT

55,130 2040 W/OUT.

55,380 2040W/INT.

2014 TOTAL 84,890

0
0
0
13,025

0
0
0
13,025

6,700
10,100
13,550
20,650

6,700
10,100
13,550
40,400

0
0
0
3,900

0
0
0
3,900

40

AM	PM
50,936	33,958
54,072	36,048
65,976	43,984
60,801	40,534

AM	PM
33,958	50,936
36,048	54,072
43,984	65,976
40,534	60,801

2014 RAMP CT. 11,620

15,200
21,125
27,225
16,200

7,225
12,650
16,900
6,900

35,100
41,500
51,650
48,550

35,500
59,075
80,575
53,725

2014 RAMP CT. 5880

8,750
12,850
18,000
14,075

8,750
12,850
18,000
14,075

2014 RAMP CT. 5410

2014 RAMP CT. 5940

7,975
8,475
10,325
9,300

2014 RAMP CT. 7270

AM	PM
47,066	31,378
49,107	32,738
60,441	40,294
59,526	39,684

AM	PM
31,378	47,066
32,738	49,107
40,294	60,441
39,684	59,526

2014 STA. 89 (29,430)

← 36,590 2014
72,410 TOTAL
35,820 2014 →

171

Providence/ Adams

STA. 17 2014 18,210

265

STA. 18 2014 3520

4,800
8,050
13,900
23,850

2014 STA. 19 6360

6,950
20,925
24,775
26,700

19,000
27,700
34,650
34,650

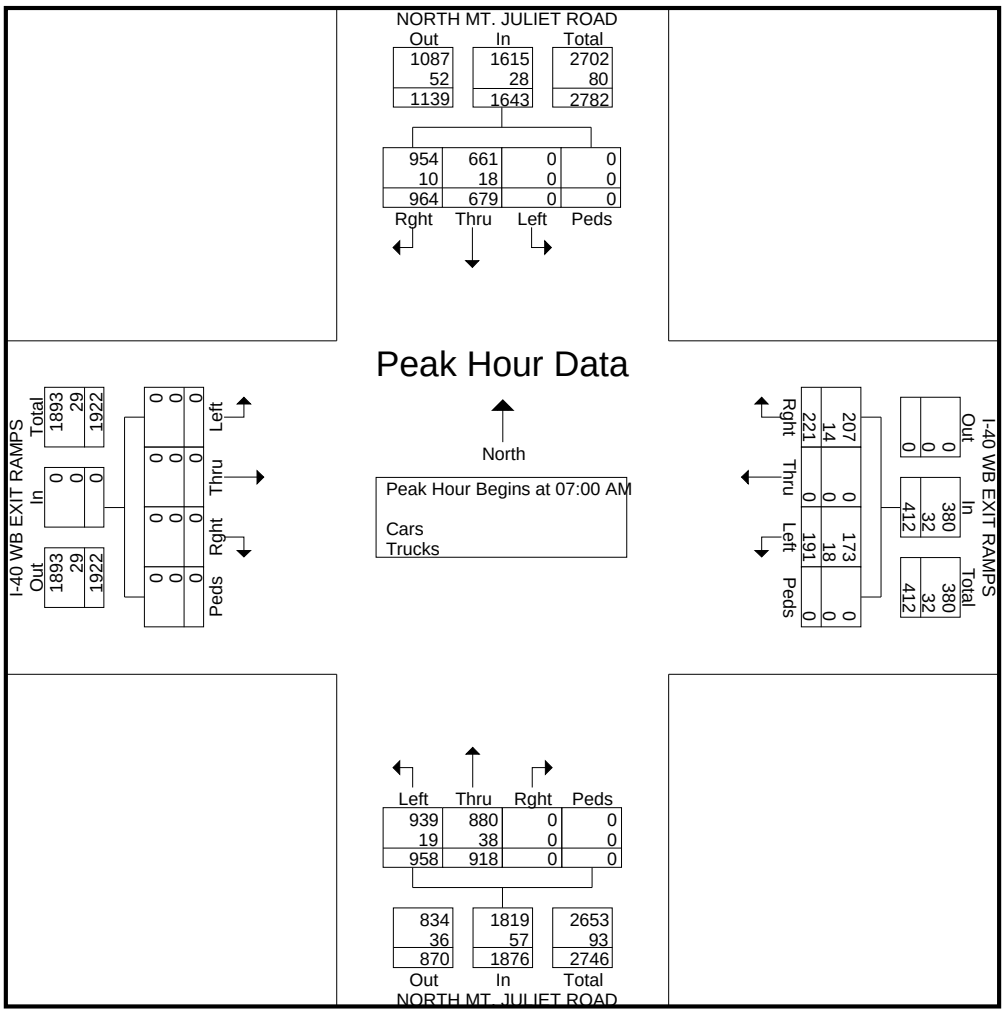
2014 STA. 90 16,430

WHERE DID RAMP ADT's COME FROM?

All Traffic Data Services, Inc
1336 Farmer Road
Conyers, Ga 30012
404-374-1283

File Name : #3 N.MtJulietRd@I-40WBRampsAM
Site Code :
Start Date : 8/29/2012
Page No : 3

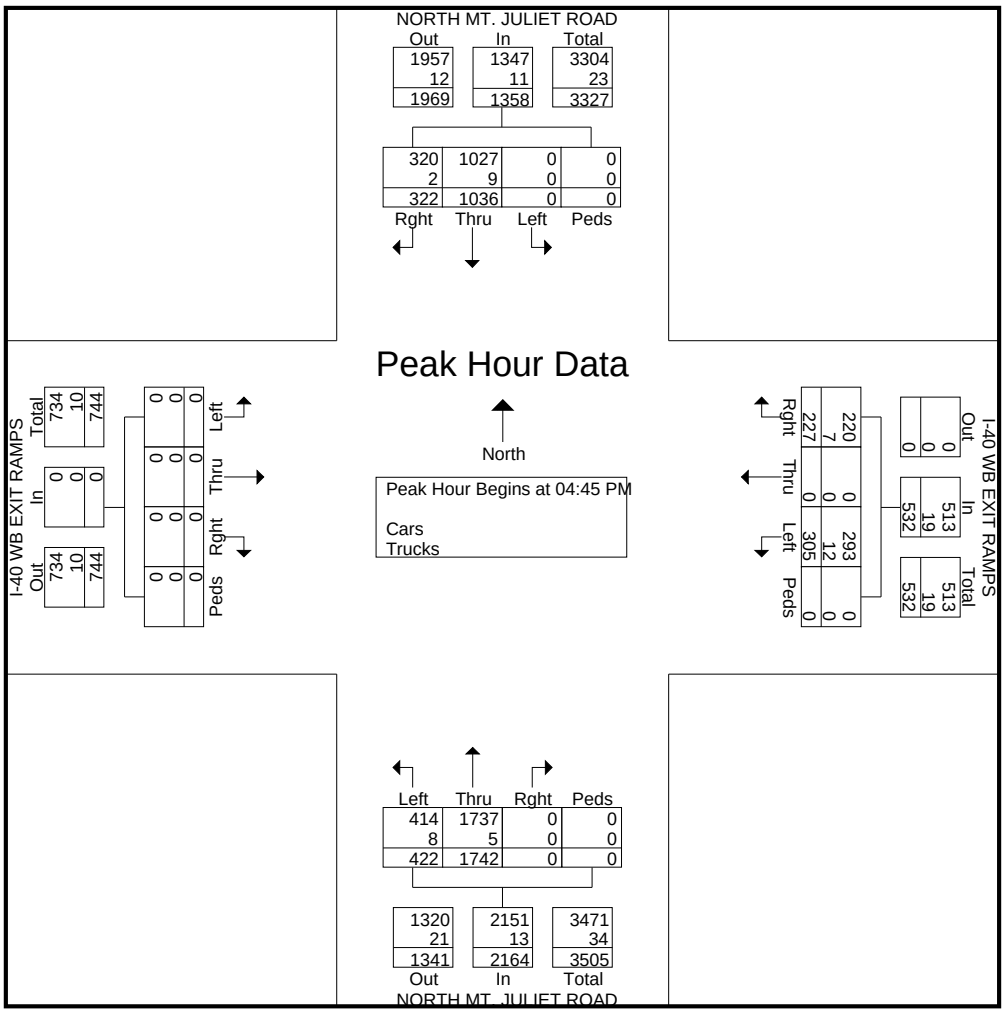
	NORTH MT. JULIET ROAD Southbound					I-40 WB EXIT RAMPS Westbound					NORTH MT. JULIET ROAD Northbound					I-40 WB EXIT RAMPS Eastbound					
Start Time	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	133	**277**	0	410	41	0	37	0	78	**272**	173	0	0	445	0	0	0	0	0	933
07:15 AM	0	172	274	0	**446**	50	0	49	0	99	253	214	0	0	467	0	0	0	0	0	**1012**
07:30 AM	0	**194**	227	0	421	42	0	58	0	100	225	253	0	0	478	0	0	0	0	0	999
07:45 AM	0	180	186	0	366	**58**	0	**77**	0	**135**	208	**278**	0	0	**486**	0	0	0	0	0	987
Total Volume	0	679	964	0	1643	191	0	221	0	412	958	918	0	0	1876	0	0	0	0	0	3931
% App. Total	0	41.3	58.7	0		46.4	0	53.6	0		51.1	48.9	0	0		0	0	0	0		
PHF	.000	.875	.870	.000	.921	.823	.000	.718	.000	.763	.881	.826	.000	.000	.965	.000	.000	.000	.000	.000	.971
Cars	0	661	954	0	1615	173	0	207	0	380	939	880	0	0	1819	0	0	0	0	0	3814
% Cars	0	97.3	99.0	0	98.3	90.6	0	93.7	0	92.2	98.0	95.9	0	0	97.0	0	0	0	0	0	97.0
Trucks	0	18	10	0	28	18	0	14	0	32	19	38	0	0	57	0	0	0	0	0	117
% Trucks	0	2.7	1.0	0	1.7	9.4	0	6.3	0	7.8	2.0	4.1	0	0	3.0	0	0	0	0	0	3.0



All Traffic Data Services, Inc
1336 Farmer Road
Conyers, Ga 30012
404-374-1283

File Name : #3 N.MtJulietRd@I-40WBRampsPM
Site Code :
Start Date : 8/29/2012
Page No : 3

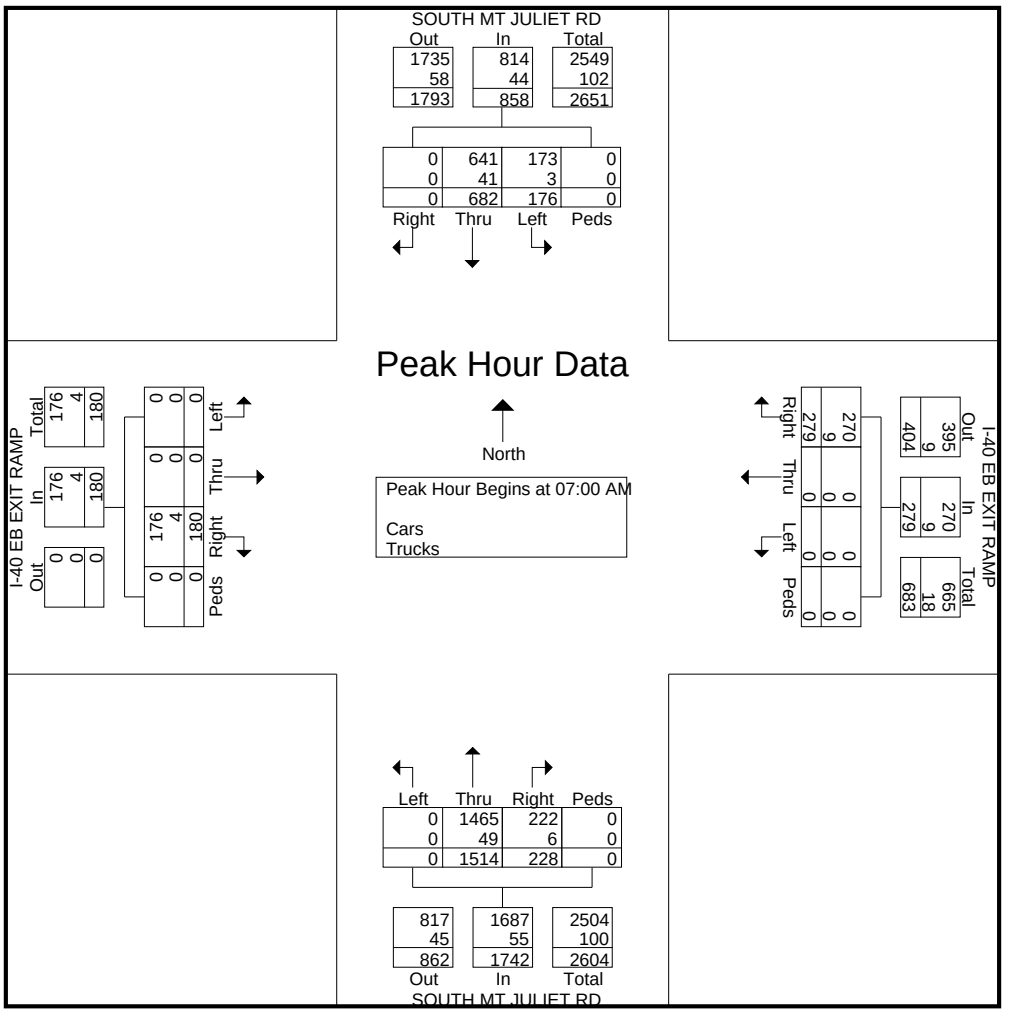
	NORTH MT. JULIET ROAD Southbound					I-40 WB EXIT RAMPS Westbound					NORTH MT. JULIET ROAD Northbound					I-40 WB EXIT RAMPS Eastbound					
Start Time	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Left	Thru	Rght	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	**285**	73	0	358	72	0	57	0	129	105	439	0	0	**544**	0	0	0	0	0	1031
05:00 PM	0	209	**87**	0	296	73	0	57	0	130	**116**	428	0	0	544	0	0	0	0	0	970
05:15 PM	0	274	86	0	**360**	**81**	0	**61**	0	**142**	87	**447**	0	0	534	0	0	0	0	0	**1036**
05:30 PM	0	268	76	0	344	79	0	52	0	131	114	428	0	0	542	0	0	0	0	0	1017
Total Volume	0	1036	322	0	1358	305	0	227	0	532	422	1742	0	0	2164	0	0	0	0	0	4054
% App. Total	0	76.3	23.7	0		57.3	0	42.7	0		19.5	80.5	0	0		0	0	0	0		
PHF	.000	.909	.925	.000	.943	.941	.000	.930	.000	.937	.909	.974	.000	.000	.994	.000	.000	.000	.000	.000	.978
Cars	0	1027										1737									
% Cars	0	99.1	99.4	0	99.2	96.1	0	96.9	0	96.4	98.1	99.7	0	0	99.4	0	0	0	0	0	98.9
Trucks	0	9	2	0	11	12	0	7	0	19	8	5	0	0	13	0	0	0	0	0	43
% Trucks	0	0.9	0.6	0	0.8	3.9	0	3.1	0	3.6	1.9	0.3	0	0	0.6	0	0	0	0	0	1.1



All Traffic Data Services, Inc
1336 Farmer Road
Conyers, Ga 30012
404-374-1283

File Name : #4 SouthMtJulietRd@I-40EBExitRampAM
Site Code : 00000000
Start Date : 8/29/2012
Page No : 3

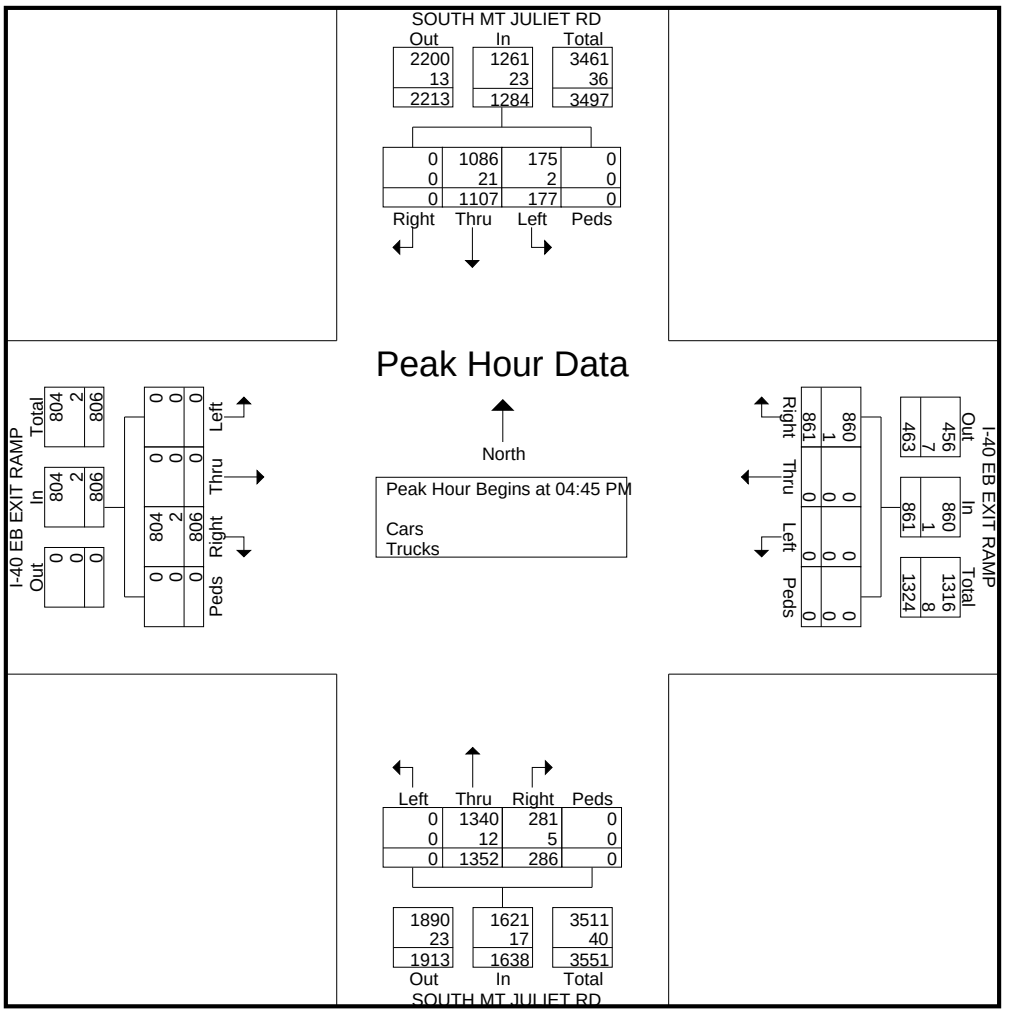
	SOUTH MT JULIET RD Southbound					I-40 EB EXIT RAMP Westbound					SOUTH MT JULIET RD Northbound					I-40 EB EXIT RAMP Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	29	147	0	0	176	0	0	53	0	53	0	**399**	45	0	444	0	0	46	0	46	719
07:15 AM	48	167	0	0	215	0	0	**81**	0	**81**	0	386	53	0	439	0	0	43	0	43	778
07:30 AM	**60**	**190**	0	0	**250**	0	0	73	0	73	0	382	**77**	0	**459**	0	0	**49**	0	**49**	**831**
07:45 AM	39	178	0	0	217	0	0	72	0	72	0	347	53	0	400	0	0	42	0	42	731
Total Volume	176	682	0	0	858	0	0	279	0	279	0	1514	228	0	1742	0	0	180	0	180	3059
% App. Total	20.5	79.5	0	0		0	0	100	0		0	86.9	13.1	0		0	0	100	0		
PHF	.733	.897	.000	.000	.858	.000	.000	.861	.000	.861	.000	.949	.740	.000	.949	.000	.000	.918	.000	.918	.920
Cars	173	641	0	0	814	0	0	270	0	270	0	1465									
% Cars	98.3	94.0	0	0	94.9	0	0	96.8	0	96.8	0	96.8	97.4	0	96.8	0	0	97.8	0	97.8	96.3
Trucks	3	41	0	0	44	0	0	9	0	9	0	49	6	0	55	0	0	4	0	4	112
% Trucks	1.7	6.0	0	0	5.1	0	0	3.2	0	3.2	0	3.2	2.6	0	3.2	0	0	2.2	0	2.2	3.7



All Traffic Data Services, Inc
1336 Farmer Road
Conyers, Ga 30012
404-374-1283

File Name : #4 SouthMtJulietRd@I-40EBExitRampPM
Site Code : 00000000
Start Date : 8/29/2012
Page No : 3

	SOUTH MT JULIET RD Southbound					I-40 EB EXIT RAMP Westbound					SOUTH MT JULIET RD Northbound					I-40 EB EXIT RAMP Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	44	287	0	0	331	0	0	**264**	0	**264**	0	307	63	0	370	0	0	193	0	193	1158
05:00 PM	42	253	0	0	295	0	0	188	0	188	0	**395**	74	0	**469**	0	0	182	0	182	1134
05:15 PM	**49**	245	0	0	294	0	0	243	0	243	0	326	**79**	0	405	0	0	**232**	0	**232**	**1174**
05:30 PM	42	**322**	0	0	**364**	0	0	166	0	166	0	324	70	0	394	0	0	199	0	199	1123
Total Volume	177	1107	0	0	1284	0	0	861	0	861	0	1352	286	0	1638	0	0	806	0	806	4589
% App. Total	13.8	86.2	0	0		0	0	100	0		0	82.5	17.5	0		0	0	100	0		
PHF	.903	.859	.000	.000	.882	.000	.000	.815	.000	.815	.000	.856	.905	.000	.873	.000	.000	.869	.000	.869	.977
Cars	175	1086										1340									
% Cars	98.9	98.1	0	0	98.2	0	0	99.9	0	99.9	0	99.1	98.3	0	99.0	0	0	99.8	0	99.8	99.1
Trucks	2	21	0	0	23	0	0	1	0	1	0	12	5	0	17	0	0	2	0	2	43
% Trucks	1.1	1.9	0	0	1.8	0	0	0.1	0	0.1	0	0.9	1.7	0	1.0	0	0	0.2	0	0.2	0.9



APPENDIX B – APPROVED DEVELOPMENT TRAFFIC IMPACT STUDIES

Historical Growth Rate in the Study Area

Year	SR 171 S. of I-40 (Sta. 000017)	SR 171 N. of I-40 (Sta. 000089)	SR 171 S. of 265 (Sta. 000090)	SR 265 W. of 171 (Sta. 000018)	SR 265 E. of 171 (Sta. 000019)	SR 265 N. of I-40 (Sta. 000050)	I-40 W. of OHB Ramp (000345)	I-40 E. of OHB Ramp (000198)	OHB S. of I-40 (Sta. 000215)	
1986	8937	11480	8089	1021	2159	22753	48988	31275	2599	
1987	10867	12478	10059	1257	2611	24216	54000	35000	2955	
1988	9830	14117	9492	1729	2786	29271	58000	40000	3468	
1989	11592	13720	9500	2167	3568	25522	55746	42898	3702	
1990	11200	13800	8926	1471	2740	27918	53211	40294	3751	
1991	12816	16124	9400	1637	3560	12215	66872	43182	3258	
1992	13510	16073	13113	1695	3050	40810	64870	41586	2805	
1993	14384	17802	12730	1481	2969	46744	72889	46325	4042	
1994	15430	17986	13939	1796	3348	39639	79234	51927	4196	
1995	14666	19481	13821	1800	3410	52782	76622	52000	4056	
1996	14343	20067	13786	1797	3042	63132	73388	39655	4805	
1997	15241	22086	14541	2807	3529	60124	86133	55026	4704	
1998	15620	19580	15022	2682	3501	43532	90840	56436	4440	
1999	15884	21666	14856	2469	3788	44115	92759	59260	5332	
2000	16111	19917	15440	2360	4009	42687	97809	64137	6045	
2001	14993	19853	14291	2424	3752	44940	93026	59792	6232	
2002	15376	18916	13283	2414	4002	45313	96714	62246	5918	
2003	15581	22447	14775	2305	3648	43557	102564	66577	5794	
2004	14959	23132	14441	2354	3724	48284	100861	63507	6057	
2005	16093	22263	14666	2560	4100	46739	101325	66462	6381	
2006	16419	26162	15833	2666	4124	44842	102613	67223	6426	
2007	16156	25462	14962	3613	5270	45625	116193	80174	6797	
2008	16886	25345	14868	3166	5815	45065	108224	71376	6739	
2009	16221	25539	13840	2637	5262	45901	94725	82040	6239	
2010	18812	29665	16221	3052	5600	44677	93820	80870	6673	
2011	18354	28515	19548	2987	6005	47239	99764	82083	6809	
2012	18110	29349	16663	3594	6185	46503	102282	82493	6626	
2013	18633	31121	16353	3531	6465	46874	111356	82910	6814	
5 Year Growth Rate										Average
	2.1%	3.2%	2.2%	3.6%	3.2%	2.4%	2.8%	3.4%	3.5%	3.0%
10 Year Growth Rate										
	2.1%	3.2%	2.2%	3.6%	3.2%	2.4%	2.8%	3.4%	3.5%	3.0%
15 Year Growth Rate										
	2.1%	3.2%	2.2%	3.6%	3.2%	2.4%	2.8%	3.4%	3.5%	3.0%
Average	2.1%	3.2%	2.2%	3.6%	3.2%	2.4%	2.8%	3.4%	3.5%	3.0%

F i s c h b a c h
Transportation Group, Inc.
Traffic Engineering and Planning

Traffic Impact Analysis

Providence Central
S. Mt. Juliet Road and Central Pike
Mt. Juliet, Tennessee

Prepared October 2012

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Traffic Impact Study

Providence Central
S. Mt. Juliet Road and Central Pike

Mt. Juliet, Tennessee

Prepared October 2012

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5. IMPACTS OF PROPOSED DEVELOPMENT – PHASE 1

5.1 TRIP GENERATION

Trip generation calculations were conducted in order to identify how much traffic will be generated by Phase 1 of the proposed project. Trip generation data for daily and peak hour trips were identified from Trip Generation, Eighth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2008. Table 6 presents the daily and peak hour trip generations for proposed project, and these trip generation calculations are included in Appendix B.

TABLE 6. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Multi-Family (LUC 220)	224 units	1,482	23	91	92	49

6. IMPACTS OF PROPOSED DEVELOPMENT – PHASE 2

6.1 TRIP GENERATION

Trip generation calculations were conducted in order to identify how much traffic will be generated by Phase 2 of the proposed project. Trip generation data for daily and peak hour trips were identified from Trip Generation, Eighth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2008. Table 8 presents the daily and peak hour trip generations for proposed project, and these trip generation calculations are included in Appendix B.

TABLE 8. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Multi-Family (LUC 220)	384 units	2,450	38	154	149	80
Office (LUC 710)	287,000 sq.ft	3,004	384	52	68	332
Retail (LUC 820)	21,250 sq.ft.	2,482	38	24	110	115
TOTAL		**7,936**	**460**	**230**	**327**	**527**
90% OF TOTAL		**7,142**	**414**	**207**	**295**	**475**

For the purposes of this study, it was estimated that none of the traffic generated by the proposed development will be captured, or "pass-by" trips from the adjacent street system. However, studies have shown that it is common for a portion of the trips generated by mixed-use developments will be internal to the site. Therefore, for the purposes of this study, it was assumed that 10% of the traffic generated by the proposed project will be internal, and the total trip generation calculations were reduced by this amount.

7. IMPACTS OF PROPOSED DEVELOPMENT – PHASE 3

Trip generation calculations were conducted in order to identify how much traffic will be generated by Phase 3 of the proposed project. Trip generation data for daily and peak hour trips were identified from Trip Generation, Eighth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2008. Table 10 presents the daily and peak hour trip generations for proposed project, and these trip generation calculations are included in Appendix B.

TABLE 10. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Office (LUC 710)	787,000 sq.ft	6,532	860	117	163	797
Retail (LUC 820)	249,500 sq.ft.	12,304	161	103	575	599
Single-Family (LUC 210)	250 units	2,416	46	139	151	89
TOTAL		**21,252**	**1,067**	**359**	**889**	**1,485**
90% OF TOTAL		**19,126**	**960**	**323**	**800**	**1,336**

As previously mentioned, no design year has been established for Phase 3 of the proposed project. Therefore, the impact of the land uses in this phase should be identified as site plans are submitted to the City of Franklin. In particular, the trip generation calculations shown in Table 10 suggest that the approved interchange on I-40 at Central Pike will need to be funded and constructed in order to accommodate the traffic generated by Phase 3 of the proposed project. Also, an improvement of Central Pike from I-40 to S. Mt. Juliet Road will be warranted.

F i s c h b a c h
Transportation Group, Inc.
Traffic Engineering and Planning

Traffic Impact Study

Boyle Retail Center
S. Mt. Juliet Road at Providence Parkway
Mt. Juliet, Tennessee

Prepared February 2008
for Land Design

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Traffic Impact Analysis

Boyle Retail Center
S. Mt. Juliet Road at Providence Parkway

Mt. Juliet, Tennessee

Prepared February 2008

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4. IMPACTS OF THE PROPOSED PROJECT

4.1 TRIP GENERATION

In order to identify how much traffic will be generated by the proposed project, trip generation calculations were conducted. Trip generation data for daily and peak hour trips were identified from Trip Generation, Seventh Edition, which was published by the Institute of Transportation Engineers (ITE) in 2003. Table 4 presents the daily and peak hour trip generations for the proposed project, and Appendix B includes the trip generation calculations.

TABLE 4. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Supermarket (LUC 850)	54,817 sq.ft.	5,062	133	85	296	284
Retail (LUC 820)	136,100 sq.ft.	8,298	115	73	368	399
Sit-Down Rest. (LUC 932)	8,000 sq.ft.	1,018	48	44	53	34
Sit-Down Rest. (LUC 932)	6,000 sq.ft.	762	36	33	40	26
Fast Food Rest. (LUC 934)	4,500 sq.ft.	2,232	122	117	81	75
Fast Food Rest. (LUC 934)	4,500 sq.ft.	2,232	122	117	81	75
Fast Food Rest. (LUC 934)	4,500 sq.ft.	2,232	122	117	81	75
Fast Food Rest. (LUC 934)	4,500 sq.ft.	2,232	122	117	81	75
Bank (LUC 912)	6,000 sq.ft.	1,350	41	33	137	137
TOTAL	**228,917 sq.ft.**	**25,418**	**861**	**736**	**1,218**	**1,180**
90% OF TOTAL		**22,876**	**775**	**662**	**1,096**	**1,062**

For the purposes of this study, it was estimated that none of the traffic generated by the proposed development will be captured, or "pass-by" trips from the adjacent street system. However, studies have shown that it is common for a portion of the trips generated by mixed-use developments will be internal to the site. Therefore, it was assumed that 10% of the traffic will be internal to the site, and so the total traffic volumes generated by land uses were reduced by this amount.

F i s c h b a c h
Transportation Group, LLC
Traffic Engineering and Planning

Traffic Impact Study

Baird Farm Residential Development
Providence Trail
Mt. Juliet, TN

Prepared May 2014
(Revised January 2015)
For Civil Site Design Group

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Traffic Impact Study

Baird Farm Residential Development
Providence Trail

Mt. Juliet, Tennessee

Prepared May 2014
(Revised January 2015)

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5. IMPACTS OF PROPOSED DEVELOPMENT

5.1 TRIP GENERATION

In order to identify how much traffic will be generated by the proposed project, trip generation data for daily and peak hour trips were identified from Trip Generation, Ninth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2012. Table 5 presents the daily and peak hour trip generations for proposed project, and these trip generation calculations are included in Appendix C.

TABLE 5. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Single-Family (LUC 210)	253 units	2,408	47	142	159	94

F i s c h b a c h
Transportation Group, LLC
Traffic Engineering and Planning

Traffic Impact Study

Shankle Property
Central Pike and Beckwith Road
Mt. Juliet, TN

Prepared November 2014
(Revised January 2015)
For Civil Site Design Group

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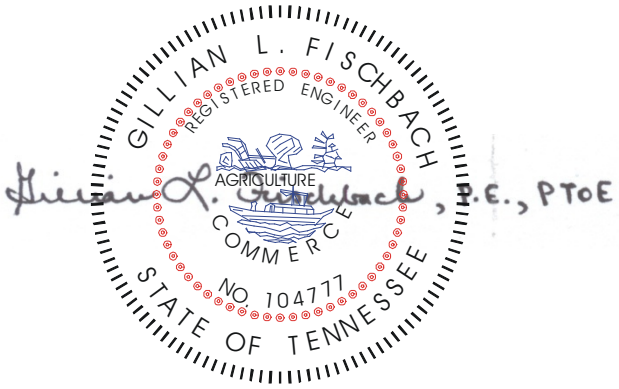
Shankle Property
Central Pike and Beckwith Road

Mt. Juliet, Tennessee

Prepared November 2014
(Revised January 2015)

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5. IMPACTS OF PROPOSED DEVELOPMENT

5.1 TRIP GENERATION

Trip generation calculations were conducted in order to identify how much traffic will be generated by the proposed project. Trip generation data for daily and peak hour trips were identified from Trip Generation, Ninth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2012. Table 5 presents the daily and peak hour trip generations for proposed project, and these trip generation calculations are included in Appendix C.

TABLE 5. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Single-Family (LUC 210)	427 units	4,066	80	240	269	158

F i s c h b a c h
Transportation Group, LLC
Traffic Engineering and Planning

Traffic Impact Study

Hamilton Hills - McCulloch Property
Mixed-Use Development
S. Mt. Juliet Road and Central Pike
Mt. Juliet, TN

Prepared February 2015
For Civil Site Design Group

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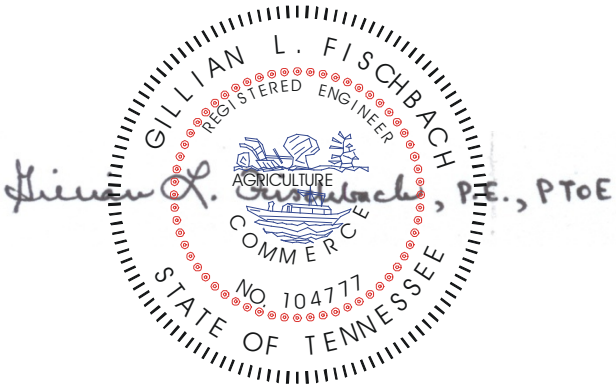
Hamilton Hills – McCulloch Property
Mixed-Use Development

S. Mt. Juliet Road and Central Pike
Mt. Juliet, Tennessee

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6. IMPACTS OF THE PROPOSED DEVELOPMENT

6.1 TRIP GENERATION

In order to identify how much traffic will be generated by the proposed project, trip generation data for daily and peak hour trips were identified from Trip Generation, Ninth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2012. Table 5 presents the daily and peak hour trip generations for each phase of the proposed project, and these trip generation calculations are included in Appendix C.

TABLE 5A. TRIP GENERATION – PHASE 1

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Office (LUC 710)	60,400 sq.ft.	666	83	11	15	75
Retail (LUC 820)	60,400 sq.ft.	2,580	36	22	108	117
Sit-Down Restaurant (LUC 932)	16,600 sq.ft.	2,110	99	81	98	65
Fast Food Restaurant (LUC 934)	4,800 sq.ft.	2,382	111	107	81	75
Hotel (LUC 310)	120 rooms	1,070	47	34	41	43
TOTAL		**8,808**	**376**	**255**	**343**	**375**
TOTAL WITH 10% REDUCTION FOR INTERNAL TRIPS		**7,926**	**338**	**230**	**309**	**338**

TABLE 5B. TRIP GENERATION – PHASE 2

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Office (LUC 710)	173,500 sq.ft.	1,914	238	32	44	215
Medical Office Building (LUC 720)	14,400 sq.ft.	520	27	7	14	37
TOTAL		**2,434**	**265**	**39**	**58**	**252**
TOTAL WITH 10% REDUCTION FOR INTERNAL TRIPS		**2,190**	**239**	**35**	**52**	**227**

TABLE 5C. TRIP GENERATION – PHASE 3

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Office (LUC 710)	145,400 sq.ft.	1,604	200	27	37	180
Day Care Center (LUC 565)	5,200 sq.ft.	386	37	33	34	38
TOTAL		**1,990**	**237**	**60**	**71**	**218**
TOTAL WITH 10% REDUCTION FOR INTERNAL TRIPS		**1,790**	**213**	**54**	**64**	**196**

TABLE 5D. TRIP GENERATION – PHASE 4

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Multi-Family (LUC 220)	276 homes	1,796	28	111	110	59
Townhomes (LUC 230)	91 homes	592	8	40	37	18
Assisted Living (LUC 254)	90 beds	246	15	6	13	20
TOTAL		**2,634**	**51**	**157**	**160**	**97**
TOTAL WITH 10% REDUCTION FOR INTERNAL TRIPS		**2,372**	**46**	**141**	**144**	**87**

TABLE 5E. TRIP GENERATION – PHASE 5

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Office (LUC 710)	242,100 sq.ft.	2,670	332	45	61	299
Sit-Down Restaurant (LUC 932)	7,000 sq.ft.	890	42	34	41	28
Pharmacy (LUC 881)	12,000 sq.ft.	1,162	22	20	59	59
Bank (LUC 912)	5,600 sq.ft.	830	39	29	68	68
TOTAL		**5,552**	**435**	**128**	**229**	**454**
TOTAL WITH 10% REDUCTION FOR INTERNAL TRIPS		**4,998**	**391**	**115**	**206**	**409**

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No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 5B.
Peak Hour Traffic Volumes Generated by the Covey Rise Residential and Retail Project

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No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 5C.
Peak Hour Traffic Volumes Generated by the Cowden Property Residential Project

APPENDIX C – INTERSECTION CAPACITY ANALYSIS WORKSHEETS



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	369	2713	686	233	1881
Number			2	12	1	6
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)				1.00	1.00	
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1827	1827	1827	1827
Adj Flow Rate, veh/h			2949	0	253	2045
Adj No. of Lanes			2	1	1	2
Peak Hour Factor			0.92	0.92	0.92	0.92
Percent Heavy Veh, %			4	4	4	4
Cap, veh/h			2916	1304	234	3379
Arrive On Green			0.84	0.00	0.11	0.97
Sat Flow, veh/h			3563	1553	1740	3563
Grp Volume(v), veh/h			2949	0	253	2045
Grp Sat Flow(s),veh/h/ln			1736	1553	1740	1736
Q Serve(g_s), s			126.0	0.0	16.0	5.7
Cycle Q Clear(g_c), s			126.0	0.0	16.0	5.7
Prop In Lane				1.00	1.00	
Lane Grp Cap(c), veh/h			2916	1304	234	3379
V/C Ratio(X)			1.01	0.00	1.08	0.61
Avail Cap(c_a), veh/h			2916	1304	234	3379
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh			12.0	0.0	64.1	0.1
Incr Delay (d2), s/veh			19.5	0.0	82.8	0.8
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln			66.2	0.0	15.0	2.7
LnGrp Delay(d),s/veh			31.5	0.0	146.9	0.9
LnGrp LOS			F		F	A
Approach Vol, veh/h			2949			2298
Approach Delay, s/veh			31.5			17.0
Approach LOS			C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	20.0	130.0				150.0		
Change Period (Y+Rc), s	4.0	4.0				4.0		
Max Green Setting (Gmax), s	16.0	126.0				146.0		
Max Q Clear Time (g_c+I1), s	18.0	128.0				7.7		
Green Ext Time (p_c), s	0.0	0.0				126.6		

Intersection Summary	
HCM 2010 Ctrl Delay	25.2
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	899	0	291	1733	1349	0	0	1215	1273
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	0	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				977	0	316	1884	1466	0	0	1321	0
Adj No. of Lanes				2	0	1	2	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				4	0	4	4	4	0	0	4	4
Cap, veh/h				608	0	280	1058	2569	0	0	1342	600
Arrive On Green				0.18	0.00	0.18	0.31	0.74	0.00	0.00	0.39	0.00
Sat Flow, veh/h				3375	0	1553	3375	3563	0	0	3563	1553
Grp Volume(v), veh/h				977	0	316	1884	1466	0	0	1321	0
Grp Sat Flow(s),veh/h/ln				1688	0	1553	1688	1736	0	0	1736	1553
Q Serve(g_s), s				27.0	0.0	27.0	47.0	28.5	0.0	0.0	56.5	0.0
Cycle Q Clear(g_c), s				27.0	0.0	27.0	47.0	28.5	0.0	0.0	56.5	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				608	0	280	1058	2569	0	0	1342	600
V/C Ratio(X)				1.61	0.00	1.13	1.78	0.57	0.00	0.00	0.98	0.00
Avail Cap(c_a), veh/h				608	0	280	1058	2569	0	0	1342	600
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				61.5	0.0	61.5	51.5	8.8	0.0	0.0	45.5	0.0
Incr Delay (d2), s/veh				281.2	0.0	93.7	355.4	0.9	0.0	0.0	21.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				36.3	0.0	18.8	74.1	13.8	0.0	0.0	30.9	0.0
LnGrp Delay(d),s/veh				342.7	0.0	155.2	406.9	9.7	0.0	0.0	66.6	0.0
LnGrp LOS				F		F	F	A			E	
Approach Vol, veh/h					1293			3350			1321	
Approach Delay, s/veh					296.9			233.1			66.6	
Approach LOS					F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		117.0			53.0	64.0		33.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		111.0			47.0	58.0		27.0
Max Q Clear Time (g_c+I1), s		30.5			49.0	58.5		29.0
Green Ext Time (p_c), s		31.4			0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		210.1
HCM 2010 LOS		F



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	1137	3002	1196	234	2422
Number			2	12	1	6
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)				1.00	1.00	
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1827	1827	1827	1827
Adj Flow Rate, veh/h			3160	0	246	2549
Adj No. of Lanes			2	1	1	2
Peak Hour Factor			0.95	0.95	0.95	0.95
Percent Heavy Veh, %			4	4	4	4
Cap, veh/h			3000	1342	188	3372
Arrive On Green			0.86	0.00	0.08	0.97
Sat Flow, veh/h			3563	1553	1740	3563
Grp Volume(v), veh/h			3160	0	246	2549
Grp Sat Flow(s),veh/h/ln			1736	1553	1740	1736
Q Serve(g_s), s			121.0	0.0	11.0	11.1
Cycle Q Clear(g_c), s			121.0	0.0	11.0	11.1
Prop In Lane				1.00	1.00	
Lane Grp Cap(c), veh/h			3000	1342	188	3372
V/C Ratio(X)			1.05	0.00	1.31	0.76
Avail Cap(c_a), veh/h			3000	1342	188	3372
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh			9.5	0.0	61.4	0.2
Incr Delay (d2), s/veh			32.7	0.0	171.3	1.6
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln			69.0	0.0	16.2	5.0
LnGrp Delay(d),s/veh			42.2	0.0	232.6	1.8
LnGrp LOS			F		F	A
Approach Vol, veh/h			3160			2795
Approach Delay, s/veh			42.2			22.2
Approach LOS			D			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	15.0	125.0				140.0		
Change Period (Y+Rc), s	4.0	4.0				4.0		
Max Green Setting (Gmax), s	11.0	121.0				136.0		
Max Q Clear Time (g_c+I1), s	13.0	123.0				13.1		
Green Ext Time (p_c), s	0.0	0.0				120.1		

Intersection Summary	
HCM 2010 Ctrl Delay	32.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	1012	0	300	1452	2687	0	0	1644	425
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	0	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				1065	0	316	1528	2828	0	0	1731	0
Adj No. of Lanes				2	0	1	2	2	0	0	2	1
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				4	0	4	4	4	0	0	4	4
Cap, veh/h				699	0	322	1085	2455	0	0	1190	532
Arrive On Green				0.21	0.00	0.21	0.32	0.71	0.00	0.00	0.34	0.00
Sat Flow, veh/h				3375	0	1553	3375	3563	0	0	3563	1553
Grp Volume(v), veh/h				1065	0	316	1528	2828	0	0	1731	0
Grp Sat Flow(s),veh/h/ln				1688	0	1553	1688	1736	0	0	1736	1553
Q Serve(g_s), s				29.0	0.0	28.4	45.0	99.0	0.0	0.0	48.0	0.0
Cycle Q Clear(g_c), s				29.0	0.0	28.4	45.0	99.0	0.0	0.0	48.0	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				699	0	322	1085	2455	0	0	1190	532
V/C Ratio(X)				1.52	0.00	0.98	1.41	1.15	0.00	0.00	1.45	0.00
Avail Cap(c_a), veh/h				699	0	322	1085	2455	0	0	1190	532
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				55.5	0.0	55.2	47.5	20.5	0.0	0.0	46.0	0.0
Incr Delay (d2), s/veh				242.7	0.0	45.2	189.3	73.6	0.0	0.0	209.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				37.1	0.0	16.2	49.5	71.8	0.0	0.0	57.6	0.0
LnGrp Delay(d),s/veh				298.2	0.0	100.5	236.8	94.1	0.0	0.0	255.3	0.0
LnGrp LOS				F		F	F	F			F	
Approach Vol, veh/h					1381			4356			1731	
Approach Delay, s/veh					253.0			144.2			255.3	
Approach LOS					F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		105.0			51.0	54.0		35.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		99.0			45.0	48.0		29.0
Max Q Clear Time (g_c+I1), s		101.0			47.0	50.0		31.0
Green Ext Time (p_c), s		0.0			0.0	0.0		0.0

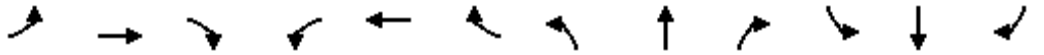
Intersection Summary	
HCM 2010 Ctrl Delay	190.0
HCM 2010 LOS	F



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	314	1550	557	198	1530
Number			2	12	1	6
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)				1.00	1.00	
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1827	1827	1827	1827
Adj Flow Rate, veh/h			1685	0	215	1663
Adj No. of Lanes			2	1	1	2
Peak Hour Factor			0.92	0.92	0.92	0.92
Percent Heavy Veh, %			4	4	4	4
Cap, veh/h			2855	1277	344	3240
Arrive On Green			0.82	0.00	0.04	0.93
Sat Flow, veh/h			3563	1553	1740	3563
Grp Volume(v), veh/h			1685	0	215	1663
Grp Sat Flow(s),veh/h/ln			1736	1553	1740	1736
Q Serve(g_s), s			15.1	0.0	1.4	5.5
Cycle Q Clear(g_c), s			15.1	0.0	1.4	5.5
Prop In Lane				1.00	1.00	
Lane Grp Cap(c), veh/h			2855	1277	344	3240
V/C Ratio(X)			0.59	0.00	0.62	0.51
Avail Cap(c_a), veh/h			2855	1277	577	3240
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh			2.8	0.0	7.2	0.4
Incr Delay (d2), s/veh			0.9	0.0	1.9	0.6
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln			7.4	0.0	4.1	2.6
LnGrp Delay(d),s/veh			3.7	0.0	9.0	1.0
LnGrp LOS			A		A	A
Approach Vol, veh/h			1685			1878
Approach Delay, s/veh			3.7			1.9
Approach LOS			A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	10.0	80.0				90.0		
Change Period (Y+Rc), s	6.0	6.0				6.0		
Max Green Setting (Gmax), s	16.0	62.0				84.0		
Max Q Clear Time (g_c+I1), s	3.4	17.1				7.5		
Green Ext Time (p_c), s	0.6	32.3				45.3		

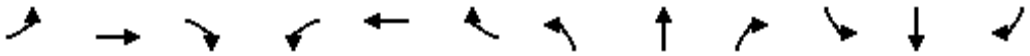
Intersection Summary	
HCM 2010 Ctrl Delay	2.7
HCM 2010 LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	548	0	247	570	1294	0	0	1180	955
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	0	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				596	0	268	620	1407	0	0	1283	0
Adj No. of Lanes				2	0	1	2	2	0	0	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				4	0	4	4	4	0	0	4	4
Cap, veh/h				600	0	276	600	2391	0	0	1543	690
Arrive On Green				0.18	0.00	0.18	0.18	0.69	0.00	0.00	0.44	0.00
Sat Flow, veh/h				3375	0	1553	3375	3563	0	0	3563	1553
Grp Volume(v), veh/h				596	0	268	620	1407	0	0	1283	0
Grp Sat Flow(s),veh/h/ln				1688	0	1553	1688	1736	0	0	1736	1553
Q Serve(g_s), s				15.9	0.0	15.4	16.0	19.1	0.0	0.0	29.3	0.0
Cycle Q Clear(g_c), s				15.9	0.0	15.4	16.0	19.1	0.0	0.0	29.3	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				600	0	276	600	2391	0	0	1543	690
V/C Ratio(X)				0.99	0.00	0.97	1.03	0.59	0.00	0.00	0.83	0.00
Avail Cap(c_a), veh/h				600	0	276	600	2391	0	0	1543	690
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				36.9	0.0	36.8	37.0	7.3	0.0	0.0	22.0	0.0
Incr Delay (d2), s/veh				34.9	0.0	46.0	45.6	1.1	0.0	0.0	5.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				10.3	0.0	10.2	11.2	9.3	0.0	0.0	15.1	0.0
LnGrp Delay(d),s/veh				71.9	0.0	82.7	82.6	8.4	0.0	0.0	27.4	0.0
LnGrp LOS				E		F	F	A			C	
Approach Vol, veh/h					864			2027			1283	
Approach Delay, s/veh					75.2			31.1			27.4	
Approach LOS					E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		68.0			22.0	46.0		22.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		62.0			16.0	40.0		16.0
Max Q Clear Time (g_c+I1), s		21.1			18.0	31.3		17.9
Green Ext Time (p_c), s		22.4			0.0	7.2		0.0

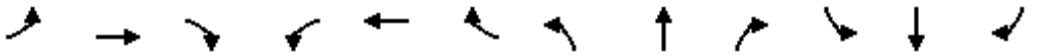
Intersection Summary	
HCM 2010 Ctrl Delay	39.1
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	0	836	0	0	0	0	1634	129	35	894	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00		0.88					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736		2733					3471	1553	1736	3471	
Flt Permitted	0.95		1.00					1.00	1.00	0.08	1.00	
Satd. Flow (perm)	1736		2733					3471	1553	139	3471	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	0	909	0	0	0	0	1776	140	38	972	0
RTOR Reduction (vph)	0	0	176	0	0	0	0	0	64	0	0	0
Lane Group Flow (vph)	128	0	733	0	0	0	0	1776	76	38	972	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	Prot		Prot					NA	Perm	pm+pt	NA	
Protected Phases	4		4					2		1	6	
Permitted Phases									2	6		
Actuated Green, G (s)	23.0		23.0					46.6	46.6	55.0	55.0	
Effective Green, g (s)	23.0		23.0					46.6	46.6	55.0	55.0	
Actuated g/C Ratio	0.26		0.26					0.52	0.52	0.61	0.61	
Clearance Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	443		698					1797	804	127	2121	
v/s Ratio Prot	0.07		c0.27					c0.51		0.01	c0.28	
v/s Ratio Perm									0.05	0.17		
v/c Ratio	0.29		1.05					0.99	0.09	0.30	0.46	
Uniform Delay, d1	26.9		33.5					21.4	11.0	19.5	9.5	
Progression Factor	1.00		1.00					0.59	0.65	0.44	0.89	
Incremental Delay, d2	0.4		48.1					13.6	0.1	0.3	0.2	
Delay (s)	27.3		81.6					26.2	7.3	8.9	8.5	
Level of Service	C		F					C	A	A	A	
Approach Delay (s)		74.9			0.0			24.8			8.6	
Approach LOS		E			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	351	0	44	1163	589	0	0	578	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				1.00		1.00	0.97	0.95			0.95	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1736		1553	3367	3471			3471	1553
Flt Permitted				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1736		1553	3367	3471			3471	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	382	0	48	1264	640	0	0	628	473
RTOR Reduction (vph)	0	0	0	0	0	37	0	0	0	0	0	326
Lane Group Flow (vph)	0	0	0	382	0	11	1264	640	0	0	628	147
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				20.0		20.0	35.6	58.0			16.4	16.4
Effective Green, g (s)				20.0		20.0	35.6	58.0			16.4	16.4
Actuated g/C Ratio				0.22		0.22	0.40	0.64			0.18	0.18
Clearance Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				385		345	1331	2236			632	282
v/s Ratio Prot				c0.22			c0.38	0.18			c0.18	
v/s Ratio Perm						0.01						0.09
v/c Ratio				0.99		0.03	0.95	0.29			0.99	0.52
Uniform Delay, d1				34.9		27.4	26.3	7.0			36.7	33.2
Progression Factor				1.00		1.00	0.46	0.53			1.00	1.00
Incremental Delay, d2				43.6		0.0	7.3	0.1			34.3	6.7
Delay (s)				78.5		27.4	19.5	3.9			71.0	40.0
Level of Service				E		C	B	A			E	D
Approach Delay (s)		0.0			72.8			14.3			57.7	
Approach LOS		A			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	966	1758	725	199	2138
Number			2	12	1	6
Initial Q (Qb), veh			0	0	0	0
Ped-Bike Adj(A_pbT)				1.00	1.00	
Parking Bus, Adj			1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln			1827	1827	1827	1827
Adj Flow Rate, veh/h			1851	0	209	2251
Adj No. of Lanes			2	1	1	2
Peak Hour Factor			0.95	0.95	0.95	0.95
Percent Heavy Veh, %			4	4	4	4
Cap, veh/h			2966	1327	296	3282
Arrive On Green			0.85	0.00	0.04	0.95
Sat Flow, veh/h			3563	1553	1740	3563
Grp Volume(v), veh/h			1851	0	209	2251
Grp Sat Flow(s),veh/h/ln			1736	1553	1740	1736
Q Serve(g_s), s			18.3	0.0	1.4	11.1
Cycle Q Clear(g_c), s			18.3	0.0	1.4	11.1
Prop In Lane				1.00	1.00	
Lane Grp Cap(c), veh/h			2966	1327	296	3282
V/C Ratio(X)			0.62	0.00	0.71	0.69
Avail Cap(c_a), veh/h			2966	1327	518	3282
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh			2.5	0.0	12.1	0.5
Incr Delay (d2), s/veh			1.0	0.0	3.1	1.2
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln			8.9	0.0	5.8	5.2
LnGrp Delay(d),s/veh			3.5	0.0	15.1	1.7
LnGrp LOS			A		B	A
Approach Vol, veh/h			1851			2460
Approach Delay, s/veh			3.5			2.8
Approach LOS			A			A

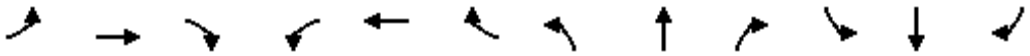
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		
Phs Duration (G+Y+Rc), s	10.0	100.0				110.0		
Change Period (Y+Rc), s	6.0	6.0				6.0		
Max Green Setting (Gmax), s	18.0	80.0				104.0		
Max Q Clear Time (g_c+I1), s	3.4	20.3				13.1		
Green Ext Time (p_c), s	0.6	50.7				71.4		

Intersection Summary	
HCM 2010 Ctrl Delay	3.1
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	728	0	255	208	2516	0	0	1609	361
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1827	0	1827	1827	1827	0	0	1827	1827
Adj Flow Rate, veh/h				766	0	268	219	2648	0	0	1694	0
Adj No. of Lanes				2	0	1	2	2	0	0	2	1
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				4	0	4	4	4	0	0	4	4
Cap, veh/h				675	0	311	276	2398	0	0	1925	861
Arrive On Green				0.20	0.00	0.20	0.08	0.69	0.00	0.00	0.55	0.00
Sat Flow, veh/h				3375	0	1553	3375	3563	0	0	3563	1553
Grp Volume(v), veh/h				766	0	268	219	2648	0	0	1694	0
Grp Sat Flow(s),veh/h/ln				1688	0	1553	1688	1736	0	0	1736	1553
Q Serve(g_s), s				22.0	0.0	18.4	7.0	76.0	0.0	0.0	46.7	0.0
Cycle Q Clear(g_c), s				22.0	0.0	18.4	7.0	76.0	0.0	0.0	46.7	0.0
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				675	0	311	276	2398	0	0	1925	861
V/C Ratio(X)				1.13	0.00	0.86	0.79	1.10	0.00	0.00	0.88	0.00
Avail Cap(c_a), veh/h				675	0	311	276	2398	0	0	1925	861
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh				44.0	0.0	42.5	49.6	17.0	0.0	0.0	21.3	0.0
Incr Delay (d2), s/veh				78.0	0.0	21.3	14.6	53.8	0.0	0.0	6.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln				17.5	0.0	9.7	3.8	53.6	0.0	0.0	23.8	0.0
LnGrp Delay(d),s/veh				122.0	0.0	63.8	64.2	70.8	0.0	0.0	27.5	0.0
LnGrp LOS				F		E	E	F			C	
Approach Vol, veh/h					1034			2867			1694	
Approach Delay, s/veh					107.0			70.3			27.5	
Approach LOS					F			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		82.0			15.0	67.0		28.0
Change Period (Y+Rc), s		6.0			6.0	6.0		6.0
Max Green Setting (Gmax), s		76.0			9.0	61.0		22.0
Max Q Clear Time (g_c+I1), s		78.0			9.0	48.7		24.0
Green Ext Time (p_c), s		0.0			0.0	12.0		0.0

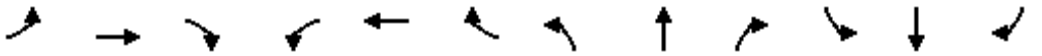
Intersection Summary	
HCM 2010 Ctrl Delay	64.1
HCM 2010 LOS	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	288	0	980	0	0	0	0	2013	471	35	984	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00		0.88					0.95	1.00	1.00	0.95	
Frt	1.00		0.85					1.00	0.85	1.00	1.00	
Flt Protected	0.95		1.00					1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1736		2733					3471	1553	1736	3471	
Flt Permitted	0.95		1.00					1.00	1.00	0.05	1.00	
Satd. Flow (perm)	1736		2733					3471	1553	99	3471	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	303	0	1032	0	0	0	0	2119	496	37	1036	0
RTOR Reduction (vph)	0	0	214	0	0	0	0	0	154	0	0	0
Lane Group Flow (vph)	303	0	818	0	0	0	0	2119	342	37	1036	0
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4						2	6		
Actuated Green, G (s)	22.0		22.0					67.6	67.6	76.0	76.0	
Effective Green, g (s)	22.0		22.0					67.6	67.6	76.0	76.0	
Actuated g/C Ratio	0.20		0.20					0.61	0.61	0.69	0.69	
Clearance Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	347		546					2133	954	104	2398	
v/s Ratio Prot	0.17							c0.61		0.01	c0.30	
v/s Ratio Perm			c0.30						0.22	0.24		
v/c Ratio	0.87		1.50					0.99	0.36	0.36	0.43	
Uniform Delay, d1	42.6		44.0					21.0	10.5	27.6	7.5	
Progression Factor	1.00		1.00					0.76	0.79	0.95	1.31	
Incremental Delay, d2	20.7		234.0					8.0	0.2	0.9	0.2	
Delay (s)	63.4		278.0					24.0	8.6	27.0	10.0	
Level of Service	E		F					C	A	C	B	
Approach Delay (s)		229.3			0.0			21.1			10.6	
Approach LOS		F			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	74.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	284	0	45	1244	1057	0	0	735	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lane Util. Factor				1.00		1.00	0.97	0.95			0.95	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1736		1553	3367	3471			3471	1553
Flt Permitted				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1736		1553	3367	3471			3471	1553
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	299	0	47	1309	1113	0	0	774	134
RTOR Reduction (vph)	0	0	0	0	0	38	0	0	0	0	0	100
Lane Group Flow (vph)	0	0	0	299	0	9	1309	1113	0	0	774	34
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				20.0		20.0	43.9	78.0			28.1	28.1
Effective Green, g (s)				20.0		20.0	43.9	78.0			28.1	28.1
Actuated g/C Ratio				0.18		0.18	0.40	0.71			0.26	0.26
Clearance Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				315		282	1343	2461			886	396
v/s Ratio Prot				c0.17			c0.39	0.32			c0.22	
v/s Ratio Perm						0.01						0.02
v/c Ratio				0.95		0.03	0.97	0.45			0.87	0.09
Uniform Delay, d1				44.5		37.0	32.5	6.9			39.2	31.2
Progression Factor				1.00		1.00	0.65	1.19			1.00	1.00
Incremental Delay, d2				36.9		0.0	9.0	0.2			11.7	0.4
Delay (s)				81.4		37.1	30.0	8.4			50.9	31.6
Level of Service				F		D	C	A			D	C
Approach Delay (s)		0.0			75.4			20.1			48.1	
Approach LOS		A			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	NBT	SET	SER2
Lane Configurations			
Volume (vph)	589	578	435
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00
Frt	1.00	1.00	0.85
Flt Protected	1.00	1.00	1.00
Satd. Flow (prot)	3539	3539	1583
Flt Permitted	1.00	1.00	1.00
Satd. Flow (perm)	3539	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95
Adj. Flow (vph)	620	608	458
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	620	608	458
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free
Actuated Green, G (s)	59.9	22.1	90.0
Effective Green, g (s)	59.9	22.1	90.0
Actuated g/C Ratio	0.67	0.25	1.00
Clearance Time (s)	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	2355	869	1583
v/s Ratio Prot	0.18	c0.17	
v/s Ratio Perm			c0.29
v/c Ratio	0.26	0.70	0.29
Uniform Delay, d1	6.1	30.9	0.0
Progression Factor	1.51	1.00	1.00
Incremental Delay, d2	0.2	2.5	0.5
Delay (s)	9.5	33.4	0.5
Level of Service	A	C	A
Approach Delay (s)	9.5	19.3	
Approach LOS	A	B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	351	0	0	0	0	578
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					4.0
Lane Util. Factor	1.00					0.95
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	1770					3539
Flt Permitted	0.95					1.00
Satd. Flow (perm)	1770					3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	369	0	0	0	0	608
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	369	0	0	0	0	608
Turn Type	Prot					NA
Protected Phases	4!					Free!
Permitted Phases						
Actuated Green, G (s)	59.9					90.0
Effective Green, g (s)	59.9					90.0
Actuated g/C Ratio	0.67					1.00
Clearance Time (s)	4.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	1178					3539
v/s Ratio Prot	c0.21					0.17
v/s Ratio Perm						
v/c Ratio	0.31					0.17
Uniform Delay, d1	6.4					0.0
Progression Factor	1.00					1.00
Incremental Delay, d2	0.7					0.1
Delay (s)	7.1					0.1
Level of Service	A					A
Approach Delay (s)	7.1		0.0			0.1
Approach LOS	A		A			A

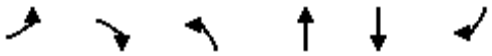
Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	NBL	NBT	SBT	SBR	SEL	SER	NEL	NER
Lane Configurations								
Volume (vph)	1634	0	0	894	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0				
Lane Util. Factor	0.97			0.88				
Frt	1.00			0.85				
Flt Protected	0.95			1.00				
Satd. Flow (prot)	3433			2787				
Flt Permitted	0.95			1.00				
Satd. Flow (perm)	3433			2787				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1720	0	0	941	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1720	0	0	941	0	0	0	0
Turn Type	Prot			Prot				
Protected Phases	4			2				
Permitted Phases								
Actuated Green, G (s)	49.6			32.4				
Effective Green, g (s)	49.6			32.4				
Actuated g/C Ratio	0.55			0.36				
Clearance Time (s)	4.0			4.0				
Vehicle Extension (s)	3.0			3.0				
Lane Grp Cap (vph)	1891			1003				
v/s Ratio Prot	c0.50			c0.34				
v/s Ratio Perm								
v/c Ratio	0.91			0.94				
Uniform Delay, d1	18.2			27.8				
Progression Factor	1.00			0.50				
Incremental Delay, d2	8.0			15.4				
Delay (s)	26.2			29.3				
Level of Service	C			C				
Approach Delay (s)		26.2	29.3		0.0		0.0	
Approach LOS		C	C		A		A	

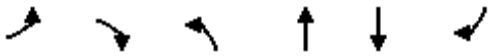
Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	837	0	0	894	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.88			0.95	
Frt		0.85			1.00	
Flt Protected		1.00			1.00	
Satd. Flow (prot)		2787			3539	
Flt Permitted		1.00			1.00	
Satd. Flow (perm)		2787			3539	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	881	0	0	941	0
RTOR Reduction (vph)	0	255	0	0	0	0
Lane Group Flow (vph)	0	626	0	0	941	0
Turn Type		Prot			NA	
Protected Phases		4!			Free!	
Permitted Phases						
Actuated Green, G (s)		49.6			90.0	
Effective Green, g (s)		49.6			90.0	
Actuated g/C Ratio		0.55			1.00	
Clearance Time (s)		4.0				
Vehicle Extension (s)		3.0				
Lane Grp Cap (vph)		1535			3539	
v/s Ratio Prot		c0.22			0.27	
v/s Ratio Perm						
v/c Ratio		0.41			0.27	
Uniform Delay, d1		11.7			0.0	
Progression Factor		1.00			1.00	
Incremental Delay, d2		0.8			0.1	
Delay (s)		12.5			0.1	
Level of Service		B			A	
Approach Delay (s)	12.5			0.0	0.1	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	118	0	0	1634	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	0.95			1.00		
Satd. Flow (prot)	1770			3539		
Flt Permitted	0.95			1.00		
Satd. Flow (perm)	1770			3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	0	0	1776	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	128	0	0	1776	0	0
Turn Type	Prot			NA		
Protected Phases	2!			Free!		
Permitted Phases						
Actuated Green, G (s)	32.4			90.0		
Effective Green, g (s)	32.4			90.0		
Actuated g/C Ratio	0.36			1.00		
Clearance Time (s)	4.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	637			3539		
v/s Ratio Prot	0.07			0.50		
v/s Ratio Perm						
v/c Ratio	0.20			0.50		
Uniform Delay, d1	19.9			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	0.2			0.2		
Delay (s)	20.0			0.2		
Level of Service	C			A		
Approach Delay (s)	20.0			0.2	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	1.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	NBT	SET	SER2
Lane Configurations			
Volume (vph)	1057	735	127
Ideal Flow (vphpl)	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0
Lane Util. Factor	0.95	0.95	1.00
Frt	1.00	1.00	0.85
Flt Protected	1.00	1.00	1.00
Satd. Flow (prot)	3539	3539	1583
Flt Permitted	1.00	1.00	1.00
Satd. Flow (perm)	3539	3539	1583
Peak-hour factor, PHF	0.95	0.95	0.95
Adj. Flow (vph)	1113	774	134
RTOR Reduction (vph)	0	0	0
Lane Group Flow (vph)	1113	774	134
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free
Actuated Green, G (s)	85.6	36.4	130.0
Effective Green, g (s)	85.6	36.4	130.0
Actuated g/C Ratio	0.66	0.28	1.00
Clearance Time (s)	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	
Lane Grp Cap (vph)	2330	990	1583
v/s Ratio Prot	c0.31	c0.22	
v/s Ratio Perm			0.08
v/c Ratio	0.48	0.78	0.08
Uniform Delay, d1	11.1	43.1	0.0
Progression Factor	0.98	1.00	1.00
Incremental Delay, d2	0.6	4.1	0.1
Delay (s)	11.4	47.2	0.1
Level of Service	B	D	A
Approach Delay (s)	11.4	40.3	
Approach LOS	B	D	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	284	0	0	0	0	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0					4.0
Lane Util. Factor	1.00					0.95
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	1770					3539
Flt Permitted	0.95					1.00
Satd. Flow (perm)	1770					3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	299	0	0	0	0	774
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	299	0	0	0	0	774
Turn Type	Prot					NA
Protected Phases	4!					Free!
Permitted Phases						
Actuated Green, G (s)	85.6					130.0
Effective Green, g (s)	85.6					130.0
Actuated g/C Ratio	0.66					1.00
Clearance Time (s)	4.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	1165					3539
v/s Ratio Prot	c0.17					0.22
v/s Ratio Perm						
v/c Ratio	0.26					0.22
Uniform Delay, d1	9.1					0.0
Progression Factor	1.00					1.00
Incremental Delay, d2	0.5					0.1
Delay (s)	9.7					0.1
Level of Service	A					A
Approach Delay (s)	9.7		0.0			0.1
Approach LOS	A		A			A

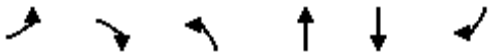
Intersection Summary			
HCM 2000 Control Delay	2.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group



Movement	NBL	NBT	SBT	SBR	SEL	SER	NEL	NER
Lane Configurations								
Volume (vph)	2013	0	0	984	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0				
Lane Util. Factor	0.97			0.88				
Frt	1.00			0.85				
Flt Protected	0.95			1.00				
Satd. Flow (prot)	3433			2787				
Flt Permitted	0.95			1.00				
Satd. Flow (perm)	3433			2787				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2119	0	0	1036	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2119	0	0	1036	0	0	0	0
Turn Type	Prot			Prot				
Protected Phases	4			2				
Permitted Phases								
Actuated Green, G (s)	77.0			45.0				
Effective Green, g (s)	77.0			45.0				
Actuated g/C Ratio	0.59			0.35				
Clearance Time (s)	4.0			4.0				
Vehicle Extension (s)	3.0			3.0				
Lane Grp Cap (vph)	2033			964				
v/s Ratio Prot	c0.62			c0.37				
v/s Ratio Perm								
v/c Ratio	1.04			1.07				
Uniform Delay, d1	26.5			42.5				
Progression Factor	1.00			0.43				
Incremental Delay, d2	32.0			51.1				
Delay (s)	58.5			69.5				
Level of Service	E			E				
Approach Delay (s)		58.5	69.5		0.0		0.0	
Approach LOS		E	E		A		A	

Intersection Summary			
HCM 2000 Control Delay	62.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

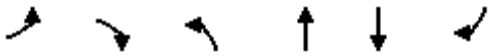


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	980	0	0	984	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.88			0.95	
Frt		0.85			1.00	
Flt Protected		1.00			1.00	
Satd. Flow (prot)		2787			3539	
Flt Permitted		1.00			1.00	
Satd. Flow (perm)		2787			3539	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1032	0	0	1036	0
RTOR Reduction (vph)	0	203	0	0	0	0
Lane Group Flow (vph)	0	829	0	0	1036	0
Turn Type		Prot			NA	
Protected Phases		4!			Free!	
Permitted Phases						
Actuated Green, G (s)		77.0			130.0	
Effective Green, g (s)		77.0			130.0	
Actuated g/C Ratio		0.59			1.00	
Clearance Time (s)		4.0				
Vehicle Extension (s)		3.0				
Lane Grp Cap (vph)		1650			3539	
v/s Ratio Prot		c0.30			0.29	
v/s Ratio Perm						
v/c Ratio		0.50			0.29	
Uniform Delay, d1		15.4			0.0	
Progression Factor		1.00			1.00	
Incremental Delay, d2		1.1			0.0	
Delay (s)		16.5			0.0	
Level of Service		B			A	
Approach Delay (s)	16.5			0.0	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

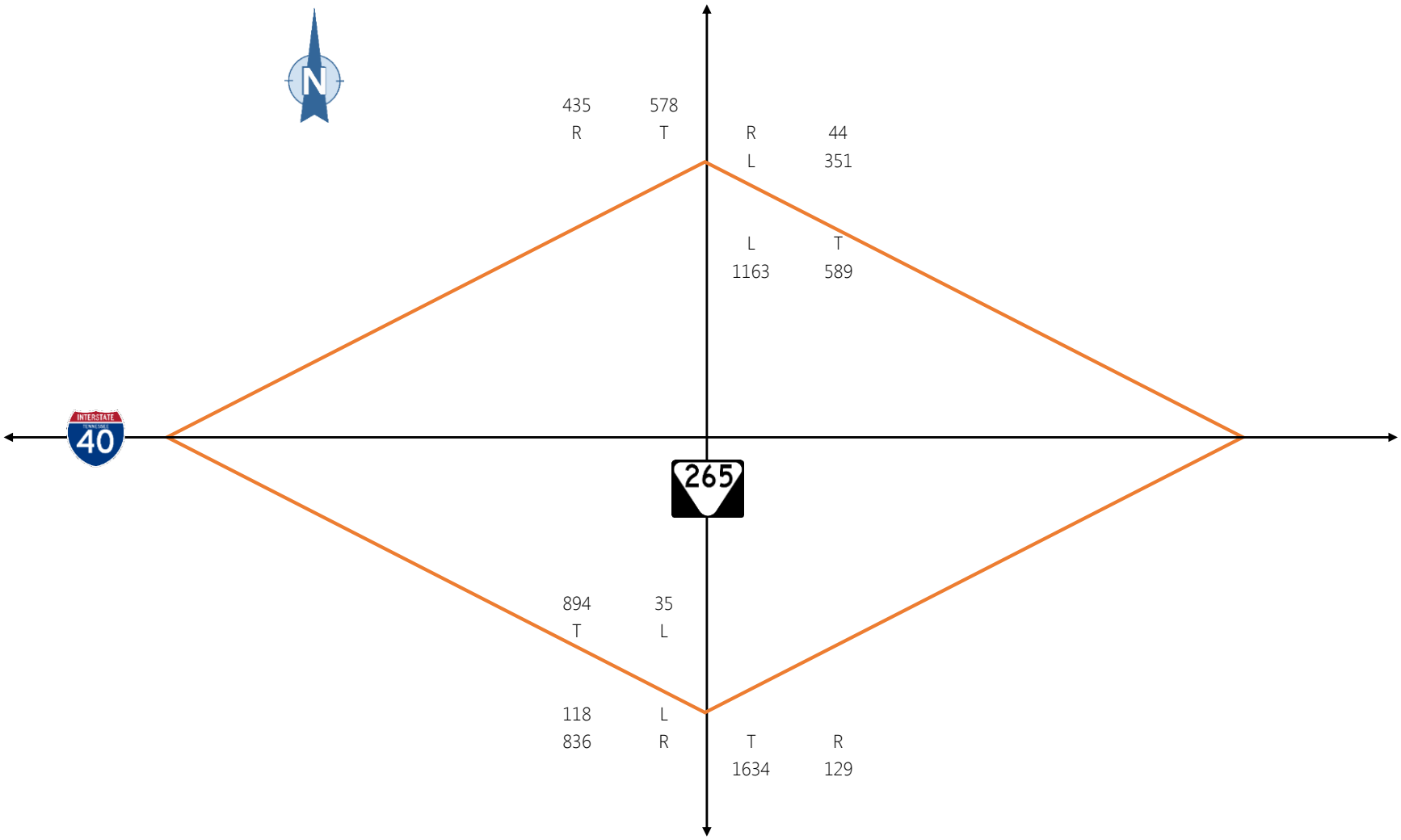


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	288	0	0	2013	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	0.95			1.00		
Satd. Flow (prot)	1770			3539		
Flt Permitted	0.95			1.00		
Satd. Flow (perm)	1770			3539		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	313	0	0	2188	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	313	0	0	2188	0	0
Turn Type	Prot			NA		
Protected Phases	2!			Free!		
Permitted Phases						
Actuated Green, G (s)	45.0			130.0		
Effective Green, g (s)	45.0			130.0		
Actuated g/C Ratio	0.35			1.00		
Clearance Time (s)	4.0					
Vehicle Extension (s)	3.0					
Lane Grp Cap (vph)	612			3539		
v/s Ratio Prot	0.18			0.62		
v/s Ratio Perm						
v/c Ratio	0.51			0.62		
Uniform Delay, d1	33.8			0.0		
Progression Factor	1.00			1.00		
Incremental Delay, d2	0.7			0.1		
Delay (s)	34.5			0.1		
Level of Service	C			A		
Approach Delay (s)	34.5			0.1	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

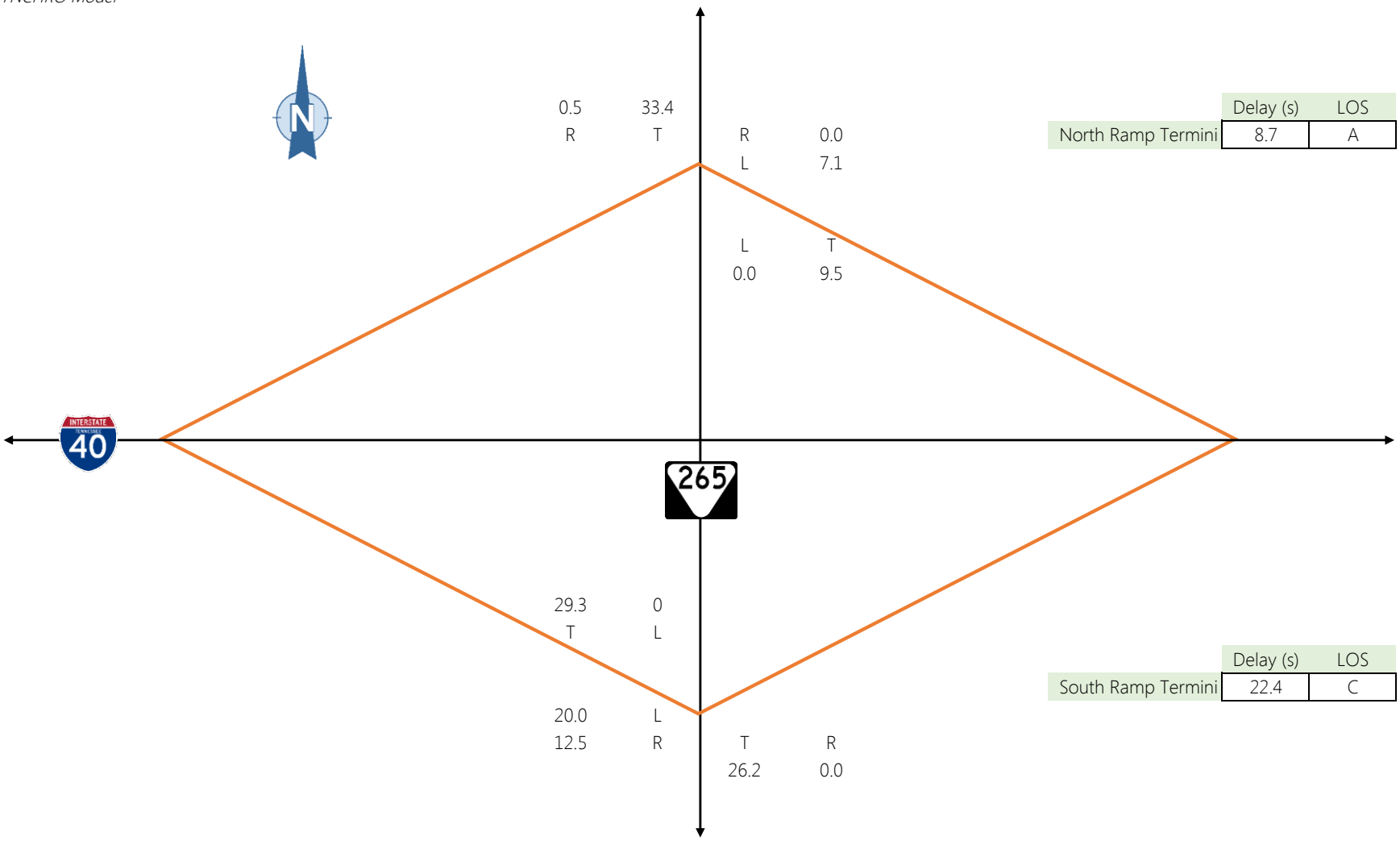
! Phase conflict between lane groups.
c Critical Lane Group

AM Peak Hour Volumes



Peak Hour Delays

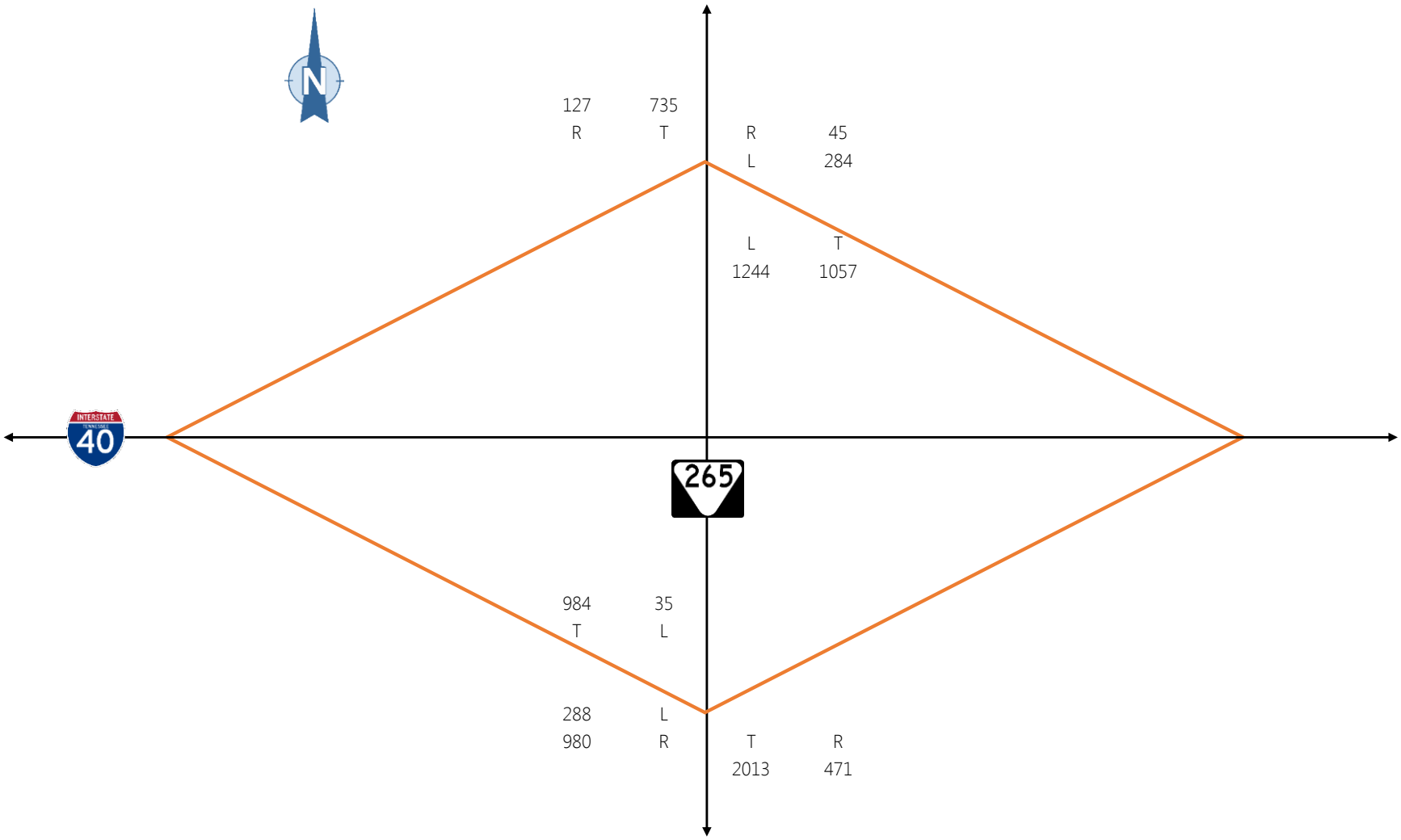
Based on SYNCHRO Model



	Delay (s)	LOS
North Ramp Termini	8.7	A

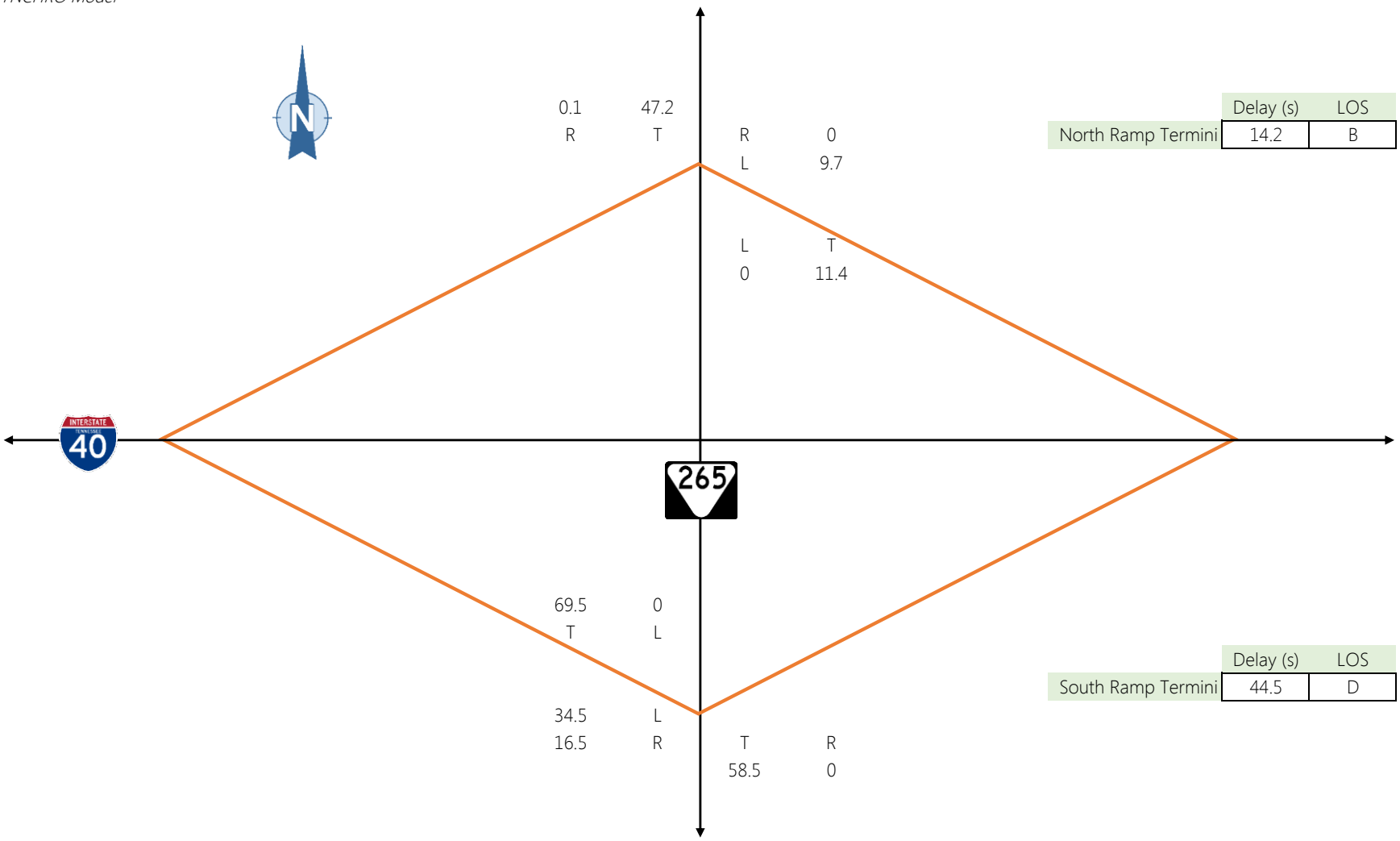
	Delay (s)	LOS
South Ramp Termini	22.4	C

PM Peak Hour Volumes



Peak Hour Delays

Based on SYNCHRO Model



	Delay (s)	LOS
North Ramp Termini	14.2	B

	Delay (s)	LOS
South Ramp Termini	44.5	D

APPENDIX D: ALTERNATIVES EXAMINED

But Not Carried Forward

ROUNDABOUT ALTERNATIVE

TENNESSEE D.O.T.
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
FILE NO. —

TYPE	YEAR	COUNTY	FIGURE NO.
IAR	2015	WILSON COUNTY	1



0′ 200′ 400′ 600′

N

INTERSTATE ACCESS REQUEST

I-40 AT STATE ROUTE 265
WILSON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

ALTERNATIVE EXAMINED, BUT NOT CARRIED FORWARD

2/1/2015 3:24:16 PM
\\global.ggp\dot\projects\292946\+Groundstation1.SHT

APPENDIX E: TRAFFIC ANALYSIS

HCS Ramp Analysis

No Build Alternative (2020) SR 45 EB On-Ramp AM
No Build Alternative (2020) SR 45 EB On-Ramp PM
No Build Alternative (2020) SR 45 WB Off-Ramp AM
No Build Alternative (2020) SR 45 WB Off-Ramp PM

No Build Alternative (2020) SR 171 EB Off-Ramp AM
No Build Alternative (2020) SR 171 EB Off-Ramp PM
No Build Alternative (2020) SR 171 EB On-Ramp AM
No Build Alternative (2020) SR 171 EB On-Ramp PM
No Build Alternative (2020) SR 171 WB On-Ramp AM
No Build Alternative (2020) SR 171 WB On-Ramp PM
No Build Alternative (2020) SR 171 WB Off-Ramp AM
No Build Alternative (2020) SR 171 WB Off-Ramp PM

No Build Alternative (2040) SR 45 EB On-Ramp AM
No Build Alternative (2040) SR 45 EB On-Ramp PM
No Build Alternative (2040) SR 45 WB Off-Ramp AM
No Build Alternative (2040) SR 45 WB Off-Ramp PM

No Build Alternative (2040) SR 171 EB Off-Ramp AM
No Build Alternative (2040) SR 171 EB Off-Ramp PM
No Build Alternative (2040) SR 171 EB On-Ramp AM
No Build Alternative (2040) SR 171 EB On-Ramp PM
No Build Alternative (2040) SR 171 WB On-Ramp AM
No Build Alternative (2040) SR 171 WB On-Ramp PM
No Build Alternative (2040) SR 171 WB Off-Ramp AM
No Build Alternative (2040) SR 171 WB Off-Ramp PM

Diamond & DDI Build Alternatives (2020) SR 45 EB On-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 45 EB On-Ramp PM
Diamond & DDI Build Alternatives (2020) SR 45 WB Off-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 45 WB Off-Ramp PM

Diamond & DDI Build Alternatives (2020) SR 265 EB Off-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 265 EB Off-Ramp PM
Diamond & DDI Build Alternatives (2020) SR 265 EB On-Ramp Weave AM
Diamond & DDI Build Alternatives (2020) SR 265 EB On-Ramp Weave PM
Diamond & DDI Build Alternatives (2020) SR 265 WB Off-Ramp Weave AM
Diamond & DDI Build Alternatives (2020) SR 265 WB Off-Ramp Weave PM
Diamond & DDI Build Alternatives (2020) SR 265 WB On-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 265 WB On-Ramp PM

Diamond & DDI Build Alternatives (2020) SR 171 EB On-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 171 EB On-Ramp PM

Diamond & DDI Build Alternatives (2020) SR 171 EB Off-Ramp Weave AM
Diamond & DDI Build Alternatives (2020) SR 171 EB Off-Ramp Weave PM
Diamond & DDI Build Alternatives (2020) SR 171 WB On-Ramp Weave AM
Diamond & DDI Build Alternatives (2020) SR 171 WB On-Ramp Weave PM
Diamond & DDI Build Alternatives (2020) SR 171 WB Off-Ramp AM
Diamond & DDI Build Alternatives (2020) SR 171 WB Off-Ramp PM

Diamond & DDI Build Alternatives (2040) SR 45 EB On-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 45 EB On-Ramp PM
Diamond & DDI Build Alternatives (2040) SR 45 WB Off-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 45 WB Off-Ramp PM

Diamond & DDI Build Alternatives (2040) SR 265 EB Off-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 265 EB Off-Ramp PM
Diamond & DDI Build Alternatives (2040) SR 265 EB On-Ramp Weave AM
Diamond & DDI Build Alternatives (2040) SR 265 EB On-Ramp Weave PM
Diamond & DDI Build Alternatives (2040) SR 265 WB Off-Ramp Weave AM
Diamond & DDI Build Alternatives (2040) SR 265 WB Off-Ramp Weave PM
Diamond & DDI Build Alternatives (2040) SR 265 WB On-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 265 WB On-Ramp PM

Diamond & DDI Build Alternatives (2040) SR 171 EB On-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 171 EB On-Ramp PM

Diamond & DDI Build Alternatives (2040) SR 171 EB Off-Ramp Weave AM
Diamond & DDI Build Alternatives (2040) SR 171 EB Off-Ramp Weave PM
Diamond & DDI Build Alternatives (2040) SR 171 WB On-Ramp Weave AM
Diamond & DDI Build Alternatives (2040) SR 171 WB On-Ramp Weave PM
Diamond & DDI Build Alternatives (2040) SR 171 WB Off-Ramp AM
Diamond & DDI Build Alternatives (2040) SR 171 WB Off-Ramp PM

Synchro Intersection Analysis

Synchro Intersection Analysis – Intersections along SR 45

SR 45 Traffic Volume Adjustments
SR 45 All Alternatives (2020)
SR 45 All Alternatives (2040)

Synchro Intersection Analysis – Intersections along SR 265

SR 265 No Build Alternative (2020)
SR 265 Diamond & DDI Build Alternatives (2020)
SR 265 Diamond Build Alternative (2020)
SR 265 DDI Build Alternative (2020)
SR 265 No Build Alternative (2040)
SR 265 Diamond & DDI Build Alternatives (2040)
SR 265 Diamond Build Alternative (2040)
SR 265 DDI Build Alternative (2040)

Synchro Intersection Analysis – Intersections along SR 171

SR 171 Interchange (2020) No SR 265 Interchange, No Improvements SR 171
SR 171 Interchange (2040) No SR 265 Interchange, No Improvements SR 171
SR 171 Interchange (2020) No SR 265 Interchange, Added NB Lane SR 171
SR 171 Interchange (2040) No SR 265 Interchange, Added NB Lane SR 171
SR 171 Interchange (2020) with SR 265 Interchange, No Improvements SR 171
SR 171 Interchange (2040) with SR 265 Interchange, No Improvements SR 171
SR 171 Interchange (2020) with SR 265 Interchange, Added NB Lane SR 171
SR 171 Interchange (2040) with SR 265 Interchange, Added NB Lane SR 171

HCS RAMP ANALYSIS

No Build Alternative (2020) SR 45 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020
Project Description	I-40/OHB EB On Ramp Merge AM 2020		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2098	
	Ramp Volume, V_R: 629	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2098	0.92	Level	12	0	0.943	1.00	2417
Ramp	629	0.92	Level	1	0	0.995	1.00	687
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.319 using Equation 0 (Exhibit 13-6)

V_{12} = 772 pc/h

V_3 or V_{av34} = 822 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 966 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3104	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1653	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.240 (Exibit 13-11)

S_R = 59.5 mph (Exhibit 13-11)

S_0 = 64.2 mph (Exhibit 13-11)

S = 61.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 45 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020

Project Description I-40/OHB EB On Ramp Merge PM 2020

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 4319	
	Ramp Volume, V_R: 758	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4319	0.92	Level	12	0	0.943	1.00	4976
Ramp	758	0.92	Level	1	0	0.995	1.00	828
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.114 using Equation 0 (Exhibit 13-6)

V_{12} = 569 pc/h

V_3 or V_{av34} 2203 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1990 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5804	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2818	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 21.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.285 (Exibit 13-11)

S_R = 58.5 mph (Exhibit 13-11)

S_0 = 61.4 mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 45 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020

Project Description I-40/OHB WB Off Ramp Diverge AM

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 260	V_D = veh/h
	Freeway Volume, V_F: 5348	
	Ramp Volume, V_R:	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5348	0.92	Level	12	0	0.943	1.00	6162
Ramp		0.92	Level	1	0	0.995	1.00	1074
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 3292 pc/h

V_3 or V_{av34} 1435 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6162	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	5088	Exhibit 13-8	9400	No
V_R	1074	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3292	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.265 (Exhibit 13-12)

S_R = 58.9 mph (Exhibit 13-12)

S_0 = 69.6 mph (Exhibit 13-12)

S = 63.5 mph (Exhibit 13-13)

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No Build Alternative (2020) SR 45 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020

Project Description I-40/OHB WB Off Ramp Diverge PM

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{up} = ft; V_u = veh/h

Freeway Number of Lanes, N	4
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	260
Freeway Volume, V_F	2898
Ramp Volume, V_R	572
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	55.0

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{down} = ft; V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2898	0.92	Level	12	0	0.943	1.00	3339
Ramp	572	0.92	Level	1	0	0.995	1.00	625
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 1808 pc/h

V_3 or V_{av34} 765 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3339	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	2714	Exhibit 13-8	9400	No
V_R	625	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1808	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 17.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.224 (Exhibit 13-12)

S_R = 59.8 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 64.6 mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 EB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020
Project Description	I-40/SR 171 EB Off Ramp Diverge AM 2020		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 250	V_D = veh/h
	Freeway Volume, V_F: 2727	
	Ramp Volume, V_R: 969	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2727	0.92	Level	12	0	0.943	1.00	3142
Ramp	969	0.92	Level	1	0	0.995	1.00	1059
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation 0 (Exhibit 13-7)

V_{12} = 1996 pc/h

V_3 or V_{av34} 1146 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3142	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	2083	Exhibit 13-8	7050	No
V_R	1059	Exhibit 13-10	4400	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1996	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 14.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.263 (Exhibit 13-12)

S_R = 58.9 mph (Exhibit 13-12)

S_0 = 70.7 mph (Exhibit 13-12)

S = 62.8 mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 EB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020
Project Description	I-40/SR 171 EB Off Ramp Diverge PM 2020		

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	2	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	250	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	5077	V_D =	veh/h
		Ramp Volume, V_R	2293		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5077	0.92	Level	12	0	0.943	1.00	5850
Ramp	2293	0.92	Level	1	0	0.995	1.00	2505
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation 0 (Exhibit 13-7)

V_{12} = 4010 pc/h

V_3 or V_{av34} 1840 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5850	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	3345	Exhibit 13-8	7050	No
V_R	2505	Exhibit 13-10	4400	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4010	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 32.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.393 (Exhibit 13-12)

S_R = 56.0 mph (Exhibit 13-12)

S_0 = 68.0 mph (Exhibit 13-12)

S = 59.3 mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020

Project Description I-40/SR 171 EB On Ramp Merge

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1758	
	Ramp Volume, V_R: 702	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1758	0.92	Level	12	0	0.943	1.00	2026
Ramp	702	0.92	Level	1	0	0.995	1.00	767
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 1211 pc/h

V_3 or V_{av34} 815 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1211 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2793	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1978	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 16.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.269 (Exibit 13-11)

S_R = 58.8 mph (Exhibit 13-11)

S_0 = 63.9 mph (Exhibit 13-11)

S = 60.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020

Project Description I-40/SR 171 EB On Ramp Merge

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2784	
	Ramp Volume, V_R: 906	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2784	0.92	Level	12	0	0.943	1.00	3208
Ramp	906	0.92	Level	1	0	0.995	1.00	990
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 1918 pc/h

V_3 or V_{av34} 1290 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1918 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4198	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2908	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 23.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.313 (Exibit 13-11)

S_R= 57.8 mph (Exhibit 13-11)

S_0= 62.2 mph (Exhibit 13-11)

S = 59.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 WB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020
Project Description	I-40/SR 171 WB On Ramp Merge 2020 AM		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 550	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2894	
	Ramp Volume, V_R: 2454	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2894	0.92	Level	12	0	0.943	1.00	3334
Ramp	2454	0.92	Level	1	0	0.995	1.00	2681
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 697 pc/h

V_3 or V_{av34} = 1318 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1333 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6015	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4014	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.377 (Exibit 13-11)

S_R = 56.3 mph (Exhibit 13-11)

S_0 = 63.2 mph (Exhibit 13-11)

S = 58.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 WB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020
Project Description	I-40/SR 171 WB On Ramp Merge 2020 AM		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 550	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2894	
	Ramp Volume, V_R: 2454	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2894	0.92	Level	12	0	0.943	1.00	3334
Ramp	2454	0.92	Level	1	0	0.995	1.00	2681
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 697 pc/h

V_3 or V_{av34} = 1318 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1333 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6015	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4014	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.377 (Exibit 13-11)

S_R = 56.3 mph (Exhibit 13-11)

S_0 = 63.2 mph (Exhibit 13-11)

S = 58.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 WB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020
Project Description	I-40/SR 171 WB On Ramp Merge 2020 PM		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 550	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1543	
	Ramp Volume, V_R: 1355	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1543	0.92	Level	12	0	0.943	1.00	1778
Ramp	1355	0.92	Level	1	0	0.995	1.00	1480
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 372 pc/h

V_3 or V_{av34} = 703 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 711 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3258	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2191	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.196 (Exibit 13-11)

S_R = 60.5 mph (Exhibit 13-11)

S_0 = 64.9 mph (Exhibit 13-11)

S = 61.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020

Project Description I-40/SR 171 WB Diverge AM

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 3690	
	Ramp Volume, V_R: 792	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3690	0.92	Level	12	0	0.943	1.00	4252
Ramp	792	0.92	Level	1	0	0.995	1.00	865
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.614 using Equation 9 (Exhibit 13-7)

V_{12} = 2944 pc/h

V_3 or V_{av34} 1308 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4252	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	3387	Exhibit 13-8	7050	No
V_R	865	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2944	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.246 (Exhibit 13-12)

S_R = 59.3 mph (Exhibit 13-12)

S_0 = 70.1 mph (Exhibit 13-12)

S = 62.3 mph (Exhibit 13-13)

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No Build Alternative (2020) SR 171 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020

Project Description I-40/SR 171 WB Diverge PM

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 2460	
	Ramp Volume, V_R: 917	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2460	0.92	Level	12	0	0.943	1.00	2834
Ramp	917	0.92	Level	1	0	0.995	1.00	1002
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.643 using Equation 9 (Exhibit 13-7)

V_{12} = 2180 pc/h

V_3 or V_{av34} 654 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2834	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	1832	Exhibit 13-8	7050	No
V_R	1002	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2180	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 20.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.258 (Exhibit 13-12)

S_R = 59.1 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 61.5 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 45 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/OHB EB On Ramp Merge AM 2040 no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2639	
	Ramp Volume, V_R: 766	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2639	0.92	Level	12	0	0.943	1.00	3041
Ramp	766	0.92	Level	1	0	0.995	1.00	837
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.301 using Equation 0 (Exhibit 13-6)

V_{12} = 914 pc/h

V_3 or V_{av34} = 1063 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1216 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3878	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2053	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.250 (Exibit 13-11)

S_R = 59.3 mph (Exhibit 13-11)

S_0 = 63.5 mph (Exhibit 13-11)

S = 61.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 45 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/OHB EB On Ramp Merge PM 2040 no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 5056	
	Ramp Volume, V_R: 925	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5056	0.92	Level	12	0	0.943	1.00	5825
Ramp	925	0.92	Level	1	0	0.995	1.00	1010
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.092 using Equation 0 (Exhibit 13-6)

V_{12} = 533 pc/h

V_3 or V_{av34} = 2646 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2330 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6835	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3340	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.329 (Exibit 13-11)

S_R = 57.4 mph (Exhibit 13-11)

S_0 = 60.5 mph (Exhibit 13-11)

S = 59.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 45 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/OHB WB Off Ramp Diverge AM no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 260	V_D = veh/h
	Freeway Volume, V_F: 6318	
	Ramp Volume, V_R: 860	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6318	0.92	Level	12	0	0.943	1.00	7279
Ramp	860	0.92	Level	1	0	0.995	1.00	939
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 3703 pc/h

V_3 or V_{av34} 1788 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7279	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	6340	Exhibit 13-8	9400	No
V_R	939	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3703	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.253 (Exhibit 13-12)

S_R = 59.2 mph (Exhibit 13-12)

S_0 = 68.2 mph (Exhibit 13-12)

S = 63.3 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 45 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/OHB WB Off Ramp Diverge PM no build

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	260	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	3566	V_D =	veh/h
		Ramp Volume, V_R	699		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3566	0.92	Level	12	0	0.943	1.00	4109
Ramp	699	0.92	Level	1	0	0.995	1.00	764
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 2222 pc/h

V_3 or V_{av34} 943 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4109	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3345	Exhibit 13-8	9400	No
V_R	764	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2222	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.237 (Exhibit 13-12)

S_R = 59.6 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 64.4 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 EB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040
Project Description	I-40/SR 171 EB Off Ramp Diverge AM 2040 No Build		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 250	V_D = veh/h
	Freeway Volume, V_F: 3405	
	Ramp Volume, V_R: 1323	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3405	0.92	Level	12	0	0.943	1.00	3923
Ramp	1323	0.92	Level	1	0	0.995	1.00	1445
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation 0 (Exhibit 13-7)

V_{12} = 2560 pc/h

V_3 or V_{av34} 1363 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3923	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	2478	Exhibit 13-8	7050	No
V_R	1445	Exhibit 13-10	4400	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2560	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 19.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.298 (Exhibit 13-12)

S_R = 58.1 mph (Exhibit 13-12)

S_0 = 69.9 mph (Exhibit 13-12)

S = 61.8 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 EB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040
Project Description	I-40/SR 171 EB Off Ramp Diverge PM 2040 no build		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 250	V_D = veh/h
	Freeway Volume, V_F: 5981	
	Ramp Volume, V_R: 2909	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5981	0.92	Level	12	0	0.943	1.00	6891
Ramp	2909	0.92	Level	1	0	0.995	1.00	3178
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation 0 (Exhibit 13-7)

V_{12} = 4849 pc/h

V_3 or V_{av34} 2042 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6891	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	3713	Exhibit 13-8	7050	No
V_R	3178	Exhibit 13-10	4400	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4849	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 39.2 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.454 (Exhibit 13-12)

S_R = 54.6 mph (Exhibit 13-12)

S_0 = 67.2 mph (Exhibit 13-12)

S = 57.8 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/SR 171 EB On Ramp Merge No-Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2082	
	Ramp Volume, V_R: 919	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2082	0.92	Level	12	0	0.943	1.00	2399
Ramp	919	0.92	Level	1	0	0.995	1.00	1004
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 1434 pc/h

V_3 or V_{av34} 965 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1434 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3403	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2438	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 19.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.286 (Exibit 13-11)

S_R = 58.4 mph (Exhibit 13-11)

S_0 = 63.3 mph (Exhibit 13-11)

S = 59.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/SR 171 EB On Ramp Merge no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3072	
	Ramp Volume, V_R: 1430	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3072	0.92	Level	12	0	0.943	1.00	3539
Ramp	1430	0.92	Level	1	0	0.995	1.00	1562
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 2116 pc/h

V_3 or V_{av34} 1423 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2116 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5101	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3678	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.396 (Exibit 13-11)

S_R = 55.9 mph (Exhibit 13-11)

S_0 = 61.7 mph (Exhibit 13-11)

S = 57.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 WB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040
Project Description	I-40/SR 171 WB On Ramp Merge 2040 AM No-Build		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 550	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3312	
	Ramp Volume, V_R: 3006	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3312	0.92	Level	12	0	0.943	1.00	3816
Ramp	3006	0.92	Level	1	0	0.995	1.00	3284
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 798 pc/h

V_3 or V_{av34} = 1509 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1526 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7100	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4810	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 32.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.639 (Exibit 13-11)

S_R = 50.3 mph (Exhibit 13-11)

S_0 = 62.7 mph (Exhibit 13-11)

S = 53.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 WB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/SR 171 WB On Ramp Merge 2040 PM No-Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 550	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1689	
	Ramp Volume, V_R: 1877	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	1689	0.92	Level	12	0	0.943	1.00	1946
Ramp	1877	0.92	Level	1	0	0.995	1.00	2050
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 407 pc/h

V_3 or V_{av34} 769 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 778 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3996	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2828	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.227 (Exibit 13-11)

S_R = 59.8 mph (Exhibit 13-11)

S_0 = 64.7 mph (Exhibit 13-11)

S = 61.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/SR 171 WB Diverge AM no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 4502	
	Ramp Volume, V_R: 1190	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4502	0.92	Level	12	0	0.943	1.00	5187
Ramp	1190	0.92	Level	1	0	0.995	1.00	1300
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.571 using Equation 9 (Exhibit 13-7)

V_{12} = 3518 pc/h

V_3 or V_{av34} 1669 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5187	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	3887	Exhibit 13-8	7050	No
V_R	1300	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3518	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 32.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.285 (Exhibit 13-12)

S_R = 58.4 mph (Exhibit 13-12)

S_0 = 68.7 mph (Exhibit 13-12)

S = 61.4 mph (Exhibit 13-13)

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No Build Alternative (2040) SR 171 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/SR 171 WB Diverge PM no build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 3001	
	Ramp Volume, V_R: 1312	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3001	0.92	Level	12	0	0.943	1.00	3458
Ramp	1312	0.92	Level	1	0	0.995	1.00	1433
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.608 using Equation 9 (Exhibit 13-7)

V_{12} = 2663 pc/h

V_3 or V_{av34} 795 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3458	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	2025	Exhibit 13-8	7050	No
V_R	1433	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2663	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.297 (Exhibit 13-12)

S_R = 58.2 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 60.7 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 45 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	9/18/17	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020

Project Description I-40/OHB EB On Ramp Merge AM 2020 Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2098	
	Ramp Volume, V_R: 629	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2098	0.92	Level	12	0	0.943	1.00	2417
Ramp	629	0.92	Level	1	0	0.995	1.00	687
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.319 using Equation (Exhibit 13-6)

V_{12} = 772 pc/h

V_3 or V_{av34} 822 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 966 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3104	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1653	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.240 (Exibit 13-11)

S_R = 59.5 mph (Exhibit 13-11)

S_0 = 64.2 mph (Exhibit 13-11)

S = 61.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 45 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build

Project Description I-40/OHB EB On Ramp Merge PM 2020

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 4319	
	Ramp Volume, V_R: 758	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4319	0.92	Level	12	0	0.943	1.00	4976
Ramp	758	0.92	Level	1	0	0.995	1.00	828
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.114 using Equation (Exhibit 13-6)

V_{12} = 569 pc/h

V_3 or V_{av34} 2203 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1990 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5804	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2818	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 21.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.285 (Exibit 13-11)

S_R = 58.5 mph (Exhibit 13-11)

S_0 = 61.4 mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 45 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020

Project Description I-40/OHB WB Off Ramp Diverge AM Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 260	V_D = veh/h
	Freeway Volume, V_F: 5348	
	Ramp Volume, V_R: 705	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	5348	0.92	Level	12	0	0.943	1.00	6162
Ramp	705	0.92	Level	1	0	0.995	1.00	770
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 3121 pc/h

V_3 or V_{av34} 1520 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6162	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	5392	Exhibit 13-8	9400	No
V_R	770	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3121	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = 28.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.237 (Exhibit 13-12)

S_R = 59.5 mph (Exhibit 13-12)

S_0 = 69.3 mph (Exhibit 13-12)

S = 64.0 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 45 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build

Project Description I-40/OHB WB Off Ramp Diverge PM

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	260	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	2898	V_D =	veh/h
		Ramp Volume, V_R	572		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2898	0.92	Level	12	0	0.943	1.00	3339
Ramp	572	0.92	Level	1	0	0.995	1.00	625
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 1808 pc/h

V_3 or V_{av34} 765 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3339	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	2714	Exhibit 13-8	9400	No
V_R	625	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1808	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 17.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.224 (Exhibit 13-12)

S_R = 59.8 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 64.6 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 265 EB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2020 AM	Analysis Year	2020 Build AM

Project Description I-40/SR 265 2040 Build AM EB Off Ramp Diverge

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 500	V_D = veh/h
	Freeway Volume, V_F: 2727	
	Ramp Volume, V_R: 221	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2727	0.92	Level	12	0	0.943	1.00	3142
Ramp	221	0.92	Level	1	0	0.995	1.00	241
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 1506 pc/h

V_3 or V_{av34} 818 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3142	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	2901	Exhibit 13-8	9400	No
V_R	241	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1506	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 12.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.190 (Exhibit 13-12)

S_R = 60.6 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 65.8 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 265 EB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2020 PM	Analysis Year	2020 Build PM

Project Description I-40/SR 265 2020 Build AM EB Off Ramp Diverge

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{up} = ft; V_u = veh/h

Freeway Number of Lanes, N	4
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	500
Freeway Volume, V_F	5077
Ramp Volume, V_R	671
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	55.0

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{down} = ft; V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5077	0.92	Level	12	0	0.943	1.00	5850
Ramp	671	0.92	Level	1	0	0.995	1.00	733
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation (Exhibit 13-7)

V_{12} = 2964 pc/h

V_3 or V_{av34} 1443 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5850	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	5117	Exhibit 13-8	9400	No
V_R	733	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2964	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.234 (Exhibit 13-12)

S_R = 59.6 mph (Exhibit 13-12)

S_0 = 69.6 mph (Exhibit 13-12)

S = 64.1 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 265 EB On-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2020 AM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2020 Build

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1920ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2232	0.92	12	0	1.5	1.2	0.943	1.00	2572
V_{RF}	157	0.92	1	0	1.5	1.2	0.995	1.00	172
V_{FR}	281	0.92	1	0	1.5	1.2	0.995	1.00	307
V_{RR}	7	0.92	1	0	1.5	1.2	0.995	1.00	8
V_{NW}	2580							V =	3059
V_W	479								
VR	0.157								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	344 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1027 lc/h
Minimum RF lane changes, LC_{RF}	2 lc/pc	Non-weaving lane changes, LC_{NW}	609 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	1636 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	495

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2910 veh/h	Weaving intensity factor, W	0.199
Weaving segment capacity, c_w	10863 veh/h	Weaving segment speed, S	59.1 mph
Weaving segment v/c ratio	0.268	Average weaving speed, S_W	56.7 mph
Weaving segment density, D	10.3 pc/mi/ln	Average non-weaving speed, S_{NW}	59.6 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	2531 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 265 EB On-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	8/22/16
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2020 Build

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3030	0.92	12	0	1.5	1.2	0.943	1.00	3491
V_{RF}	431	0.92	1	0	1.5	1.2	0.995	1.00	471
V_{FR}	1376	0.92	1	0	1.5	1.2	0.995	1.00	1503
V_{RR}	75	0.92	1	0	1.5	1.2	0.995	1.00	82
V_{NW}	3573							V =	5547
V_W	1974								
VR	0.356								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	942 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1791 lc/h
Minimum RF lane changes, LC_{RF}	2 lc/pc	Non-weaving lane changes, LC_{NW}	1291 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	3082 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	1000

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5340 veh/h	Weaving intensity factor, W	0.244
Weaving segment capacity, c_w	9278 veh/h	Weaving segment speed, S	53.7 mph
Weaving segment v/c ratio	0.575	Average weaving speed, S_W	55.2 mph
Weaving segment density, D	20.7 pc/mi/ln	Average non-weaving speed, S_{NW}	52.9 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4625 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 265 WB Off-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Jonathan Smith
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2020 AM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2020 Build

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3009	0.92	12	0	1.5	1.2	0.943	1.00	3467
V_{RF}	1410	0.92	1	0	1.5	1.2	0.995	1.00	1540
V_{FR}	280	0.92	1	0	1.5	1.2	0.995	1.00	306
V_{RR}	115	0.92	1	0	1.5	1.2	0.995	1.00	126
V_{NW}	3593							V =	5439
V_W	1846								
VR	0.339								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	1846 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	2447 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1295 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	3742 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	302

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5233 veh/h	Weaving intensity factor, W	0.284
Weaving segment capacity, c_w	9729 veh/h	Weaving segment speed, S	48.8 mph
Weaving segment v/c ratio	0.538	Average weaving speed, S_W	53.9 mph
Weaving segment density, D	22.3 pc/mi/ln	Average non-weaving speed, S_{NW}	46.5 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4444 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 265 WB Off-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2020 PM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2020

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1615	0.92	12	0	1.5	1.2	0.943	1.00	1861
V_{RF}	819	0.92	1	0	1.5	1.2	0.995	1.00	895
V_{FR}	257	0.92	1	0	1.5	1.2	0.995	1.00	281
V_{RR}	72	0.92	1	0	1.5	1.2	0.995	1.00	79
V_{NW}	1940							V =	3116
V_W	1176								
VR	0.377								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	1176 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	1777 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	954 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	2731 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	163

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	3004 veh/h	Weaving intensity factor, W	0.222
Weaving segment capacity, c_w	8749 veh/h	Weaving segment speed, S	54.4 mph
Weaving segment v/c ratio	0.343	Average weaving speed, S_W	55.9 mph
Weaving segment density, D	11.5 pc/mi/ln	Average non-weaving speed, S_{NW}	53.5 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	4863 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 265 WB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 WB
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2020 Build AM	Analysis Year	2020 AM Build

Project Description I-40/SR 265 WB On Ramp Merge AM Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 500	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 4460	
	Ramp Volume, V_R: 918	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	4460	0.92	Level	12	0	0.943	1.00	5139
Ramp	918	0.92	Level	1	0	0.995	1.00	1003
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation (Exhibit 13-6)

V_{12} = 1074 pc/h

V_3 or V_{av34} = 2032 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2055 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6142	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3058	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 16.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.184 (Exibit 13-11)

S_R = 60.8 mph (Exhibit 13-11)

S_0 = 61.2 mph (Exhibit 13-11)

S = 61.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 265 WB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 WB
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2020 Build AM	Analysis Year	2020 AM Build

Project Description I-40/SR 265 WB On Ramp Merge PM 040 Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 500	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2434	
	Ramp Volume, V_R: 464	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2434	0.92	Level	12	0	0.943	1.00	2804
Ramp	464	0.92	Level	1	0	0.995	1.00	507
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation (Exhibit 13-6)

V_{12} = 586 pc/h

V_3 or V_{av34} 1109 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1121 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3311	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1628	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 5.4 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.121 (Exibit 13-11)

S_R = 62.2 mph (Exhibit 13-11)

S_0 = 63.8 mph (Exhibit 13-11)

S = 63.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 171 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build

Project Description I-40/SR 171 EB On Ramp Merge

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1977	
	Ramp Volume, V_R: 248	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1977	0.92	Level	12	0	0.943	1.00	2278
Ramp	248	0.92	Level	1	0	0.995	1.00	271
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation (Exhibit 13-6)

V_{12} = 1362 pc/h

V_3 or V_{av34} = 916 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1362 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2549	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1633	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 13.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.261 (Exibit 13-11)

S_R = 59.0 mph (Exhibit 13-11)

S_0 = 63.5 mph (Exhibit 13-11)

S = 60.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 171 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build

Project Description I-40/SR 171 EB On Ramp Merge

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3822	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3822	0.92	Level	12	0	0.943	1.00	4404
Ramp	400	0.92	Level	1	0	0.995	1.00	437
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation (Exhibit 13-6)

V_{12} = 2633 pc/h

V_3 or V_{av34} = 1771 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2633 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4841	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3070	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.325 (Exibit 13-11)

S_R = 57.5 mph (Exhibit 13-11)

S_0 = 60.4 mph (Exhibit 13-11)

S = 58.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 171 EB Off-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2020 AM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2020 Build

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1920ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2232	0.92	12	0	1.5	1.2	0.943	1.00	2572
V_{RF}	157	0.92	1	0	1.5	1.2	0.995	1.00	172
V_{FR}	281	0.92	1	0	1.5	1.2	0.995	1.00	307
V_{RR}	7	0.92	1	0	1.5	1.2	0.995	1.00	8
V_{NW}	2580							V =	3059
V_W	479								
VR	0.157								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	344 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1027 lc/h
Minimum RF lane changes, LC_{RF}	2 lc/pc	Non-weaving lane changes, LC_{NW}	609 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	1636 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	495

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2910 veh/h	Weaving intensity factor, W	0.199
Weaving segment capacity, c_w	10863 veh/h	Weaving segment speed, S	59.1 mph
Weaving segment v/c ratio	0.268	Average weaving speed, S_W	56.7 mph
Weaving segment density, D	10.3 pc/mi/ln	Average non-weaving speed, S_{NW}	59.6 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	2531 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 171 EB Off-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	8/22/16
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2020 Build

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3030	0.92	12	0	1.5	1.2	0.943	1.00	3491
V_{RF}	431	0.92	1	0	1.5	1.2	0.995	1.00	471
V_{FR}	1376	0.92	1	0	1.5	1.2	0.995	1.00	1503
V_{RR}	75	0.92	1	0	1.5	1.2	0.995	1.00	82
V_{NW}	3573							V =	5547
V_W	1974								
VR	0.356								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	942 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1791 lc/h
Minimum RF lane changes, LC_{RF}	2 lc/pc	Non-weaving lane changes, LC_{NW}	1291 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	3082 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	1000

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5340 veh/h	Weaving intensity factor, W	0.244
Weaving segment capacity, c_w	9278 veh/h	Weaving segment speed, S	53.7 mph
Weaving segment v/c ratio	0.575	Average weaving speed, S_W	55.2 mph
Weaving segment density, D	20.7 pc/mi/ln	Average non-weaving speed, S_{NW}	52.9 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4625 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 171 WB On-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Jonathan Smith
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2020 AM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2020 Build

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3009	0.92	12	0	1.5	1.2	0.943	1.00	3467
V_{RF}	1410	0.92	1	0	1.5	1.2	0.995	1.00	1540
V_{FR}	280	0.92	1	0	1.5	1.2	0.995	1.00	306
V_{RR}	115	0.92	1	0	1.5	1.2	0.995	1.00	126
V_{NW}	3593							V =	5439
V_W	1846								
VR	0.339								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	1846 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	2447 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1295 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	3742 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	302

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5233 veh/h	Weaving intensity factor, W	0.284
Weaving segment capacity, c_w	9729 veh/h	Weaving segment speed, S	48.8 mph
Weaving segment v/c ratio	0.538	Average weaving speed, S_W	53.9 mph
Weaving segment density, D	22.3 pc/mi/ln	Average non-weaving speed, S_{NW}	46.5 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4444 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 171 WB On-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2020 PM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2020

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1615	0.92	12	0	1.5	1.2	0.943	1.00	1861
V_{RF}	819	0.92	1	0	1.5	1.2	0.995	1.00	895
V_{FR}	257	0.92	1	0	1.5	1.2	0.995	1.00	281
V_{RR}	72	0.92	1	0	1.5	1.2	0.995	1.00	79
V_{NW}	1940							V =	3116
V_W	1176								
VR	0.377								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	1176 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	1777 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	954 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	2731 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	163

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	3004 veh/h	Weaving intensity factor, W	0.222
Weaving segment capacity, c_w	8749 veh/h	Weaving segment speed, S	54.4 mph
Weaving segment v/c ratio	0.343	Average weaving speed, S_W	55.9 mph
Weaving segment density, D	11.5 pc/mi/ln	Average non-weaving speed, S_{NW}	53.5 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	4863 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2020) SR 171 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	9/18/17	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2020 Build

Project Description I-40/SR 171 WB Diverge AM

Inputs

Upstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{up} = ft; V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	230
Freeway Volume, V_F	3690
Ramp Volume, V_R	401
Freeway Free-Flow Speed, S_{FF}	65.0
Ramp Free-Flow Speed, S_{FR}	55.0

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{down} = ft; V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3690	0.92	Level	12	0	0.943	1.00	4252
Ramp	401	0.92	Level	1	0	0.995	1.00	438
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.634 using Equation (Exhibit 13-7)

V_{12} = 2854 pc/h

V_3 or V_{av34} 1398 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4252	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	3814	Exhibit 13-8	7050	No
V_R	438	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2854	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.207 (Exhibit 13-12)

S_R = 60.2 mph (Exhibit 13-12)

S_0 = 69.8 mph (Exhibit 13-12)

S = 63.1 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2020) SR 171 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2020 Build

Project Description I-40/SR 171 WB Diverge PM

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	230	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	2460	V_D =	veh/h
		Ramp Volume, V_R	588		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2460	0.92	Level	12	0	0.943	1.00	2834
Ramp	588	0.92	Level	1	0	0.995	1.00	642
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.660 using Equation (Exhibit 13-7)

V_{12} = 2088 pc/h

V_3 or V_{av34} 746 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2834	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	2192	Exhibit 13-8	7050	No
V_R	642	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2088	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 20.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.226 (Exhibit 13-12)

S_R = 59.8 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 62.5 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 45 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/OHB EB On Ramp Merge AM 2040 Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2651	
	Ramp Volume, V_R: 817	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2651	0.92	Level	12	0	0.943	1.00	3054
Ramp	817	0.92	Level	1	0	0.995	1.00	892
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.294 using Equation 0 (Exhibit 13-6)

V_{12} = 897 pc/h

V_3 or V_{av34} = 1078 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1221 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3946	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2113	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.252 (Exibit 13-11)

S_R = 59.2 mph (Exhibit 13-11)

S_0 = 63.5 mph (Exhibit 13-11)

S = 61.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 45 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 EB
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/OHB EB On Ramp Merge PM 2040 Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 925	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 5109	
	Ramp Volume, V_R: 989	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5109	0.92	Level	12	0	0.943	1.00	5886
Ramp	989	0.92	Level	1	0	0.995	1.00	1080
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.083 using Equation 0 (Exhibit 13-6)

V_{12} = 487 pc/h

V_3 or V_{av34} = 2699 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2354 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6966	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3434	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.340 (Exibit 13-11)

S_R = 57.2 mph (Exhibit 13-11)

S_0 = 60.4 mph (Exhibit 13-11)

S = 58.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 45 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/OHB WB Off Ramp Diverge AM Build

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	260	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	6435	V_D =	veh/h
		Ramp Volume, V_R	889		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6435	0.92	Level	12	0	0.943	1.00	7414
Ramp	889	0.92	Level	1	0	0.995	1.00	971
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 3780 pc/h

V_3 or V_{av34} 1817 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7414	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	6443	Exhibit 13-8	9400	No
V_R	971	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3780	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 34.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.255 (Exhibit 13-12)

S_R = 59.1 mph (Exhibit 13-12)

S_0 = 68.1 mph (Exhibit 13-12)

S = 63.2 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 45 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	OHB
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/OHB WB Off Ramp Diverge PM Build

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	260	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	3629	V_D =	veh/h
		Ramp Volume, V_R	715		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3629	0.92	Level	12	0	0.943	1.00	4181
Ramp	715	0.92	Level	1	0	0.995	1.00	781
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 2263 pc/h

V_3 or V_{av34} 959 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4181	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	3400	Exhibit 13-8	9400	No
V_R	781	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2263	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.238 (Exhibit 13-12)

S_R = 59.5 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 64.4 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 265 EB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2040 AM	Analysis Year	2040 Build AM
Project Description	I-40/SR 265 2040 AM EB Off Ramp Diverge Build		

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	500	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	3468	V_D =	veh/h
		Ramp Volume, V_R	954		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3468	0.92	Level	12	0	0.943	1.00	3996
Ramp	954	0.92	Level	1	0	0.995	1.00	1042
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 2330 pc/h

V_3 or V_{av34} 833 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3996	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	2954	Exhibit 13-8	9400	No
V_R	1042	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2330	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = 19.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.262 (Exhibit 13-12)

S_R = 59.0 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 63.6 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 265 EB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2040 PM	Analysis Year	2040 Build PM
Project Description	I-40/SR 265 2040 PM EB Off Ramp Diverge Build		

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	4	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	500	L_{down} =	ft
V_u =	veh/h	Freeway Volume, V_F	6098	V_D =	veh/h
		Ramp Volume, V_R	1268		
		Freeway Free-Flow Speed, S_{FF}	65.0		
		Ramp Free-Flow Speed, S_{FR}	55.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6098	0.92	Level	12	0	0.943	1.00	7026
Ramp	1268	0.92	Level	1	0	0.995	1.00	1385
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 using Equation 0 (Exhibit 13-7)

V_{12} = 3844 pc/h

V_3 or V_{av34} 1591 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7026	Exhibit 13-8	9400	No
$V_{FO} = V_F - V_R$	5641	Exhibit 13-8	9400	No
V_R	1385	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3844	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 32.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.293 (Exhibit 13-12)

S_R= 58.3 mph (Exhibit 13-12)

S_0= 69.0 mph (Exhibit 13-12)

S = 62.7 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 265 EB On-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2040 AM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2040

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1920ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2403	0.92	12	0	1.5	1.2	0.943	1.00	2769
V_{RF}	157	0.92	1	0	1.5	1.2	0.995	1.00	172
V_{FR}	111	0.92	1	0	1.5	1.2	0.995	1.00	121
V_{RR}	7	0.92	1	0	1.5	1.2	0.995	1.00	8
V_{NW}	2777							V =	3070
V_W	293								
VR	0.095								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	172 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	855 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	650 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	1505 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	533

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2911 veh/h	Weaving intensity factor, W	0.186
Weaving segment capacity, c_w	11080 veh/h	Weaving segment speed, S	60.4 mph
Weaving segment v/c ratio	0.263	Average weaving speed, S_W	57.1 mph
Weaving segment density, D	10.2 pc/mi/ln	Average non-weaving speed, S_{NW}	60.8 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	1929 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 265 EB On-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2040

Project Description Weave analysis for SR 265 EB On Ramp Build

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4113	0.92	12	0	1.5	1.2	0.943	1.00	4739
V_{RF}	431	0.92	1	0	1.5	1.2	0.995	1.00	471
V_{FR}	717	0.92	1	0	1.5	1.2	0.995	1.00	783
V_{RR}	75	0.92	1	0	1.5	1.2	0.995	1.00	82
V_{NW}	4821							V =	6075
V_W	1254								
VR	0.206								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	471 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1320 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1641 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	2961 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	1350

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5800 veh/h	Weaving intensity factor, W	0.236
Weaving segment capacity, c_w	11000 veh/h	Weaving segment speed, S	55.7 mph
Weaving segment v/c ratio	0.527	Average weaving speed, S_W	55.4 mph
Weaving segment density, D	21.8 pc/mi/ln	Average non-weaving speed, S_{NW}	55.8 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	3036 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 265 WB Off-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Jonathan Smith
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2040 AM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2040

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3427	0.92	12	0	1.5	1.2	0.943	1.00	3949
V_{RF}	1410	0.92	1	0	1.5	1.2	0.995	1.00	1540
V_{FR}	280	0.92	1	0	1.5	1.2	0.995	1.00	306
V_{RR}	115	0.92	1	0	1.5	1.2	0.995	1.00	126
V_{NW}	4075							V =	5921
V_W	1846								
VR	0.312								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	306 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	907 lc/h
Minimum RF lane changes, LC_{RF}	0 lc/pc	Non-weaving lane changes, LC_{NW}	1394 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	2301 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	342

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5687 veh/h	Weaving intensity factor, W	0.194
Weaving segment capacity, c_w	10591 veh/h	Weaving segment speed, S	57.0 mph
Weaving segment v/c ratio	0.537	Average weaving speed, S_W	56.9 mph
Weaving segment density, D	20.8 pc/mi/ln	Average non-weaving speed, S_{NW}	57.1 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4145 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 265 WB Off-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2040

Project Description SR 171 WB On Ramp Weave

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1761	0.92	12	0	1.5	1.2	0.943	1.00	2029
V_{RF}	497	0.92	1	0	1.5	1.2	0.995	1.00	543
V_{FR}	257	0.92	1	0	1.5	1.2	0.995	1.00	281
V_{RR}	72	0.92	1	0	1.5	1.2	0.995	1.00	79
V_{NW}	2108							V =	2932
V_W	824								
VR	0.281								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	281 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	882 lc/h
Minimum RF lane changes, LC_{RF}	0 lc/pc	Non-weaving lane changes, LC_{NW}	989 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1871 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	177

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2812 veh/h	Weaving intensity factor, W	0.164
Weaving segment capacity, c_w	10717 veh/h	Weaving segment speed, S	59.5 mph
Weaving segment v/c ratio	0.262	Average weaving speed, S_W	57.9 mph
Weaving segment density, D	9.9 pc/mi/ln	Average non-weaving speed, S_{NW}	60.2 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	3815 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 265 WB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 WB
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2040 Build AM	Analysis Year	2040 AM Build
Project Description	I-40/SR 265 WB On Ramp Merge AM 040 Build		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 500	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 4837	
	Ramp Volume, V_R: 1598	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4837	0.92	Level	12	0	0.943	1.00	5573
Ramp	1598	0.92	Level	1	0	0.995	1.00	1746
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 1165 pc/h

V_3 or V_{av34} = 2204 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 2229 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7319	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3975	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 23.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.309 (Exibit 13-11)

S_R = 57.9 mph (Exhibit 13-11)

S_0 = 60.8 mph (Exhibit 13-11)

S = 59.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 265 WB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40 WB
Agency or Company	Gresham, Smith & Partners	Junction	SR 265
Date Performed	1/20/2015	Jurisdiction	
Analysis Time Period	2040 Build PM	Analysis Year	2040 PM Build

Project Description I-40/SR 265 WB On Ramp Merge PM 040 Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 4	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 500	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2258	
	Ramp Volume, V_R: 1371	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2258	0.92	Level	12	0	0.943	1.00	2602
Ramp	1371	0.92	Level	1	0	0.995	1.00	1498
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.209 using Equation 0 (Exhibit 13-6)

V_{12} = 544 pc/h

V_3 or V_{av34} = 1029 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes, V_{12a} = 1040 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4100	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2538	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.150 (Exibit 13-11)

S_R = 61.5 mph (Exhibit 13-11)

S_0 = 64.0 mph (Exhibit 13-11)

S = 62.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 171 EB On-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040

Project Description I-40/SR 171 EB On Ramp Merge Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2246	
	Ramp Volume, V_R: 755	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2246	0.92	Level	12	0	0.943	1.00	2588
Ramp	755	0.92	Level	1	0	0.995	1.00	825
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 1547 pc/h

V_3 or V_{av34} 1041 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1547 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3413	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2372	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 19.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.283 (Exibit 13-11)

S_R= 58.5 mph (Exhibit 13-11)

S_0= 63.1 mph (Exhibit 13-11)

S = 59.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 171 EB On-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/SR 171 EB On Ramp Merge Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 725	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 3578	
	Ramp Volume, V_R: 924	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3578	0.92	Level	12	0	0.943	1.00	4122
Ramp	924	0.92	Level	1	0	0.995	1.00	1009
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.598 using Equation 3 (Exhibit 13-6)

V_{12} = 2464 pc/h

V_3 or V_{av34} 1658 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2464 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5131	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3473	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 27.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.367 (Exibit 13-11)

S_R= 56.6 mph (Exhibit 13-11)

S_0= 60.8 mph (Exhibit 13-11)

S = 57.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 171 EB Off-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JHS
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2040 AM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2040

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1920ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2403	0.92	12	0	1.5	1.2	0.943	1.00	2769
V_{RF}	157	0.92	1	0	1.5	1.2	0.995	1.00	172
V_{FR}	111	0.92	1	0	1.5	1.2	0.995	1.00	121
V_{RR}	7	0.92	1	0	1.5	1.2	0.995	1.00	8
V_{NW}	2777							V =	3070
V_W	293								
VR	0.095								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	172 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	855 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	650 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	1505 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	533

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2911 veh/h	Weaving intensity factor, W	0.186
Weaving segment capacity, c_w	11080 veh/h	Weaving segment speed, S	60.4 mph
Weaving segment v/c ratio	0.263	Average weaving speed, S_W	57.1 mph
Weaving segment density, D	10.2 pc/mi/ln	Average non-weaving speed, S_{NW}	60.8 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	1929 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 171 EB Off-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/19/2015
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 EB
Weaving Segment Location	I-40/SR 265 EB On Ramp
Analysis Year	2040

Project Description Weave analysis for SR 265 EB On Ramp

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4113	0.92	12	0	1.5	1.2	0.943	1.00	4739
V_{RF}	431	0.92	1	0	1.5	1.2	0.995	1.00	471
V_{FR}	717	0.92	1	0	1.5	1.2	0.995	1.00	783
V_{RR}	75	0.92	1	0	1.5	1.2	0.995	1.00	82
V_{NW}	4821							V =	6075
V_W	1254								
VR	0.206								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	471 lc/h
Interchange density, ID	1.0 int/mi	Weaving lane changes, LC_W	1320 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	1641 lc/h
Minimum FR lane changes, LC_{FR}	0 lc/pc	Total lane changes, LC_{ALL}	2961 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	1350

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5800 veh/h	Weaving intensity factor, W	0.236
Weaving segment capacity, c_w	11000 veh/h	Weaving segment speed, S	55.7 mph
Weaving segment v/c ratio	0.527	Average weaving speed, S_W	55.4 mph
Weaving segment density, D	21.8 pc/mi/ln	Average non-weaving speed, S_{NW}	55.8 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	3036 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 171 WB On-Ramp Weave AM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	Jonathan Smith
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2040 AM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2040

Project Description SR 171 WB On Ramp Weave Build

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	3427	0.92	12	0	1.5	1.2	0.943	1.00	3949
V_{RF}	1410	0.92	1	0	1.5	1.2	0.995	1.00	1540
V_{FR}	280	0.92	1	0	1.5	1.2	0.995	1.00	306
V_{RR}	115	0.92	1	0	1.5	1.2	0.995	1.00	126
V_{NW}	4075							V =	5921
V_W	1846								
VR	0.312								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	306 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	907 lc/h
Minimum RF lane changes, LC_{RF}	0 lc/pc	Non-weaving lane changes, LC_{NW}	1394 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	2301 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	342

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	5687 veh/h	Weaving intensity factor, W	0.194
Weaving segment capacity, c_w	10591 veh/h	Weaving segment speed, S	57.0 mph
Weaving segment v/c ratio	0.537	Average weaving speed, S_W	56.9 mph
Weaving segment density, D	20.8 pc/mi/ln	Average non-weaving speed, S_{NW}	57.1 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	4145 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 171 WB On-Ramp Weave PM

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	Gresham, Smith & Partners
Date Performed	1/23/2015
Analysis Time Period	2040 PM

Site Information

Freeway/Dir of Travel	I-40 WB
Weaving Segment Location	SR 171
Analysis Year	2040

Project Description SR 171 WB On Ramp Weave Build

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	5	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	2800ft	Freeway maximum capacity, C_{IFL}	2350
Freeway free-flow speed, FFS	65 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1761	0.92	12	0	1.5	1.2	0.943	1.00	2029
V_{RF}	497	0.92	1	0	1.5	1.2	0.995	1.00	543
V_{FR}	257	0.92	1	0	1.5	1.2	0.995	1.00	281
V_{RR}	72	0.92	1	0	1.5	1.2	0.995	1.00	79
V_{NW}	2108							V =	2932
V_W	824								
VR	0.281								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	3 lc	Minimum weaving lane changes, LC_{MIN}	281 lc/h
Interchange density, ID	0.3 int/mi	Weaving lane changes, LC_W	882 lc/h
Minimum RF lane changes, LC_{RF}	0 lc/pc	Non-weaving lane changes, LC_{NW}	989 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1871 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	177

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2812 veh/h	Weaving intensity factor, W	0.164
Weaving segment capacity, c_w	10717 veh/h	Weaving segment speed, S	59.5 mph
Weaving segment v/c ratio	0.262	Average weaving speed, S_W	57.9 mph
Weaving segment density, D	9.9 pc/mi/ln	Average non-weaving speed, S_{NW}	60.2 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	3815 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Diamond & DDI Build Alternatives (2040) SR 171 WB Off-Ramp AM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	AM	Analysis Year	2040
Project Description	I-40/SR 171 WB Diverge AM Build		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 4502	
	Ramp Volume, V_R: 795	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4502	0.92	Level	12	0	0.943	1.00	5187
Ramp	795	0.92	Level	1	0	0.995	1.00	868
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.590 using Equation 9 (Exhibit 13-7)

V_{12} = 3418 pc/h

V_3 or V_{av34} 1769 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5187	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	4319	Exhibit 13-8	7050	No
V_R	868	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3418	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 31.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.246 (Exhibit 13-12)

S_R = 59.3 mph (Exhibit 13-12)

S_0 = 68.3 mph (Exhibit 13-12)

S = 62.1 mph (Exhibit 13-13)

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Diamond & DDI Build Alternatives (2040) SR 171 WB Off-Ramp PM

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Jonathan Smith	Freeway/Dir of Travel	I-40
Agency or Company	Gresham, Smith & Partners	Junction	SR 171
Date Performed	1/15/2015	Jurisdiction	
Analysis Time Period	PM	Analysis Year	2040

Project Description I-40/SR 171 WB Diverge PM Build

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = veh/h	Deceleration Lane Length L_D: 230	V_D = veh/h
	Freeway Volume, V_F: 3001	
	Ramp Volume, V_R: 983	
	Freeway Free-Flow Speed, S_{FF}: 65.0	
	Ramp Free-Flow Speed, S_{FR}: 55.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3001	0.92	Level	12	0	0.943	1.00	3458
Ramp	983	0.92	Level	1	0	0.995	1.00	1074
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.624 using Equation 9 (Exhibit 13-7)

V_{12} = 2562 pc/h

V_3 or V_{av34} 896 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3458	Exhibit 13-8	7050	No
$V_{FO} = V_F - V_R$	2384	Exhibit 13-8	7050	No
V_R	1074	Exhibit 13-10	2200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2562	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.265 (Exhibit 13-12)

S_R = 58.9 mph (Exhibit 13-12)

S_0 = 71.3 mph (Exhibit 13-12)

S = 61.7 mph (Exhibit 13-13)

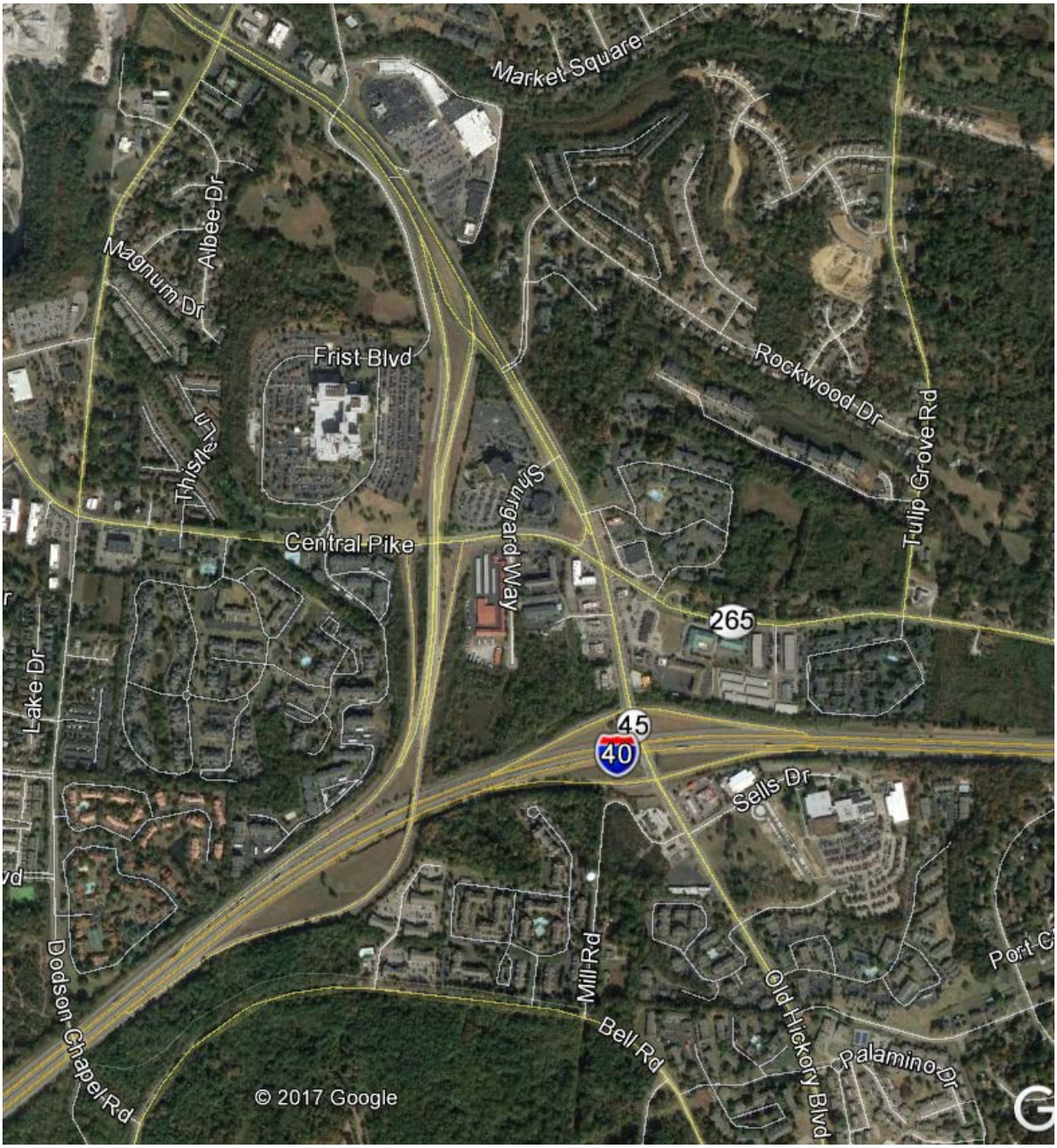
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SYNCHRO INTERSECTION ANALYSIS

Synchro Intersection Analysis – Intersections along SR 45

SR 45 Traffic Volume Adjustments

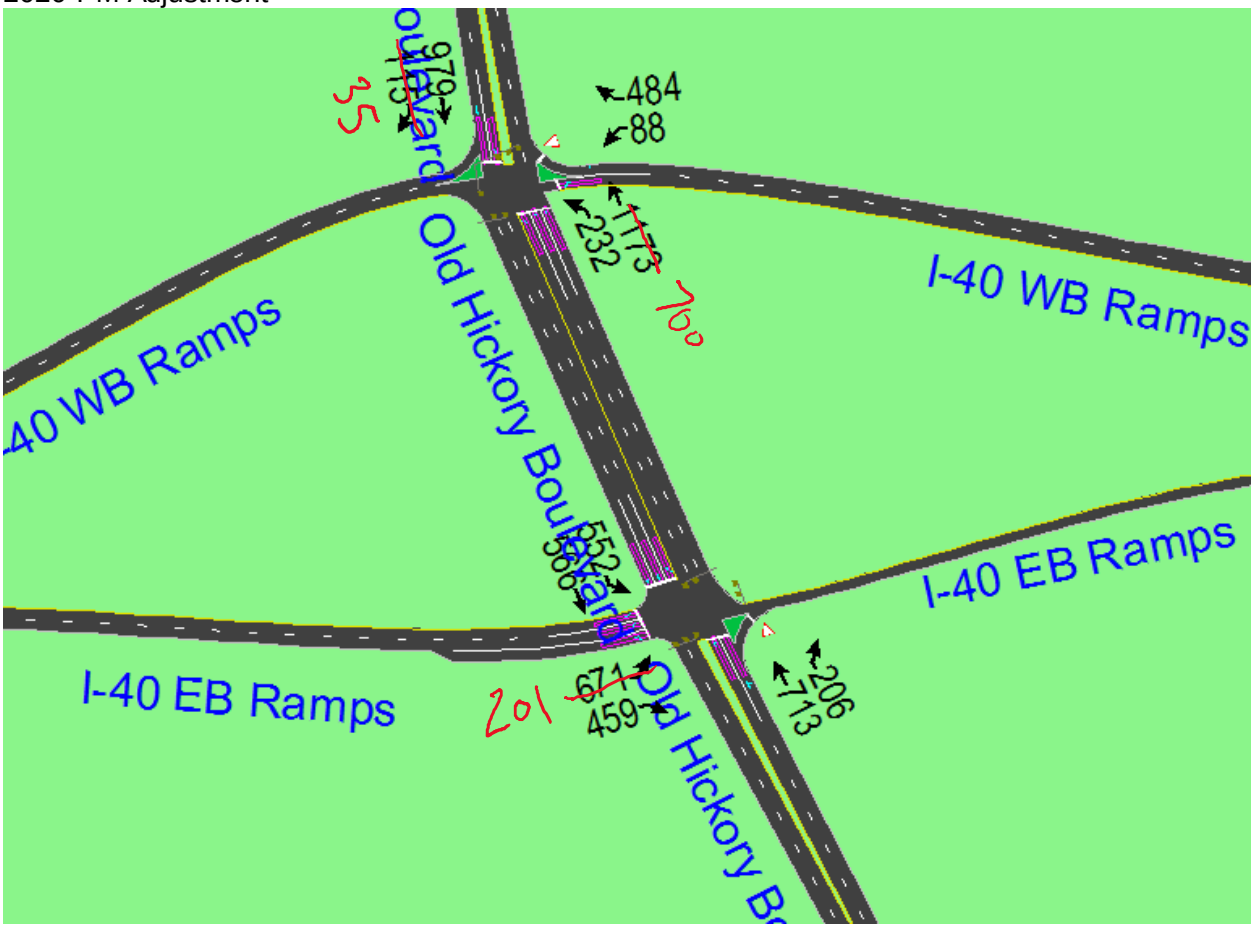
SR 45 traffic projections were schematic (for one interchange), and did not account for the half flyover interchange between I-40 to the west and SR 45 to the north. Estimate conservatively that 2/3 of the traffic between Nashville and SR 45 to the north is accommodated on the flyover ramps. The remaining 1/3 is on the diamond interchange.



2020 AM Adjustment



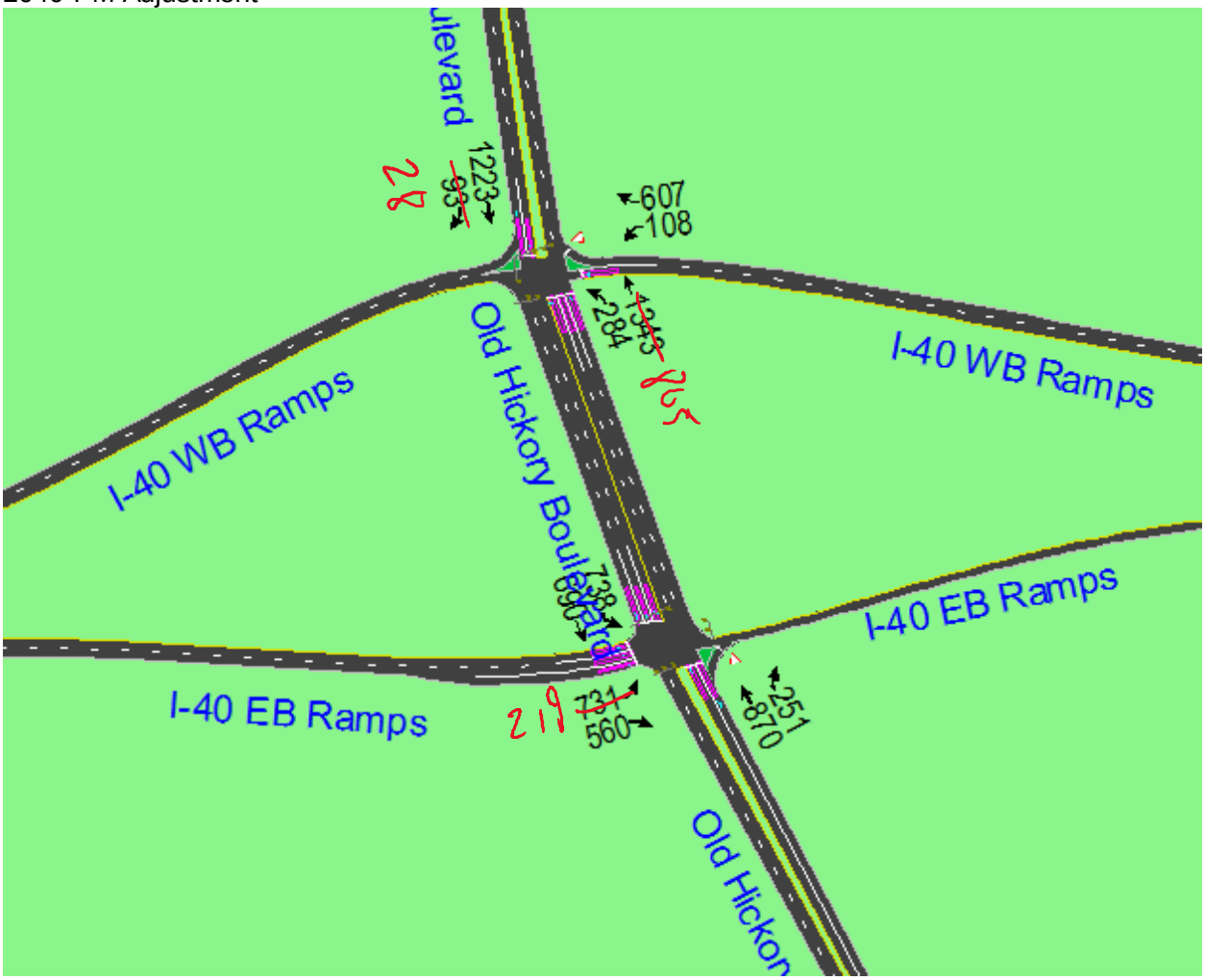
2020 PM Adjustment



2040 AM Adjustment



2040 PM Adjustment



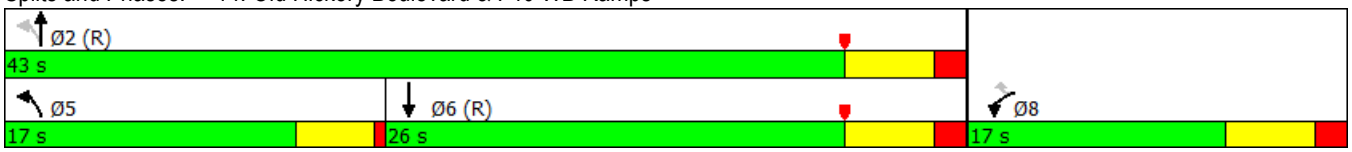
SR 45 All Alternatives (2020)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	102	0	603	498	377	0	0	828	145
Future Volume (vph)	0	0	0	102	0	603	498	377	0	0	828	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			2%			1%			1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.978	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1718	0	1537	1727	3454	0	0	3378	0
Flt Permitted				0.950			0.163					
Satd. Flow (perm)	0	0	0	1718	0	1537	296	3454	0	0	3378	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						485					38	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		859			1198			484			509	
Travel Time (s)		19.5			27.2			8.3			8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	111	0	655	541	410	0	0	900	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	111	0	655	541	410	0	0	1058	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	1			1	
Detector Template												
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Detector 1 Position(ft)				0		0	0	0			0	
Detector 1 Size(ft)				50		50	50	50			50	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Perm	pm+pt	NA			NA	
Protected Phases				8			5	2			6	
Permitted Phases						8	2					
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				10.0		10.0	8.0	10.0			10.0	
Total Split (s)				17.0		17.0	17.0	43.0			26.0	
Total Split (%)				28.3%		28.3%	28.3%	71.7%			43.3%	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)				11.5		11.5	13.0	37.5			20.5	
Yellow Time (s)				4.0		4.0	3.5	4.0			4.0	
All-Red Time (s)				1.5		1.5	0.5	1.5			1.5	
Lost Time Adjust (s)				-1.5		-1.5	-1.5	-1.5			-1.5	
Total Lost Time (s)				4.0		4.0	2.5	4.0			4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				2.5		2.5	3.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				12.7		12.7	40.8	39.3			22.0	
Actuated g/C Ratio				0.21		0.21	0.68	0.66			0.37	
v/c Ratio				0.31		0.93	0.98	0.18			0.84	
Control Delay				22.5		29.4	38.1	1.4			24.6	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				22.5		29.4	38.1	1.4			24.6	
LOS				C		C	D	A			C	
Approach Delay					28.4			22.3			24.6	
Approach LOS					C			C			C	
Queue Length 50th (ft)				34		55	2	1			172	
Queue Length 95th (ft)				72		#256	m#284	m1			#280	
Internal Link Dist (ft)		779			1118			404			429	
Turn Bay Length (ft)												
Base Capacity (vph)				372		712	554	2263			1262	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.30		0.92	0.98	0.18			0.84	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow, Master Intersection			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 24.9		Intersection LOS: C	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 14: Old Hickory Boulevard & I-40 WB Ramps



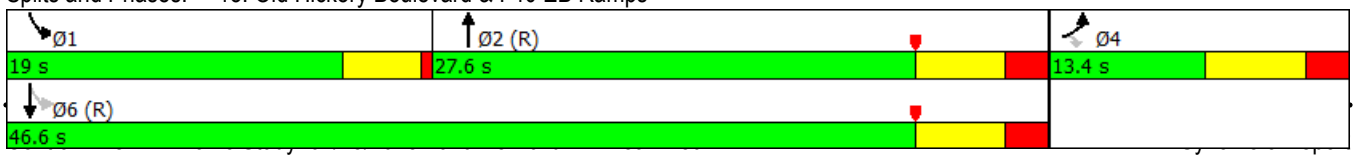
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	0	255	0	0	0	0	815	185	444	505	0
Future Volume (vph)	60	0	255	0	0	0	0	815	185	444	505	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			2%			-1%	
Storage Length (ft)	0		200	0		0	0		500	0		0
Storage Lanes	2		1	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850					0.972				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3350	0	1545	0	0	0	0	3340	0	1744	3489	0
Flt Permitted	0.950									0.143		
Satd. Flow (perm)	3350	0	1545	0	0	0	0	3340	0	263	3489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			277					54				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		907			752			525			484	
Travel Time (s)		20.6			17.1			8.9			8.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	65	0	277	0	0	0	0	886	201	483	549	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	65	0	277	0	0	0	0	1087	0	483	549	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.01	1.01	1.01	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					1		1	1	
Detector Template												
Leading Detector (ft)	50		50					50		50	50	
Trailing Detector (ft)	0		0					0		0	0	
Detector 1 Position(ft)	0		0					0		0	0	
Detector 1 Size(ft)	50		50					50		50	50	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0		0.0	0.0	
Turn Type	Prot		Perm					NA		pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4							6		
Detector Phase	4		4					2		1	6	
Switch Phase												
Minimum Initial (s)	4.0		4.0					4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	10.5		10.5					10.0		8.0	10.0	
Total Split (s)	13.4		13.4					27.6		19.0	46.6	
Total Split (%)	22.3%		22.3%					46.0%		31.7%	77.7%	
Maximum Green (s)	6.9		6.9					21.6		15.0	40.6	
Yellow Time (s)	4.5		4.5					4.0		3.5	4.0	
All-Red Time (s)	2.0		2.0					2.0		0.5	2.0	
Lost Time Adjust (s)	-2.5		-2.5					-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0		4.0					4.0		2.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Vehicle Extension (s)	2.5		2.5					4.0		3.0	2.5	
Recall Mode	None		None					C-Max		None	C-Max	
Act Effct Green (s)	8.6		8.6					25.9		45.4	43.4	
Actuated g/C Ratio	0.14		0.14					0.43		0.76	0.72	
v/c Ratio	0.14		0.60					0.74		0.83	0.22	
Control Delay	22.9		9.9					18.3		12.5	0.7	
Queue Delay	0.0		0.0					0.0		0.0	0.0	
Total Delay	22.9		9.9					18.3		12.5	0.7	
LOS	C		A					B		B	A	
Approach Delay		12.3						18.3			6.2	
Approach LOS		B						B			A	
Queue Length 50th (ft)	10		0					168		2	1	
Queue Length 95th (ft)	25		56					#245		m2	m1	
Internal Link Dist (ft)		827			672			445			404	
Turn Bay Length (ft)			200									
Base Capacity (vph)	524		475					1472		622	2524	
Starvation Cap Reductn	0		0					0		0	0	
Spillback Cap Reductn	0		0					0		0	0	
Storage Cap Reductn	0		0					0		0	0	
Reduced v/c Ratio	0.12		0.58					0.74		0.78	0.22	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 32 (53%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 12.4 Intersection LOS: B
Intersection Capacity Utilization 70.8% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Old Hickory Boulevard & I-40 EB Ramps

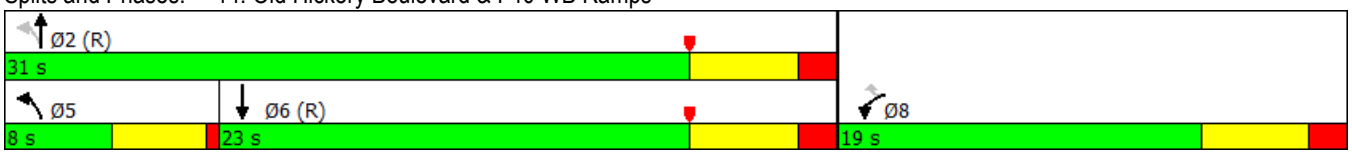


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	88	0	484	232	700	0	0	979	35
Future Volume (vph)	0	0	0	88	0	484	232	700	0	0	979	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			2%			1%			1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.995	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1718	0	1537	1727	3454	0	0	3437	0
Flt Permitted				0.950			0.185					
Satd. Flow (perm)	0	0	0	1718	0	1537	336	3454	0	0	3437	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						182					8	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		859			1198			484			509	
Travel Time (s)		19.5			27.2			8.3			8.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	93	0	509	244	737	0	0	1031	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	93	0	509	244	737	0	0	1068	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	1			1	
Detector Template												
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Detector 1 Position(ft)				0		0	0	0			0	
Detector 1 Size(ft)				50		50	50	50			50	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Perm	pm+pt	NA			NA	
Protected Phases				8			5	2			6	
Permitted Phases						8	2					
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				10.0		10.0	8.0	10.0			10.0	
Total Split (s)				19.0		19.0	8.0	31.0			23.0	
Total Split (%)				38.0%		38.0%	16.0%	62.0%			46.0%	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)				13.5		13.5	4.0	25.5			17.5	
Yellow Time (s)				4.0		4.0	3.5	4.0			4.0	
All-Red Time (s)				1.5		1.5	0.5	1.5			1.5	
Lost Time Adjust (s)				-1.5		-1.5	-1.5	-1.5			-1.5	
Total Lost Time (s)				4.0		4.0	2.5	4.0			4.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				2.5		2.5	3.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				14.3		14.3	29.2	27.7			19.1	
Actuated g/C Ratio				0.29		0.29	0.58	0.55			0.38	
v/c Ratio				0.19		0.89	0.67	0.39			0.81	
Control Delay				14.2		32.8	12.8	3.2			20.4	
Queue Delay				0.0		0.0	0.0	0.0			0.0	
Total Delay				14.2		32.8	12.8	3.2			20.4	
LOS				B		C	B	A			C	
Approach Delay					29.9			5.6			20.4	
Approach LOS					C			A			C	
Queue Length 50th (ft)				20		87	5	12			140	
Queue Length 95th (ft)				47		#246	m6	m14			#241	
Internal Link Dist (ft)		779			1118			404			429	
Turn Bay Length (ft)												
Base Capacity (vph)				515		588	364	1911			1318	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			0	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.18		0.87	0.67	0.39			0.81	

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 50			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 17.1		Intersection LOS: B	
Intersection Capacity Utilization 72.6%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 14: Old Hickory Boulevard & I-40 WB Ramps



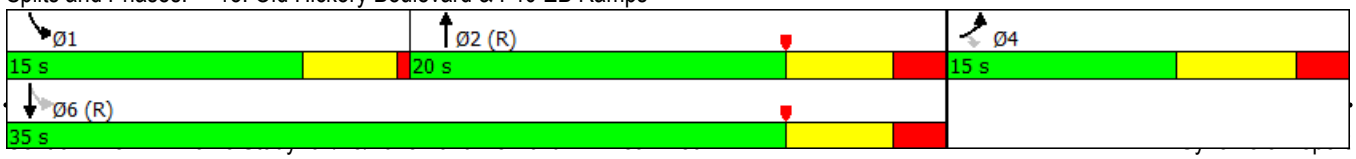
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	201	0	459	0	0	0	0	713	206	552	566	0
Future Volume (vph)	201	0	459	0	0	0	0	713	206	552	566	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			2%			-1%	
Storage Length (ft)	0		200	0		0	0		500	0		0
Storage Lanes	2		1	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850					0.966				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3350	0	1545	0	0	0	0	3320	0	1744	3489	0
Flt Permitted	0.950									0.222		
Satd. Flow (perm)	3350	0	1545	0	0	0	0	3320	0	408	3489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			314					79				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		907			752			525			484	
Travel Time (s)		20.6			17.1			8.9			8.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	212	0	483	0	0	0	0	751	217	581	596	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	0	483	0	0	0	0	968	0	581	596	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.01	1.01	1.01	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					1		1	1	
Detector Template												
Leading Detector (ft)	50		50					50		50	50	
Trailing Detector (ft)	0		0					0		0	0	
Detector 1 Position(ft)	0		0					0		0	0	
Detector 1 Size(ft)	50		50					50		50	50	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0		0.0	0.0	
Turn Type	Prot		Perm					NA		pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4							6		
Detector Phase	4		4					2		1	6	
Switch Phase												
Minimum Initial (s)	4.0		4.0					4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	10.5		10.5					10.0		8.0	10.0	
Total Split (s)	15.0		15.0					20.0		15.0	35.0	
Total Split (%)	30.0%		30.0%					40.0%		30.0%	70.0%	
Maximum Green (s)	8.5		8.5					14.0		11.0	29.0	
Yellow Time (s)	4.5		4.5					4.0		3.5	4.0	
All-Red Time (s)	2.0		2.0					2.0		0.5	2.0	
Lost Time Adjust (s)	-2.5		-2.5					-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0		4.0					4.0		2.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Vehicle Extension (s)	2.5		2.5					4.0		3.0	2.5	
Recall Mode	None		None					C-Max		None	C-Max	
Act Effct Green (s)	10.6		10.6					16.0		33.4	31.4	
Actuated g/C Ratio	0.21		0.21					0.32		0.67	0.63	
v/c Ratio	0.30		0.84					0.87		0.92	0.27	
Control Delay	17.7		23.2					25.6		25.7	1.5	
Queue Delay	0.0		0.0					0.0		0.0	0.0	
Total Delay	17.7		23.2					25.6		25.7	1.5	
LOS	B		C					C		C	A	
Approach Delay		21.5						25.6			13.5	
Approach LOS		C						C			B	
Queue Length 50th (ft)	26		44					126		3	2	
Queue Length 95th (ft)	50		#186					#229		m#190	m2	
Internal Link Dist (ft)		827			672			445			404	
Turn Bay Length (ft)			200									
Base Capacity (vph)	737		584					1116		629	2188	
Starvation Cap Reductn	0		0					0		0	0	
Spillback Cap Reductn	0		0					0		0	0	
Storage Cap Reductn	0		0					0		0	0	
Reduced v/c Ratio	0.29		0.83					0.87		0.92	0.27	

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 50
Offset: 24 (48%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 19.6 Intersection LOS: B
Intersection Capacity Utilization 72.6% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Old Hickory Boulevard & I-40 EB Ramps



SR 45 All Alternatives (2040)

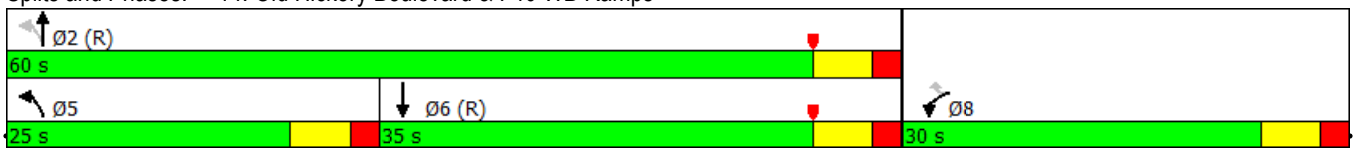
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	124	0	765	607	441	0	0	1026	151
Future Volume (vph)	0	0	0	124	0	765	607	441	0	0	1026	151
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			2%			1%			1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.981	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1718	0	1537	1727	3454	0	0	3388	0
Flt Permitted				0.950			0.114					
Satd. Flow (perm)	0	0	0	1718	0	1537	207	3454	0	0	3388	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						400					19	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		859			1198			495			891	
Travel Time (s)		19.5			27.2			8.4			15.2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	135	0	832	660	479	0	0	1115	164
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	135	0	832	660	479	0	0	1279	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	1			1	
Detector Template												
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Detector 1 Position(ft)				0		0	0	0			0	
Detector 1 Size(ft)				50		50	50	50			50	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Perm	pm+pt	NA			NA	
Protected Phases				8			5	2			6	
Permitted Phases						8	2					
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				10.0		10.0	10.0	10.0			10.0	
Total Split (s)				30.0		30.0	25.0	60.0			35.0	
Total Split (%)				33.3%		33.3%	27.8%	66.7%			38.9%	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)				24.0		24.0	19.0	54.0			29.0	
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	
Lost Time Adjust (s)				-1.5		-1.5	-1.5	-1.5			-1.5	
Total Lost Time (s)				4.5		4.5	4.5	4.5			4.5	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				2.5		2.5	3.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				25.5		25.5	55.5	55.5			30.5	
Actuated g/C Ratio				0.28		0.28	0.62	0.62			0.34	
v/c Ratio				0.28		1.15	1.40	0.22			1.10	
Control Delay				27.0		102.2	200.9	4.2			88.7	
Queue Delay				0.0		0.0	0.0	0.0			0.1	
Total Delay				27.0		102.2	200.9	4.2			88.8	
LOS				C		F	F	A			F	
Approach Delay					91.7			118.2			88.8	
Approach LOS					F			F			F	
Queue Length 50th (ft)				60		~387	~441	49			~436	
Queue Length 95th (ft)				108		#615	m#508	m50			#570	
Internal Link Dist (ft)		779			1118			415			811	
Turn Bay Length (ft)												
Base Capacity (vph)				486		722	473	2129			1160	
Starvation Cap Reductn				0		0	0	0			0	
Spillback Cap Reductn				0		0	0	0			23	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.28		1.15	1.40	0.22			1.12	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow, Master Intersection
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.40
Intersection Signal Delay: 99.5 Intersection LOS: F
Intersection Capacity Utilization 84.9% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: Old Hickory Boulevard & I-40 WB Ramps



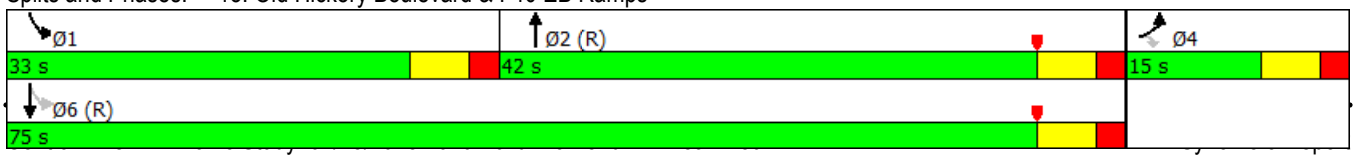
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	0	311	0	0	0	0	995	225	592	617	0
Future Volume (vph)	53	0	311	0	0	0	0	995	225	592	617	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			2%			-1%	
Storage Length (ft)	0		200	0		0	0		500	0		0
Storage Lanes	2		1	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850					0.972				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3350	0	1545	0	0	0	0	3340	0	1744	3489	0
Flt Permitted	0.950									0.095		
Satd. Flow (perm)	3350	0	1545	0	0	0	0	3340	0	174	3489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			338					37				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		907			752			892			495	
Travel Time (s)		20.6			17.1			15.2			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	58	0	338	0	0	0	0	1082	245	643	671	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	0	338	0	0	0	0	1327	0	643	671	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.01	1.01	1.01	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					1		1	1	
Detector Template												
Leading Detector (ft)	50		50					50		50	50	
Trailing Detector (ft)	0		0					0		0	0	
Detector 1 Position(ft)	0		0					0		0	0	
Detector 1 Size(ft)	50		50					50		50	50	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0		0.0	0.0	
Turn Type	Prot		Perm					NA		pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4							6		
Detector Phase	4		4					2		1	6	
Switch Phase												
Minimum Initial (s)	4.0		4.0					4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	10.5		10.5					10.0		10.0	10.0	
Total Split (s)	15.0		15.0					42.0		33.0	75.0	
Total Split (%)	16.7%		16.7%					46.7%		36.7%	83.3%	
Maximum Green (s)	9.0		9.0					36.0		27.0	69.0	
Yellow Time (s)	4.0		4.0					4.0		4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0		2.0	2.0	
Lost Time Adjust (s)	-2.5		-2.5					-2.0		-2.0	-2.0	
Total Lost Time (s)	3.5		3.5					4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Vehicle Extension (s)	2.5		2.5					4.0		3.0	2.5	
Recall Mode	None		None					C-Max		None	C-Max	
Act Effct Green (s)	9.6		9.6					38.0		72.9	72.9	
Actuated g/C Ratio	0.11		0.11					0.42		0.81	0.81	
v/c Ratio	0.16		0.73					0.93		0.95	0.24	
Control Delay	36.9		14.2					36.7		17.3	0.2	
Queue Delay	0.0		0.0					0.0		4.4	0.0	
Total Delay	36.9		14.2					36.7		21.7	0.2	
LOS	D		B					D		C	A	
Approach Delay		17.5						36.7			10.7	
Approach LOS		B						D			B	
Queue Length 50th (ft)	15		0					358		7	1	
Queue Length 95th (ft)	32		80					#510		m12	m2	
Internal Link Dist (ft)		827			672			812			415	
Turn Bay Length (ft)			200									
Base Capacity (vph)	428		492					1431		680	2827	
Starvation Cap Reductn	0		0					0		21	0	
Spillback Cap Reductn	0		0					0		0	0	
Storage Cap Reductn	0		0					0		0	0	
Reduced v/c Ratio	0.14		0.69					0.93		0.98	0.24	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 50 (56%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 23.0 Intersection LOS: C
Intersection Capacity Utilization 84.9% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Old Hickory Boulevard & I-40 EB Ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	108	0	607	284	805	0	0	1223	28
Future Volume (vph)	0	0	0	108	0	607	284	805	0	0	1223	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		-1%			2%			1%			1%	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt						0.850					0.997	
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	1718	0	1537	1727	3454	0	0	3443	0
Flt Permitted				0.950			0.083					
Satd. Flow (perm)	0	0	0	1718	0	1537	151	3454	0	0	3443	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						153					2	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		859			1198			495			891	
Travel Time (s)		19.5			27.2			8.4			15.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	114	0	639	299	847	0	0	1287	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	114	0	639	299	847	0	0	1316	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	1			1	
Detector Template												
Leading Detector (ft)				50		50	50	50			50	
Trailing Detector (ft)				0		0	0	0			0	
Detector 1 Position(ft)				0		0	0	0			0	
Detector 1 Size(ft)				50		50	50	50			50	
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	
Turn Type				Prot		Perm	pm+pt	NA			NA	
Protected Phases				8			5	2			6	
Permitted Phases						8	2					
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				4.0		4.0	4.0	4.0			4.0	
Minimum Split (s)				10.0		10.0	10.0	10.0			10.0	
Total Split (s)				43.0		43.0	19.0	67.0			48.0	
Total Split (%)				39.1%		39.1%	17.3%	60.9%			43.6%	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)				37.0		37.0	13.0	61.0			42.0	
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	
Lost Time Adjust (s)				-1.5		-1.5	-1.5	-1.5			-1.5	
Total Lost Time (s)				4.5		4.5	4.5	4.5			4.5	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?							Yes				Yes	
Vehicle Extension (s)				2.5		2.5	3.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				38.5		38.5	62.5	62.5			43.5	
Actuated g/C Ratio				0.35		0.35	0.57	0.57			0.40	
v/c Ratio				0.19		1.00	1.02	0.43			0.97	
Control Delay				26.0		64.6	64.9	4.1			50.6	
Queue Delay				0.0		0.0	0.0	0.5			33.1	
Total Delay				26.0		64.6	64.9	4.6			83.7	
LOS				C		E	E	A			F	
Approach Delay					58.8			20.4			83.7	
Approach LOS					E			C			F	
Queue Length 50th (ft)				56		~370	~139	90			470	
Queue Length 95th (ft)				99		#621	m#178	m88			#628	
Internal Link Dist (ft)		779			1118			415			811	
Turn Bay Length (ft)												
Base Capacity (vph)				601		637	293	1962			1362	
Starvation Cap Reductn				0		0	0	635			0	
Spillback Cap Reductn				39		0	0	0			142	
Storage Cap Reductn				0		0	0	0			0	
Reduced v/c Ratio				0.20		1.00	1.02	0.64			1.08	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 55.3 Intersection LOS: E
Intersection Capacity Utilization 89.2% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 14: Old Hickory Boulevard & I-40 WB Ramps



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	219	0	560	0	0	0	0	870	251	738	690	0
Future Volume (vph)	219	0	560	0	0	0	0	870	251	738	690	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			2%			-1%	
Storage Length (ft)	0		200	0		0	0		500	0		0
Storage Lanes	2		1	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850					0.966				
Flt Protected	0.950									0.950		
Satd. Flow (prot)	3350	0	1545	0	0	0	0	3320	0	1744	3489	0
Flt Permitted	0.950									0.100		
Satd. Flow (perm)	3350	0	1545	0	0	0	0	3320	0	184	3489	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			283					36				
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		907			752			892			495	
Travel Time (s)		20.6			17.1			15.2			8.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	231	0	589	0	0	0	0	916	264	777	726	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	231	0	589	0	0	0	0	1180	0	777	726	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	0.99	0.99	0.99	1.01	1.01	1.01	0.99	0.99	0.99
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					1		1	1	
Detector Template												
Leading Detector (ft)	50		50					50		50	50	
Trailing Detector (ft)	0		0					0		0	0	
Detector 1 Position(ft)	0		0					0		0	0	
Detector 1 Size(ft)	50		50					50		50	50	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0		0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0		0.0	0.0	
Turn Type	Prot		Perm					NA		pm+pt	NA	
Protected Phases	4							2		1	6	
Permitted Phases			4							6		
Detector Phase	4		4					2		1	6	
Switch Phase												
Minimum Initial (s)	4.0		4.0					4.0		4.0	4.0	

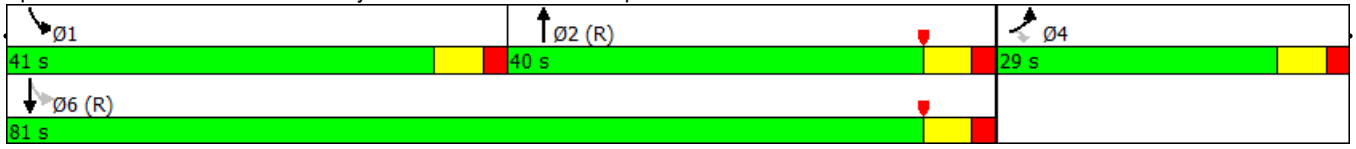
Lanes, Volumes, Timings
13: Old Hickory Boulevard & I-40 EB Ramps 09/26/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	10.5		10.5					10.0		10.0	10.0	
Total Split (s)	29.0		29.0					40.0		41.0	81.0	
Total Split (%)	26.4%		26.4%					36.4%		37.3%	73.6%	
Maximum Green (s)	23.0		23.0					34.0		35.0	75.0	
Yellow Time (s)	4.0		4.0					4.0		4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0		2.0	2.0	
Lost Time Adjust (s)	-2.5		-2.5					-2.0		-2.0	-2.0	
Total Lost Time (s)	3.5		3.5					4.0		4.0	4.0	
Lead/Lag								Lag		Lead		
Lead-Lag Optimize?								Yes		Yes		
Vehicle Extension (s)	2.5		2.5					4.0		3.0	2.5	
Recall Mode	None		None					C-Max		None	C-Max	
Act Effct Green (s)	25.5		25.5					36.0		77.0	77.0	
Actuated g/C Ratio	0.23		0.23					0.33		0.70	0.70	
v/c Ratio	0.30		1.02					1.06		1.19	0.30	
Control Delay	36.1		66.5					80.7		116.1	11.5	
Queue Delay	0.0		0.0					0.0		0.7	0.0	
Total Delay	36.1		66.5					80.7		116.9	11.5	
LOS	D		E					F		F	B	
Approach Delay		58.0						80.7			66.0	
Approach LOS		E						F			E	
Queue Length 50th (ft)	69		~278					~475		~635	200	
Queue Length 95th (ft)	105		#497					#612		m#700	m210	
Internal Link Dist (ft)		827			672			812			415	
Turn Bay Length (ft)			200									
Base Capacity (vph)	776		575					1110		653	2442	
Starvation Cap Reductn	0		0					0		65	0	
Spillback Cap Reductn	0		0					0		0	0	
Storage Cap Reductn	0		0					0		0	0	
Reduced v/c Ratio	0.30		1.02					1.06		1.32	0.30	

Intersection Summary

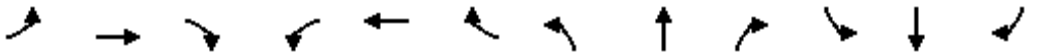
Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 64 (58%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.19
Intersection Signal Delay: 69.1 Intersection LOS: E
Intersection Capacity Utilization 89.2% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: Old Hickory Boulevard & I-40 EB Ramps

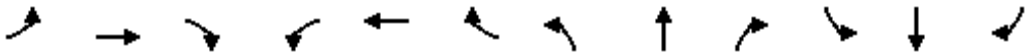


Synchro Intersection Analysis – Intersections along SR 265

SR 265 No Build Alternative (2020)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	187	111	280	212	641	140	843	383	188	566	4
Future Volume (vph)	50	187	111	280	212	641	140	843	383	188	566	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957				0.850		0.953			0.999	
Flt Protected		0.993			0.972		0.950			0.950		
Satd. Flow (prot)	0	1736	0	0	1776	1553	1736	1741	0	1736	1825	0
Flt Permitted		0.429			0.507		0.206			0.057		
Satd. Flow (perm)	0	750	0	0	926	1553	376	1741	0	104	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18				116		21				
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		547			1559			1697			843	
Travel Time (s)		10.7			30.4			25.7			12.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	54	203	121	304	230	697	152	916	416	204	615	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	378	0	0	534	697	152	1332	0	204	619	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	60.0	60.0		60.0	60.0	60.0	14.0	77.0		13.0	76.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%	40.0%	9.3%	51.3%		8.7%	50.7%	
Maximum Green (s)	54.0	54.0		54.0	54.0	54.0	8.0	71.0		7.0	70.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	
Act Effct Green (s)		54.0			54.0	54.0	79.0	71.0		77.0	70.0	
Actuated g/C Ratio		0.36			0.36	0.36	0.53	0.47		0.51	0.47	
v/c Ratio		1.35			1.60	1.10	0.56	1.60		1.58	0.73	
Control Delay		213.3			318.0	103.7	25.1	302.7		321.9	38.4	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		213.3			318.0	103.7	25.1	302.7		321.9	38.4	
LOS		F			F	F	C	F		F	D	
Approach Delay		213.3			196.7			274.2			108.7	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~472			~745	~696	69	~1857		~234	481	
Queue Length 95th (ft)		#686			#976	#947	108	#2126		#405	637	
Internal Link Dist (ft)		467			1479			1617			763	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		281			333	633	270	835		129	851	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		1.35			1.60	1.10	0.56	1.60		1.58	0.73	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.60			
Intersection Signal Delay: 209.2		Intersection LOS: F	
Intersection Capacity Utilization 144.1%		ICU Level of Service H	
Analysis Period (min) 15			

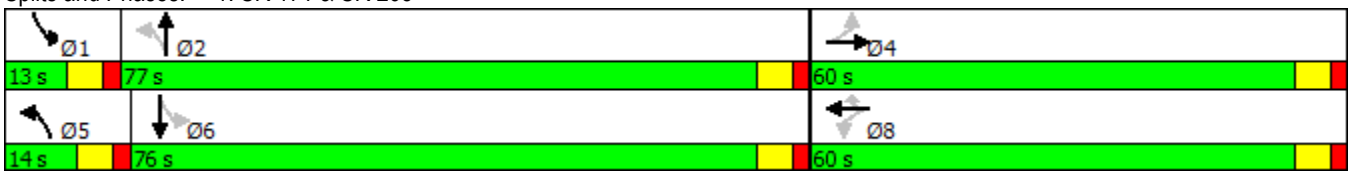
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265



Intersection	
Intersection Delay, s/veh	14.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	72	28	3	29	54	27	319	19	85	306	2
Future Vol, veh/h	8	72	28	3	29	54	27	319	19	85	306	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	9	78	30	3	32	59	29	347	21	92	333	2
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.7	10.1	15.1	16.5
HCM LOS	B	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	7%	7%	3%	22%
Vol Thru, %	87%	67%	34%	78%
Vol Right, %	5%	26%	63%	1%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	365	108	86	393
LT Vol	27	8	3	85
Through Vol	319	72	29	306
RT Vol	19	28	54	2
Lane Flow Rate	397	117	93	427
Geometry Grp	1	1	1	1
Degree of Util (X)	0.575	0.2	0.155	0.621
Departure Headway (Hd)	5.218	6.125	5.964	5.23
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	690	583	598	688
Service Time	3.258	4.186	4.028	3.269
HCM Lane V/C Ratio	0.575	0.201	0.156	0.621
HCM Control Delay	15.1	10.7	10.1	16.5
HCM Lane LOS	C	B	B	C
HCM 95th-tile Q	3.7	0.7	0.5	4.3

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	91	199	439	27	50	203
Future Vol, veh/h	91	199	439	27	50	203
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	99	216	477	29	54	221

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	507	0	-	0	906	492
Stage 1	-	-	-	-	492	-
Stage 2	-	-	-	-	414	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1048	-	-	-	304	573
Stage 1	-	-	-	-	610	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1048	-	-	-	271	573
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	610	-
Stage 2	-	-	-	-	592	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	22.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1048	-	-	-	470
HCM Lane V/C Ratio	0.094	-	-	-	0.585
HCM Control Delay (s)	8.8	0	-	-	22.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	3.7

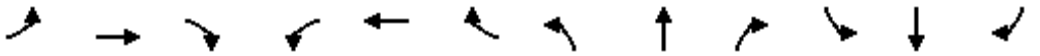
Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	456	10	5	244
Future Vol, veh/h	5	10	456	10	5	244
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	11	496	11	5	265

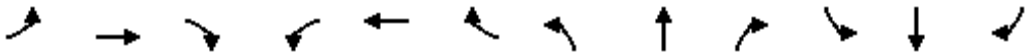
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	777	501	0	0	507	0
Stage 1	501	-	-	-	-	-
Stage 2	276	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	365	570	-	-	1058	-
Stage 1	609	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	363	570	-	-	1058	-
Mov Cap-2 Maneuver	363	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	479	1058	-
HCM Lane V/C Ratio	-	-	0.034	0.005	-
HCM Control Delay (s)	-	-	12.8	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	260	156	413	236	362	140	702	325	641	886	13
Future Volume (vph)	60	260	156	413	236	362	140	702	325	641	886	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956				0.850		0.953			0.998	
Flt Protected		0.994			0.969		0.950			0.950		
Satd. Flow (prot)	0	1736	0	0	1770	1553	1736	1741	0	1736	1823	0
Flt Permitted		0.291			0.432		0.087			0.077		
Satd. Flow (perm)	0	508	0	0	789	1553	159	1741	0	141	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20				109		16			1	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		547			1559			1697			837	
Travel Time (s)		10.7			30.4			25.7			12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	65	283	170	449	257	393	152	763	353	697	963	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	518	0	0	706	393	152	1116	0	697	977	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	70.0	70.0		70.0	70.0	70.0	11.0	52.0		28.0	69.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%	46.7%	7.3%	34.7%		18.7%	46.0%	
Maximum Green (s)	64.0	64.0		64.0	64.0	64.0	5.0	46.0		22.0	63.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	
Act Effct Green (s)		64.0			64.0	64.0	51.0	46.0		74.0	63.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.34	0.31		0.49	0.42	
v/c Ratio		2.27			2.10	0.54	1.43	2.05		2.30	1.28	
Control Delay		608.5			530.2	25.7	266.8	504.9		618.9	170.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		608.5			530.2	25.7	266.8	504.9		618.9	170.9	
LOS		F			F	C	F	F		F	F	
Approach Delay		608.5			349.8			476.3			357.4	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~604			~1091	205	~147	~1715		~1066	~1210	
Queue Length 95th (ft)		#836			#1023	312	#303	#1984		#1317	#1475	
Internal Link Dist (ft)		467			1479			1617			757	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		228			336	725	106	545		303	766	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		2.27			2.10	0.54	1.43	2.05		2.30	1.28	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 2.30			
Intersection Signal Delay: 417.2		Intersection LOS: F	
Intersection Capacity Utilization 174.1%		ICU Level of Service H	
Analysis Period (min) 15			

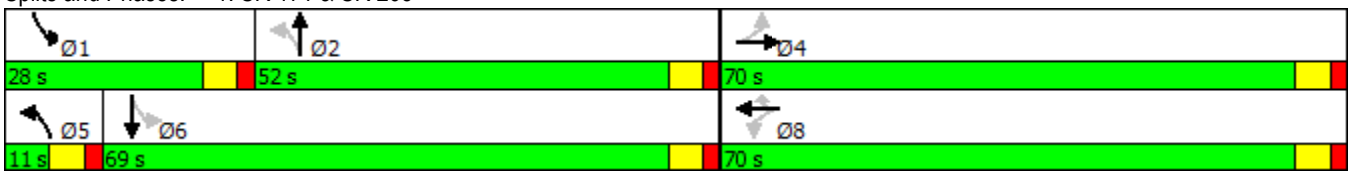
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265



Intersection	
Intersection Delay, s/veh	48.6
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	63	29	30	79	176	18	357	6	128	392	14
Future Vol, veh/h	17	63	29	30	79	176	18	357	6	128	392	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	18	68	32	33	86	191	20	388	7	139	426	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	14.3	21	30.7	83
HCM LOS	B	C	D	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	5%	16%	11%	24%
Vol Thru, %	94%	58%	28%	73%
Vol Right, %	2%	27%	62%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	381	109	285	534
LT Vol	18	17	30	128
Through Vol	357	63	79	392
RT Vol	6	29	176	14
Lane Flow Rate	414	118	310	580
Geometry Grp	1	1	1	1
Degree of Util (X)	0.781	0.264	0.608	1.066
Departure Headway (Hd)	7.026	8.363	7.297	6.614
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	518	432	499	551
Service Time	5.026	6.363	5.297	4.669
HCM Lane V/C Ratio	0.799	0.273	0.621	1.053
HCM Control Delay	30.7	14.3	21	83
HCM Lane LOS	D	B	C	F
HCM 95th-tile Q	7.1	1	4	17.1

Intersection	
Int Delay, s/veh	10.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	75	312	512	38	77	198
Future Vol, veh/h	75	312	512	38	77	198
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	82	339	557	41	84	215

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	598	0	-	0	1079	577
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	502	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	969	-	-	-	240	512
Stage 1	-	-	-	-	558	-
Stage 2	-	-	-	-	604	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	969	-	-	-	215	512
Mov Cap-2 Maneuver	-	-	-	-	215	-
Stage 1	-	-	-	-	558	-
Stage 2	-	-	-	-	541	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	45.4
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	969	-	-	-	369
HCM Lane V/C Ratio	0.084	-	-	-	0.81
HCM Control Delay (s)	9.1	0	-	-	45.4
HCM Lane LOS	A	A	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	-	7.1

Intersection	
Int Delay, s/veh	0.4

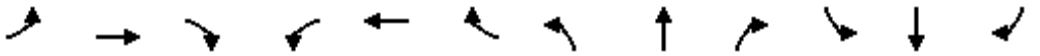
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	545	5	10	379
Future Vol, veh/h	10	5	545	5	10	379
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	592	5	11	412

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1029	595	0	0	598	0
Stage 1	595	-	-	-	-	-
Stage 2	434	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	259	504	-	-	979	-
Stage 1	551	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	255	504	-	-	979	-
Mov Cap-2 Maneuver	255	-	-	-	-	-
Stage 1	551	-	-	-	-	-
Stage 2	643	-	-	-	-	-

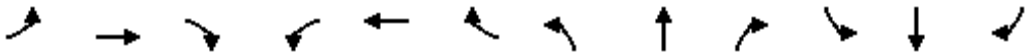
Approach	WB	NB	SB
HCM Control Delay, s	17.5	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	305	979	-
HCM Lane V/C Ratio	-	-	0.053	0.011	-
HCM Control Delay (s)	-	-	17.5	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

SR 265 Diamond & DDI Build Alternatives (2020)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	373	255	280	212	641	400	916	50	335	422	449
Future Volume (vph)	305	373	255	280	212	641	400	916	50	335	422	449
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.963				0.850		0.992			0.923	
Flt Protected		0.984			0.972		0.950			0.950		
Satd. Flow (prot)	0	1731	0	0	1776	1553	1736	1812	0	1736	1686	0
Flt Permitted		0.166			0.477		0.950			0.950		
Satd. Flow (perm)	0	292	0	0	871	1553	1736	1812	0	1736	1686	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21				140		4			77	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		2141			1559			1697			862	
Travel Time (s)		41.7			30.4			25.7			13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	332	405	277	304	230	697	435	996	54	364	459	488
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1014	0	0	534	697	435	1050	0	364	947	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8	8 1	5	2		1	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases												
Detector Phase	7	4		3	8	8 1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	22.0		10.0	22.0		12.0	26.0		12.0	26.0	
Total Split (%)	14.3%	31.4%		14.3%	31.4%		17.1%	37.1%		17.1%	37.1%	
Maximum Green (s)	4.0	16.0		4.0	16.0		6.0	20.0		6.0	20.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)		0.0			0.0	28.0	6.0	20.0		6.0	20.0	
Actuated g/C Ratio		0.00			0.00	0.47	0.10	0.33		0.10	0.33	
v/c Ratio		48.29			no cap	0.87	2.51	1.73		2.10	1.54	
Control Delay		21367.0				26.3	717.0	357.8		537.0	274.3	
Queue Delay		0.0				0.0	0.0	0.0		0.0	0.0	
Total Delay		21367.0			Error	26.3	717.0	357.8		537.0	274.3	
LOS		F			F	C	F	F		F	F	
Approach Delay		21367.0			Err			463.0			347.2	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~773			~416	172	~271	~592		~216	~486	
Queue Length 95th (ft)		#979			#580	#385	#424	#808		#358	#694	
Internal Link Dist (ft)		2061			1479			1617			782	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		21			1	799	173	606		173	613	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		48.29			534.00	0.87	2.51	1.73		2.10	1.54	

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 60			
Natural Cycle: 70			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization 170.6%		ICU Level of Service H	
Analysis Period (min) 15			

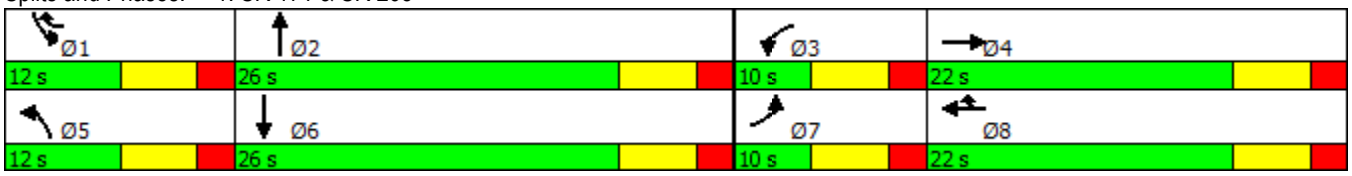
~ Volume exceeds capacity, queue is theoretically infinite.

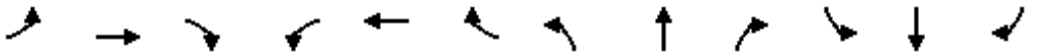
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

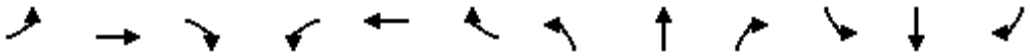
Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265





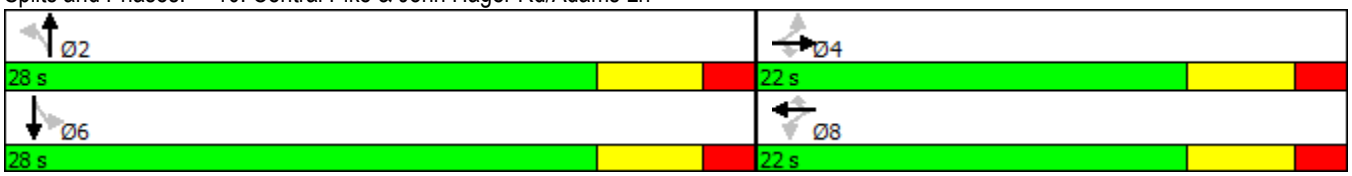
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	50	50	50	50	100	25	1011	25	25	833	25
Future Volume (vph)	100	50	50	50	50	100	25	1011	25	25	833	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.996			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1827	1553	1736	1827	1553	1736	3457	0	1736	3457	0
Flt Permitted	0.722			0.722			0.289			0.212		
Satd. Flow (perm)	1319	1827	1553	1319	1827	1553	528	3457	0	387	3457	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			65		6			7	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		720			602			624			1080	
Travel Time (s)		16.4			13.7			9.5			16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	109	54	54	54	54	109	27	1099	27	27	905	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	109	54	54	54	54	109	27	1126	0	27	932	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0		22.0	22.0	
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	28.0	28.0		28.0	28.0	
Total Split (%)	44.0%	44.0%	44.0%	44.0%	44.0%	44.0%	56.0%	56.0%		56.0%	56.0%	
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	22.0	22.0		22.0	22.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	Min	Min		Min	Min	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	8.9	8.9	8.9	8.9	8.9	8.9	23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.22	0.22	0.22	0.22	0.22	0.22	0.59	0.59		0.59	0.59	
v/c Ratio	0.37	0.13	0.14	0.19	0.13	0.28	0.09	0.55		0.12	0.46	
Control Delay	18.0	13.9	4.8	14.9	13.9	9.1	7.7	9.1		8.6	8.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	18.0	13.9	4.8	14.9	13.9	9.1	7.7	9.1		8.6	8.1	
LOS	B	B	A	B	B	A	A	A		A	A	
Approach Delay		13.7			11.7			9.1			8.1	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)	22	10	0	10	10	8	3	88		3	67	
Queue Length 95th (ft)	55	30	16	31	30	36	15	180		16	137	
Internal Link Dist (ft)		640			522			544			1000	
Turn Bay Length (ft)	200		200	200		200	200			200		
Base Capacity (vph)	534	740	668	534	740	668	325	2131		238	2132	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.20	0.07	0.08	0.10	0.07	0.16	0.08	0.53		0.11	0.44	

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 40.4			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 9.4		Intersection LOS: A	
Intersection Capacity Utilization 55.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 10: Central Pike & John Hager Rd/Adams Ln



Intersection	
Int Delay, s/veh	168.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	32	316	439	142	403	139
Future Vol, veh/h	32	316	439	142	403	139
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	35	343	477	154	438	151

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	632	0	-	0	967	554
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	413	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	941	-	-	-	~ 280	528
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	664	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	941	-	-	-	~ 267	528
Mov Cap-2 Maneuver	-	-	-	-	~ 267	-
Stage 1	-	-	-	-	572	-
Stage 2	-	-	-	-	633	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	$ 456.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	941	-	-	-	306
HCM Lane V/C Ratio	0.037	-	-	-	1.925
HCM Control Delay (s)	9	0	-	-	$ 456.3
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	40.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

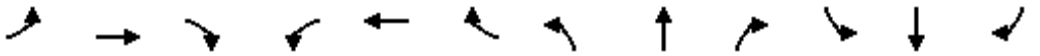
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	714	571	10	5	10
Future Vol, veh/h	5	714	571	10	5	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	776	621	11	5	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	632	0	-	0	1413	626
Stage 1	-	-	-	-	626	-
Stage 2	-	-	-	-	787	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	951	-	-	-	152	484
Stage 1	-	-	-	-	533	-
Stage 2	-	-	-	-	449	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	951	-	-	-	151	484
Mov Cap-2 Maneuver	-	-	-	-	151	-
Stage 1	-	-	-	-	533	-
Stage 2	-	-	-	-	445	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	18.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	951	-	-	-	279
HCM Lane V/C Ratio	0.006	-	-	-	0.058
HCM Control Delay (s)	8.8	0	-	-	18.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	565	335	413	456	232	258	584	325	336	707	234
Future Volume (vph)	236	565	335	413	456	232	258	584	325	336	707	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960				0.850		0.946			0.963	
Flt Protected		0.990			0.977		0.950			0.950		
Satd. Flow (prot)	0	1736	0	0	1785	1553	1736	1728	0	1736	1759	0
Flt Permitted		0.151			0.407		0.950			0.950		
Satd. Flow (perm)	0	265	0	0	744	1553	1736	1728	0	1736	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25				151		42			25	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		2141			1559			1697			862	
Travel Time (s)		41.7			30.4			25.7			13.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	257	614	364	449	496	252	280	635	353	365	768	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1235	0	0	945	252	280	988	0	365	1022	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8	8 1	5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases												
Detector Phase	7	4		3	8	8 1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	22.0		10.0	22.0		10.0	22.0		10.0	22.0	
Total Split (s)	10.0	22.0		10.0	22.0		10.0	23.0		10.0	23.0	
Total Split (%)	15.4%	33.8%		15.4%	33.8%		15.4%	35.4%		15.4%	35.4%	
Maximum Green (s)	4.0	16.0		4.0	16.0		4.0	17.0		4.0	17.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Max		None	Max	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)		0.0			0.0	26.0	4.0	17.0		4.0	17.0	
Actuated g/C Ratio		0.00			0.00	0.47	0.07	0.31		0.07	0.31	
v/c Ratio		49.40			no cap	0.31	2.22	1.75		2.90	1.82	
Control Delay		21854.4				5.0	595.1	367.4		891.5	398.5	
Queue Delay		0.0				0.0	0.0	0.0		0.0	0.0	
Total Delay		21854.4			Error	5.0	595.1	367.4		891.5	398.5	
LOS		F			F	A	F	F		F	F	
Approach Delay		21854.4			Err			417.7			528.2	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~858			~670	17	~154	~501		~214	~532	
Queue Length 95th (ft)		#1069			#864	51	#276	#706		#350	#738	
Internal Link Dist (ft)		2061			1479			1617			782	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		25			1	813	126	563		126	560	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		49.40			945.00	0.31	2.22	1.75		2.90	1.82	

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 55			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization 199.2%		ICU Level of Service H	
Analysis Period (min) 15			

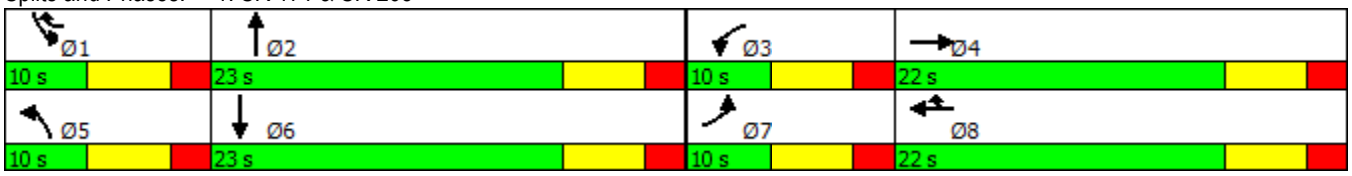
~ Volume exceeds capacity, queue is theoretically infinite.

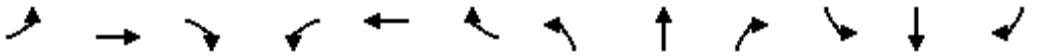
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

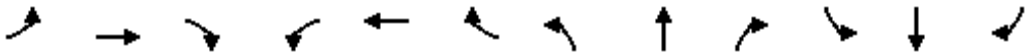
Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	30	35	35	30	35	85	1380	85	85	1066	85
Future Volume (vph)	35	30	35	35	30	35	85	1380	85	85	1066	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.991			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	1827	1553	1736	1827	1553	1736	3440	0	1736	3433	0
Flt Permitted	0.736			0.736			0.203			0.126		
Satd. Flow (perm)	1345	1827	1553	1345	1827	1553	371	3440	0	230	3433	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			41			41		16			21	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		720			602			624			1080	
Travel Time (s)		16.4			13.7			9.5			16.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	38	33	38	38	33	38	92	1500	92	92	1159	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	38	33	38	38	33	38	92	1592	0	92	1251	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0		22.0	22.0	
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	58.0	58.0		58.0	58.0	
Total Split (%)	27.5%	27.5%	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%		72.5%	72.5%	
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	52.0	52.0		52.0	52.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	Min	Min		Min	Min	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	7.7	7.7	7.7	7.7	7.7	7.7	49.4	49.4		49.4	49.4	
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.77	0.77		0.77	0.77	
v/c Ratio	0.24	0.15	0.17	0.24	0.15	0.17	0.32	0.60		0.52	0.47	
Control Delay	32.6	30.1	11.6	32.6	30.1	11.6	7.8	6.0		20.0	4.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	32.6	30.1	11.6	32.6	30.1	11.6	7.8	6.0		20.0	4.7	
LOS	C	C	B	C	C	B	A	A		B	A	
Approach Delay		24.5			24.5			6.1			5.8	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)	15	13	0	15	13	0	11	143		14	94	
Queue Length 95th (ft)	43	38	24	43	38	24	41	234		#99	154	
Internal Link Dist (ft)		640			522			544			1000	
Turn Bay Length (ft)	200		200	200		200	200			200		
Base Capacity (vph)	355	483	440	355	483	440	294	2733		182	2728	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.11	0.07	0.09	0.11	0.07	0.09	0.31	0.58		0.51	0.46	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 64			
Natural Cycle: 80			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 7.2		Intersection LOS: A	
Intersection Capacity Utilization 69.2%		ICU Level of Service C	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: Central Pike & John Hager Rd/Adams Ln



Intersection	
Int Delay, s/veh	63.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	46	375	512	283	176	175
Future Vol, veh/h	46	375	512	283	176	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	50	408	557	308	191	190

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	864	0	-	0	1218	710
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	508	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	770	-	-	-	198	430
Stage 1	-	-	-	-	484	-
Stage 2	-	-	-	-	600	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	770	-	-	-	~ 181	430
Mov Cap-2 Maneuver	-	-	-	-	~ 181	-
Stage 1	-	-	-	-	484	-
Stage 2	-	-	-	-	550	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	281.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	770	-	-	-	254
HCM Lane V/C Ratio	0.065	-	-	-	1.502
HCM Control Delay (s)	10	0	-	-	281.6
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	22.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.4

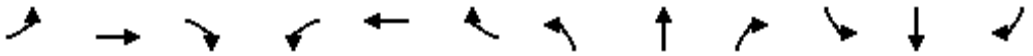
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	541	790	5	10	5
Future Vol, veh/h	10	541	790	5	10	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	588	859	5	11	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	864	0	-	0	1471	861
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	610	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	779	-	-	-	140	355
Stage 1	-	-	-	-	414	-
Stage 2	-	-	-	-	542	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	779	-	-	-	137	355
Mov Cap-2 Maneuver	-	-	-	-	137	-
Stage 1	-	-	-	-	414	-
Stage 2	-	-	-	-	531	-

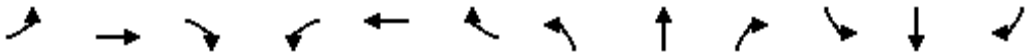
Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	28.1
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	779	-	-	-	172
HCM Lane V/C Ratio	0.014	-	-	-	0.095
HCM Control Delay (s)	9.7	0	-	-	28.1
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.3

SR 265 Diamond Build Alternative (2020)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	0	166	0	0	0	0	1082	129	35	717	0
Future Volume (vph)	55	0	166	0	0	0	0	1082	129	35	717	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	0		250	150		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	*1.00	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1736	0	2733	0	0	0	0	5481	1553	1736	3471	0
Flt Permitted	0.950									0.208		
Satd. Flow (perm)	1736	0	2733	0	0	0	0	5481	1553	380	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180						151			
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1380			665			1080			528	
Travel Time (s)		31.4			15.1			16.4			8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	60	0	180	0	0	0	0	1176	140	38	779	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	0	180	0	0	0	0	1176	140	38	779	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					2	1	1	2	
Detector Template	Left		Right					Thru	Right	Left	Thru	
Leading Detector (ft)	20		20					100	20	20	100	
Trailing Detector (ft)	0		0					0	0	0	0	
Detector 1 Position(ft)	0		0					0	0	0	0	
Detector 1 Size(ft)	20		20					6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4						2	6		
Detector Phase	4		4					2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0		6.0					8.0	8.0	4.0	8.0	
Minimum Split (s)	22.0		22.0					22.0	22.0	10.0	22.0	
Total Split (s)	23.0		23.0					31.0	31.0	11.0	42.0	
Total Split (%)	35.4%		35.4%					47.7%	47.7%	16.9%	64.6%	
Maximum Green (s)	17.0		17.0					25.0	25.0	5.0	36.0	
Yellow Time (s)	4.0		4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Recall Mode	None		None					C-Max	C-Max	None	C-Max	
Walk Time (s)	5.0		5.0					5.0	5.0		5.0	
Flash Dont Walk (s)	11.0		11.0					11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0		0					0	0		0	
Act Effct Green (s)	7.8		7.8					40.2	40.2	45.2	45.2	
Actuated g/C Ratio	0.12		0.12					0.62	0.62	0.70	0.70	
v/c Ratio	0.29		0.37					0.35	0.14	0.10	0.32	
Control Delay	29.0		7.0					7.8	2.2	0.5	0.6	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	29.0		7.0					7.8	2.2	0.5	0.6	
LOS	C		A					A	A	A	A	
Approach Delay		12.5						7.2			0.6	
Approach LOS		B						A			A	
Queue Length 50th (ft)	22		0					47	0	0	0	
Queue Length 95th (ft)	52		26					131	23	m1	0	
Internal Link Dist (ft)		1300			585			1000			448	
Turn Bay Length (ft)			300						250	150		
Base Capacity (vph)	454		847					3388	1017	389	2412	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.13		0.21					0.35	0.14	0.10	0.32	

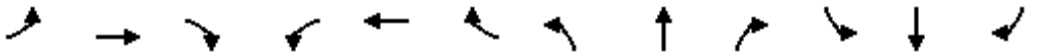
Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 34 (52%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 5.5		Intersection LOS: A	
Intersection Capacity Utilization 61.8%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

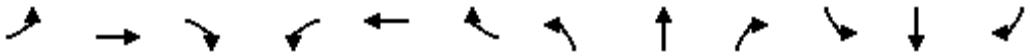
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Central Pike & I-40 EB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	351	0	44	600	537	0	0	401	318
Future Volume (vph)	0	0	0	351	0	44	600	537	0	0	401	318
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		300	150		0	0		250
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						151						346
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		521			649			528			1018	
Travel Time (s)		11.8			14.8			8.0			15.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	382	0	48	652	584	0	0	436	346
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	382	0	48	652	584	0	0	436	346
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	

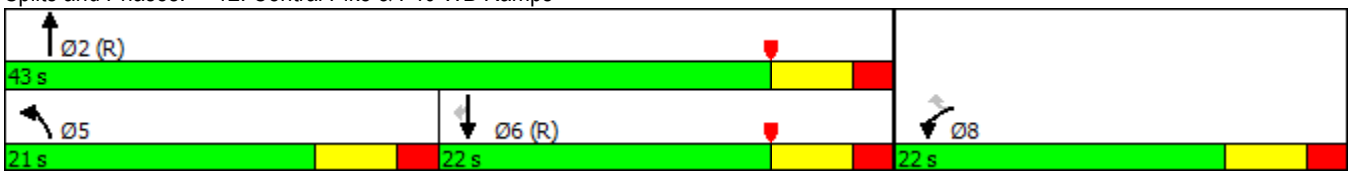


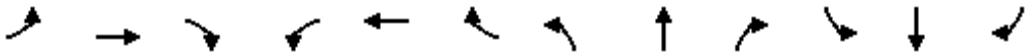
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						8						6
Detector Phase				8		8	5	2			6	6
Switch Phase												
Minimum Initial (s)				6.0		6.0	4.0	8.0			8.0	8.0
Minimum Split (s)				22.0		22.0	10.0	22.0			22.0	22.0
Total Split (s)				22.0		22.0	21.0	43.0			22.0	22.0
Total Split (%)				33.8%		33.8%	32.3%	66.2%			33.8%	33.8%
Maximum Green (s)				16.0		16.0	15.0	37.0			16.0	16.0
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Max			C-Max	C-Max
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				12.5		12.5	16.0	40.5			18.5	18.5
Actuated g/C Ratio				0.19		0.19	0.25	0.62			0.28	0.28
v/c Ratio				0.59		0.11	0.79	0.27			0.44	0.50
Control Delay				27.4		0.5	24.0	8.6			21.6	5.6
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				27.4		0.5	24.0	8.6			21.6	5.6
LOS				C		A	C	A			C	A
Approach Delay					24.4			16.7			14.6	
Approach LOS					C			B			B	
Queue Length 50th (ft)				71		0	119	66			77	0
Queue Length 95th (ft)				103		0	#209	145			119	57
Internal Link Dist (ft)		441			569			448			938	
Turn Bay Length (ft)				200		300	150					250
Base Capacity (vph)				828		496	842	2161			987	689
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.46		0.10	0.77	0.27			0.44	0.50

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 64 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 61.8%		ICU Level of Service B	
Analysis Period (min) 15			

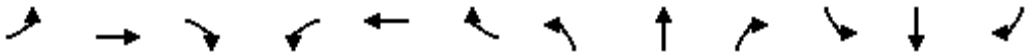
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Central Pike & I-40 WB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	0	500	0	0	0	0	979	471	35	736	0
Future Volume (vph)	171	0	500	0	0	0	0	979	471	35	736	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	0		250	150		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	*1.00	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1736	0	2733	0	0	0	0	5481	1553	1736	3471	0
Flt Permitted	0.950									0.226		
Satd. Flow (perm)	1736	0	2733	0	0	0	0	5481	1553	413	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			303						512			
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1380			665			1080			528	
Travel Time (s)		31.4			15.1			16.4			8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	186	0	543	0	0	0	0	1064	512	38	800	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	186	0	543	0	0	0	0	1064	512	38	800	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					2	1	1	2	
Detector Template	Left		Right					Thru	Right	Left	Thru	
Leading Detector (ft)	20		20					100	20	20	100	
Trailing Detector (ft)	0		0					0	0	0	0	
Detector 1 Position(ft)	0		0					0	0	0	0	
Detector 1 Size(ft)	20		20					6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	



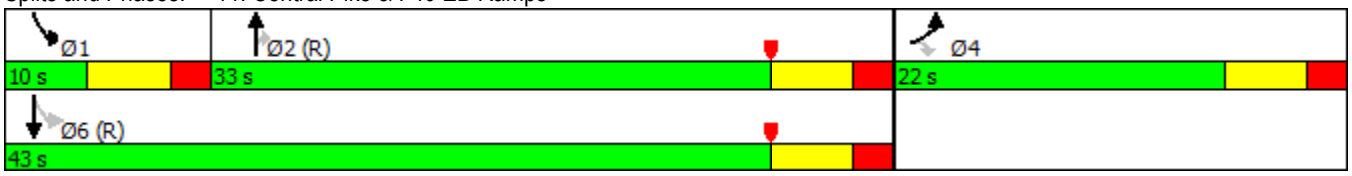
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4						2	6		
Detector Phase	4		4					2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0		6.0					8.0	8.0	4.0	8.0	
Minimum Split (s)	22.0		22.0					22.0	22.0	10.0	22.0	
Total Split (s)	22.0		22.0					33.0	33.0	10.0	43.0	
Total Split (%)	33.8%		33.8%					50.8%	50.8%	15.4%	66.2%	
Maximum Green (s)	16.0		16.0					27.0	27.0	4.0	37.0	
Yellow Time (s)	4.0		4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Recall Mode	None		None					C-Max	C-Max	None	C-Max	
Walk Time (s)	5.0		5.0					5.0	5.0		5.0	
Flash Dont Walk (s)	11.0		11.0					11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0		0					0	0		0	
Act Effct Green (s)	12.3		12.3					36.5	36.5	40.7	40.7	
Actuated g/C Ratio	0.19		0.19					0.56	0.56	0.63	0.63	
v/c Ratio	0.57		0.71					0.35	0.47	0.10	0.37	
Control Delay	30.1		15.7					9.8	3.0	0.6	0.7	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	30.1		15.7					9.8	3.0	0.6	0.7	
LOS	C		B					A	A	A	A	
Approach Delay		19.4						7.6			0.7	
Approach LOS		B						A			A	
Queue Length 50th (ft)	67		47					58	0	0	0	
Queue Length 95th (ft)	116		93					128	51	m0	3	
Internal Link Dist (ft)		1300			585			1000			448	
Turn Bay Length (ft)			300						250	150		
Base Capacity (vph)	427		901					3074	1095	365	2172	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.44		0.60					0.35	0.47	0.10	0.37	

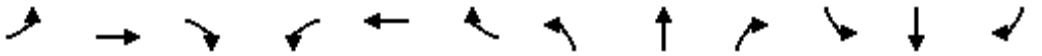
Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 26 (40%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 8.5		Intersection LOS: A	
Intersection Capacity Utilization 57.0%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

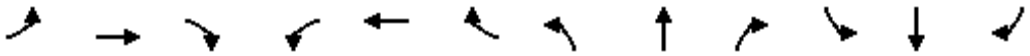
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Central Pike & I-40 EB Ramps





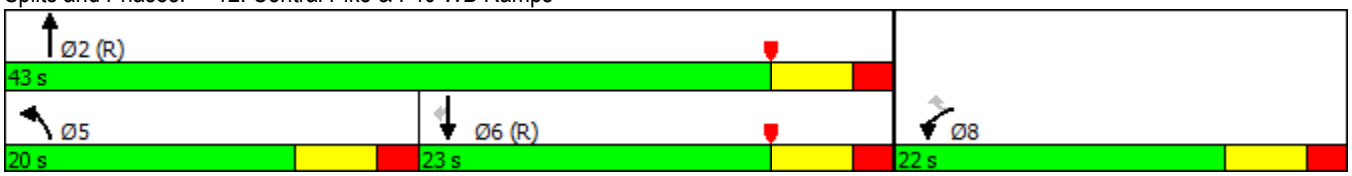
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	284	0	45	400	750	0	0	487	64
Future Volume (vph)	0	0	0	284	0	45	400	750	0	0	487	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		300	150		0	0		250
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						151						151
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		521			649			528			1018	
Travel Time (s)		11.8			14.8			8.0			15.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	309	0	49	435	815	0	0	529	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	309	0	49	435	815	0	0	529	70
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						8						6
Detector Phase				8		8	5	2			6	6
Switch Phase												
Minimum Initial (s)				6.0		6.0	4.0	8.0			8.0	8.0
Minimum Split (s)				22.0		22.0	10.0	22.0			22.0	22.0
Total Split (s)				22.0		22.0	20.0	43.0			23.0	23.0
Total Split (%)				33.8%		33.8%	30.8%	66.2%			35.4%	35.4%
Maximum Green (s)				16.0		16.0	14.0	37.0			17.0	17.0
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Max			C-Max	C-Max
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				11.2		11.2	13.2	41.8			22.6	22.6
Actuated g/C Ratio				0.17		0.17	0.20	0.64			0.35	0.35
v/c Ratio				0.53		0.12	0.64	0.37			0.44	0.11
Control Delay				27.6		0.6	22.2	8.7			19.0	0.3
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				27.6		0.6	22.2	8.7			19.0	0.3
LOS				C		A	C	A			B	A
Approach Delay					23.9			13.4			16.8	
Approach LOS					C			B			B	
Queue Length 50th (ft)				58		0	86	49			83	0
Queue Length 95th (ft)				87		0	138	194			141	1
Internal Link Dist (ft)		441			569			448			938	
Turn Bay Length (ft)				200		300	150					250
Base Capacity (vph)				828		496	752	2232			1207	638
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.37		0.10	0.58	0.37			0.44	0.11

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 16.0		Intersection LOS: B	
Intersection Capacity Utilization 57.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 12: Central Pike & I-40 WB Ramps



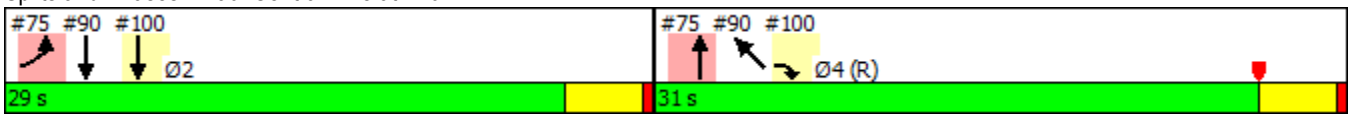
SR 265 DDI Build Alternative (2020)

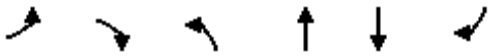
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	717	0	0	0	0	0	1082	0
Future Volume (vph)	0	0	0	0	717	0	0	0	0	0	1082	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	0	0	0	0	0	5085	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	0	0	0	0	0	5085	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		80			147			146			140	
Travel Time (s)		1.8			3.3			3.3			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	755	0	0	0	0	0	1139	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	755	0	0	0	0	0	1139	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		3			-24			12			0	
Crosswalk Width(ft)		16			0			0			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					1						2	
Detector Template											Thru	
Leading Detector (ft)					30						100	
Trailing Detector (ft)					0						0	
Detector 1 Position(ft)					0						0	
Detector 1 Size(ft)					30						6	
Detector 1 Type					Cl+Ex						Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)					0.0						0.0	
Detector 1 Queue (s)					0.0						0.0	
Detector 1 Delay (s)					0.0						0.0	
Detector 2 Position(ft)											94	
Detector 2 Size(ft)											6	
Detector 2 Type											Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)											0.0	
Turn Type					NA						NA	
Protected Phases					2						4	
Permitted Phases												
Detector Phase					2						4	
Switch Phase												
Minimum Initial (s)					4.0						4.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Minimum Split (s)					20.0						20.0	
Total Split (s)					29.0						31.0	
Total Split (%)					48.3%						51.7%	
Maximum Green (s)					25.0						27.0	
Yellow Time (s)					3.5						3.5	
All-Red Time (s)					0.5						0.5	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0						3.0	
Recall Mode					Min						C-Min	
Act Effct Green (s)					21.1						30.9	
Actuated g/C Ratio					0.35						0.52	
v/c Ratio					0.61						0.43	
Control Delay					16.4						10.4	
Queue Delay					0.0						0.0	
Total Delay					16.4						10.4	
LOS					B						B	
Approach Delay					16.4						10.4	
Approach LOS					B						B	
Queue Length 50th (ft)					71						89	
Queue Length 95th (ft)					103						134	
Internal Link Dist (ft)		1			67			66			60	
Turn Bay Length (ft)												
Base Capacity (vph)					1474						2622	
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					0						0	
Storage Cap Reductn					0						0	
Reduced v/c Ratio					0.51						0.43	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 12.8		Intersection LOS: B	
Intersection Capacity Utilization 47.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 90: Central Plke at I-40 EB



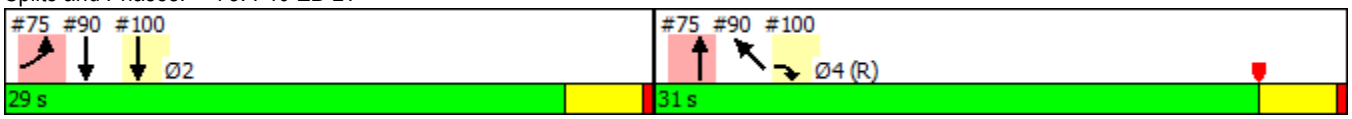


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	0	0	1082	0	0
Future Volume (vph)	55	0	0	1082	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	5085	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	5085	0	0
Right Turn on Red	No	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			146	301	
Travel Time (s)	3.6			3.3	6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	0	0	1176	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	0	0	1176	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	-3			0	0	
Crosswalk Width(ft)	0			0	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9	15			9
Number of Detectors	1			1		
Detector Template	Left					
Leading Detector (ft)	20			20		
Trailing Detector (ft)	0			0		
Detector 1 Position(ft)	0			0		
Detector 1 Size(ft)	20			20		
Detector 1 Type	Cl+Ex			Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0		
Detector 1 Queue (s)	0.0			0.0		
Detector 1 Delay (s)	0.0			0.0		
Turn Type	Prot			NA		
Protected Phases	2			4		
Permitted Phases						
Detector Phase	2			4		
Switch Phase						
Minimum Initial (s)	4.0			4.0		
Minimum Split (s)	20.0			20.0		
Total Split (s)	29.0			31.0		
Total Split (%)	48.3%			51.7%		
Maximum Green (s)	25.0			27.0		
Yellow Time (s)	3.5			3.5		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
All-Red Time (s)	0.5			0.5		
Lost Time Adjust (s)	0.0			0.0		
Total Lost Time (s)	4.0			4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0		
Recall Mode	Min			C-Min		
Act Effct Green (s)	21.1			30.9		
Actuated g/C Ratio	0.35			0.52		
v/c Ratio	0.10			0.45		
Control Delay	11.9			2.3		
Queue Delay	0.0			0.0		
Total Delay	11.9			2.3		
LOS	B			A		
Approach Delay	11.9			2.3		
Approach LOS	B			A		
Queue Length 50th (ft)	14			12		
Queue Length 95th (ft)	31			15		
Internal Link Dist (ft)	80			66	221	
Turn Bay Length (ft)						
Base Capacity (vph)	737			2622		
Starvation Cap Reductn	0			150		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.08			0.48		

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 2.8		Intersection LOS: A	
Intersection Capacity Utilization 30.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 75: I-40 EB LT

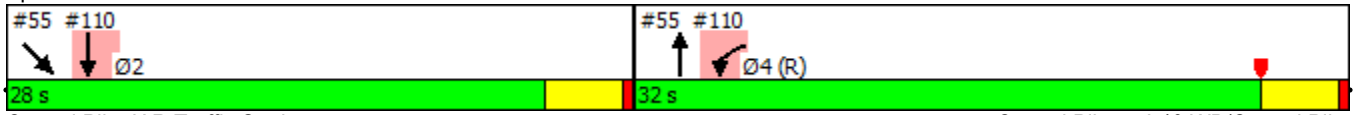


Lane Group	NBT	SET	SER2
Lane Configurations			
Traffic Volume (vph)	537	401	318
Future Volume (vph)	537	401	318
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor	0.95	0.95	1.00
Frt			0.850
Flt Protected			
Satd. Flow (prot)	3539	3539	1583
Flt Permitted			
Satd. Flow (perm)	3539	3539	1583
Right Turn on Red			Yes
Satd. Flow (RTOR)			335
Link Speed (mph)	30	30	
Link Distance (ft)	160	301	
Travel Time (s)	3.6	6.8	
Peak Hour Factor	0.95	0.95	0.95
Adj. Flow (vph)	565	422	335
Shared Lane Traffic (%)			
Lane Group Flow (vph)	565	422	335
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)	0	0	
Link Offset(ft)	-12	-12	
Crosswalk Width(ft)	16	16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)			9
Number of Detectors	1	2	1
Detector Template		Thru	Right
Leading Detector (ft)	50	100	20
Trailing Detector (ft)	0	0	0
Detector 1 Position(ft)	0	0	0
Detector 1 Size(ft)	50	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel			
Detector 1 Extend (s)	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0
Detector 2 Position(ft)		94	
Detector 2 Size(ft)		6	
Detector 2 Type		Cl+Ex	
Detector 2 Channel			
Detector 2 Extend (s)		0.0	
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free

Lane Group	NBT	SET	SER2
Detector Phase	4	2	
Switch Phase			
Minimum Initial (s)	4.0	4.0	
Minimum Split (s)	20.0	25.5	
Total Split (s)	32.0	28.0	
Total Split (%)	53.3%	46.7%	
Maximum Green (s)	28.0	24.0	
Yellow Time (s)	3.5	3.5	
All-Red Time (s)	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	4.0	4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	
Recall Mode	C-Max	Min	
Act Effct Green (s)	36.6	15.4	60.0
Actuated g/C Ratio	0.61	0.26	1.00
v/c Ratio	0.26	0.46	0.21
Control Delay	4.4	19.6	0.3
Queue Delay	0.0	0.0	0.0
Total Delay	4.4	19.6	0.3
LOS	A	B	A
Approach Delay	4.4	11.0	
Approach LOS	A	B	
Queue Length 50th (ft)	27	67	0
Queue Length 95th (ft)	41	86	0
Internal Link Dist (ft)	80	221	
Turn Bay Length (ft)			200
Base Capacity (vph)	2156	1415	1583
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.26	0.30	0.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 8.2		Intersection LOS: A	
Intersection Capacity Utilization 32.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 55: Central Pike at I-40 WB/Central Pike





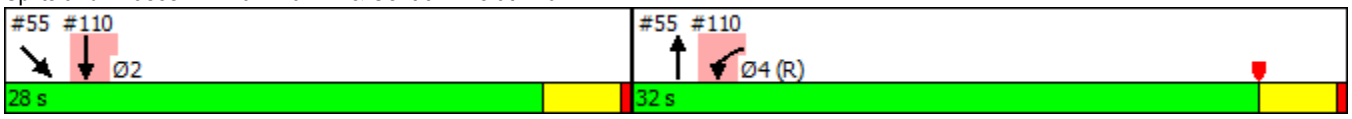
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	351	0	0	0	0	401
Future Volume (vph)	351	0	0	0	0	401
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	No	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	30		30			30
Link Distance (ft)	98		276			203
Travel Time (s)	2.2		6.3			4.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	369	0	0	0	0	422
Shared Lane Traffic (%)						
Lane Group Flow (vph)	369	0	0	0	0	422
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9		9	15	
Number of Detectors	1					2
Detector Template	Left					Thru
Leading Detector (ft)	20					100
Trailing Detector (ft)	0					0
Detector 1 Position(ft)	0					0
Detector 1 Size(ft)	20					6
Detector 1 Type	Cl+Ex					Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0					0.0
Detector 1 Queue (s)	0.0					0.0
Detector 1 Delay (s)	0.0					0.0
Detector 2 Position(ft)						94
Detector 2 Size(ft)						6
Detector 2 Type						Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)						0.0
Turn Type	Prot					NA
Protected Phases	4					2
Permitted Phases						
Detector Phase	4					2
Switch Phase						
Minimum Initial (s)	4.0					4.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.0					25.5
Total Split (s)	32.0					28.0
Total Split (%)	53.3%					46.7%
Maximum Green (s)	28.0					24.0
Yellow Time (s)	3.5					3.5
All-Red Time (s)	0.5					0.5
Lost Time Adjust (s)	0.0					0.0
Total Lost Time (s)	4.0					4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0					3.0
Recall Mode	C-Max					Min
Act Effct Green (s)	36.6					15.4
Actuated g/C Ratio	0.61					0.26
v/c Ratio	0.34					0.46
Control Delay	8.1					4.8
Queue Delay	0.0					0.0
Total Delay	8.1					4.9
LOS	A					A
Approach Delay	8.1					4.9
Approach LOS	A					A
Queue Length 50th (ft)	56					7
Queue Length 95th (ft)	135					10
Internal Link Dist (ft)	18		196			123
Turn Bay Length (ft)						
Base Capacity (vph)	1078					1415
Starvation Cap Reductn	0					112
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.34					0.32

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 6.4		Intersection LOS: A	
Intersection Capacity Utilization 37.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 110: I-40 WB & Central Pike at I-40 WB

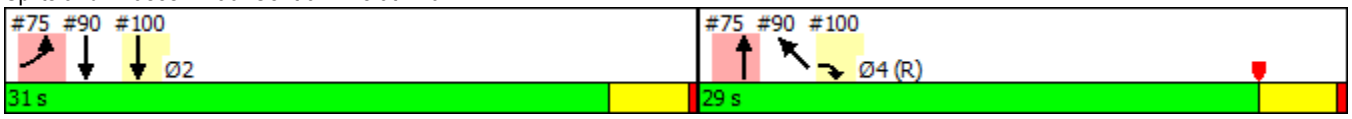


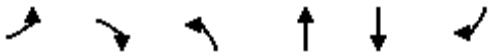
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	736	0	0	0	0	0	979	0
Future Volume (vph)	0	0	0	0	736	0	0	0	0	0	979	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	0	0	0	0	0	5085	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	0	0	0	0	0	5085	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		80			147			146			140	
Travel Time (s)		1.8			3.3			3.3			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	775	0	0	0	0	0	1031	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	775	0	0	0	0	0	1031	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		3			-24			12			0	
Crosswalk Width(ft)		16			0			0			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					1						2	
Detector Template											Thru	
Leading Detector (ft)					30						100	
Trailing Detector (ft)					0						0	
Detector 1 Position(ft)					0						0	
Detector 1 Size(ft)					30						6	
Detector 1 Type					Cl+Ex						Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)					0.0						0.0	
Detector 1 Queue (s)					0.0						0.0	
Detector 1 Delay (s)					0.0						0.0	
Detector 2 Position(ft)											94	
Detector 2 Size(ft)											6	
Detector 2 Type											Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)											0.0	
Turn Type					NA						NA	
Protected Phases					2						4	
Permitted Phases												
Detector Phase					2						4	
Switch Phase												
Minimum Initial (s)					4.0						4.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Minimum Split (s)					20.0						20.0	
Total Split (s)					31.0						29.0	
Total Split (%)					51.7%						48.3%	
Maximum Green (s)					27.0						25.0	
Yellow Time (s)					3.5						3.5	
All-Red Time (s)					0.5						0.5	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0						3.0	
Recall Mode					Min						C-Min	
Act Effct Green (s)					22.5						29.5	
Actuated g/C Ratio					0.38						0.49	
v/c Ratio					0.58						0.41	
Control Delay					13.4						11.3	
Queue Delay					0.0						0.0	
Total Delay					13.4						11.3	
LOS					B						B	
Approach Delay					13.4						11.3	
Approach LOS					B						B	
Queue Length 50th (ft)					60						84	
Queue Length 95th (ft)					88						128	
Internal Link Dist (ft)		1			67			66			60	
Turn Bay Length (ft)												
Base Capacity (vph)					1592						2498	
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					0						0	
Storage Cap Reductn					0						0	
Reduced v/c Ratio					0.49						0.41	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 45.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 90: Central Plke at I-40 EB



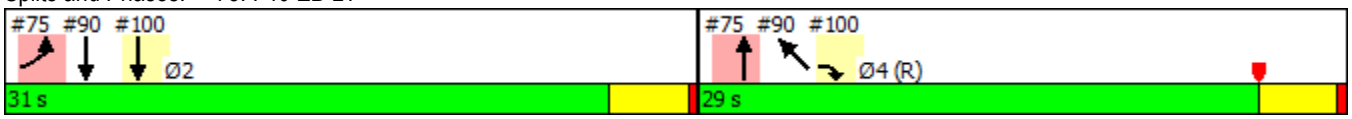


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	171	0	0	979	0	0
Future Volume (vph)	171	0	0	979	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	5085	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	5085	0	0
Right Turn on Red	No	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			146	301	
Travel Time (s)	3.6			3.3	6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	186	0	0	1064	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	186	0	0	1064	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	-3			0	0	
Crosswalk Width(ft)	0			0	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9	15			9
Number of Detectors	1			1		
Detector Template	Left					
Leading Detector (ft)	20			20		
Trailing Detector (ft)	0			0		
Detector 1 Position(ft)	0			0		
Detector 1 Size(ft)	20			20		
Detector 1 Type	Cl+Ex			Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0		
Detector 1 Queue (s)	0.0			0.0		
Detector 1 Delay (s)	0.0			0.0		
Turn Type	Prot			NA		
Protected Phases	2			4		
Permitted Phases						
Detector Phase	2			4		
Switch Phase						
Minimum Initial (s)	4.0			4.0		
Minimum Split (s)	20.0			20.0		
Total Split (s)	31.0			29.0		
Total Split (%)	51.7%			48.3%		
Maximum Green (s)	27.0			25.0		
Yellow Time (s)	3.5			3.5		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
All-Red Time (s)	0.5			0.5		
Lost Time Adjust (s)	0.0			0.0		
Total Lost Time (s)	4.0			4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0		
Recall Mode	Min			C-Min		
Act Effct Green (s)	22.5			29.5		
Actuated g/C Ratio	0.38			0.49		
v/c Ratio	0.28			0.43		
Control Delay	13.1			2.4		
Queue Delay	0.0			0.0		
Total Delay	13.1			2.4		
LOS	B			A		
Approach Delay	13.1			2.4		
Approach LOS	B			A		
Queue Length 50th (ft)	44			10		
Queue Length 95th (ft)	74			13		
Internal Link Dist (ft)	80			66	221	
Turn Bay Length (ft)						
Base Capacity (vph)	796			2498		
Starvation Cap Reductn	0			194		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.23			0.46		

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 4.0		Intersection LOS: A	
Intersection Capacity Utilization 35.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 75: I-40 EB LT

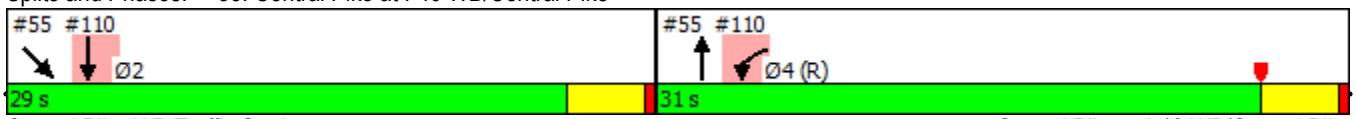


Lane Group	NBT	SET	SER2
Lane Configurations			
Traffic Volume (vph)	750	487	64
Future Volume (vph)	750	487	64
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor	0.95	0.95	1.00
Frt			0.850
Flt Protected			
Satd. Flow (prot)	3539	3539	1583
Flt Permitted			
Satd. Flow (perm)	3539	3539	1583
Right Turn on Red			Yes
Satd. Flow (RTOR)			91
Link Speed (mph)	30	30	
Link Distance (ft)	160	301	
Travel Time (s)	3.6	6.8	
Peak Hour Factor	0.95	0.95	0.95
Adj. Flow (vph)	789	513	67
Shared Lane Traffic (%)			
Lane Group Flow (vph)	789	513	67
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)	0	0	
Link Offset(ft)	-12	-12	
Crosswalk Width(ft)	16	16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)			9
Number of Detectors	1	2	1
Detector Template		Thru	Right
Leading Detector (ft)	50	100	20
Trailing Detector (ft)	0	0	0
Detector 1 Position(ft)	0	0	0
Detector 1 Size(ft)	50	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel			
Detector 1 Extend (s)	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0
Detector 2 Position(ft)		94	
Detector 2 Size(ft)		6	
Detector 2 Type		Cl+Ex	
Detector 2 Channel			
Detector 2 Extend (s)		0.0	
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free

Lane Group	NBT	SET	SER2
Detector Phase	4	2	
Switch Phase			
Minimum Initial (s)	4.0	4.0	
Minimum Split (s)	20.0	25.5	
Total Split (s)	31.0	29.0	
Total Split (%)	51.7%	48.3%	
Maximum Green (s)	27.0	25.0	
Yellow Time (s)	3.5	3.5	
All-Red Time (s)	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	4.0	4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	
Recall Mode	C-Max	Min	
Act Effct Green (s)	33.9	18.1	60.0
Actuated g/C Ratio	0.56	0.30	1.00
v/c Ratio	0.39	0.48	0.04
Control Delay	6.5	17.8	0.0
Queue Delay	0.0	0.0	0.0
Total Delay	6.5	17.8	0.0
LOS	A	B	A
Approach Delay	6.5	15.7	
Approach LOS	A	B	
Queue Length 50th (ft)	53	78	0
Queue Length 95th (ft)	85	96	0
Internal Link Dist (ft)	80	221	
Turn Bay Length (ft)			200
Base Capacity (vph)	1998	1474	1583
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.39	0.35	0.04

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 10.4		Intersection LOS: B	
Intersection Capacity Utilization 40.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 55: Central Pike at I-40 WB/Central Pike





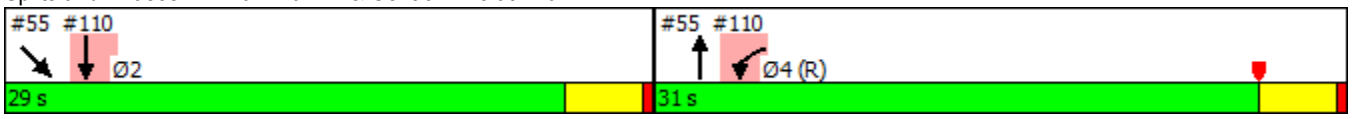
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	284	0	0	0	0	487
Future Volume (vph)	284	0	0	0	0	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	No	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	30		30			30
Link Distance (ft)	98		276			203
Travel Time (s)	2.2		6.3			4.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	299	0	0	0	0	513
Shared Lane Traffic (%)						
Lane Group Flow (vph)	299	0	0	0	0	513
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9		9	15	
Number of Detectors	1					2
Detector Template	Left					Thru
Leading Detector (ft)	20					100
Trailing Detector (ft)	0					0
Detector 1 Position(ft)	0					0
Detector 1 Size(ft)	20					6
Detector 1 Type	Cl+Ex					Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0					0.0
Detector 1 Queue (s)	0.0					0.0
Detector 1 Delay (s)	0.0					0.0
Detector 2 Position(ft)						94
Detector 2 Size(ft)						6
Detector 2 Type						Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)						0.0
Turn Type	Prot					NA
Protected Phases	4					2
Permitted Phases						
Detector Phase	4					2
Switch Phase						
Minimum Initial (s)	4.0					4.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.0					25.5
Total Split (s)	31.0					29.0
Total Split (%)	51.7%					48.3%
Maximum Green (s)	27.0					25.0
Yellow Time (s)	3.5					3.5
All-Red Time (s)	0.5					0.5
Lost Time Adjust (s)	0.0					0.0
Total Lost Time (s)	4.0					4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0					3.0
Recall Mode	C-Max					Min
Act Effct Green (s)	33.9					18.1
Actuated g/C Ratio	0.56					0.30
v/c Ratio	0.30					0.48
Control Delay	9.3					4.5
Queue Delay	0.0					0.0
Total Delay	9.3					4.5
LOS	A					A
Approach Delay	9.3					4.5
Approach LOS	A					A
Queue Length 50th (ft)	51					8
Queue Length 95th (ft)	119					12
Internal Link Dist (ft)	18		196			123
Turn Bay Length (ft)						
Base Capacity (vph)	999					1474
Starvation Cap Reductn	0					118
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.30					0.38

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 6.3		Intersection LOS: A	
Intersection Capacity Utilization 35.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 110: I-40 WB & Central Pike at I-40 WB



SR 265 No Build Alternative (2040)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	237	184	276	329	754	315	1014	389	216	681	5
Future Volume (vph)	52	237	184	276	329	754	315	1014	389	216	681	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948				0.850		0.958			0.999	
Flt Protected		0.994			0.978		0.950			0.950		
Satd. Flow (prot)	0	1722	0	0	1787	1553	1736	1750	0	1736	1825	0
Flt Permitted		0.346			0.489		0.062			0.067		
Satd. Flow (perm)	0	599	0	0	893	1553	113	1750	0	122	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26				119		16				
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		547			1559			1697			839	
Travel Time (s)		10.7			30.4			25.7			12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	57	258	200	300	358	820	342	1102	423	235	740	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	515	0	0	658	820	342	1525	0	235	745	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	67.0	67.0		67.0	67.0	67.0	17.0	70.0		13.0	66.0	
Total Split (%)	44.7%	44.7%		44.7%	44.7%	44.7%	11.3%	46.7%		8.7%	44.0%	
Maximum Green (s)	61.0	61.0		61.0	61.0	61.0	11.0	64.0		7.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	
Act Effct Green (s)		61.0			61.0	61.0	75.0	64.0		67.0	60.0	
Actuated g/C Ratio		0.41			0.41	0.41	0.50	0.43		0.45	0.40	
v/c Ratio		1.99			1.81	1.17	1.95	2.02		1.82	1.02	
Control Delay		483.5			404.8	124.9	474.8	488.9		422.7	82.6	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		483.5			404.8	124.9	474.8	488.9		422.7	82.6	
LOS		F			F	F	F	F		F	F	
Approach Delay		483.5			249.5			486.3			164.1	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~773			~966	~881	~470	~2338		~297	~771	
Queue Length 95th (ft)		#768			#1212	#1140	#676	#2608		#478	#1022	
Internal Link Dist (ft)		467			1479			1617			759	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		259			363	702	175	755		129	730	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		1.99			1.81	1.17	1.95	2.02		1.82	1.02	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 2.02			
Intersection Signal Delay: 348.5		Intersection LOS: F	
Intersection Capacity Utilization 168.2%		ICU Level of Service H	
Analysis Period (min) 15			

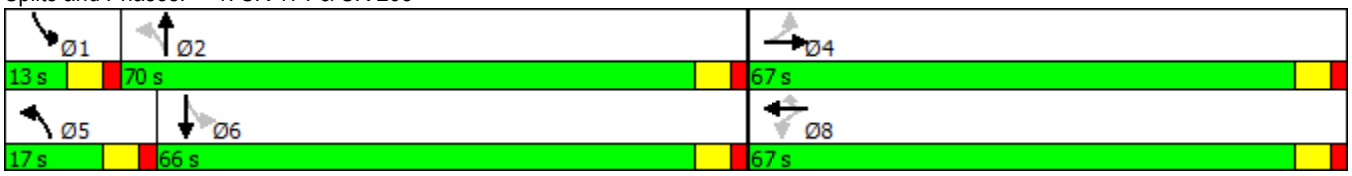
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265



Intersection	
Intersection Delay, s/veh	265.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	194	74	44	347	98	152	363	143	152	342	51
Future Vol, veh/h	10	194	74	44	347	98	152	363	143	152	342	51
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	211	80	48	377	107	165	395	155	165	372	55
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	58.3	202.7	395.2	272
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	23%	4%	9%	28%
Vol Thru, %	55%	70%	71%	63%
Vol Right, %	22%	27%	20%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	658	278	489	545
LT Vol	152	10	44	152
Through Vol	363	194	347	342
RT Vol	143	74	98	51
Lane Flow Rate	715	302	532	592
Geometry Grp	1	1	1	1
Degree of Util (X)	1.792	0.798	1.329	1.498
Departure Headway (Hd)	11.476	14.828	12.316	12.381
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	322	248	298	302
Service Time	9.476	12.828	10.316	10.381
HCM Lane V/C Ratio	2.22	1.218	1.785	1.96
HCM Control Delay	395.2	58.3	202.7	272
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	36.8	6	19.5	24.7

Intersection	
Int Delay, s/veh	10.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	101	338	439	32	61	241
Future Vol, veh/h	101	338	439	32	61	241
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	110	367	477	35	66	262

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	512	0	-	0	1082	495
Stage 1	-	-	-	-	495	-
Stage 2	-	-	-	-	587	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	1043	-	-	-	239	571
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	552	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1043	-	-	-	207	571
Mov Cap-2 Maneuver	-	-	-	-	207	-
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	479	-

Approach	EB	WB	SB
HCM Control Delay, s	2	0	37.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1043	-	-	-	421
HCM Lane V/C Ratio	0.105	-	-	-	0.78
HCM Control Delay (s)	8.9	0	-	-	37.9
HCM Lane LOS	A	A	-	-	E
HCM 95th %tile Q(veh)	0.4	-	-	-	6.7

Intersection	
Int Delay, s/veh	0.3

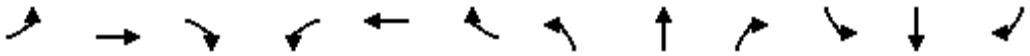
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	10	461	10	5	394
Future Vol, veh/h	5	10	461	10	5	394
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	11	501	11	5	428

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	946	507	0	0	512	0
Stage 1	507	-	-	-	-	-
Stage 2	439	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	290	566	-	-	1053	-
Stage 1	605	-	-	-	-	-
Stage 2	650	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	288	566	-	-	1053	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	605	-	-	-	-	-
Stage 2	646	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	428	1053	-
HCM Lane V/C Ratio	-	-	0.038	0.005	-
HCM Control Delay (s)	-	-	13.7	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	428	390	411	331	420	291	844	315	750	1064	16
Future Volume (vph)	65	428	390	411	331	420	291	844	315	750	1064	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		34	81		0	196		0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940				0.850		0.959			0.998	
Flt Protected		0.996			0.973		0.950			0.950		
Satd. Flow (prot)	0	1710	0	0	1778	1553	1736	1752	0	1736	1823	0
Flt Permitted		0.153			0.264		0.085			0.075		
Satd. Flow (perm)	0	263	0	0	482	1553	155	1752	0	137	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		33				109		13			1	
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		547			1559			1697			836	
Travel Time (s)		10.7			30.4			25.7			12.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	68	451	411	433	348	442	306	888	332	789	1120	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	930	0	0	781	442	306	1220	0	789	1137	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2			6		
Detector Phase	4	4		8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	10.0	22.0		10.0	22.0	
Total Split (s)	70.0	70.0		70.0	70.0	70.0	14.0	53.0		27.0	66.0	
Total Split (%)	46.7%	46.7%		46.7%	46.7%	46.7%	9.3%	35.3%		18.0%	44.0%	
Maximum Green (s)	64.0	64.0		64.0	64.0	64.0	8.0	47.0		21.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	None	Max		None	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0			11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0		0			0	
Act Effct Green (s)		64.0			64.0	64.0	55.0	47.0		74.0	60.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.37	0.31		0.49	0.40	
v/c Ratio		7.10			3.81	0.61	2.17	2.19		2.71	1.56	
Control Delay		2768.5			1290.8	28.6	571.7	566.9		800.0	290.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		2768.5			1290.8	28.6	571.7	566.9		800.0	290.8	
LOS		F			F	C	F	F		F	F	
Approach Delay		2768.5			834.6			567.8			499.4	
Approach LOS		F			F			F			F	
Queue Length 50th (ft)		~1646			~1190	252	~432	~1918		~1268	~1577	
Queue Length 95th (ft)		#1909			#1445	372	#629	#2187		#1525	#1846	
Internal Link Dist (ft)		467			1479			1617			756	
Turn Bay Length (ft)						34	81			196		
Base Capacity (vph)		131			205	725	141	557		291	729	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		7.10			3.81	0.61	2.17	2.19		2.71	1.56	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 7.10			
Intersection Signal Delay: 967.7		Intersection LOS: F	
Intersection Capacity Utilization 215.3%		ICU Level of Service H	
Analysis Period (min) 15			

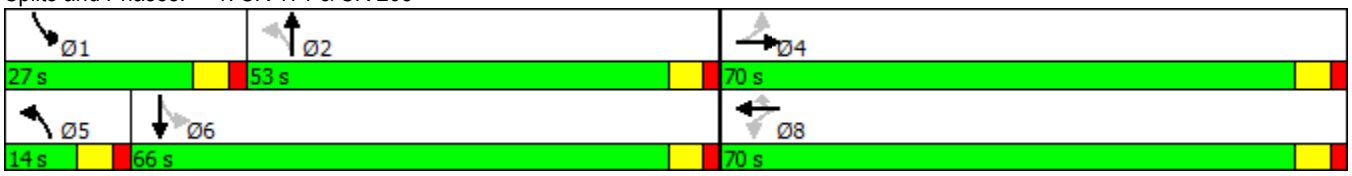
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265



Intersection	
Intersection Delay, s/veh	567.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	510	202	203	356	349	122	399	108	197	447	57
Future Vol, veh/h	21	510	202	203	356	349	122	399	108	197	447	57
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	22	537	213	214	375	367	128	420	114	207	471	60
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	535.1	738.7	421.8	510.7
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	19%	3%	22%	28%
Vol Thru, %	63%	70%	39%	64%
Vol Right, %	17%	28%	38%	8%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	629	733	908	701
LT Vol	122	21	203	197
Through Vol	399	510	356	447
RT Vol	108	202	349	57
Lane Flow Rate	662	772	956	738
Geometry Grp	1	1	1	1
Degree of Util (X)	1.766	2.037	2.517	1.983
Departure Headway (Hd)	24.588	23.362	20.545	22.99
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	159	162	191	170
Service Time	22.588	21.362	18.545	20.99
HCM Lane V/C Ratio	4.164	4.765	5.005	4.341
HCM Control Delay	421.8	535.1	738.7	510.7
HCM Lane LOS	F	F	F	F
HCM 95th-tile Q	19.1	24.7	37.6	24.1

Intersection	
Int Delay, s/veh	51.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	83	461	722	47	95	230
Future Vol, veh/h	83	461	722	47	95	230
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	87	485	760	49	100	242

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	809	0	-	0	1445	785
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	660	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	808	-	-	-	144	390
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	510	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	808	-	-	-	123	390
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	435	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	255.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	808	-	-	-	239
HCM Lane V/C Ratio	0.108	-	-	-	1.431
HCM Control Delay (s)	10	0	-	-	255.4
HCM Lane LOS	A	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	19.5

Intersection	
Int Delay, s/veh	0.4

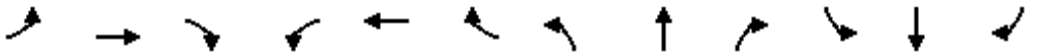
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	5	764	5	10	546
Future Vol, veh/h	10	5	764	5	10	546
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	830	5	11	593

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1448	833	0	0	836	0
Stage 1	833	-	-	-	-	-
Stage 2	615	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	145	369	-	-	798	-
Stage 1	427	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	142	369	-	-	798	-
Mov Cap-2 Maneuver	142	-	-	-	-	-
Stage 1	427	-	-	-	-	-
Stage 2	528	-	-	-	-	-

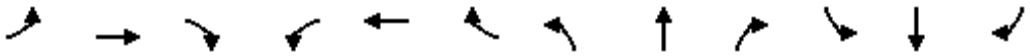
Approach	WB	NB	SB
HCM Control Delay, s	27.1	0	0.2
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	179	798	-
HCM Lane V/C Ratio	-	-	0.091	0.014	-
HCM Control Delay (s)	-	-	27.1	9.6	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

SR 265 Diamond & DDI Build Alternatives (2040)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	227	423	248	276	630	494	552	777	389	157	617	106
Future Volume (vph)	227	423	248	276	630	494	552	777	389	157	617	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	2		1	2		1	2		1	2		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3367	3471	1553	3367	3471	1553	3367	3471	1553	3367	3471	1553
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3367	3471	1553	3367	3471	1553	3367	3471	1553	3367	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			123			205			123			205
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		2141			1559			1697			859	
Travel Time (s)		41.7			30.4			25.7			13.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	247	460	270	300	685	537	600	845	423	171	671	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	247	460	270	300	685	537	600	845	423	171	671	115
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	8 1	5	2	2 3	1	6	7



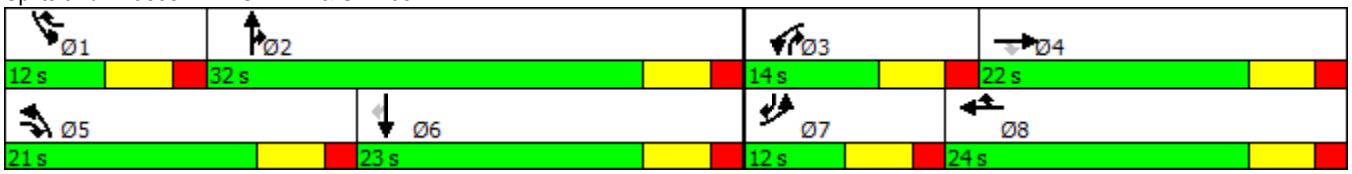
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4									6
Detector Phase	7	4	5	3	8	8 1	5	2	2 3	1	6	7
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	10.0	22.0	10.0	10.0	22.0		10.0	22.0		10.0	22.0	10.0
Total Split (s)	12.0	22.0	21.0	14.0	24.0		21.0	32.0		12.0	23.0	12.0
Total Split (%)	15.0%	27.5%	26.3%	17.5%	30.0%		26.3%	40.0%		15.0%	28.8%	15.0%
Maximum Green (s)	6.0	16.0	15.0	8.0	18.0		15.0	26.0		6.0	17.0	6.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Max		None	Max	None
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	6.0	16.0	37.0	8.0	18.0	30.0	15.0	26.0	40.0	6.0	17.0	29.0
Actuated g/C Ratio	0.08	0.20	0.46	0.10	0.22	0.38	0.19	0.32	0.50	0.08	0.21	0.36
v/c Ratio	0.98	0.66	0.34	0.89	0.88	0.76	0.95	0.75	0.50	0.68	0.91	0.17
Control Delay	91.9	34.8	8.6	65.9	44.4	21.3	59.6	29.1	11.6	50.9	49.5	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	91.9	34.8	8.6	65.9	44.4	21.3	59.6	29.1	11.6	50.9	49.5	0.6
LOS	F	C	A	E	D	C	E	C	B	D	D	A
Approach Delay		42.0			40.5			34.9			43.9	
Approach LOS		D			D			C			D	
Queue Length 50th (ft)	64	112	42	77	174	142	154	195	91	43	173	0
Queue Length 95th (ft)	#137	162	92	#148	#270	#276	#254	263	167	#86	#273	2
Internal Link Dist (ft)		2061			1479			1617			779	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	252	694	784	336	780	710	631	1128	838	252	737	693
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.66	0.34	0.89	0.88	0.76	0.95	0.75	0.50	0.68	0.91	0.17

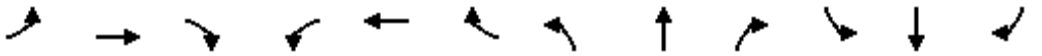
Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Natural Cycle: 80			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 39.4		Intersection LOS: D	
Intersection Capacity Utilization 76.7%		ICU Level of Service D	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

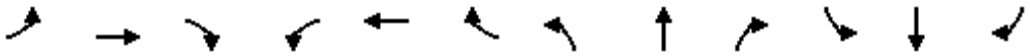
Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	104	74	44	83	645	152	1002	143	649	767	315
Future Volume (vph)	116	104	74	44	83	645	152	1002	143	649	767	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	2		1	2		1	1		1	2		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3367	1827	1553	3367	1827	2733	1736	3471	1553	3367	3471	1553
Flt Permitted	0.950			0.950			0.338			0.950		
Satd. Flow (perm)	3367	1827	1553	3367	1827	2733	617	3471	1553	3367	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			109			182			342
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		720			602			957			1493	
Travel Time (s)		16.4			13.7			14.5			22.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	126	113	80	48	90	701	165	1089	155	705	834	342
Shared Lane Traffic (%)												
Lane Group Flow (vph)	126	113	80	48	90	701	165	1089	155	705	834	342
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4			8	2		2			6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	22.0	10.0	10.0	22.0	10.0	10.0	22.0	10.0	10.0	22.0	10.0
Total Split (s)	10.0	22.0	15.0	10.0	22.0	24.0	15.0	34.0	10.0	24.0	43.0	10.0
Total Split (%)	11.1%	24.4%	16.7%	11.1%	24.4%	26.7%	16.7%	37.8%	11.1%	26.7%	47.8%	11.1%
Maximum Green (s)	4.0	16.0	9.0	4.0	16.0	18.0	9.0	28.0	4.0	18.0	37.0	4.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	None	C-Max	None	None	C-Max	None
Act Effct Green (s)	4.0	10.8	22.9	4.0	10.7	37.6	39.0	30.4	40.4	23.3	45.1	55.1
Actuated g/C Ratio	0.04	0.12	0.25	0.04	0.12	0.42	0.43	0.34	0.45	0.26	0.50	0.61
v/c Ratio	0.85	0.51	0.15	0.32	0.41	0.58	0.44	0.93	0.19	0.81	0.48	0.32
Control Delay	86.4	44.8	0.6	47.7	41.5	18.5	13.7	44.8	2.3	41.3	17.7	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.4	44.8	0.6	47.7	41.5	18.5	13.7	44.8	2.3	41.3	17.7	2.1
LOS	F	D	A	D	D	B	B	D	A	D	B	A
Approach Delay		50.1			22.6			36.5			23.7	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	37	61	0	13	48	134	34	~328	0	194	167	0
Queue Length 95th (ft)	#88	109	0	31	90	193	68	#471	25	#323	248	39
Internal Link Dist (ft)		640			522			877			1413	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	149	324	543	149	324	1204	390	1173	797	870	1740	1083
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.35	0.15	0.32	0.28	0.58	0.42	0.93	0.19	0.81	0.48	0.32

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 83 (92%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 29.5 Intersection LOS: C
Intersection Capacity Utilization 71.2% ICU Level of Service C
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: Central Pike & John Hager Rd/Adams Ln

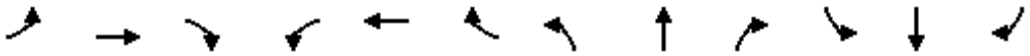


Intersection	
Intersection Delay, s/veh	14.6
Intersection LOS	B

Approach	EB	WB	SB
Entry Lanes	2	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	541	637	679
Demand Flow Rate, veh/h	563	662	706
Vehicles Circulating, veh/h	468	48	496
Vehicles Exiting, veh/h	496	983	48
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	20.4	7.7	16.4
Approach LOS	C	A	C

Lane	Left	Right	Left	Bypass	Left	Bypass
Designated Moves	L	TR	T	R	L	R
Assumed Moves	L	TR	T	R	L	R
RT Channelized				Yield		Yield
Lane Util	0.085	0.915	1.000		1.000	
Critical Headway, s	5.193	5.193	5.193		5.193	
Entry Flow, veh/h	48	515	496	166	468	238
Cap Entry Lane, veh/h	708	708	1077	1077	688	688
Entry HV Adj Factor	0.958	0.962	0.962	0.962	0.962	0.962
Flow Entry, veh/h	46	495	477	160	450	229
Cap Entry, veh/h	678	680	1036	1036	662	662
V/C Ratio	0.068	0.728	0.461	0.155	0.680	0.346
Control Delay, s/veh	6.0	21.7	8.7	4.9	19.6	10.0
LOS	A	C	A	A	C	B
95th %tile Queue, veh	0	6	2	1	5	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	734	489	411	551	291	409	726	315	541	965	237
Future Volume (vph)	161	734	489	411	551	291	409	726	315	541	965	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	2		1	2		1	2		1	2		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3367	3471	1553	3367	3471	1553	3367	3471	1553	3367	3471	1553
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3367	3471	1553	3367	3471	1553	3367	3471	1553	3367	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			98			98			98			98
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		547			1559			1697			851	
Travel Time (s)		10.7			30.4			25.7			12.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	169	773	515	433	580	306	431	764	332	569	1016	249
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	773	515	433	580	306	431	764	332	569	1016	249
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane											Yes	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	8 1	5	2	2 3	1	6	7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4									6
Detector Phase	7	4	5	3	8	8 1	5	2	2 3	1	6	7
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	10.0	22.0	10.0	10.0	22.0		10.0	22.0		10.0	22.0	10.0
Total Split (s)	15.0	27.0	19.0	18.0	30.0		19.0	32.0		23.0	36.0	15.0
Total Split (%)	15.0%	27.0%	19.0%	18.0%	30.0%		19.0%	32.0%		23.0%	36.0%	15.0%
Maximum Green (s)	9.0	21.0	13.0	12.0	24.0		13.0	26.0		17.0	30.0	9.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Max		None	Max	None
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	8.7	21.0	40.0	12.0	24.3	47.3	13.0	26.0	44.0	17.0	30.0	44.7
Actuated g/C Ratio	0.09	0.21	0.40	0.12	0.24	0.47	0.13	0.26	0.44	0.17	0.30	0.45
v/c Ratio	0.58	1.06	0.76	1.07	0.69	0.39	0.99	0.85	0.45	0.99	0.98	0.33
Control Delay	52.2	89.9	29.1	108.1	39.4	13.0	84.4	45.4	15.6	78.9	58.2	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.2	89.9	29.1	108.1	39.4	13.0	84.4	45.4	15.6	78.9	58.2	11.8
LOS	D	F	C	F	D	B	F	D	B	E	E	B
Approach Delay		64.1			55.8			49.9			58.3	
Approach LOS		E			E			D			E	
Queue Length 50th (ft)	54	~286	228	~158	178	80	143	243	98	188	336	57
Queue Length 95th (ft)	88	#405	365	#255	238	145	#242	#338	174	#301	#475	114
Internal Link Dist (ft)		467			1479			1617			771	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	303	728	680	404	844	786	437	902	738	572	1041	752
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	1.06	0.76	1.07	0.69	0.39	0.99	0.85	0.45	0.99	0.98	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 57.1		Intersection LOS: E	
Intersection Capacity Utilization 90.4%		ICU Level of Service E	
Analysis Period (min) 15			

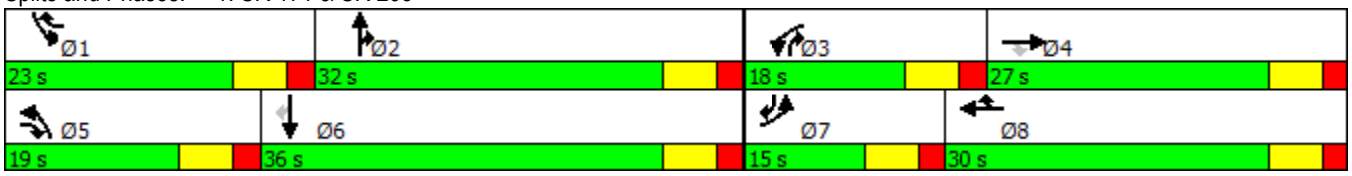
~ Volume exceeds capacity, queue is theoretically infinite.

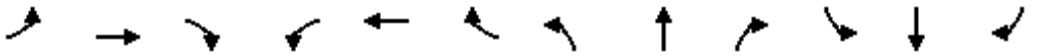
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

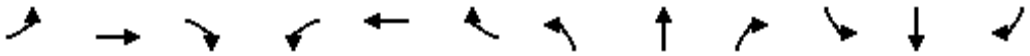
Queue shown is maximum after two cycles.

Splits and Phases: 1: SR 171 & SR 265





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	455	143	202	203	136	1071	122	958	108	740	948	277
Future Volume (vph)	455	143	202	203	136	1071	122	958	108	740	948	277
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	200		200	200		200
Storage Lanes	2		1	2		1	1		1	2		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3367	1827	1553	3367	1827	2733	1736	3471	1553	3367	3471	1553
Flt Permitted	0.950			0.950			0.239			0.950		
Satd. Flow (perm)	3367	1827	1553	3367	1827	2733	437	3471	1553	3367	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			149			89			149			292
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		720			602			957			1493	
Travel Time (s)		16.4			13.7			14.5			22.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	479	151	213	214	143	1127	128	1008	114	779	998	292
Shared Lane Traffic (%)												
Lane Group Flow (vph)	479	151	213	214	143	1127	128	1008	114	779	998	292
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	pm+ov	Prot	NA	pt+ov	pm+pt	NA	pm+ov	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	8 1	5	2	3	1	6	7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4				2		2			6
Detector Phase	7	4	5	3	8	8 1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	10.0	22.0	10.0	10.0	22.0		10.0	22.0	10.0	10.0	22.0	10.0
Total Split (s)	21.0	25.0	16.0	18.0	22.0		16.0	37.0	18.0	30.0	51.0	21.0
Total Split (%)	19.1%	22.7%	14.5%	16.4%	20.0%		14.5%	33.6%	16.4%	27.3%	46.4%	19.1%
Maximum Green (s)	15.0	19.0	10.0	12.0	16.0		10.0	31.0	12.0	24.0	45.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	C-Max	None	None	C-Max	None
Act Effct Green (s)	15.0	19.8	34.7	11.2	16.0	46.0	39.9	31.0	48.2	24.0	46.1	67.1
Actuated g/C Ratio	0.14	0.18	0.32	0.10	0.15	0.42	0.36	0.28	0.44	0.22	0.42	0.61
v/c Ratio	1.04	0.46	0.36	0.63	0.54	0.94	0.49	1.03	0.15	1.06	0.69	0.28
Control Delay	100.3	45.9	11.3	55.9	51.9	44.6	21.3	76.2	1.7	92.5	29.3	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	100.3	45.9	11.3	55.9	51.9	44.6	21.3	76.2	1.7	92.5	29.3	1.8
LOS	F	D	B	E	D	D	C	E	A	F	C	A
Approach Delay		68.1			47.0			63.8			49.2	
Approach LOS		E			D			E			D	
Queue Length 50th (ft)	~189	97	32	75	95	400	41	~402	0	~312	298	0
Queue Length 95th (ft)	#294	163	92	115	161	#566	72	#532	17	#433	378	33
Internal Link Dist (ft)		640			522			877			1413	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	459	329	606	367	265	1194	280	978	774	734	1454	1061
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.46	0.35	0.58	0.54	0.94	0.46	1.03	0.15	1.06	0.69	0.28

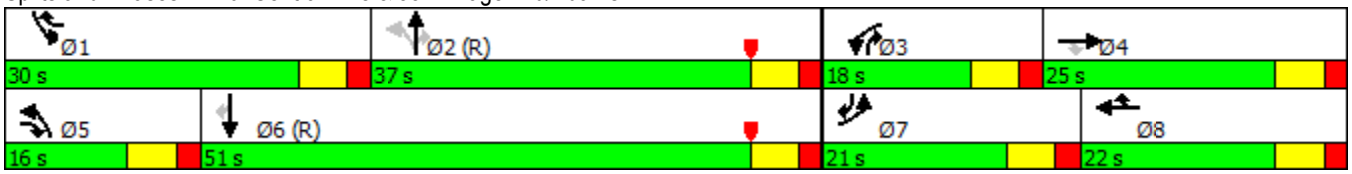
Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 82 (75%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 54.7 Intersection LOS: D
Intersection Capacity Utilization 91.9% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 10: Central Pike & John Hager Rd/Adams Ln

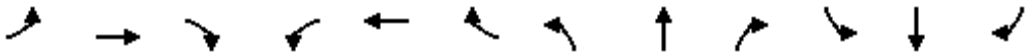


Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

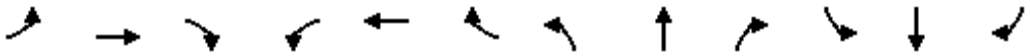
Approach	EB	WB	SB
Entry Lanes	2	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	609	1067	390
Demand Flow Rate, veh/h	633	1109	405
Vehicles Circulating, veh/h	212	59	790
Vehicles Exiting, veh/h	790	786	59
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	13.0	13.7	14.0
Approach LOS	B	B	B

Lane	Left	Right	Left	Bypass	Left	Bypass
Designated Moves	L	TR	T	R	L	R
Assumed Moves	L	TR	T	R	L	R
RT Channelized				Yield		Yield
Lane Util	0.093	0.907	1.000		1.000	
Critical Headway, s	5.193	5.193	5.193		5.193	
Entry Flow, veh/h	59	574	790	319	212	193
Cap Entry Lane, veh/h	914	914	1065	1065	513	513
Entry HV Adj Factor	0.966	0.962	0.962	0.962	0.962	0.962
Flow Entry, veh/h	57	552	760	307	204	186
Cap Entry, veh/h	883	879	1024	1024	493	493
V/C Ratio	0.065	0.628	0.742	0.300	0.413	0.377
Control Delay, s/veh	4.7	13.9	16.6	6.5	14.4	13.5
LOS	A	B	C	A	B	B
95th %tile Queue, veh	0	5	7	1	2	2

SR 265 Diamond Build Alternative (2040)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	0	836	0	0	0	0	1634	129	35	894	0
Future Volume (vph)	118	0	836	0	0	0	0	1634	129	35	894	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	0		250	150		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	*1.00	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1736	0	2733	0	0	0	0	5481	1553	1736	3471	0
Flt Permitted	0.950									0.099		
Satd. Flow (perm)	1736	0	2733	0	0	0	0	5481	1553	181	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164						140			
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1380			665			636			528	
Travel Time (s)		31.4			15.1			9.6			8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	128	0	909	0	0	0	0	1776	140	38	972	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	128	0	909	0	0	0	0	1776	140	38	972	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					2	1	1	2	
Detector Template	Left		Right					Thru	Right	Left	Thru	
Leading Detector (ft)	20		20					100	20	20	100	
Trailing Detector (ft)	0		0					0	0	0	0	
Detector 1 Position(ft)	0		0					0	0	0	0	
Detector 1 Size(ft)	20		20					6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Prot		Perm					NA	Perm	pm+pt	NA	
Protected Phases	4							2		1	6	

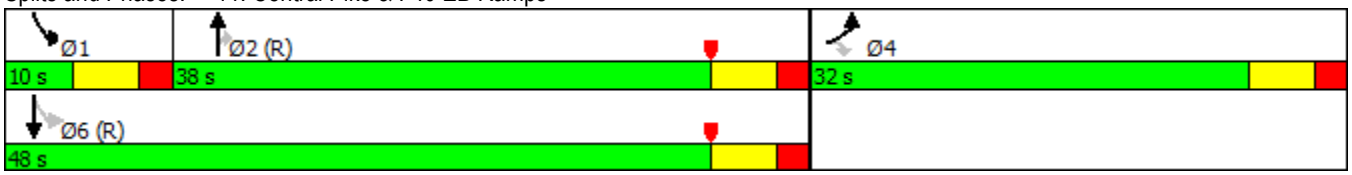


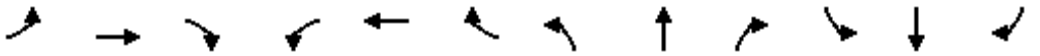
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases			4						2	6		
Detector Phase	4		4					2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0		6.0					8.0	8.0	4.0	8.0	
Minimum Split (s)	22.0		22.0					22.0	22.0	10.0	22.0	
Total Split (s)	32.0		32.0					38.0	38.0	10.0	48.0	
Total Split (%)	40.0%		40.0%					47.5%	47.5%	12.5%	60.0%	
Maximum Green (s)	26.0		26.0					32.0	32.0	4.0	42.0	
Yellow Time (s)	4.0		4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Recall Mode	None		None					C-Max	C-Max	None	C-Max	
Walk Time (s)	5.0		5.0					5.0	5.0		5.0	
Flash Dont Walk (s)	11.0		11.0					11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0		0					0	0		0	
Act Effct Green (s)	25.2		25.2					36.8	36.8	42.8	42.8	
Actuated g/C Ratio	0.32		0.32					0.46	0.46	0.54	0.54	
v/c Ratio	0.23		0.93					0.71	0.18	0.21	0.52	
Control Delay	21.2		39.4					20.3	3.6	10.5	12.9	
Queue Delay	0.0		0.0					0.0	0.0	0.0	0.0	
Total Delay	21.2		39.4					20.3	3.6	10.5	12.9	
LOS	C		D					C	A	B	B	
Approach Delay		37.2						19.1			12.8	
Approach LOS		D						B			B	
Queue Length 50th (ft)	46		205					256	0	15	278	
Queue Length 95th (ft)	87		#338					310	33	m16	m324	
Internal Link Dist (ft)		1300			585			556			448	
Turn Bay Length (ft)			300						250	150		
Base Capacity (vph)	564		998					2518	789	180	1855	
Starvation Cap Reductn	0		0					0	0	0	0	
Spillback Cap Reductn	0		0					0	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.23		0.91					0.71	0.18	0.21	0.52	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 50 (63%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 22.2		Intersection LOS: C	
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

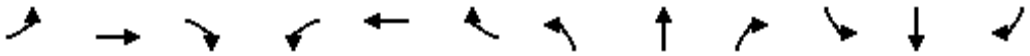
* User Entered Value
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Central Pike & I-40 EB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	351	0	44	1163	589	0	0	578	435
Future Volume (vph)	0	0	0	351	0	44	1163	589	0	0	578	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		300	150		0	0		250
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						123						386
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		521			649			528			993	
Travel Time (s)		11.8			14.8			8.0			15.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	382	0	48	1264	640	0	0	628	473
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	382	0	48	1264	640	0	0	628	473
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	

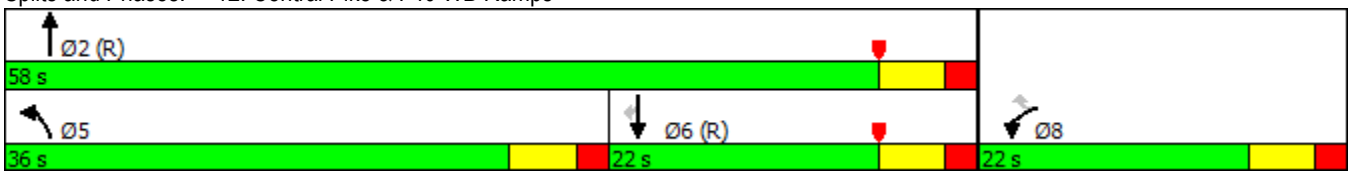


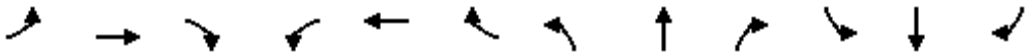
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						8						6
Detector Phase				8		8	5	2			6	6
Switch Phase												
Minimum Initial (s)				6.0		6.0	4.0	8.0			8.0	8.0
Minimum Split (s)				22.0		22.0	10.0	22.0			22.0	22.0
Total Split (s)				22.0		22.0	36.0	58.0			22.0	22.0
Total Split (%)				27.5%		27.5%	45.0%	72.5%			27.5%	27.5%
Maximum Green (s)				16.0		16.0	30.0	52.0			16.0	16.0
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Max			C-Max	C-Max
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				13.8		13.8	32.2	54.2			16.0	16.0
Actuated g/C Ratio				0.17		0.17	0.40	0.68			0.20	0.20
v/c Ratio				0.66		0.13	0.93	0.27			0.90	0.76
Control Delay				36.4		0.7	17.9	1.6			49.9	16.0
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				36.4		0.7	17.9	1.6			49.9	16.0
LOS				D		A	B	A			D	B
Approach Delay					32.5			12.4			35.4	
Approach LOS					C			B			D	
Queue Length 50th (ft)				92		0	2	4			162	37
Queue Length 95th (ft)				132		0	#450	5			#260	#180
Internal Link Dist (ft)		441			569			448			913	
Turn Bay Length (ft)				200		300	150					250
Base Capacity (vph)				673		409	1353	2351			696	620
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.57		0.12	0.93	0.27			0.90	0.76

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 22.3		Intersection LOS: C	
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

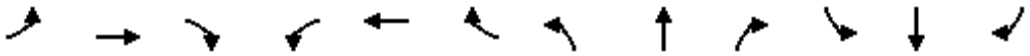
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Central Pike & I-40 WB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	288	0	980	0	0	0	0	2013	471	35	984	0
Future Volume (vph)	288	0	980	0	0	0	0	2013	471	35	984	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	0		250	150		0
Storage Lanes	1		2	0		0	0		1	1		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	*1.00	1.00	1.00	0.95	1.00
Frt			0.850						0.850			
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1736	0	2733	0	0	0	0	5481	1553	1736	3471	0
Flt Permitted	0.950									0.950		
Satd. Flow (perm)	1736	0	2733	0	0	0	0	5481	1553	1736	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157						496			
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		1380			665			636			528	
Travel Time (s)		31.4			15.1			9.6			8.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	303	0	1032	0	0	0	0	2119	496	37	1036	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	303	0	1032	0	0	0	0	2119	496	37	1036	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1		1					2	1	1	2	
Detector Template	Left		Right					Thru	Right	Left	Thru	
Leading Detector (ft)	20		20					100	20	20	100	
Trailing Detector (ft)	0		0					0	0	0	0	
Detector 1 Position(ft)	0		0					0	0	0	0	
Detector 1 Size(ft)	20		20					6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex					Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Prot		Prot					NA	Perm	Prot	NA	
Protected Phases	4		4					2		1	6	



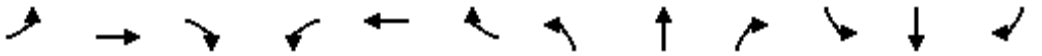
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases									2			
Detector Phase	4		4					2	2	1	6	
Switch Phase												
Minimum Initial (s)	6.0		6.0					8.0	8.0	4.0	8.0	
Minimum Split (s)	22.0		22.0					22.0	22.0	10.0	22.0	
Total Split (s)	39.0		39.0					51.0	51.0	10.0	61.0	
Total Split (%)	39.0%		39.0%					51.0%	51.0%	10.0%	61.0%	
Maximum Green (s)	33.0		33.0					45.0	45.0	4.0	55.0	
Yellow Time (s)	4.0		4.0					4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0		2.0					2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0					0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0		6.0					6.0	6.0	6.0	6.0	
Lead/Lag								Lag	Lag	Lead		
Lead-Lag Optimize?								Yes	Yes	Yes		
Vehicle Extension (s)	3.0		3.0					3.0	3.0	3.0	3.0	
Recall Mode	None		None					C-Max	C-Max	None	C-Max	
Walk Time (s)	5.0		5.0					5.0	5.0		5.0	
Flash Dont Walk (s)	11.0		11.0					11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0		0					0	0		0	
Act Effct Green (s)	33.0		33.0					49.0	49.0	4.0	55.0	
Actuated g/C Ratio	0.33		0.33					0.49	0.49	0.04	0.55	
v/c Ratio	0.53		1.02					0.79	0.49	0.54	0.54	
Control Delay	31.3		64.0					24.7	3.4	34.3	22.7	
Queue Delay	0.0		0.0					0.1	0.0	0.0	2.0	
Total Delay	31.3		64.0					24.9	3.4	34.3	24.6	
LOS	C		E					C	A	C	C	
Approach Delay		56.6						20.8			25.0	
Approach LOS		E						C			C	
Queue Length 50th (ft)	156		~359					391	0	23	378	
Queue Length 95th (ft)	241		#500					455	56	m25	445	
Internal Link Dist (ft)		1300			585			556			448	
Turn Bay Length (ft)			300						250	150		
Base Capacity (vph)	572		1007					2685	1013	69	1909	
Starvation Cap Reductn	0		0					0	0	0	683	
Spillback Cap Reductn	0		0					70	0	0	0	
Storage Cap Reductn	0		0					0	0	0	0	
Reduced v/c Ratio	0.53		1.02					0.81	0.49	0.54	0.85	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 62 (62%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 31.2		Intersection LOS: C	
Intersection Capacity Utilization 78.9%		ICU Level of Service D	
Analysis Period (min) 15			

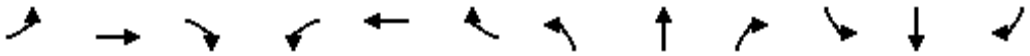
* User Entered Value
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Central Pike & I-40 EB Ramps





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	284	0	45	1244	1057	0	0	735	127
Future Volume (vph)	0	0	0	284	0	45	1244	1057	0	0	735	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		300	150		0	0		250
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3367	0	1553	3367	3471	0	0	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						98						134
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		521			649			528			993	
Travel Time (s)		11.8			14.8			8.0			15.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%
Adj. Flow (vph)	0	0	0	299	0	47	1309	1113	0	0	774	134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	299	0	47	1309	1113	0	0	774	134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Prot		Perm	Prot	NA			NA	Perm
Protected Phases				8			5	2			6	

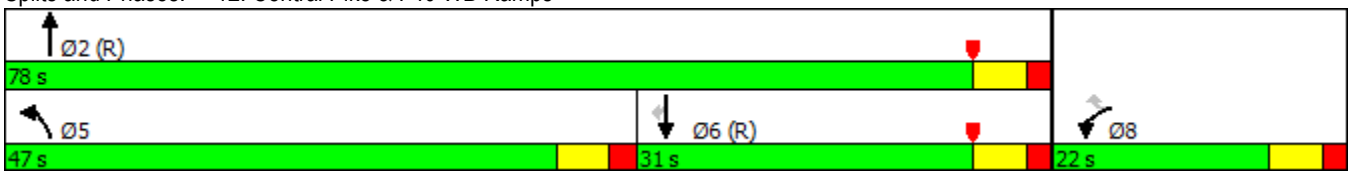


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						8						6
Detector Phase				8		8	5	2			6	6
Switch Phase												
Minimum Initial (s)				6.0		6.0	4.0	8.0			8.0	8.0
Minimum Split (s)				22.0		22.0	10.0	22.0			22.0	22.0
Total Split (s)				22.0		22.0	47.0	78.0			31.0	31.0
Total Split (%)				22.0%		22.0%	47.0%	78.0%			31.0%	31.0%
Maximum Green (s)				16.0		16.0	41.0	72.0			25.0	25.0
Yellow Time (s)				4.0		4.0	4.0	4.0			4.0	4.0
All-Red Time (s)				2.0		2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)				6.0		6.0	6.0	6.0			6.0	6.0
Lead/Lag							Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Recall Mode				None		None	None	C-Max			C-Max	C-Max
Walk Time (s)				5.0		5.0		5.0			5.0	5.0
Flash Dont Walk (s)				11.0		11.0		11.0			11.0	11.0
Pedestrian Calls (#/hr)				0		0		0			0	0
Act Effct Green (s)				13.7		13.7	41.5	74.3			26.8	26.8
Actuated g/C Ratio				0.14		0.14	0.42	0.74			0.27	0.27
v/c Ratio				0.65		0.16	0.94	0.43			0.83	0.26
Control Delay				47.5		1.4	17.0	1.8			44.4	6.8
Queue Delay				0.6		0.0	0.0	0.3			0.0	0.0
Total Delay				48.2		1.4	17.0	2.1			44.4	6.8
LOS				D		A	B	A			D	A
Approach Delay					41.8			10.2			38.9	
Approach LOS					D			B			D	
Queue Length 50th (ft)				93		0	11	9			251	0
Queue Length 95th (ft)				135		3	#529	11			#358	45
Internal Link Dist (ft)		441			569			448			913	
Turn Bay Length (ft)				200		300	150					250
Base Capacity (vph)				538		330	1411	2579			929	513
Starvation Cap Reductn				0		0	1	773			0	0
Spillback Cap Reductn				59		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.62		0.14	0.93	0.62			0.83	0.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 100			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 78.9%		ICU Level of Service D	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Central Pike & I-40 WB Ramps



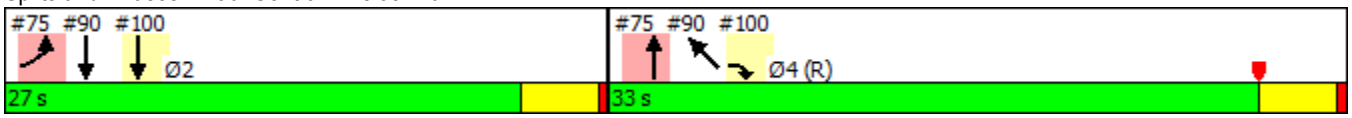
SR 265 DDI Build Alternative (2040)

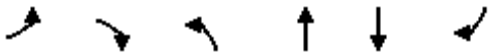
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	894	0	0	0	0	0	1634	0
Future Volume (vph)	0	0	0	0	894	0	0	0	0	0	1634	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	0	0	0	0	0	5085	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	0	0	0	0	0	5085	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		80			147			146			140	
Travel Time (s)		1.8			3.3			3.3			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	941	0	0	0	0	0	1720	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	941	0	0	0	0	0	1720	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		3			-24			12			0	
Crosswalk Width(ft)		16			0			0			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					1						2	
Detector Template											Thru	
Leading Detector (ft)					30						100	
Trailing Detector (ft)					0						0	
Detector 1 Position(ft)					0						0	
Detector 1 Size(ft)					30						6	
Detector 1 Type					Cl+Ex						Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)					0.0						0.0	
Detector 1 Queue (s)					0.0						0.0	
Detector 1 Delay (s)					0.0						0.0	
Detector 2 Position(ft)											94	
Detector 2 Size(ft)											6	
Detector 2 Type											Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)											0.0	
Turn Type					NA						NA	
Protected Phases					2						4	
Permitted Phases												
Detector Phase					2						4	
Switch Phase												
Minimum Initial (s)					4.0						4.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Minimum Split (s)					20.0						20.0	
Total Split (s)					27.0						33.0	
Total Split (%)					45.0%						55.0%	
Maximum Green (s)					23.0						29.0	
Yellow Time (s)					3.5						3.5	
All-Red Time (s)					0.5						0.5	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0						3.0	
Recall Mode					Min						C-Min	
Act Effct Green (s)					22.1						29.9	
Actuated g/C Ratio					0.37						0.50	
v/c Ratio					0.72						0.68	
Control Delay					13.4						13.4	
Queue Delay					0.0						0.0	
Total Delay					13.4						13.4	
LOS					B						B	
Approach Delay					13.4						13.4	
Approach LOS					B						B	
Queue Length 50th (ft)					81						165	
Queue Length 95th (ft)					114						213	
Internal Link Dist (ft)		1			67			66			60	
Turn Bay Length (ft)												
Base Capacity (vph)					1356						2535	
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					0						0	
Storage Cap Reductn					0						0	
Reduced v/c Ratio					0.69						0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 13.4		Intersection LOS: B	
Intersection Capacity Utilization 63.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 90: Central Plke at I-40 EB



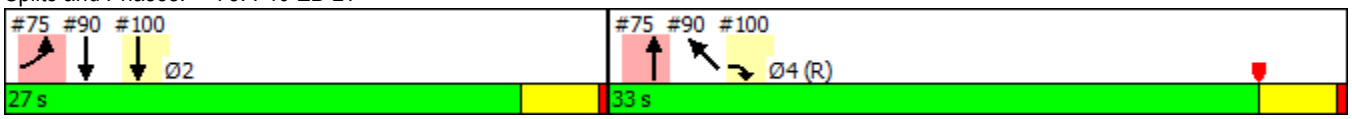


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	0	0	1634	0	0
Future Volume (vph)	118	0	0	1634	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	5085	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	5085	0	0
Right Turn on Red	No	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			146	301	
Travel Time (s)	3.6			3.3	6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	0	0	1776	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	0	0	1776	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	-3			0	0	
Crosswalk Width(ft)	0			0	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9	15			9
Number of Detectors	1			1		
Detector Template	Left					
Leading Detector (ft)	20			20		
Trailing Detector (ft)	0			0		
Detector 1 Position(ft)	0			0		
Detector 1 Size(ft)	20			20		
Detector 1 Type	Cl+Ex			Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0		
Detector 1 Queue (s)	0.0			0.0		
Detector 1 Delay (s)	0.0			0.0		
Turn Type	Prot			NA		
Protected Phases	2			4		
Permitted Phases						
Detector Phase	2			4		
Switch Phase						
Minimum Initial (s)	4.0			4.0		
Minimum Split (s)	20.0			20.0		
Total Split (s)	27.0			33.0		
Total Split (%)	45.0%			55.0%		
Maximum Green (s)	23.0			29.0		
Yellow Time (s)	3.5			3.5		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
All-Red Time (s)	0.5			0.5		
Lost Time Adjust (s)	0.0			0.0		
Total Lost Time (s)	4.0			4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0		
Recall Mode	Min			C-Min		
Act Effct Green (s)	22.1			29.9		
Actuated g/C Ratio	0.37			0.50		
v/c Ratio	0.20			0.70		
Control Delay	13.4			3.1		
Queue Delay	0.0			0.0		
Total Delay	13.4			3.1		
LOS	B			A		
Approach Delay	13.4			3.1		
Approach LOS	B			A		
Queue Length 50th (ft)	30			18		
Queue Length 95th (ft)	61			21		
Internal Link Dist (ft)	80			66	221	
Turn Bay Length (ft)						
Base Capacity (vph)	678			2535		
Starvation Cap Reductn	0			0		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.19			0.70		

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 3.8		Intersection LOS: A	
Intersection Capacity Utilization 44.8%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 75: I-40 EB LT

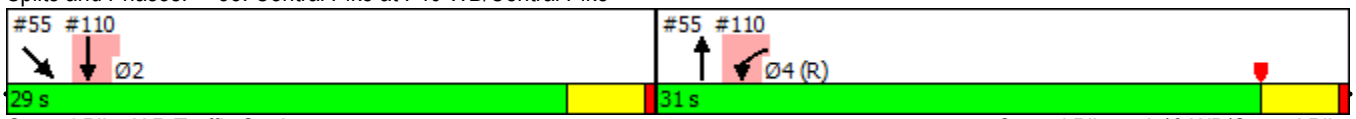


Lane Group	NBT	SET	SER2
Lane Configurations			
Traffic Volume (vph)	589	578	435
Future Volume (vph)	589	578	435
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor	0.95	0.95	1.00
Frt			0.850
Flt Protected			
Satd. Flow (prot)	3539	3539	1583
Flt Permitted			
Satd. Flow (perm)	3539	3539	1583
Right Turn on Red			Yes
Satd. Flow (RTOR)			458
Link Speed (mph)	30	30	
Link Distance (ft)	160	492	
Travel Time (s)	3.6	11.2	
Peak Hour Factor	0.95	0.95	0.95
Adj. Flow (vph)	620	608	458
Shared Lane Traffic (%)			
Lane Group Flow (vph)	620	608	458
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)	0	0	
Link Offset(ft)	-12	-12	
Crosswalk Width(ft)	16	16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)			9
Number of Detectors	1	2	1
Detector Template		Thru	Right
Leading Detector (ft)	50	100	20
Trailing Detector (ft)	0	0	0
Detector 1 Position(ft)	0	0	0
Detector 1 Size(ft)	50	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel			
Detector 1 Extend (s)	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0
Detector 2 Position(ft)		94	
Detector 2 Size(ft)		6	
Detector 2 Type		Cl+Ex	
Detector 2 Channel			
Detector 2 Extend (s)		0.0	
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free

Lane Group	NBT	SET	SER2
Detector Phase	4	2	
Switch Phase			
Minimum Initial (s)	4.0	4.0	
Minimum Split (s)	20.0	25.5	
Total Split (s)	31.0	29.0	
Total Split (%)	51.7%	48.3%	
Maximum Green (s)	27.0	25.0	
Yellow Time (s)	3.5	3.5	
All-Red Time (s)	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	4.0	4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	
Recall Mode	C-Max	Min	
Act Effct Green (s)	31.5	20.5	60.0
Actuated g/C Ratio	0.52	0.34	1.00
v/c Ratio	0.33	0.50	0.29
Control Delay	11.2	16.6	0.5
Queue Delay	0.0	0.0	0.0
Total Delay	11.2	16.6	0.5
LOS	B	B	A
Approach Delay	11.2	9.6	
Approach LOS	B	A	
Queue Length 50th (ft)	62	87	0
Queue Length 95th (ft)	104	115	0
Internal Link Dist (ft)	80	412	
Turn Bay Length (ft)			200
Base Capacity (vph)	1857	1474	1583
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.41	0.29

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 56 (93%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 10.2		Intersection LOS: B	
Intersection Capacity Utilization 38.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 55: Central Pike at I-40 WB/Central Pike





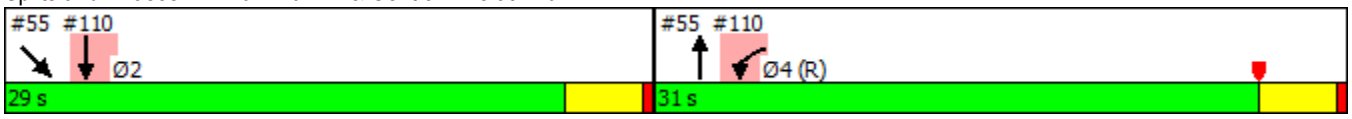
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	351	0	0	0	0	578
Future Volume (vph)	351	0	0	0	0	578
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	No	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	30		30			30
Link Distance (ft)	98		276			203
Travel Time (s)	2.2		6.3			4.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	369	0	0	0	0	608
Shared Lane Traffic (%)						
Lane Group Flow (vph)	369	0	0	0	0	608
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9		9	15	
Number of Detectors	1					2
Detector Template	Left					Thru
Leading Detector (ft)	20					100
Trailing Detector (ft)	0					0
Detector 1 Position(ft)	0					0
Detector 1 Size(ft)	20					6
Detector 1 Type	Cl+Ex					Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0					0.0
Detector 1 Queue (s)	0.0					0.0
Detector 1 Delay (s)	0.0					0.0
Detector 2 Position(ft)						94
Detector 2 Size(ft)						6
Detector 2 Type						Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)						0.0
Turn Type	Prot					NA
Protected Phases	4					2
Permitted Phases						
Detector Phase	4					2
Switch Phase						
Minimum Initial (s)	4.0					4.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.0					25.5
Total Split (s)	31.0					29.0
Total Split (%)	51.7%					48.3%
Maximum Green (s)	27.0					25.0
Yellow Time (s)	3.5					3.5
All-Red Time (s)	0.5					0.5
Lost Time Adjust (s)	0.0					0.0
Total Lost Time (s)	4.0					4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0					3.0
Recall Mode	C-Max					Min
Act Effct Green (s)	31.5					20.5
Actuated g/C Ratio	0.52					0.34
v/c Ratio	0.40					0.50
Control Delay	11.5					4.2
Queue Delay	0.0					0.0
Total Delay	11.5					4.2
LOS	B					A
Approach Delay	11.5					4.2
Approach LOS	B					A
Queue Length 50th (ft)	75					10
Queue Length 95th (ft)	151					14
Internal Link Dist (ft)	18		196			123
Turn Bay Length (ft)						
Base Capacity (vph)	929					1474
Starvation Cap Reductn	0					72
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.40					0.43

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 56 (93%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 7.0		Intersection LOS: A	
Intersection Capacity Utilization 42.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 110: I-40 WB & Central Pike at I-40 WB

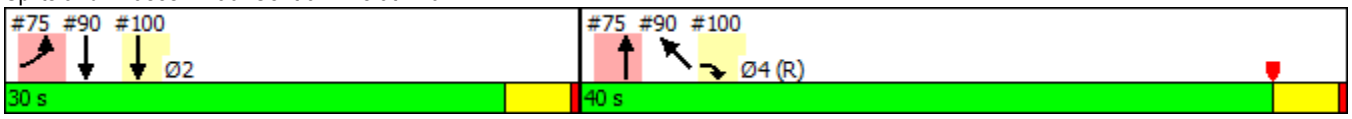


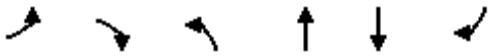
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	984	0	0	0	0	0	2013	0
Future Volume (vph)	0	0	0	0	984	0	0	0	0	0	2013	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.91	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	0	0	0	3539	0	0	0	0	0	5085	0
Flt Permitted												
Satd. Flow (perm)	0	0	0	0	3539	0	0	0	0	0	5085	0
Right Turn on Red			Yes			Yes			Yes	Yes		Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		80			147			146			140	
Travel Time (s)		1.8			3.3			3.3			3.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1036	0	0	0	0	0	2119	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	1036	0	0	0	0	0	2119	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		3			-24			12			0	
Crosswalk Width(ft)		16			0			0			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors					1						2	
Detector Template											Thru	
Leading Detector (ft)					30						100	
Trailing Detector (ft)					0						0	
Detector 1 Position(ft)					0						0	
Detector 1 Size(ft)					30						6	
Detector 1 Type					Cl+Ex						Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)					0.0						0.0	
Detector 1 Queue (s)					0.0						0.0	
Detector 1 Delay (s)					0.0						0.0	
Detector 2 Position(ft)											94	
Detector 2 Size(ft)											6	
Detector 2 Type											Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)											0.0	
Turn Type					NA						NA	
Protected Phases					2						4	
Permitted Phases												
Detector Phase					2						4	
Switch Phase												
Minimum Initial (s)					4.0						4.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Minimum Split (s)					20.0						20.0	
Total Split (s)					30.0						40.0	
Total Split (%)					42.9%						57.1%	
Maximum Green (s)					26.0						36.0	
Yellow Time (s)					3.5						3.5	
All-Red Time (s)					0.5						0.5	
Lost Time Adjust (s)					0.0						0.0	
Total Lost Time (s)					4.0						4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)					3.0						3.0	
Recall Mode					Min						C-Min	
Act Effct Green (s)					25.7						36.3	
Actuated g/C Ratio					0.37						0.52	
v/c Ratio					0.80						0.80	
Control Delay					14.1						17.0	
Queue Delay					0.3						0.0	
Total Delay					14.4						17.0	
LOS					B						B	
Approach Delay					14.4						17.0	
Approach LOS					B						B	
Queue Length 50th (ft)					80						258	
Queue Length 95th (ft)					98						322	
Internal Link Dist (ft)		1			67			66			60	
Turn Bay Length (ft)												
Base Capacity (vph)					1314						2638	
Starvation Cap Reductn					0						0	
Spillback Cap Reductn					35						0	
Storage Cap Reductn					0						0	
Reduced v/c Ratio					0.81						0.80	

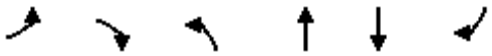
Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 72.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 90: Central Plke at I-40 EB





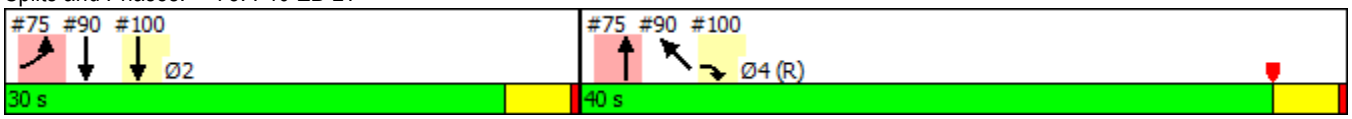
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	288	0	0	2013	0	0
Future Volume (vph)	288	0	0	2013	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	5085	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	5085	0	0
Right Turn on Red	No	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	30			30	30	
Link Distance (ft)	160			146	301	
Travel Time (s)	3.6			3.3	6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	313	0	0	2188	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	313	0	0	2188	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	-3			0	0	
Crosswalk Width(ft)	0			0	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9	15			9
Number of Detectors	1			1		
Detector Template	Left					
Leading Detector (ft)	20			20		
Trailing Detector (ft)	0			0		
Detector 1 Position(ft)	0			0		
Detector 1 Size(ft)	20			20		
Detector 1 Type	Cl+Ex			Cl+Ex		
Detector 1 Channel						
Detector 1 Extend (s)	0.0			0.0		
Detector 1 Queue (s)	0.0			0.0		
Detector 1 Delay (s)	0.0			0.0		
Turn Type	Prot			NA		
Protected Phases	2			4		
Permitted Phases						
Detector Phase	2			4		
Switch Phase						
Minimum Initial (s)	4.0			4.0		
Minimum Split (s)	20.0			20.0		
Total Split (s)	30.0			40.0		
Total Split (%)	42.9%			57.1%		
Maximum Green (s)	26.0			36.0		
Yellow Time (s)	3.5			3.5		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
All-Red Time (s)	0.5			0.5		
Lost Time Adjust (s)	0.0			0.0		
Total Lost Time (s)	4.0			4.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0		
Recall Mode	Min			C-Min		
Act Effct Green (s)	25.7			36.3		
Actuated g/C Ratio	0.37			0.52		
v/c Ratio	0.48			0.83		
Control Delay	20.0			4.2		
Queue Delay	0.0			0.0		
Total Delay	20.0			4.2		
LOS	C			A		
Approach Delay	20.0			4.2		
Approach LOS	C			A		
Queue Length 50th (ft)	100			23		
Queue Length 95th (ft)	169			33		
Internal Link Dist (ft)	80			66	221	
Turn Bay Length (ft)						
Base Capacity (vph)	657			2638		
Starvation Cap Reductn	0			0		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.48			0.83		

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 0 (0%), Referenced to phase 4:NBT, Start of Yellow, Master Intersection			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 6.1		Intersection LOS: A	
Intersection Capacity Utilization 61.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 75: I-40 EB LT

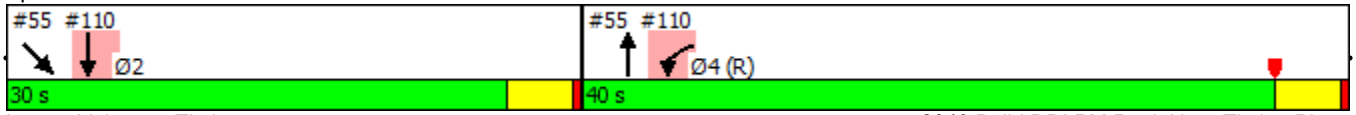


Lane Group	NBT	SET	SER2
Lane Configurations			
Traffic Volume (vph)	1057	735	127
Future Volume (vph)	1057	735	127
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor	0.95	0.95	1.00
Frt			0.850
Flt Protected			
Satd. Flow (prot)	3539	3539	1583
Flt Permitted			
Satd. Flow (perm)	3539	3539	1583
Right Turn on Red			Yes
Satd. Flow (RTOR)			134
Link Speed (mph)	30	30	
Link Distance (ft)	160	492	
Travel Time (s)	3.6	11.2	
Peak Hour Factor	0.95	0.95	0.95
Adj. Flow (vph)	1113	774	134
Shared Lane Traffic (%)			
Lane Group Flow (vph)	1113	774	134
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)	0	0	
Link Offset(ft)	-12	-12	
Crosswalk Width(ft)	16	16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)			9
Number of Detectors	1	2	1
Detector Template		Thru	Right
Leading Detector (ft)	50	100	20
Trailing Detector (ft)	0	0	0
Detector 1 Position(ft)	0	0	0
Detector 1 Size(ft)	50	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel			
Detector 1 Extend (s)	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0
Detector 2 Position(ft)		94	
Detector 2 Size(ft)		6	
Detector 2 Type		Cl+Ex	
Detector 2 Channel			
Detector 2 Extend (s)		0.0	
Turn Type	NA	NA	Free
Protected Phases	4	2	
Permitted Phases			Free

Lane Group	NBT	SET	SER2
Detector Phase	4	2	
Switch Phase			
Minimum Initial (s)	4.0	4.0	
Minimum Split (s)	20.0	25.5	
Total Split (s)	40.0	30.0	
Total Split (%)	57.1%	42.9%	
Maximum Green (s)	36.0	26.0	
Yellow Time (s)	3.5	3.5	
All-Red Time (s)	0.5	0.5	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	4.0	4.0	
Lead/Lag			
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	
Recall Mode	C-Max	Min	
Act Effct Green (s)	37.4	24.6	70.0
Actuated g/C Ratio	0.53	0.35	1.00
v/c Ratio	0.59	0.62	0.08
Control Delay	13.1	21.1	0.1
Queue Delay	0.0	0.0	0.0
Total Delay	13.1	21.1	0.1
LOS	B	C	A
Approach Delay	13.1	18.0	
Approach LOS	B	B	
Queue Length 50th (ft)	150	137	0
Queue Length 95th (ft)	m201	191	0
Internal Link Dist (ft)	80	412	
Turn Bay Length (ft)			200
Base Capacity (vph)	1889	1314	1583
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.59	0.59	0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 64 (91%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 15.3		Intersection LOS: B	
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 55: Central Pike at I-40 WB/Central Pike





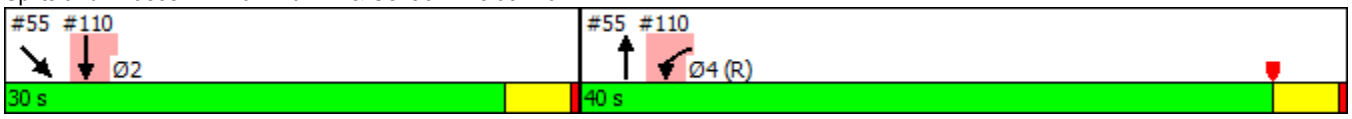
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	284	0	0	0	0	735
Future Volume (vph)	284	0	0	0	0	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	No	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	30		30			30
Link Distance (ft)	98		276			203
Travel Time (s)	2.2		6.3			4.6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	299	0	0	0	0	774
Shared Lane Traffic (%)						
Lane Group Flow (vph)	299	0	0	0	0	774
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	20	9		9	15	
Number of Detectors	1					2
Detector Template	Left					Thru
Leading Detector (ft)	20					100
Trailing Detector (ft)	0					0
Detector 1 Position(ft)	0					0
Detector 1 Size(ft)	20					6
Detector 1 Type	Cl+Ex					Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0					0.0
Detector 1 Queue (s)	0.0					0.0
Detector 1 Delay (s)	0.0					0.0
Detector 2 Position(ft)						94
Detector 2 Size(ft)						6
Detector 2 Type						Cl+Ex
Detector 2 Channel						
Detector 2 Extend (s)						0.0
Turn Type	Prot					NA
Protected Phases	4					2
Permitted Phases						
Detector Phase	4					2
Switch Phase						
Minimum Initial (s)	4.0					4.0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Split (s)	20.0					25.5
Total Split (s)	40.0					30.0
Total Split (%)	57.1%					42.9%
Maximum Green (s)	36.0					26.0
Yellow Time (s)	3.5					3.5
All-Red Time (s)	0.5					0.5
Lost Time Adjust (s)	0.0					0.0
Total Lost Time (s)	4.0					4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0					3.0
Recall Mode	C-Max					Min
Act Effct Green (s)	37.4					24.6
Actuated g/C Ratio	0.53					0.35
v/c Ratio	0.32					0.62
Control Delay	10.8					4.8
Queue Delay	0.0					0.0
Total Delay	10.8					4.8
LOS	B					A
Approach Delay	10.8					4.8
Approach LOS	B					A
Queue Length 50th (ft)	70					13
Queue Length 95th (ft)	118					16
Internal Link Dist (ft)	18		196			123
Turn Bay Length (ft)						
Base Capacity (vph)	944					1314
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.32					0.59

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 70			
Offset: 64 (91%), Referenced to phase 4:NBT, Start of Yellow			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 6.4		Intersection LOS: A	
Intersection Capacity Utilization 42.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 110: I-40 WB & Central Pike at I-40 WB



Synchro Intersection Analysis – Intersections along SR 171

SR 171 Interchange (2020) No SR 265 Interchange, No Improvements SR 171

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2215	511	191	1323	0	0	666
Future Volume (vph)	0	0	0	2215	511	191	1323	0	0	666
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.972						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3440	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3440	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				66						165
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2408	555	208	1438	0	0	724
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2963	0	208	1438	0	0	724
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.07		0.98	0.41			0.45
Control Delay				50.7		96.2	0.2			0.9
Queue Delay				12.3		0.0	0.0			0.0
Total Delay				63.0		96.2	0.2			0.9
LOS				E		F	A			A
Approach Delay				63.0			12.3		0.9	
Approach LOS				E			B		A	
Queue Length 50th (ft)				~1699		217	0			0
Queue Length 95th (ft)				m#1511		m204	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2765		212	3539			1611
Starvation Cap Reductn				245		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.18		0.98	0.41			0.45

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 8 (5%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 38.9		Intersection LOS: D	
Intersection Capacity Utilization 98.1%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	557	0	239	1411	1107	0	0	957	1043
Future Volume (vph)	0	0	0	557	0	239	1411	1107	0	0	957	1043
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						128						576
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	605	0	260	1534	1203	0	0	1040	1134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	605	0	260	1534	1203	0	0	1040	1134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

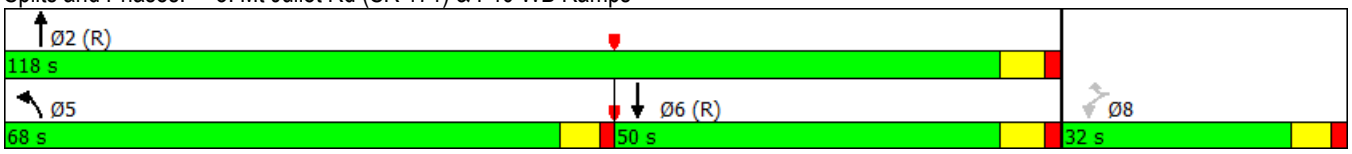
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				32.0		32.0	68.0	118.0			50.0	
Total Split (%)				21.3%		21.3%	45.3%	78.7%			33.3%	
Maximum Green (s)				25.5		25.5	62.0	111.0			43.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				25.5		25.5	62.0	111.0			43.0	150.0
Actuated g/C Ratio				0.17		0.17	0.41	0.74			0.29	1.00
v/c Ratio				1.11		0.71	1.08	0.47			1.04	0.71
Control Delay				127.2		41.1	73.6	10.9			63.5	8.5
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				127.2		41.1	73.6	10.9			63.5	8.5
LOS				F		D	E	B			E	A
Approach Delay					101.3			46.0			34.8	
Approach LOS					F			D			C	
Queue Length 50th (ft)				~346		125	~858	304			~564	674
Queue Length 95th (ft)				#470		231	m#779	m281			#706	786
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				546		365	1418	2568			1004	1599
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.11		0.71	1.08	0.47			1.04	0.71

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 50.1 Intersection LOS: D
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Future Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.963						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3408	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3408	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				79						81
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2407	776	209	1952	0	0	1479
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	3183	0	209	1952	0	0	1479
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				128.0		22.0	150.0			
Total Split (%)				85.3%		14.7%	100.0%			
Maximum Green (s)				122.0		16.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				122.0		16.0	150.0			150.0
Actuated g/C Ratio				0.81		0.11	1.00			1.00
v/c Ratio				1.14		1.11	0.55			0.92
Control Delay				84.3		117.9	0.6			10.8
Queue Delay				0.2		0.0	0.0			1.3
Total Delay				84.5		117.9	0.6			12.0
LOS				F		F	A			B
Approach Delay				84.5			12.0		12.0	
Approach LOS				F			B		B	
Queue Length 50th (ft)				~1927		~239	0			0
Queue Length 95th (ft)				m#1961		m#203	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2786		188	3539			1611
Starvation Cap Reductn				203		0	0			0
Spillback Cap Reductn				36		0	88			40
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.23		1.11	0.57			0.94

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 45.8		Intersection LOS: D	
Intersection Capacity Utilization 125.6%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



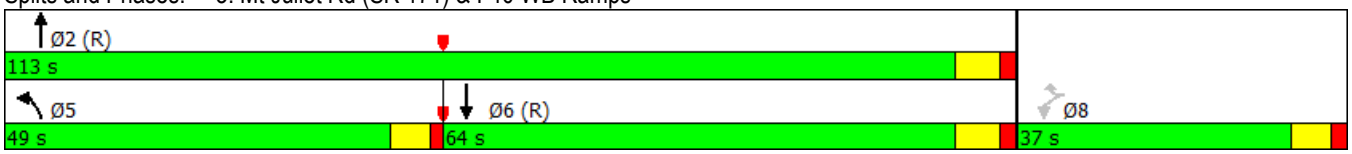
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	671	0	246	1007	2139	0	0	1317	348
Future Volume (vph)	0	0	0	671	0	246	1007	2139	0	0	1317	348
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						229
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	729	0	267	1095	2325	0	0	1432	378
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	729	0	267	1095	2325	0	0	1432	378
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				37.0		37.0	49.0	113.0			64.0	
Total Split (%)				24.7%		24.7%	32.7%	75.3%			42.7%	
Maximum Green (s)				30.5		30.5	43.0	106.0			57.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				30.5		30.5	43.0	106.0			57.0	150.0
Actuated g/C Ratio				0.20		0.20	0.29	0.71			0.38	1.00
v/c Ratio				1.12		0.73	1.11	0.95			1.08	0.27
Control Delay				124.9		52.6	100.6	30.4			73.3	0.4
Queue Delay				0.0		0.0	0.0	23.0			0.0	0.0
Total Delay				124.9		52.7	100.6	53.4			73.3	0.4
LOS				F		D	F	D			E	A
Approach Delay					105.6			68.5			58.1	
Approach LOS					F			E			E	
Queue Length 50th (ft)				~420		182	~630	915			~822	0
Queue Length 95th (ft)				#549		291	m#569	m833			#949	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				653		368	984	2452			1331	1390
Starvation Cap Reductn				0		0	0	236			0	0
Spillback Cap Reductn				0		1	0	57			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.12		0.73	1.11	1.05			1.08	0.27

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 71.4		Intersection LOS: E	
Intersection Capacity Utilization 98.4%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Future Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.963						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3408	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3408	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				79						81
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2407	776	209	1952	0	0	1479
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	3183	0	209	1952	0	0	1479
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				128.0		22.0	150.0			
Total Split (%)				85.3%		14.7%	100.0%			
Maximum Green (s)				122.0		16.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				122.0		16.0	150.0			150.0
Actuated g/C Ratio				0.81		0.11	1.00			1.00
v/c Ratio				1.14		1.11	0.55			0.92
Control Delay				84.3		117.9	0.6			10.8
Queue Delay				0.2		0.0	0.0			1.3
Total Delay				84.5		117.9	0.6			12.0
LOS				F		F	A			B
Approach Delay				84.5			12.0		12.0	
Approach LOS				F			B		B	
Queue Length 50th (ft)				~1927		~239	0			0
Queue Length 95th (ft)				m#1961		m#203	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2786		188	3539			1611
Starvation Cap Reductn				203		0	0			0
Spillback Cap Reductn				36		0	88			40
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.23		1.11	0.57			0.94

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 45.8		Intersection LOS: D	
Intersection Capacity Utilization 125.6%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	166	80	25	59	582	55	1136	21	530	1641	162
Future Volume (vph)	290	166	80	25	59	582	55	1136	21	530	1641	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		125	250		0	314		0	175		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.97	0.91	0.91
Frt			0.850			0.850		0.997			0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1681	1553	1583	1900	1553	1612	3484	0	3367	4884	0
Flt Permitted	0.643			0.621			0.075			0.950		
Satd. Flow (perm)	1198	1681	1553	1035	1900	1553	127	3484	0	3367	4884	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			156			279		1			15	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		649			663			672			610	
Travel Time (s)		14.8			15.1			15.3			13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	13%	4%	14%	0%	4%	12%	3%	20%	4%	5%	3%
Adj. Flow (vph)	315	180	87	27	64	633	60	1235	23	576	1784	176
Shared Lane Traffic (%)												
Lane Group Flow (vph)	315	180	87	27	64	633	60	1258	0	576	1960	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	

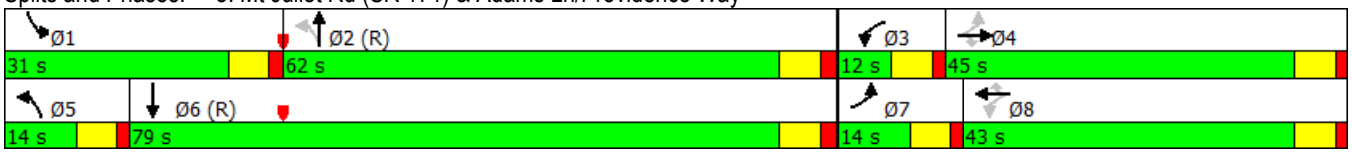
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2					
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	8.0	8.0	6.0	8.0	8.0	8.0	20.0		8.0	20.0	
Minimum Split (s)	12.0	14.0	14.0	12.0	43.0	43.0	14.0	36.5		14.0	36.5	
Total Split (s)	14.0	45.0	45.0	12.0	43.0	43.0	14.0	62.0		31.0	79.0	
Total Split (%)	9.3%	30.0%	30.0%	8.0%	28.7%	28.7%	9.3%	41.3%		20.7%	52.7%	
Maximum Green (s)	8.0	39.0	39.0	6.0	37.0	37.0	8.0	55.5		25.0	72.5	
Yellow Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.0		1.5	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.5		6.0	6.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	
Act Effct Green (s)	48.6	43.8	43.8	43.0	37.0	37.0	64.0	55.5		25.0	75.3	
Actuated g/C Ratio	0.32	0.29	0.29	0.29	0.25	0.25	0.43	0.37		0.17	0.50	
v/c Ratio	0.75	0.37	0.15	0.08	0.14	1.07	0.45	0.98		1.03	0.80	
Control Delay	56.3	46.3	0.6	34.3	45.1	85.7	37.4	52.4		118.3	30.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	12.9	0.0	0.5		0.0	2.4	
Total Delay	56.3	46.3	0.6	34.3	45.1	98.7	37.4	52.8		118.3	33.1	
LOS	E	D	A	C	D	F	D	D		F	C	
Approach Delay		44.9			91.5			52.1			52.5	
Approach LOS		D			F			D			D	
Queue Length 50th (ft)	248	147	0	18	49	~464	20	493		~315	465	
Queue Length 95th (ft)	#355	223	0	42	91	#709	m65	#772		m#435	569	
Internal Link Dist (ft)		569			583			592			530	
Turn Bay Length (ft)	150		125	250			314			175		
Base Capacity (vph)	418	491	563	318	468	593	133	1289		561	2459	
Starvation Cap Reductn	0	0	0	0	0	0	0	4		0	358	
Spillback Cap Reductn	0	0	0	0	0	39	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.75	0.37	0.15	0.08	0.14	1.14	0.45	0.98		1.03	0.93	

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 32 (21%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 57.0 Intersection LOS: E
Intersection Capacity Utilization 99.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Mt Juliet Rd (SR 171) & Adams Ln/Providence Way



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	25	10	2462	10	10	1698
Future Volume (vph)	25	10	2462	10	10	1698
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	100	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Frt	0.961		0.999			
Flt Protected	0.966				0.950	
Satd. Flow (prot)	1729	0	3536	0	1770	3539
Flt Permitted	0.966				0.950	
Satd. Flow (perm)	1729	0	3536	0	1770	3539
Link Speed (mph)	30		45			45
Link Distance (ft)	461		851			393
Travel Time (s)	10.5		12.9			6.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	11	2676	11	11	1846
Shared Lane Traffic (%)						
Lane Group Flow (vph)	38	0	2687	0	11	1846
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		24			24
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 78.4%		ICU Level of Service D	
Analysis Period (min) 15			



Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations	↑↑			↑↑		↱
Traffic Volume (vph)	2214	0	0	1988	0	932
Future Volume (vph)	2214	0	0	1988	0	932
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt						0.865
Flt Protected						
Satd. Flow (prot)	3539	0	0	3539	0	1611
Flt Permitted						
Satd. Flow (perm)	3539	0	0	3539	0	1611
Link Speed (mph)	30			30	30	
Link Distance (ft)	368			586	302	
Travel Time (s)	8.4			13.3	6.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2407	0	0	2161	0	1013
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2407	0	0	2161	0	1013
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 125.6%		ICU Level of Service H	
Analysis Period (min) 15			

SR 171 Interchange (2040) No SR 265 Interchange, No Improvements SR 171

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	899	0	291	1733	1349	0	0	1215	1273
Future Volume (vph)	0	0	0	899	0	291	1733	1349	0	0	1215	1273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						623
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	977	0	316	1884	1466	0	0	1321	1384
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	977	0	316	1884	1466	0	0	1321	1384
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				38.0		38.0	62.0	112.0			50.0	
Total Split (%)				25.3%		25.3%	41.3%	74.7%			33.3%	
Maximum Green (s)				31.5		31.5	56.0	105.0			43.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				31.5		31.5	56.0	105.0			43.0	150.0
Actuated g/C Ratio				0.21		0.21	0.37	0.70			0.29	1.00
v/c Ratio				1.45		0.84	1.47	0.60			1.32	0.87
Control Delay				251.6		63.2	252.6	14.4			178.4	18.8
Queue Delay				0.0		0.0	0.0	0.5			0.0	0.0
Total Delay				251.6		63.2	252.6	14.8			178.4	18.8
LOS				F		E	F	B			F	B
Approach Delay					205.5			148.5			96.7	
Approach LOS					F			F			F	
Queue Length 50th (ft)				~669		236	~1306	387			~868	928
Queue Length 95th (ft)				#803		#396	m#1155	m355			#1013	1087
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				674		377	1281	2429			1004	1599
Starvation Cap Reductn				0		0	0	459			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.45		0.84	1.47	0.74			1.32	0.87

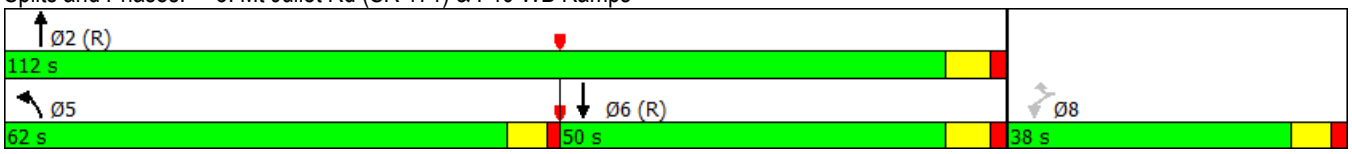
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.47			
Intersection Signal Delay: 139.5		Intersection LOS: F	
Intersection Capacity Utilization 122.8%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2713	686	233	1881	0	0	954
Future Volume (vph)	0	0	0	2713	686	233	1881	0	0	954
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.970						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3433	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3433	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				65						71
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2949	746	253	2045	0	0	1037
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	3695	0	253	2045	0	0	1037
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.34		1.19	0.58			0.64
Control Delay				171.8		125.0	4.3			2.0
Queue Delay				0.2		0.0	0.0			0.0
Total Delay				172.0		125.0	4.3			2.0
LOS				F		F	A			A
Approach Delay				172.0			17.6		2.0	
Approach LOS				F			B		A	
Queue Length 50th (ft)				~2493		~302	90			0
Queue Length 95th (ft)				m#2301		m174	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2759		212	3539			1611
Starvation Cap Reductn				206		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.45		1.19	0.58			0.64

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 112 (75%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.34			
Intersection Signal Delay: 96.4		Intersection LOS: F	
Intersection Capacity Utilization 119.8%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1012	0	300	1452	2687	0	0	1644	425
Future Volume (vph)	0	0	0	1012	0	300	1452	2687	0	0	1644	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	3471	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						224
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	1100	0	326	1578	2921	0	0	1787	462
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	1100	0	326	1578	2921	0	0	1787	462
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

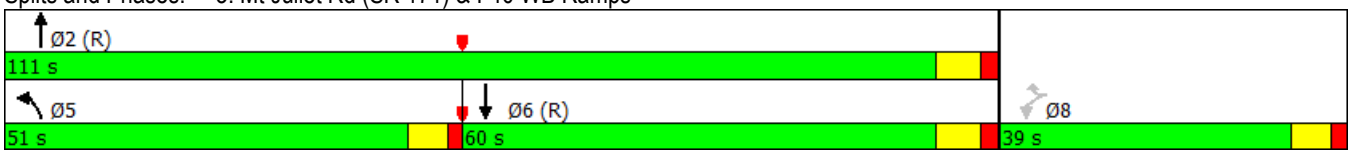
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				39.0		39.0	51.0	111.0			60.0	
Total Split (%)				26.0%		26.0%	34.0%	74.0%			40.0%	
Maximum Green (s)				32.5		32.5	45.0	104.0			53.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				32.5		32.5	45.0	104.0			53.0	150.0
Actuated g/C Ratio				0.22		0.22	0.30	0.69			0.35	1.00
v/c Ratio				1.58		0.84	1.53	1.21			1.44	0.33
Control Delay				305.5		63.2	276.2	124.6			232.2	0.6
Queue Delay				0.2		0.1	0.0	0.2			0.0	0.0
Total Delay				305.7		63.3	276.2	124.8			232.2	0.6
LOS				F		E	F	F			F	A
Approach Delay					250.3			177.9			184.6	
Approach LOS					F			F			F	
Queue Length 50th (ft)				~786		245	~1130	~1836			~1256	0
Queue Length 95th (ft)				#922		#411	m#832	m937			#1378	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				696		387	1029	2406			1238	1390
Starvation Cap Reductn				0		0	0	199			0	0
Spillback Cap Reductn				16		1	0	51			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.62		0.84	1.53	1.32			1.44	0.33

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.58
Intersection Signal Delay: 192.4 Intersection LOS: F
Intersection Capacity Utilization 129.9% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	3002	1196	234	2422	0	0	1772
Future Volume (vph)	0	0	0	3002	1196	234	2422	0	0	1772
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.957						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3387	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3387	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				64						65
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	3263	1300	254	2633	0	0	1926
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	4563	0	254	2633	0	0	1926
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.68		1.20	0.74			1.20
Control Delay				324.2		145.9	10.9			102.6
Queue Delay				0.2		0.0	0.1			0.2
Total Delay				324.4		145.9	11.0			102.7
LOS				F		F	B			F
Approach Delay				324.4			22.9		102.7	
Approach LOS				F			C		F	
Queue Length 50th (ft)				~3441		~308	758			~639
Queue Length 95th (ft)				m#3434		m177	m0			#895
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2722		212	3539			1611
Starvation Cap Reductn				53		0	0			0
Spillback Cap Reductn				233		0	177			80
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.83		1.20	0.78			1.26

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 146 (97%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.68			
Intersection Signal Delay: 186.0		Intersection LOS: F	
Intersection Capacity Utilization 144.2%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



SR 171 Interchange (2020) No SR 265 Interchange, Added NB Lane SR 171

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	557	0	239	1411	1107	0	0	957	1043
Future Volume (vph)	0	0	0	557	0	239	1411	1107	0	0	957	1043
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						128						576
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	605	0	260	1534	1203	0	0	1040	1134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	605	0	260	1534	1203	0	0	1040	1134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

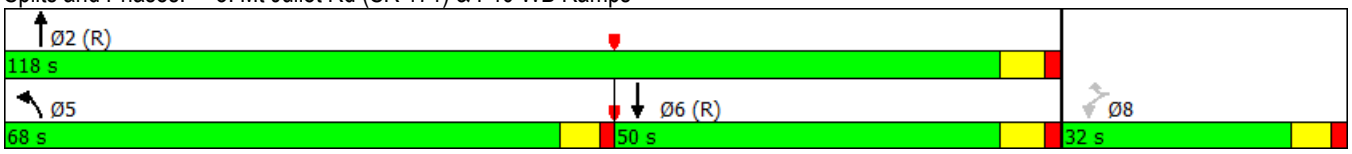
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				32.0		32.0	68.0	118.0			50.0	
Total Split (%)				21.3%		21.3%	45.3%	78.7%			33.3%	
Maximum Green (s)				25.5		25.5	62.0	111.0			43.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				25.5		25.5	62.0	111.0			43.0	150.0
Actuated g/C Ratio				0.17		0.17	0.41	0.74			0.29	1.00
v/c Ratio				1.11		0.71	1.08	0.33			1.04	0.71
Control Delay				127.2		41.1	75.5	8.9			64.8	7.9
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				127.2		41.1	75.5	8.9			64.8	7.9
LOS				F		D	E	A			E	A
Approach Delay					101.3			46.2			35.2	
Approach LOS					F			D			D	
Queue Length 50th (ft)				~346		125	~858	173			~573	629
Queue Length 95th (ft)				#470		231	m#779	m162			#706	669
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				546		365	1418	3691			1004	1599
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.11		0.71	1.08	0.33			1.04	0.71

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.11
Intersection Signal Delay: 50.3 Intersection LOS: D
Intersection Capacity Utilization 96.8% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2215	511	191	1323	0	0	666
Future Volume (vph)	0	0	0	2215	511	191	1323	0	0	666
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.972						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3440	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3440	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				66						165
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2408	555	208	1438	0	0	724
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2963	0	208	1438	0	0	724
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



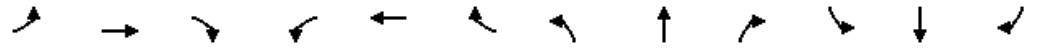
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.07		0.98	0.41			0.45
Control Delay				51.0		105.2	0.2			0.9
Queue Delay				12.3		0.0	0.0			0.0
Total Delay				63.3		105.2	0.2			0.9
LOS				E		F	A			A
Approach Delay				63.3			13.5		0.9	
Approach LOS				E			B		A	
Queue Length 50th (ft)				~1695		217	0			0
Queue Length 95th (ft)				m#607		m204	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2765		212	3539			1611
Starvation Cap Reductn				256		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.18		0.98	0.41			0.45

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 18 (12%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 39.5		Intersection LOS: D	
Intersection Capacity Utilization 98.1%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	671	0	246	1007	2139	0	0	1317	348
Future Volume (vph)	0	0	0	671	0	246	1007	2139	0	0	1317	348
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						229
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	729	0	267	1095	2325	0	0	1432	378
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	729	0	267	1095	2325	0	0	1432	378
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	



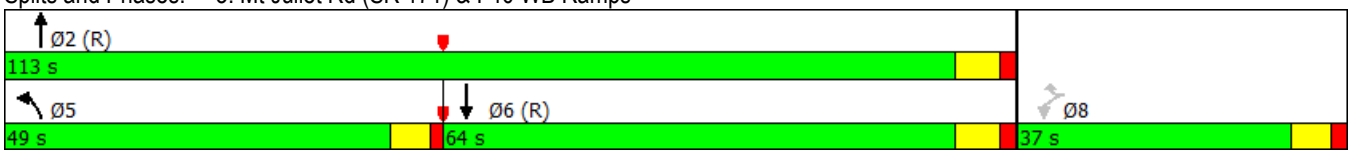
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				37.0		37.0	49.0	113.0			64.0	
Total Split (%)				24.7%		24.7%	32.7%	75.3%			42.7%	
Maximum Green (s)				30.5		30.5	43.0	106.0			57.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				30.5		30.5	43.0	106.0			57.0	150.0
Actuated g/C Ratio				0.20		0.20	0.29	0.71			0.38	1.00
v/c Ratio				1.12		0.73	1.11	0.66			1.08	0.27
Control Delay				124.9		52.6	107.8	6.8			73.6	0.4
Queue Delay				0.0		0.1	0.0	0.4			0.0	0.0
Total Delay				124.9		52.7	107.8	7.2			73.6	0.4
LOS				F		D	F	A			E	A
Approach Delay					105.6			39.4			58.3	
Approach LOS					F			D			E	
Queue Length 50th (ft)				~420		182	~629	299			~822	0
Queue Length 95th (ft)				#549		291	m#569	m255			#964	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				653		368	984	3524			1331	1390
Starvation Cap Reductn				0		0	0	579			0	0
Spillback Cap Reductn				0		2	0	138			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.12		0.73	1.11	0.79			1.08	0.27

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.12			
Intersection Signal Delay: 55.5		Intersection LOS: E	
Intersection Capacity Utilization 98.4%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Future Volume (vph)	0	0	0	2214	714	192	1796	0	0	1361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.963						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3408	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3408	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				79						81
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2407	776	209	1952	0	0	1479
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	3183	0	209	1952	0	0	1479
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				128.0		22.0	150.0			
Total Split (%)				85.3%		14.7%	100.0%			
Maximum Green (s)				122.0		16.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				122.0		16.0	150.0			150.0
Actuated g/C Ratio				0.81		0.11	1.00			1.00
v/c Ratio				1.14		1.11	0.55			0.92
Control Delay				84.0		120.0	0.6			10.8
Queue Delay				0.1		0.0	0.1			9.5
Total Delay				84.1		120.0	0.7			20.3
LOS				F		F	A			C
Approach Delay				84.1			12.2		20.3	
Approach LOS				F			B		C	
Queue Length 50th (ft)				~1908		~229	0			0
Queue Length 95th (ft)				m#1945		m#188	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2786		188	3539			1611
Starvation Cap Reductn				183		0	0			0
Spillback Cap Reductn				0		0	293			133
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.22		1.11	0.60			1.00

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 60 (40%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 47.5		Intersection LOS: D	
Intersection Capacity Utilization 125.6%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



SR 171 Interchange (2040) No SR 265 Interchange, Added NB Lane SR 171

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	899	0	291	1733	1349	0	0	1215	1273
Future Volume (vph)	0	0	0	899	0	291	1733	1349	0	0	1215	1273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						623
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	977	0	316	1884	1466	0	0	1321	1384
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	977	0	316	1884	1466	0	0	1321	1384
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

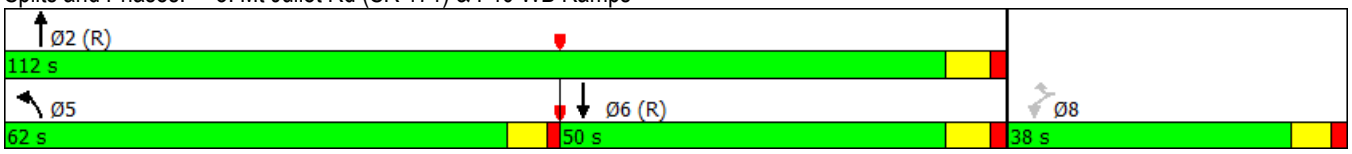
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				38.0		38.0	62.0	112.0			50.0	
Total Split (%)				25.3%		25.3%	41.3%	74.7%			33.3%	
Maximum Green (s)				31.5		31.5	56.0	105.0			43.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				31.5		31.5	56.0	105.0			43.0	150.0
Actuated g/C Ratio				0.21		0.21	0.37	0.70			0.29	1.00
v/c Ratio				1.45		0.84	1.47	0.42			1.32	0.87
Control Delay				251.6		63.2	249.0	7.7			179.1	18.0
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				251.6		63.2	249.0	7.7			179.1	18.0
LOS				F		E	F	A			F	B
Approach Delay					205.5			143.4			96.7	
Approach LOS					F			F			F	
Queue Length 50th (ft)				~669		236	~1305	183			~878	826
Queue Length 95th (ft)				#803		#396	m#1155	m166			#1012	910
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				674		377	1281	3491			1004	1599
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.45		0.84	1.47	0.42			1.32	0.87

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.47
Intersection Signal Delay: 137.1 Intersection LOS: F
Intersection Capacity Utilization 122.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	2713	686	233	1881	0	0	954
Future Volume (vph)	0	0	0	2713	686	233	1881	0	0	954
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.970						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3433	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3433	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				65						71
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	2949	746	253	2045	0	0	1037
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	3695	0	253	2045	0	0	1037
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.34		1.19	0.58			0.64
Control Delay				171.7		160.4	4.3			2.0
Queue Delay				0.1		0.0	0.0			0.0
Total Delay				171.8		160.4	4.3			2.0
LOS				F		F	A			A
Approach Delay				171.8			21.5		2.0	
Approach LOS				F			C		A	
Queue Length 50th (ft)				~2488		~292	89			0
Queue Length 95th (ft)				m#2297		m166	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2759		212	3539			1611
Starvation Cap Reductn				183		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.43		1.19	0.58			0.64

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 40 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.34			
Intersection Signal Delay: 97.6		Intersection LOS: F	
Intersection Capacity Utilization 119.8%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



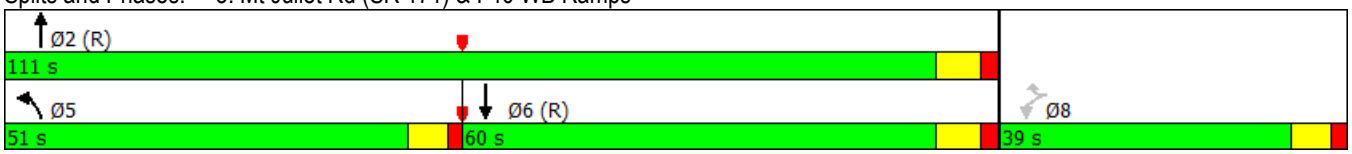
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1012	0	300	1452	2687	0	0	1644	425
Future Volume (vph)	0	0	0	1012	0	300	1452	2687	0	0	1644	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						224
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	1100	0	326	1578	2921	0	0	1787	462
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	1100	0	326	1578	2921	0	0	1787	462
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				39.0		39.0	51.0	111.0			60.0	
Total Split (%)				26.0%		26.0%	34.0%	74.0%			40.0%	
Maximum Green (s)				32.5		32.5	45.0	104.0			53.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				32.5		32.5	45.0	104.0			53.0	150.0
Actuated g/C Ratio				0.22		0.22	0.30	0.69			0.35	1.00
v/c Ratio				1.58		0.84	1.53	0.84			1.44	0.33
Control Delay				305.5		63.2	278.1	11.6			232.0	0.6
Queue Delay				4.4		0.1	0.0	5.1			0.0	0.0
Total Delay				309.9		63.3	278.1	16.7			232.0	0.6
LOS				F		E	F	B			F	A
Approach Delay					253.5			108.4			184.5	
Approach LOS					F			F			F	
Queue Length 50th (ft)				~786		245	~1116	565			~1256	0
Queue Length 95th (ft)				#922		#411	m#820	m324			#1378	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				696		387	1029	3458			1238	1390
Starvation Cap Reductn				0		0	0	487			0	0
Spillback Cap Reductn				293		1	0	111			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				2.73		0.84	1.53	0.98			1.44	0.33

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.58			
Intersection Signal Delay: 154.6		Intersection LOS: F	
Intersection Capacity Utilization 129.9%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	3002	1196	234	2422	0	0	1772
Future Volume (vph)	0	0	0	3002	1196	234	2422	0	0	1772
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.957						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3387	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3387	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				64						65
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	3263	1300	254	2633	0	0	1926
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	4563	0	254	2633	0	0	1926
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				126.0		24.0	150.0			
Total Split (%)				84.0%		16.0%	100.0%			
Maximum Green (s)				120.0		18.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				120.0		18.0	150.0			150.0
Actuated g/C Ratio				0.80		0.12	1.00			1.00
v/c Ratio				1.68		1.20	0.74			1.20
Control Delay				324.5		149.8	10.9			102.6
Queue Delay				0.0		0.0	0.2			0.2
Total Delay				324.6		149.8	11.1			102.8
LOS				F		F	B			F
Approach Delay				324.6			23.3		102.8	
Approach LOS				F			C		F	
Queue Length 50th (ft)				~3465		~296	1311			~639
Queue Length 95th (ft)				m#3453		m153	m0			#895
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2722		212	3539			1611
Starvation Cap Reductn				52		0	0			0
Spillback Cap Reductn				20		0	197			89
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.71		1.20	0.79			1.27

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 62 (41%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.68			
Intersection Signal Delay: 186.2		Intersection LOS: F	
Intersection Capacity Utilization 144.2%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



SR 171 Interchange (2020) with SR 265 Interchange, Added NB Lane SR 171

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	206	0	195	811	922	0	0	922	725
Future Volume (vph)	0	0	0	206	0	195	811	922	0	0	922	725
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						203						677
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	224	0	212	882	1002	0	0	1002	788
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	224	0	212	882	1002	0	0	1002	788
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

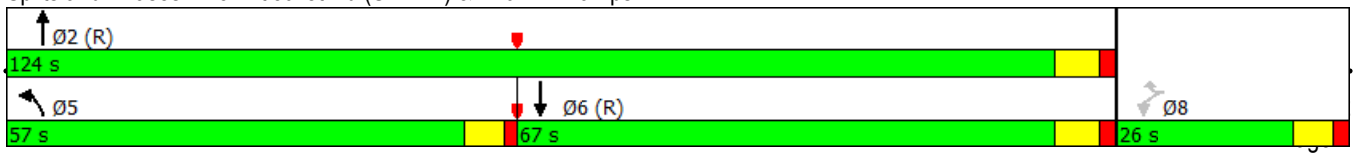
Lanes, Volumes, Timings
3: Mt Juliet Rd (SR 171) & I-40 WB Ramps 09/18/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				26.0		26.0	57.0	124.0			67.0	
Total Split (%)				17.3%		17.3%	38.0%	82.7%			44.7%	
Maximum Green (s)				19.5		19.5	51.0	117.0			60.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				16.4		16.4	45.5	120.1			68.6	150.0
Actuated g/C Ratio				0.11		0.11	0.30	0.80			0.46	1.00
v/c Ratio				0.64		0.61	0.85	0.25			0.62	0.49
Control Delay				72.4		16.7	44.6	3.4			13.6	0.7
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				72.4		16.7	44.6	3.4			13.6	0.7
LOS				E		B	D	A			B	A
Approach Delay					45.3			22.7			7.9	
Approach LOS					D			C			A	
Queue Length 50th (ft)				109		8	371	36			254	0
Queue Length 95th (ft)				153		89	438	119			425	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				417		374	1167	3995			1604	1599
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.54		0.57	0.76	0.25			0.62	0.49

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 68.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



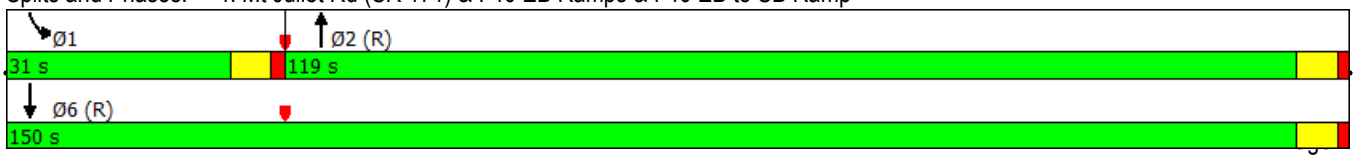
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	1615	382	156	972	0	0	445
Future Volume (vph)	0	0	0	1615	382	156	972	0	0	445
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.971						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3437	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3437	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				56						276
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1755	415	170	1057	0	0	484
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2170	0	170	1057	0	0	484
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free

Lanes, Volumes, Timings
4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp 09/18/2017

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				119.0		31.0	150.0			
Total Split (%)				79.3%		20.7%	100.0%			
Maximum Green (s)				113.0		25.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				118.0		20.0	150.0			150.0
Actuated g/C Ratio				0.79		0.13	1.00			1.00
v/c Ratio				0.80		0.72	0.30			0.30
Control Delay				6.7		104.0	0.2			0.5
Queue Delay				2.9		0.0	0.0			0.0
Total Delay				9.7		104.0	0.2			0.5
LOS				A		F	A			A
Approach Delay				9.7			14.6		0.5	
Approach LOS				A			B		A	
Queue Length 50th (ft)				327		177	0			0
Queue Length 95th (ft)				m329		258	0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2714		295	3539			1611
Starvation Cap Reductn				424		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				0.95		0.58	0.30			0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 14 (9%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 75.5%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



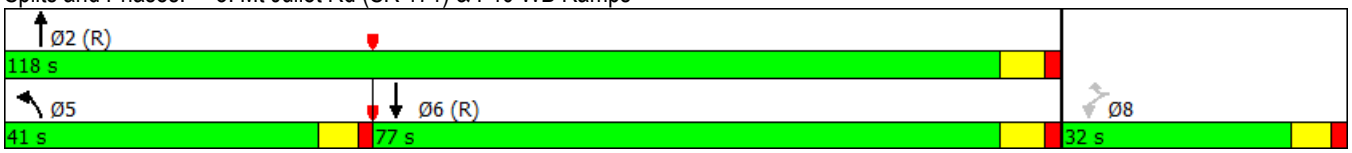
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	387	0	201	607	1968	0	0	1282	284
Future Volume (vph)	0	0	0	387	0	201	607	1968	0	0	1282	284
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						192
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	421	0	218	660	2139	0	0	1393	309
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	421	0	218	660	2139	0	0	1393	309
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				32.0		32.0	41.0	118.0			77.0	
Total Split (%)				21.3%		21.3%	27.3%	78.7%			51.3%	
Maximum Green (s)				25.5		25.5	35.0	111.0			70.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				23.9		23.9	33.2	112.6			73.4	150.0
Actuated g/C Ratio				0.16		0.16	0.22	0.75			0.49	1.00
v/c Ratio				0.82		0.72	0.87	0.57			0.81	0.22
Control Delay				74.8		53.1	74.6	3.6			19.0	0.3
Queue Delay				0.0		0.0	0.0	0.1			0.0	0.0
Total Delay				74.8		53.2	74.6	3.7			19.0	0.3
LOS				E		D	E	A			B	A
Approach Delay					67.4			20.5			15.6	
Approach LOS					E			C			B	
Queue Length 50th (ft)				205		136	320	191			623	0
Queue Length 95th (ft)				267		232	386	126			645	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				546		319	801	3743			1714	1390
Starvation Cap Reductn				0		0	0	545			0	0
Spillback Cap Reductn				0		1	0	113			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.77		0.69	0.82	0.67			0.81	0.22

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 24.7 Intersection LOS: C
Intersection Capacity Utilization 78.0% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps





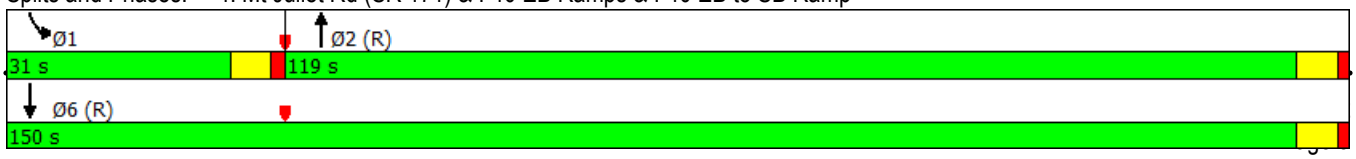
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	1814	243	157	1512	0	0	690
Future Volume (vph)	0	0	0	1814	243	157	1512	0	0	690
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.982						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3476	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3476	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				28						125
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1972	264	171	1643	0	0	750
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2236	0	171	1643	0	0	750
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free

Lanes, Volumes, Timings
4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp 09/18/2017

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				119.0		31.0	150.0			
Total Split (%)				79.3%		20.7%	100.0%			
Maximum Green (s)				113.0		25.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				117.9		20.1	150.0			150.0
Actuated g/C Ratio				0.79		0.13	1.00			1.00
v/c Ratio				0.82		0.72	0.46			0.47
Control Delay				9.8		60.2	0.3			1.0
Queue Delay				2.2		0.0	0.0			0.1
Total Delay				12.0		60.2	0.3			1.1
LOS				B		E	A			A
Approach Delay				12.0			5.9		1.1	
Approach LOS				B			A		A	
Queue Length 50th (ft)				311		144	0			0
Queue Length 95th (ft)				m339		m183	0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2737		295	3539			1611
Starvation Cap Reductn				352		0	0			0
Spillback Cap Reductn				0		0	349			159
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				0.94		0.58	0.52			0.52

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 82 (55%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 8.0		Intersection LOS: A	
Intersection Capacity Utilization 103.9%		ICU Level of Service G	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



SR 171 Interchange (2040) with SR 265 Interchange, Added NB Lane SR 171

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	548	0	247	570	1294	0	0	1180	955
Future Volume (vph)	0	0	0	548	0	247	570	1294	0	0	1180	955
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						701
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	596	0	268	620	1407	0	0	1283	1038
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	596	0	268	620	1407	0	0	1283	1038
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	

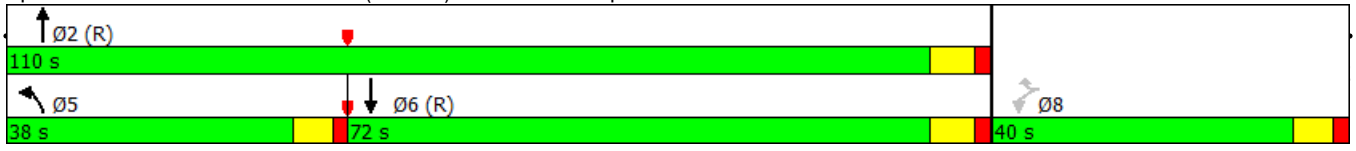
Lanes, Volumes, Timings
3: Mt Juliet Rd (SR 171) & I-40 WB Ramps 09/18/2017

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				40.0		40.0	38.0	110.0			72.0	
Total Split (%)				26.7%		26.7%	25.3%	73.3%			48.0%	
Maximum Green (s)				33.5		33.5	32.0	103.0			65.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				32.2		32.2	30.8	104.3			67.4	150.0
Actuated g/C Ratio				0.21		0.21	0.21	0.70			0.45	1.00
v/c Ratio				0.86		0.70	0.88	0.41			0.81	0.65
Control Delay				70.3		49.3	67.4	9.9			19.5	3.6
Queue Delay				0.0		0.0	0.0	0.0			0.0	0.0
Total Delay				70.3		49.3	67.4	9.9			19.5	3.6
LOS				E		D	E	A			B	A
Approach Delay					63.8			27.5			12.4	
Approach LOS					E			C			B	
Queue Length 50th (ft)				289		178	288	205			494	12
Queue Length 95th (ft)				362		285	m355	247			597	7
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				717		397	732	3467			1575	1599
Starvation Cap Reductn				0		0	0	0			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				0.83		0.68	0.85	0.41			0.81	0.65

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 26.8 Intersection LOS: C
Intersection Capacity Utilization 78.7% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



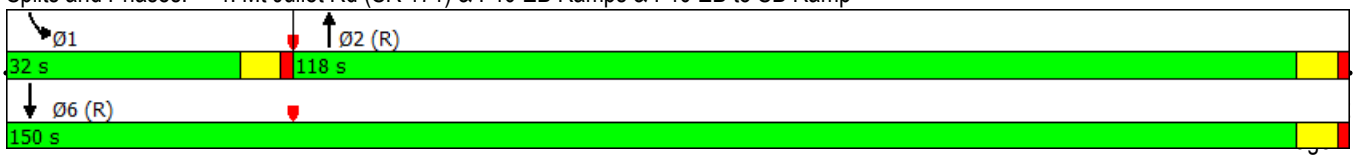
Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	1550	557	198	1530	0	0	118
Future Volume (vph)	0	0	0	1550	557	198	1530	0	0	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.960						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3398	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3398	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				96						121
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1685	605	215	1663	0	0	128
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2290	0	215	1663	0	0	128
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free

Lanes, Volumes, Timings
4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp 09/18/2017

Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				118.0		32.0	150.0			
Total Split (%)				78.7%		21.3%	100.0%			
Maximum Green (s)				112.0		26.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				115.2		22.8	150.0			150.0
Actuated g/C Ratio				0.77		0.15	1.00			1.00
v/c Ratio				0.87		0.80	0.47			0.08
Control Delay				9.8		78.9	0.2			0.1
Queue Delay				3.0		0.0	0.0			0.0
Total Delay				12.8		78.9	0.2			0.1
LOS				B		E	A			A
Approach Delay				12.8			9.3		0.1	
Approach LOS				B			A		A	
Queue Length 50th (ft)				437		181	0			0
Queue Length 95th (ft)				m408		m236	0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2632		306	3539			1611
Starvation Cap Reductn				245		0	0			0
Spillback Cap Reductn				0		0	0			0
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				0.96		0.70	0.47			0.08

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 56 (37%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 10.8		Intersection LOS: B	
Intersection Capacity Utilization 81.6%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



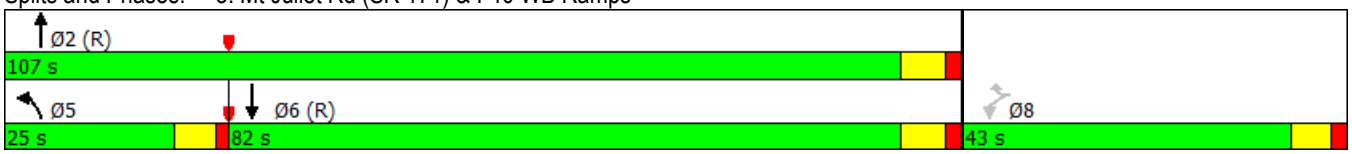
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	728	0	255	208	2516	0	0	1609	361
Future Volume (vph)	0	0	0	728	0	255	208	2516	0	0	1609	361
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	600		200	450		0	0		450
Storage Lanes	0		0	2		0	2		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.95	1.00
Ped Bike Factor												0.87
Frt						0.850						0.850
Flt Protected				0.950			0.950					
Satd. Flow (prot)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1599
Flt Permitted				0.950			0.950					
Satd. Flow (perm)	0	0	0	3213	0	1524	3433	4988	0	0	3505	1390
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						73						194
Link Speed (mph)		30			30			30			45	
Link Distance (ft)		574			886			586			851	
Travel Time (s)		13.0			20.1			13.3			12.9	
Confl. Peds. (#/hr)												403
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	9%	2%	6%	2%	4%	2%	2%	3%	1%
Adj. Flow (vph)	0	0	0	791	0	277	226	2735	0	0	1749	392
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	791	0	277	226	2735	0	0	1749	392
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors				1		1	1	2			2	1
Detector Template				Left		Right	Left	Thru			Thru	Right
Leading Detector (ft)				20		20	20	100			100	20
Trailing Detector (ft)				0		0	0	0			0	0
Detector 1 Position(ft)				0		0	0	0			0	0
Detector 1 Size(ft)				20		20	20	6			6	20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)				0.0		0.0	0.0	0.0			0.0	0.0
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type				Perm		Perm	Prot	NA			NA	Free
Protected Phases							5	2			6	
Permitted Phases				8		8						Free
Detector Phase				8		8	5	2			6	
Switch Phase												
Minimum Initial (s)				10.0		10.0	15.0	20.0			20.0	
Minimum Split (s)				18.0		18.0	25.0	32.0			32.0	
Total Split (s)				43.0		43.0	25.0	107.0			82.0	
Total Split (%)				28.7%		28.7%	16.7%	71.3%			54.7%	
Maximum Green (s)				36.5		36.5	19.0	100.0			75.0	
Yellow Time (s)				4.5		4.5	4.5	5.0			5.0	
All-Red Time (s)				2.0		2.0	1.5	2.0			2.0	
Lost Time Adjust (s)				0.0		0.0	0.0	0.0			0.0	
Total Lost Time (s)				6.5		6.5	6.0	7.0			7.0	
Lead/Lag							Lead				Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)				4.0		4.0	4.0	4.0			4.0	
Recall Mode				None		None	None	C-Max			C-Max	
Act Effct Green (s)				36.5		36.5	16.6	100.0			77.4	150.0
Actuated g/C Ratio				0.24		0.24	0.11	0.67			0.52	1.00
v/c Ratio				1.01		0.65	0.60	0.82			0.97	0.28
Control Delay				90.8		45.2	75.3	13.1			32.4	0.4
Queue Delay				0.0		0.0	0.0	0.9			0.0	0.0
Total Delay				90.8		45.2	75.3	14.0			32.4	0.4
LOS				F		D	E	B			C	A
Approach Delay					79.0			18.7			26.5	
Approach LOS					E			B			C	
Queue Length 50th (ft)				~410		182	108	510			853	0
Queue Length 95th (ft)				#548		289	m121	m526			#1070	0
Internal Link Dist (ft)		494			806			506			771	
Turn Bay Length (ft)				600		200	450					450
Base Capacity (vph)				781		426	434	3325			1809	1390
Starvation Cap Reductn				0		0	0	310			0	0
Spillback Cap Reductn				0		0	0	0			0	0
Storage Cap Reductn				0		0	0	0			0	0
Reduced v/c Ratio				1.01		0.65	0.52	0.91			0.97	0.28

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green, Master Intersection			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.01			
Intersection Signal Delay: 31.9		Intersection LOS: C	
Intersection Capacity Utilization 91.9%		ICU Level of Service F	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Mt Juliet Rd (SR 171) & I-40 WB Ramps



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Lane Configurations										
Traffic Volume (vph)	0	0	0	1758	724	199	2138	0	0	792
Future Volume (vph)	0	0	0	1758	724	199	2138	0	0	792
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0		0	150		0	0	0
Storage Lanes	0	0	0		0	1		0	0	1
Taper Length (ft)	25		25			25			25	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00
Frt				0.956						0.865
Flt Protected						0.950				
Satd. Flow (prot)	0	0	0	3383	0	1770	3539	0	0	1611
Flt Permitted						0.950				
Satd. Flow (perm)	0	0	0	3383	0	1770	3539	0	0	1611
Right Turn on Red					Yes			Yes		Yes
Satd. Flow (RTOR)				129						65
Link Speed (mph)	30			30			30		30	
Link Distance (ft)	635			610			368		351	
Travel Time (s)	14.4			13.9			8.4		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1911	787	216	2324	0	0	861
Shared Lane Traffic (%)										
Lane Group Flow (vph)	0	0	0	2698	0	216	2324	0	0	861
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Right	Left	Left	Right	Left	R NA
Median Width(ft)	0			24			12		0	
Link Offset(ft)	0			0			0		0	
Crosswalk Width(ft)	16			16			16		16	
Two way Left Turn Lane										
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15		9	15		9	15	9
Number of Detectors				2		1	2			1
Detector Template				Thru		Left	Thru			Right
Leading Detector (ft)				100		20	100			20
Trailing Detector (ft)				0		0	0			0
Detector 1 Position(ft)				0		0	0			0
Detector 1 Size(ft)				6		20	6			20
Detector 1 Type				Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex
Detector 1 Channel										
Detector 1 Extend (s)				0.0		0.0	0.0			0.0
Detector 1 Queue (s)				0.0		0.0	0.0			0.0
Detector 1 Delay (s)				0.0		0.0	0.0			0.0
Detector 2 Position(ft)				94			94			
Detector 2 Size(ft)				6			6			
Detector 2 Type				Cl+Ex			Cl+Ex			
Detector 2 Channel										
Detector 2 Extend (s)				0.0			0.0			
Turn Type				NA		Prot	NA			Free
Protected Phases				2		1	6			
Permitted Phases										Free



Lane Group	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SER
Detector Phase				2		1	6			
Switch Phase										
Minimum Initial (s)				20.0		10.0	20.0			
Minimum Split (s)				32.0		20.0	32.0			
Total Split (s)				124.0		26.0	150.0			
Total Split (%)				82.7%		17.3%	100.0%			
Maximum Green (s)				118.0		20.0	144.0			
Yellow Time (s)				4.5		4.5	4.5			
All-Red Time (s)				1.5		1.5	1.5			
Lost Time Adjust (s)				0.0		0.0	0.0			
Total Lost Time (s)				6.0		6.0	6.0			
Lead/Lag				Lag		Lead				
Lead-Lag Optimize?										
Vehicle Extension (s)				4.0		4.0	4.0			
Recall Mode				C-Max		None	C-Max			
Act Effct Green (s)				118.1		19.9	150.0			150.0
Actuated g/C Ratio				0.79		0.13	1.00			1.00
v/c Ratio				1.00		0.92	0.66			0.53
Control Delay				23.5		72.2	0.4			1.3
Queue Delay				37.0		0.0	0.1			0.1
Total Delay				60.5		72.2	0.5			1.4
LOS				E		E	A			A
Approach Delay				60.5			6.6		1.4	
Approach LOS				E			A		A	
Queue Length 50th (ft)				~324		206	0			0
Queue Length 95th (ft)				m#1208		m212	m0			0
Internal Link Dist (ft)	555			530			288		271	
Turn Bay Length (ft)						150				
Base Capacity (vph)				2689		236	3539			1611
Starvation Cap Reductn				283		0	0			0
Spillback Cap Reductn				0		0	200			91
Storage Cap Reductn				0		0	0			0
Reduced v/c Ratio				1.12		0.92	0.70			0.57

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 96 (64%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 29.7		Intersection LOS: C	
Intersection Capacity Utilization 115.1%		ICU Level of Service H	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: Mt Juliet Rd (SR 171) & I-40 EB Ramps & I-40 EB to SB Ramp



APPENDIX F: SAFETY ANALYSIS

eTRIMS Crash, Traffic, and Route Feature Reports – SR 265
eTRIMS Crash, Traffic, and Route Feature Reports – SR 171
eTRIMS Crash, Traffic, and Route Feature Reports – I-40 Davidson County
eTRIMS Crash, Traffic, and Route Feature Reports – I-40 Davidson County
Statewide Average Crash Rates
IHSDM Predictive Crash Analysis: Existing Geometry 2016 Adams Lane
IHSDM Predictive Crash Analysis: Existing Geometry 2016 I-40
IHSDM Predictive Crash Analysis: Existing Geometry 2016 SR 171
IHSDM Predictive Crash Analysis: Existing Geometry 2016 SR 265
IHSDM Predictive Crash Analysis: Existing Geometry 2040 Adams Lane
IHSDM Predictive Crash Analysis: Existing Geometry 2040 I-40
IHSDM Predictive Crash Analysis: Existing Geometry 2040 SR 171
IHSDM Predictive Crash Analysis: Existing Geometry 2040 SR 265
IHSDM Predictive Crash Analysis: Proposed Geometry 2040 Adams Lane
IHSDM Predictive Crash Analysis: Proposed Geometry 2040 I-40
IHSDM Predictive Crash Analysis: Proposed Geometry 2040 SR 171
IHSDM Predictive Crash Analysis: Proposed Geometry 2040 SR 265
HSM CMF (Diamond Interchange to DDI Interchange)

ETRIMS CRASH, TRAFFIC, AND ROUTE FEATURE REPORTS – SR 265

Crash Summary Report

County: WILSON **Route:** SR265 **Spcl Cse:** 0-NONE **Cnty Seq:** 1

Log Miles: 1.890 to 3.570 - Crash Dates: 1/1/2014 to 12/31/2016
Vehicle Filter: None - Other Factors Filter: None

Statistics

Fatal Crashes:	0
Total Killed:	0
Incap Injury Crashes:	1
Total Incap Injuries:	1
Other Injury Crashes:	15
Total Other Injuries:	21
Prop Damage Crashes:	34
Total Crashes:	**50**

Crash Location

Along Roadway:	23
At Intersection:	27
Railroad Crossing:	0
Bridge:	0
Underpass:	0
Ramp:	0
Private Property:	0
Other:	0

Crashes Involving

Pedestrians:	0
Hazardous Cargo:	0
Work / Constr Zones:	0
Fixed Objects:	8
Single Unit Trucks	2
Tractor - Trailer Trucks:	0
Bicycles:	0
Motorcycles:	1
Lane Departures:	11
Distracted Drivers:	2

Road Conditions

Ice:	0
Snow or Slush:	0
Sand, Mud, Dirt or Oil:	0
Wet:	6
Dry:	44

First Harmful Event

Pedestrian:	0
Pedalcycle:	0
Railway Train:	0
Deer (Animal):	1
Other Animal:	1
Motor Vehicle in Transport:	35
Motor Vehicle in Transport in Other Roadway:	2
Parked Motor Vehicle:	0
Other Type Non-Motorist:	0
Fixed Object:	8
Other Object (Not Fixed):	0
Non Collision:	2
Overturn:	1
Jackknife:	0
Cross Median:	0
Ran Off Road:	0

Manner of Collision

Rear End:	9
Head On:	5
Rear-to-Side / Rear:	0
Angle:	20
Sideswipe Same Dir:	0
Sideswipe Opp Dir:	1
Unknown:	2

Light Conditions

Dawn:	0
Daylight:	37
Dusk:	2
Dark / Lighted:	2
Dark / Not Lighted:	8
Not Indicated:	1

Weather Conditions

No Adverse Conditions:	45
Rain:	4
Sleet and Hail:	0
Snow:	0
Foggy:	0
Smog, Smoke:	1
Crosswind:	0

Fixed Objects

Boulder:	0	Other Barrier:	0	Ditch:	1
Building:	0	Highway Traffic Sign Post	0	Embankment:	1
Impact Attenuator:	0	Overhead Sign Support:	0	Fence:	0
Overhead Structure:	0	Luminaire/Light Support:	0	Wall:	0
Bridge Pier/Abutment/End:	0	Traffic Signal Support:	0	Mail Box:	1
Bridge Rail:	0	Utility Pole:	0	Shrubbery:	0
Guardrail:	1	Other Post, Pole Supports:	0	Tree:	1
Cable Barrier:	0	Culvert:	2	Fire Hydrant:	0
		Curb:	1	Other Fixed Object:	0

This report was generated by E-TRIMS

Route Feature Description Listing

Wilson County (95) - Route: SR265, Special Case: 0-None , Log Mile 1.8 to 4.9

COUNTY: WILSON **COUNTY NO:** 95

ROUTE: SR265 **SPECIAL CASE:** 0-NONE **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
1.880	1	ENTER MT. JULIET CITY LIMITS	130
1.890	9	FLASHING YELLOW LIGHT	907
1.890	4	4851 PLEASANT GROVE RD. LT.	430
1.920	9	PLEASANT GROVE UNITED METHODIST CHURCH LT.	912
1.970	9	FLASHING YELLOW LIGHTS LT.	907
2.219	5	A653 TILLMAN DR. LT.	530
2.240	2	OVERHEAD [95I00400001]: I-40	221
2.260	3	I-40 RT. & LT. / CENTER OF OVERHEAD	360
2.305	1	LEAVE MT. JULIET CITY LIMITS	135
2.315	5	A556 JOHN HAGER RD. RT. & A556 ADAMS LN. LT.	510
2.315	9	FLASHING YELLOW LIGHTS	907
2.388	1	ENTER MT. JULIET CITY LIMITS	130
2.892	1	LEAVE MT. JULIET CITY LIMITS	135
2.990	2	BRIDGE [95S61590001]: NORTH CREEK	211
3.043	5	A560 S.W. COOKS RD. RT.	520
3.161	9	TRAFFIC COUNT STATION 18	959
3.280	9	CULVERT: DRAINAGE	980
3.360	9	SPOKEN WORD MISSION CHURCH RT.	912
3.570	9	TRAFFIC SIGNAL	905
3.570	3	SR-171 S. MT. JULIET RD. RT. & LT.	310
3.930	9	CEMETERY RT.	913
4.008	9	TRAFFIC COUNT STATION 19	959
4.040	9	CULVERT: DRAINAGE	980
4.450	9	CULVERT [95CULV09003]: BRANCH	980
4.490	2	BRIDGE [95S61590003]: WRIGHT BRANCH	221
4.600	5	C170 BRYSON PLACE RT.	520
4.741	5	B798 STOCKBRIDGE WAY RT.	520
4.741	4	6100 S. RUTLAND RD. LT.	430

Route Feature Description Listing

Wilson County (95) - Route: SR265, Special Case: 0-None , Log Mile 1.8 to 4.9

COUNTY: WILSON **COUNTY NO:** 95

ROUTE: SR265 **SPECIAL CASE:** 0-NONE **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
4.900	9	CENTER CHAPEL CHURCH OF CHRIST CHURCT RT.	912

Traffic Report

Wilson County (95) - Route: SR265, Special Case: 0-None , Log Mile 1.89 to 3.57

COUNTY: WILSON

ROUTE	SC	CO SQ	BEG LOG MILE	END LOG MILE	YR OF TRAFFIC	ANNUAL AVERAGE DAILY TRAFFIC	PEAK HOUR %	DESIGN HOUR VOLUME	DIRECT DIST %	% PASS CARS	% SINGLE UNIT TRUCKS	% MULTI UNIT TRUCKS	CYCLE COUNTS STATION NBR	CYCLE COUNTS STATION COUNTY	CLASS COUNTS STATION NBR	CLASS COUNTS STATION COUNTY	IS CLASS COUNT?
SR265	0	1	0.000	1.890	2016	7040	10	12	65	99	1	0	247 @	19	247C	19	NO
SR265	0	1	1.890	3.570	2016	3960	11	13	65	98	2	0	18	95	247C	19	NO
SR265	0	1	3.570	6.730	2016	7050	9	11	65	98	1	1	19	95	019C	95	YES

ETRIMS CRASH, TRAFFIC, AND ROUTE FEATURE REPORTS – SR 171

Crash Summary Report

County: WILSON **Route:** SR171 **Spcl Cse:** 0-NONE **Cnty Seq:** 1

Log Miles: 3.570 to 4.850 - Crash Dates: 1/1/2014 to 12/31/2016
Vehicle Filter: None - Other Factors Filter: None

Statistics

Fatal Crashes:	0
Total Killed:	0
Incap Injury Crashes:	3
Total Incap Injuries:	3
Other Injury Crashes:	50
Total Other Injuries:	65
Prop Damage Crashes:	200
Total Crashes:	**253**

Crash Location

Along Roadway:	113
At Intersection:	122
Railroad Crossing:	0
Bridge:	8
Underpass:	0
Ramp:	10
Private Property:	0
Other:	0

Crashes Involving

Pedestrians:	0
Hazardous Cargo:	0
Work / Constr Zones:	0
Fixed Objects:	6
Single Unit Trucks	6
Tractor - Trailer Trucks:	4
Bicycles:	0
Motorcycles:	1
Lane Departures:	8
Distracted Drivers:	25

Road Conditions

Ice:	3
Snow or Slush:	1
Sand, Mud, Dirt or Oil:	0
Wet:	37
Dry:	208

First Harmful Event

Pedestrian:	0
Pedalcycle:	0
Railway Train:	0
Deer (Animal):	2
Other Animal:	1
Motor Vehicle in Transport:	233
Motor Vehicle in Transport in Other Roadway:	2
Parked Motor Vehicle:	0
Other Type Non-Motorist:	0
Fixed Object:	6
Other Object (Not Fixed):	0
Non Collision:	3
Overturn:	2
Jackknife:	0
Cross Median:	0
Ran Off Road:	0

Manner of Collision

Rear End:	158
Head On:	8
Rear-to-Side / Rear:	2
Angle:	30
Sideswipe Same Dir:	33
Sideswipe Opp Dir:	2
Unknown:	2

Light Conditions

Dawn:	4
Daylight:	178
Dusk:	5
Dark / Lighted:	49
Dark / Not Lighted:	13
Not Indicated:	0

Weather Conditions

No Adverse Conditions:	218
Rain:	26
Sleet and Hail:	2
Snow:	3
Foggy:	0
Smog, Smoke:	0
Crosswind:	0

Fixed Objects

Boulder:	0	Other Barrier:	0	Ditch:	1
Building:	0	Highway Traffic Sign Post	0	Embankment:	0
Impact Attenuator:	0	Overhead Sign Support:	1	Fence:	0
Overhead Structure:	0	Luminaire/Light Support:	0	Wall:	0
Bridge Pier/Abutment/End:	0	Traffic Signal Support:	0	Mail Box:	0
Bridge Rail:	1	Utility Pole:	0	Shrubbery:	0
Guardrail:	1	Other Post, Pole Supports:	0	Tree:	0
Cable Barrier:	0	Culvert:	0	Fire Hydrant:	0
		Curb:	0	Other Fixed Object:	2

This report was generated by E-TRIMS

Route Feature Description Listing

Wilson County (95) - Route: SR171, Special Case: 0-None , Log Mile 3.57 to 4.85

COUNTY: WILSON **COUNTY NO:** 95

ROUTE: SR171 **SPECIAL CASE:** 0-NONE **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
3.570	7	RAMP TO SR-265 CENTRAL PK. LT.	712
3.571	1	ENTER MT. JULIET CITY LIMITS	130
4.075	9	TRAFFIC SIGNAL / ENTRANCE TO PROVIDENCE COMMONS RT.	905
4.150	9	CULVERT: DRAINAGE	980
4.230	9	BEGIN 30 MPH	932
4.231	9	TRAFFIC COUNT STATION 17	959
4.302	9	TRAFFIC SIGNAL	905
4.302	4	6103 PROVIDENCE PKWY. RT.	420
4.302	5	B705 PROVIDENCE W. PKWY. LT.	530
4.302	9	BEGIN ILLUMINATION	930
4.310	9	CULVERT [95CULV08001]: BRANCH	980
4.434	9	TRAFFIC SIGNAL	905
4.434	5	B237 CROSSINGS CIR. RT. & LT.	510
4.560	9	TRAFFIC SIGNAL	905
4.560	4	4855 BELINDA PKWY. RT.	420
4.560	5	A556 ADAMS LN. LT.	530
4.635	5	B237 HERSCHEL DR. LT.	530
4.640	7	RAMP TO I-40 EB LNS. RT.	702
4.680	9	TRAFFIC SIGNAL	905
4.680	7	RAMP TO I-40 EB LNS. RT.	702
4.680	7	RAMP FROM I-40 EB LNS. LT.	706
4.750	7	RAMP FROM I-40 EB LNS. RT.	705
4.790	2	OVERHEAD [95I00400003]: I-40	221
4.810	3	I-40 / CENTER OF OVERHEAD	360
4.810	0	BEGIN N. MT. JULIET RD.	920
4.850	9	TRAFFIC SIGNAL	905
4.850	7	RAMP FROM I-40 WB LNS. RT.	705
4.850	7	RAMP TO I-40 WB LNS. LT.	703

Traffic Report

Wilson County (95) - Route: SR171, Special Case: 0-None , Log Mile 3.57 to 4.85

COUNTY: WILSON

ROUTE	SC	CO SQ	BEG LOG MILE	END LOG MILE	YR OF TRAFFIC	ANNUAL AVERAGE DAILY TRAFFIC	PEAK HOUR %	DESIGN HOUR VOLUME	DIRECT DIST %	% PASS CARS	% SINGLE UNIT TRUCKS	% MULTI UNIT TRUCKS	CYCLE COUNTS STATION NBR	CYCLE COUNTS STATION COUNTY	CLASS COUNTS STATION NBR	CLASS COUNTS STATION COUNTY	IS CLASS COUNT?
SR171	0	1	3.560	4.810	2016	19910	8	10	65	96	1	3	17	95	017C	95	YES
SR171	0	1	4.810	6.920	2016	25820	9	11	55	86	4	10	89	95	089C	95	YES

ETRIMS CRASH, TRAFFIC, AND ROUTE FEATURE REPORTS – I-40 DAVIDSON COUNTY

Crash Summary Report

County: DAVIDSON **Route:** I0040 **Spcl Cse:** 0-NONE **Cnty Seq:** 1

Log Miles: 29.500 to 31.220 - Crash Dates: 1/1/2014 to 12/31/2016
Vehicle Filter: None - Other Factors Filter: None

Statistics

Fatal Crashes:	1
Total Killed:	1
Incap Injury Crashes:	6
Total Incap Injuries:	7
Other Injury Crashes:	51
Total Other Injuries:	66
Prop Damage Crashes:	110
Total Crashes:	**168**

Crash Location

Along Roadway:	165
At Intersection:	0
Railroad Crossing:	0
Bridge:	0
Underpass:	1
Ramp:	2
Private Property:	0
Other:	0

Crashes Involving

Pedestrians:	1
Hazardous Cargo:	0
Work / Constr Zones:	1
Fixed Objects:	31
Single Unit Trucks	4
Tractor - Trailer Trucks:	15
Bicycles:	0
Motorcycles:	0
Lane Departures:	36
Distracted Drivers:	7

Road Conditions

Ice:	4
Snow or Slush:	7
Sand, Mud, Dirt or Oil:	0
Wet:	25
Dry:	119

First Harmful Event

Pedestrian:	1
Pedalcycle:	0
Railway Train:	0
Deer (Animal):	3
Other Animal:	1
Motor Vehicle in Transport:	106
Motor Vehicle in Transport in Other Roadway:	0
Parked Motor Vehicle:	0
Other Type Non-Motorist:	0
Fixed Object:	31
Other Object (Not Fixed):	11
Non Collision:	0
Overturn:	0
Jackknife:	0
Cross Median:	0
Ran Off Road:	0

Manner of Collision

Rear End:	76
Head On:	0
Rear-to-Side / Rear:	0
Angle:	5
Sideswipe Same Dir:	23
Sideswipe Opp Dir:	1
Unknown:	3

Light Conditions

Dawn:	1
Daylight:	114
Dusk:	3
Dark / Lighted:	9
Dark / Not Lighted:	28
Not Indicated:	0

Weather Conditions

No Adverse Conditions:	121
Rain:	24
Sleet and Hail:	3
Snow:	6
Foggy:	1
Smog, Smoke:	0
Crosswind:	0

Fixed Objects

Boulder:	0	Other Barrier:	19	Ditch:	1
Building:	0	Highway Traffic Sign Post	0	Embankment:	2
Impact Attenuator:	0	Overhead Sign Support:	0	Fence:	0
Overhead Structure:	0	Luminaire/Light Support:	0	Wall:	2
Bridge Pier/Abutment/End:	0	Traffic Signal Support:	0	Mail Box:	0
Bridge Rail:	0	Utility Pole:	0	Shrubbery:	0
Guardrail:	6	Other Post, Pole Supports:	0	Tree:	1
Cable Barrier:	0	Culvert:	0	Fire Hydrant:	0
		Curb:	0	Other Fixed Object:	0

This report was generated by E-TRIMS

Route Feature Description Listing

Davidson County (19) - Route: I0040, Special Case: 0-None , Log Mile 28.9 to 31.22

COUNTY: DAVIDSON **COUNTY NO:** 19

ROUTE: I0040 **SPECIAL CASE:** 0-NONE **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
28.900	9	CULVERT: DRAINAGE	980
29.020	2	OVERHEAD [19I00400161]: RAMP OVER I-40	241
29.030	2	UNDERPASS [19I00400161]: RAMP FROM I-40 TO SR-45 OLD HICKORY BLVD.	242
29.040	9	ITS CAMERA # 112 / WB LNS.	967
29.100	0	EXIT 221B: OLD HICKORY BLVD.	990
29.100	7	RAMP 221-B TO 1004 OLD HICKORY BLVD. RT.	721
29.180	7	RAMP 221-E FROM SR-45 OLD HICKORY BLVD. LT.	715
29.330	9	ITS CAMERA # 113 / WB LNS.	967
29.340	2	UNDERPASS [19I00400141]: 1004 OLD HICKORY BLVD. RT. & SR-45 OLD HICKORY BLVD. LT.	242
29.350	4	1004 OLD HICKORY BLVD. / CENTER OF UNDERPASS	480
29.350	3	SR-45 OLD HICKORY BLVD. / CENTER OF UNDERPASS	380
29.350	0	INTERCHANGE 0221	939
29.530	7	RAMP 221-C FROM 1004 OLD HICKORY BLVD. RT.	724
29.530	0	MILE POST # 221	963
29.560	7	RAMP 221-D TO SR-45 OLD HICKORY BLVD. LT.	712
29.826	9	TRAFFIC COUNT STATION 198	959
29.890	9	CULVERT: BRANCH	980
30.240	2	UNDERPASS [19I00400143]: 1004 NEW HOPE RD.	222
30.250	9	ITS CAMERA # 114 / WB LNS.	967
30.550	0	MILE POST # 222	963
31.020	2	OVERHEAD [19I00400145]: G006 EARHART RD.	221
31.090	9	ITS MESSAGE SIGN # 42 / WB LNS.	966
31.190	9	ITS CAMERA # 115 / WB LNS.	967
31.220	1	DAVIDSON-WILSON COUNTY LINE	125

Traffic Report

Davidson County (19) - Route: I0040, Special Case: 0-None , Log Mile 28.9 to 31.22

COUNTY: DAVIDSON

ROUTE	SC	CO SQ	BEG LOG MILE	END LOG MILE	YR OF TRAFFIC	ANNUAL AVERAGE DAILY TRAFFIC	PEAK HOUR %	DESIGN HOUR VOLUME	DIRECT DIST %	% PASS CARS	% SINGLE UNIT TRUCKS	% MULTI UNIT TRUCKS	CYCLE COUNTS STATION NBR	CYCLE COUNTS STATION COUNTY	CLASS COUNTS STATION NBR	CLASS COUNTS STATION COUNTY	IS CLASS COUNT?
I0040	0	1	27.480	29.350	2016	132000	9	11	65	92	2	6	345	19	431S	19	NO
I0040	0	1	29.350	31.220	2016	93120	9	11	60	86	2	12	198	19	174C	95	NO

ETRIMS CRASH, TRAFFIC, AND ROUTE FEATURE REPORTS – I-40 WILSON COUNTY

Crash Summary Report

County: WILSON **Route:** I0040 **Spcl Cse:** 0-NONE **Cnty Seq:** 1

Log Miles: 0.000 to 3.400 - Crash Dates: 1/1/2014 to 12/31/2016
Vehicle Filter: None - Other Factors Filter: None

Statistics

Fatal Crashes:	0
Total Killed:	0
Incap Injury Crashes:	7
Total Incap Injuries:	8
Other Injury Crashes:	58
Total Other Injuries:	80
Prop Damage Crashes:	146
Total Crashes:	**211**

Crash Location

Along Roadway:	194
At Intersection:	1
Railroad Crossing:	0
Bridge:	0
Underpass:	0
Ramp:	16
Private Property:	0
Other:	0

Crashes Involving

Pedestrians:	0
Hazardous Cargo:	0
Work / Constr Zones:	4
Fixed Objects:	74
Single Unit Trucks	3
Tractor - Trailer Trucks:	17
Bicycles:	0
Motorcycles:	1
Lane Departures:	87
Distracted Drivers:	6

Road Conditions

Ice:	2
Snow or Slush:	5
Sand, Mud, Dirt or Oil:	0
Wet:	86
Dry:	117

First Harmful Event

Pedestrian:	0
Pedalcycle:	0
Railway Train:	0
Deer (Animal):	7
Other Animal:	1
Motor Vehicle in Transport:	107
Motor Vehicle in Transport in Other Roadway:	0
Parked Motor Vehicle:	1
Other Type Non-Motorist:	0
Fixed Object:	74
Other Object (Not Fixed):	7
Non Collision:	4
Overturn:	7
Jackknife:	1
Cross Median:	0
Ran Off Road:	0

Manner of Collision

Rear End:	47
Head On:	2
Rear-to-Side / Rear:	1
Angle:	13
Sideswipe Same Dir:	38
Sideswipe Opp Dir:	0
Unknown:	8

Light Conditions

Dawn:	5
Daylight:	128
Dusk:	8
Dark / Lighted:	19
Dark / Not Lighted:	46
Not Indicated:	4

Weather Conditions

No Adverse Conditions:	123
Rain:	79
Sleet and Hail:	2
Snow:	3
Foggy:	1
Smog, Smoke:	1
Crosswind:	0

Fixed Objects

Boulder:	0	Other Barrier:	50	Ditch:	2
Building:	0	Highway Traffic Sign Post	0	Embankment:	3
Impact Attenuator:	1	Overhead Sign Support:	0	Fence:	0
Overhead Structure:	0	Luminaire/Light Support:	0	Wall:	9
Bridge Pier/Abutment/End:	0	Traffic Signal Support:	0	Mail Box:	0
Bridge Rail:	0	Utility Pole:	0	Shrubbery:	0
Guardrail:	8	Other Post, Pole Supports:	0	Tree:	1
Cable Barrier:	0	Culvert:	0	Fire Hydrant:	0
		Curb:	0	Other Fixed Object:	0

This report was generated by E-TRIMS

Route Feature Description Listing

Wilson County (95) - Route: I0040, Special Case: 0-None , Log Mile 0 to 3.4

COUNTY: WILSON **COUNTY NO:** 95

ROUTE: I0040 **SPECIAL CASE:** 0-NONE **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
0.000	1	DAVIDSON-WILSON COUNTY LINE	120
0.000	0	BEGIN I-40	920
0.000	9	BEGIN 70 MPH	932
0.340	0	MILE POST # 223	963
0.360	9	CULVERT [95CULV01001]: BRANCH	980
1.370	0	MILE POST # 224	963
2.020	2	UNDERPASS [95I00400001]: SR-265 CENTRAL PK.	222
2.360	0	MILE POST # 225	963
2.520	9	CULVERT [95CULV01003]: BRANCH	980
2.720	0	EXIT 226 A-B SR-171 MT. JULIET / BELINDA PKWY. / PROVIDENCE WAY	990
2.720	9	BEGIN ILLUMINATION	930
2.720	7	RAMP 226-A TO SR-171 S. MT. JULIET RD. & RAMP 226-B TO SR-171 N. MT. JULIET RD. RT.	711
2.880	7	RAMP 226-E FROM SR-171 N. MT. JULIET RD. LT.	715
3.110	2	UNDERPASS [95I00400003]: SR-171 S. MT. JULIET RD. RT. & SR-171 N. MT. JULIET RD. LT.	222
3.120	3	SR-171 S. MT. JULIET RD. & SR-171 N. MT. JULIET RD. / CENTER OF UNDERPASS	380
3.120	0	INTERCHANGE 0226	939
3.350	0	MILE POST # 226	963
3.350	7	RAMP 226-D TO SR-171 N. MT. JULIET RD. LT.	712
3.400	7	RAMP 226-C FROM SR-171 S. MT. JULIET RD. RT.	714

Traffic Report

Wilson County (95) - Route: I0040, Special Case: 0-None , Log Mile 0 to 3.4

COUNTY: WILSON

ROUTE	SC	CO SQ	BEG LOG MILE	END LOG MILE	YR OF TRAFFIC	ANNUAL AVERAGE DAILY TRAFFIC	PEAK HOUR %	DESIGN HOUR VOLUME	DIRECT DIST %	% PASS CARS	% SINGLE UNIT TRUCKS	% MULTI UNIT TRUCKS	CYCLE COUNTS STATION NBR	CYCLE COUNTS STATION COUNTY	CLASS COUNTS STATION NBR	CLASS COUNTS STATION COUNTY	IS CLASS COUNT?
I0040	0	1	0.000	3.120	2016	93120	9	11	60	86	2	12	198 @	19	174C	95	NO
I0040	0	1	3.120	6.280	2016	80990	8	10	51	84	2	14	990	95	174C	95	NO

STATEWIDE AVERAGE CRASH RATES

Tennessee Department of Transportation

Statewide Average Crash Rates for Sections and Spots

Study: 2012 - 2014 HSIP LIST

Begin Date: 1/1/2012 End Date: 12/31/2014

Route Type	Rural / Urban	Location Type	Highway Type	Fatal Rate	Incap. Rate	Other Inj. Rate	Pd. Rate	Total Rate	Severe Crash Rate	Total Veh. Miles (in millions)
Interstates and State Routes										
IS & SR	Rural	Section	2 OR 3 LN	0.026	0.125	0.442	1.117	**1.709**	0.150	22,710
IS & SR	Rural	Section	2 OR 3 LN W/TL	0.019	0.088	0.457	1.541	**2.104**	0.106	751
IS & SR	Rural	Section	4 OR MORE UNDIV	0.016	0.096	0.398	1.128	**1.638**	0.112	429
IS & SR	Rural	Section	4 OR MORE DIV	0.013	0.049	0.183	0.524	**0.768**	0.062	7,362
IS & SR	Rural	Section	4 OR MORE W TL	0.015	0.056	0.231	0.739	**1.041**	0.071	2,646
IS & SR	Rural	Section	FREEWAY	0.005	0.027	0.105	0.376	**0.512**	0.032	26,240
IS & SR	Rural	Spot	2 OR 3 LN	0.007	0.035	0.124	0.315	**0.482**	0.042	82,468
IS & SR	Rural	Spot	2 OR 3 LN W/TL	0.003	0.014	0.079	0.267	**0.363**	0.017	4,587
IS & SR	Rural	Spot	4 OR MORE UNDIV	0.003	0.015	0.069	0.207	**0.295**	0.018	2,622
IS & SR	Rural	Spot	4 OR MORE DIV	0.004	0.012	0.048	0.139	**0.203**	0.016	28,455
IS & SR	Rural	Spot	4 OR MORE W TL	0.004	0.013	0.054	0.175	**0.246**	0.016	11,691
IS & SR	Rural	Spot	FREEWAY	0.001	0.005	0.017	0.062	**0.085**	0.005	158,735
IS & SR	Urban	Section	2 OR 3 LN	0.015	0.099	0.604	1.838	**2.556**	0.114	9,257
IS & SR	Urban	Section	2 OR 3 LN W/TL	0.009	0.095	0.580	2.078	**2.762**	0.104	1,701
IS & SR	Urban	Section	4 OR MORE UNDIV	0.013	0.100	0.821	2.804	**3.738**	0.113	2,876
IS & SR	Urban	Section	4 OR MORE DIV	0.009	0.058	0.439	1.538	**2.044**	0.067	15,295
IS & SR	Urban	Section	4 OR MORE W TL	0.013	0.069	0.660	2.257	**2.999**	0.082	13,160
IS & SR	Urban	Section	FREEWAY	0.005	0.024	0.226	0.781	**1.036**	0.029	45,182
IS & SR	Urban	Spot	2 OR 3 LN	0.002	0.015	0.094	0.296	**0.408**	0.017	65,044
IS & SR	Urban	Spot	2 OR 3 LN W/TL	0.001	0.013	0.078	0.281	**0.373**	0.014	13,374
IS & SR	Urban	Spot	4 OR MORE UNDIV	0.001	0.010	0.093	0.339	**0.443**	0.011	34,220
IS & SR	Urban	Spot	4 OR MORE DIV	0.001	0.008	0.062	0.218	**0.288**	0.009	119,884
IS & SR	Urban	Spot	4 OR MORE W TL	0.002	0.008	0.080	0.274	**0.364**	0.010	113,972
IS & SR	Urban	Spot	FREEWAY	0.001	0.003	0.027	0.094	**0.125**	0.004	377,023

Note: Section rates are crashes per million vehicle miles

Note: Spot rates are crashes per million vehicles. Spots are sections of roadways less than or equal to .10 miles

Note: Severe crash rates are the sum of rates for fatal and incapacitating injury crashes

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2016 ADAMS LANE

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

Adams Lane
Existing Geometry
2016

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 4:16 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 14:43:29 CDT 2017
IHSDM Version: v12.1.0 (Mar 24, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2016 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: Adams Lane
Site Set Comment: Created Thu Sep 21 14:39:57 CDT 2017
Site Set Version: v1

Evaluation Title: Adams Lane
Evaluation Comment: Created Thu Sep 21 14:43:08 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2016
Last Year of Analysis: 2016
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	Adams Lane		1.0000	2016: 3000	10.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.0	3	no	None (0)	no	no	0.00	0.0000	0	0.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	Adams Lane	1.0000	1.21	1.2092	1.10

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.01	1.2	0.15	12.5	0.15	12.1
Highway Segment	Collision with Bicycle	0.00	0.1	0.00	0.1	0.00	0.2
Highway Segment	Other Single-vehicle Collision	0.00	0.2	0.02	2.0	0.03	2.1
Highway Segment	Overturned	0.01	1.2	0.01	1.0	0.03	2.5
Highway Segment	Collision with Pedestrian	0.00	0.2	0.00	0.1	0.00	0.3
Highway Segment	Run Off Road	0.21	17.5	0.41	34.3	0.63	52.1
Highway Segment	Total Single Vehicle Crashes	0.25	20.5	0.60	49.9	0.84	69.3
Highway Segment	Angle Collision	0.04	3.2	0.06	4.9	0.10	8.5
Highway Segment	Head-on Collision	0.01	1.1	0.00	0.2	0.02	1.6
Highway Segment	Other Multiple-vehicle Collision	0.01	0.8	0.03	2.0	0.03	2.7
Highway Segment	Rear-end Collision	0.06	5.3	0.10	8.3	0.17	14.2
Highway Segment	Sideswipe	0.01	1.2	0.03	2.6	0.04	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.14	11.7	0.22	18.0	0.37	30.7
Highway Segment	Total Highway Segment Crashes	0.39	32.2	0.82	67.9	1.21	100.0
	Total Crashes	0.39	32.2	0.82	67.9	1.21	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2016 I-40

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

I-40
Existing Geometry
2016

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 4:17 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 16:00:00 CDT 2017
IHSDM Version: v12.1.0 (Mar 24, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2016 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: I-40 Existing
Site Set Comment: Created Thu Sep 21 14:44:31 CDT 2017
Site Set Version: v1

Evaluation Title: I-40 Existing Geometry 2016
Evaluation Comment: Created Thu Sep 21 15:59:39 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2016
Last Year of Analysis: 2016
Empirical-Bayes Analysis: None

Freeway Segment Site Set CPM Evaluation

Type: Freeway
Calibration Factor: FI_MV=1.0, PDO_MV=1.0, FI_SV=1.0, PDO_SV=1.0

Table 1. Evaluation Freeway Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway	I40	SR 45 to SR 171	5.7200	2016: 93120

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway	I40	SR 45 to SR 171	5.7200	96.35	16.8446	0.50

Table 3. Expected Freeway Freeway Sites Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.6446	1.7039	9.2192	19.9883	64.7951
Total	0.6446	1.7039	9.2192	19.9883	64.7951

Table 4. Expected Freeway Site Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.04	0.0	0.56	0.6	0.60	0.6
Highway Segment	Collision with Fixed Object	7.78	8.1	18.28	19.0	26.06	27.0
Highway Segment	Collision with Other Object	0.55	0.6	3.55	3.7	4.10	4.3
Highway Segment	Other Single-vehicle Collision	2.24	2.3	2.73	2.8	4.97	5.2
Highway Segment	Collision with Parked Vehicle	0.16	0.2	0.41	0.4	0.57	0.6
Highway Segment	Total Single Vehicle Crashes	10.77	11.2	25.54	26.5	36.30	37.7
Highway Segment	Right-Angle Collision	0.64	0.7	0.71	0.7	1.35	1.4
Highway Segment	Head-on Collision	0.17	0.2	0.08	0.1	0.24	0.3
Highway Segment	Other Multi-vehicle Collision	0.64	0.7	0.94	1.0	1.59	1.6
Highway Segment	Rear-end Collision	15.59	16.2	27.09	28.1	42.68	44.3
Highway Segment	Sideswipe, Same Direction Collision	3.74	3.9	10.44	10.8	14.19	14.7
Highway Segment	Total Multiple Vehicle Crashes	20.79	21.6	39.26	40.7	60.05	62.3
Highway Segment	Total Highway Segment Crashes	31.56	32.8	64.80	67.2	96.35	100.0
	Total Crashes	31.56	32.8	64.80	67.2	96.35	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Speed Change Site Set CPM Evaluation

Type: Ramp Exit Speed Change
Calibration Factor: FI_EX=1.0, PDO_EX=1.0

Table 5. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	0.2000	2016: 93120
2	Eight-lane Freeway Speed Change	I-40	SR 171 Off Ramp	0.2000	2016: 93120

Table 6. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	2.26	11.3104	0.67
2	Eight-lane Freeway Speed Change	I-40	SR 171 Off Ramp	2.26	11.3104	0.67

Table 7. Expected Exit Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0182	0.0482	0.2624	0.5797	1.3535
2	0.0182	0.0482	0.2624	0.5797	1.3535
Total	0.0363	0.0965	0.5249	1.1595	2.7070

Table 8. Expected Exit Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.02	0.4	0.02	0.4
Highway Segment	Collision with Fixed Object	0.36	7.9	0.56	12.4	0.92	20.3
Highway Segment	Collision with Other Object	0.03	0.6	0.08	1.8	0.11	2.4
Highway Segment	Other Single-vehicle Collision	0.09	2.0	0.06	1.4	0.15	3.3
Highway Segment	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Total Single Vehicle Crashes	0.47	10.5	0.72	16.0	1.20	26.5
Highway Segment	Right-Angle Collision	0.02	0.4	0.03	0.7	0.05	1.2
Highway Segment	Head-on Collision	0.01	0.2	0.01	0.1	0.01	0.3
Highway Segment	Other Multi-vehicle Collision	0.03	0.6	0.04	1.0	0.07	1.6
Highway Segment	Rear-end Collision	1.00	22.1	1.53	33.8	2.53	55.9
Highway Segment	Sideswipe, Same Direction Collision	0.29	6.3	0.37	8.3	0.66	14.6
Highway Segment	Total Multiple Vehicle Crashes	1.34	29.7	1.98	43.9	3.33	73.5
Highway Segment	Total Highway Segment Crashes	1.82	40.2	2.71	59.8	4.52	100.0
	Total Crashes	1.82	40.2	2.71	59.8	4.52	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance Speed Change
Calibration Factor: FI_EN=1.0, PDO_EN=1.0

Table 9. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	0.2000	2016: 93120
2	Eight-lane Freeway Speed Change	I-40	SR 171 On Ramp	0.2000	2016: 93120

Table 10. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	2.81	14.0313	0.83
2	Eight-lane Freeway Speed Change	I-40	SR 171 On Ramp	2.94	14.7258	0.87

Table 11. Expected Entrance Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0190	0.0505	0.2749	0.6073	1.8545
2	0.0218	0.0579	0.3150	0.6959	1.8545
Total	0.0408	0.1084	0.5899	1.3032	3.7091

Table 12. Expected Entrance Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.01	0.1	0.01	0.1
Highway Segment	Collision with Fixed Object	0.40	6.9	0.48	8.3	0.88	15.2
Highway Segment	Collision with Other Object	0.04	0.7	0.13	2.3	0.17	3.0
Highway Segment	Other Single-vehicle Collision	0.14	2.4	0.06	1.0	0.20	3.4
Highway Segment	Collision with Parked Vehicle	0.01	0.1	0.01	0.2	0.02	0.3
Highway Segment	Total Single Vehicle Crashes	0.58	10.1	0.69	12.0	1.27	22.1
Highway Segment	Right-Angle Collision	0.04	0.7	0.06	1.0	0.10	1.7
Highway Segment	Head-on Collision	0.01	0.1	0.00	0.1	0.01	0.2
Highway Segment	Other Multi-vehicle Collision	0.04	0.6	0.06	1.0	0.09	1.6
Highway Segment	Rear-end Collision	1.11	19.3	1.97	34.2	3.08	53.5
Highway Segment	Sideswipe, Same Direction Collision	0.27	4.7	0.94	16.3	1.21	21.0
Highway Segment	Total Multiple Vehicle Crashes	1.46	25.4	3.02	52.5	4.48	77.9
Highway Segment	Total Highway Segment Crashes	2.04	35.5	3.71	64.5	5.75	100.0
	Total Crashes	2.04	35.5	3.71	64.5	5.75	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Ramp Site Set CPM Evaluation

Type: Ramp Exit
Calibration Factor: EX_RAMP_MV_FI=1.0, EX_RAMP_MV_PDO=1.0, EX_RAMP_SV_FI=1.0, EX_RAMP_SV_PDO=1.0

Table 13. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	2016: 6040
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	2016: 5410

Table 14. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	0.36	1.6522	0.75
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	0.45	1.8016	0.91

Table 15. Expected Exit Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0045	0.0138	0.0587	0.0889	0.1976
2	0.0039	0.0118	0.0418	0.1148	0.2781
Total	0.0084	0.0256	0.1005	0.2037	0.4757

Table 16. Expected Exit Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.2	0.01	1.1	0.01	1.3
Highway Segment	Collision with Fixed Object	0.23	28.5	0.30	37.0	0.53	65.6
Highway Segment	Collision with Other Object	0.02	2.0	0.06	7.2	0.07	9.2
Highway Segment	Other Single-vehicle Collision	0.07	8.2	0.04	5.5	0.11	13.8
Highway Segment	Collision with Parked Vehicle	0.01	0.6	0.01	0.8	0.01	1.4
Highway Segment	Total Single Vehicle Crashes	0.32	39.5	0.42	51.7	0.74	91.2
Highway Segment	Right-Angle Collision	0.00	0.1	0.00	0.1	0.00	0.2
Highway Segment	Head-on Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Multi-vehicle Collision	0.00	0.1	0.00	0.2	0.00	0.2
Highway Segment	Rear-end Collision	0.01	1.5	0.04	4.7	0.05	6.2
Highway Segment	Sideswipe, Same Direction Collision	0.00	0.4	0.01	1.8	0.02	2.2
Highway Segment	Total Multiple Vehicle Crashes	0.02	2.0	0.06	6.8	0.07	8.8
Highway Segment	Total Highway Segment Crashes	0.34	41.5	0.48	58.5	0.81	100.0
	Total Crashes	0.34	41.5	0.48	58.5	0.81	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance
Calibration Factor: ENT_RAMP_MV_FI=1.0, ENT_RAMP_MV_PDO=1.0, ENT_RAMP_SV_FI=1.0, ENT_RAMP_SV_PDO=1.0

Table 17. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	2016: 5840
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	2016: 11620

Table 18. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	0.22	1.4725	0.69
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	0.89	3.5394	0.83

Table 19. Expected Entrance Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0020	0.0060	0.0384	0.0468	0.1277
2	0.0051	0.0156	0.0826	0.1932	0.5883
Total	0.0071	0.0216	0.1210	0.2400	0.7160

Table 20. Expected Entrance Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.1	0.01	0.8	0.01	0.9
Highway Segment	Collision with Fixed Object	0.20	17.8	0.30	27.1	0.50	44.9
Highway Segment	Collision with Other Object	0.01	1.3	0.06	5.3	0.07	6.5
Highway Segment	Other Single-vehicle Collision	0.06	5.1	0.04	4.0	0.10	9.2
Highway Segment	Collision with Parked Vehicle	0.00	0.4	0.01	0.6	0.01	1.0
Highway Segment	Total Single Vehicle Crashes	0.27	24.7	0.42	37.8	0.69	62.5
Highway Segment	Right-Angle Collision	0.00	0.3	0.01	0.5	0.01	0.8
Highway Segment	Head-on Collision	0.00	0.1	0.00	0.1	0.00	0.1
Highway Segment	Other Multi-vehicle Collision	0.00	0.3	0.01	0.6	0.01	1.0
Highway Segment	Rear-end Collision	0.09	7.9	0.20	18.6	0.29	26.5
Highway Segment	Sideswipe, Same Direction Collision	0.02	1.9	0.08	7.2	0.10	9.1
Highway Segment	Total Multiple Vehicle Crashes	0.12	10.5	0.30	26.9	0.41	37.5
Highway Segment	Total Highway Segment Crashes	0.39	35.2	0.72	64.8	1.11	100.0
	Total Crashes	0.39	35.2	0.72	64.8	1.11	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2016 SR 171

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

SR 171
Existing Geometry
2016

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 4:15 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 14:21:46 CDT 2017
IHSDM Version: v12.1.0 (Mar 24, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2016 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: SR 171 Existing
Site Set Comment: Created Thu Sep 21 13:30:58 CDT 2017
Site Set Version: v1

Evaluation Title: SR 171 Existing Condition 2016
Evaluation Comment: Created Thu Sep 21 14:20:54 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2016
Last Year of Analysis: 2016
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	SR 171	TriStar to SR 265	0.4800	2016: 19910	12.00	12.00	8.00	8.00	0.00	0.00	0.00	0.00	0.00	6.0	3	no	None (0)	no	no	0.00	0.0000	0	0.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	SR 171	TriStar to SR 265	0.4800	2.37	4.9301	0.68

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.03	1.2	0.30	12.5	0.29	12.1
Highway Segment	Collision with Bicycle	0.00	0.1	0.00	0.1	0.01	0.2
Highway Segment	Other Single-vehicle Collision	0.01	0.2	0.05	2.0	0.05	2.1
Highway Segment	Overturned	0.03	1.2	0.02	1.0	0.06	2.5
Highway Segment	Collision with Pedestrian	0.01	0.2	0.00	0.1	0.01	0.3
Highway Segment	Run Off Road	0.41	17.5	0.81	34.3	1.23	52.1
Highway Segment	Total Single Vehicle Crashes	0.48	20.5	1.18	49.9	1.64	69.3
Highway Segment	Angle Collision	0.08	3.2	0.12	4.9	0.20	8.5
Highway Segment	Head-on Collision	0.03	1.1	0.01	0.2	0.04	1.6
Highway Segment	Other Multiple-vehicle Collision	0.02	0.8	0.05	2.0	0.06	2.7
Highway Segment	Rear-end Collision	0.12	5.3	0.20	8.3	0.34	14.2
Highway Segment	Sideswipe	0.03	1.2	0.06	2.6	0.09	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.28	11.7	0.43	18.0	0.73	30.7
Highway Segment	Total Highway Segment Crashes	0.76	32.2	1.61	67.9	2.37	100.0
	Total Crashes	0.76	32.2	1.61	67.9	2.37	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Urban Arterial Site Set CPM Evaluation

Type: 3T
Calibration Factor: 1

Table 4. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	3T	SR 171	Providence toTriStar	0.2000	2016: 19910	3	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	3T	SR 171	Providence toTriStar	0.2000	2.11	10.5419	1.45

Table 6. Expected 3T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Collision with Bicycle	0.05	2.5	0.00	0.0	0.05	2.5
Highway Segment	Collision with Fixed Object	0.03	1.6	0.12	5.9	0.16	7.5
Highway Segment	Collision with Other Object	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Single-vehicle Collision	0.01	0.7	0.01	0.2	0.02	0.9
Highway Segment	Collision with Pedestrian	0.08	3.8	0.00	0.0	0.08	3.8
Highway Segment	Total Segment Single Vehicle Crashes	0.18	8.7	0.13	6.1	0.31	14.8
Highway Segment	Angle Collision	0.02	1.2	0.02	0.9	0.04	2.0
Highway Segment	Driveway-related Collision	0.13	6.2	0.41	19.3	0.54	25.5
Highway Segment	Head-on Collision	0.01	0.6	0.02	0.9	0.03	1.4
Highway Segment	Other Multi-vehicle Collision	0.01	0.6	0.02	0.9	0.03	1.4
Highway Segment	Rear-end Collision	0.30	14.2	0.76	36.1	1.06	50.3
Highway Segment	Sideswipe, Opposite Direction Collision	0.01	0.3	0.02	0.9	0.02	1.1
Highway Segment	Sideswipe, Same Direction Collision	0.00	0.0	0.07	3.3	0.07	3.4
Highway Segment	Total Segment Multiple Vehicle Crashes	0.48	23.0	1.31	62.2	1.80	85.2
Highway Segment	Total Highway Segment Crashes	0.67	31.7	1.44	68.3	2.11	100.0
	Total Crashes	0.67	31.7	1.44	68.3	2.11	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 5T
Calibration Factor: 1

Table 7. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	5T	SR 171	I-40 to Providence	0.6000	2016: 19910	1	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	5T	SR 171	I-40 to Providence	0.6000	6.30	10.5017	1.45

Table 9. Expected 5T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.1	0.04	0.7	0.05	0.7
Highway Segment	Collision with Bicycle	0.29	4.6	0.00	0.0	0.29	4.6
Highway Segment	Collision with Fixed Object	0.11	1.7	0.67	10.6	0.78	12.3
Highway Segment	Collision with Other Object	0.00	0.0	0.05	0.8	0.06	0.9
Highway Segment	Other Single-vehicle Collision	0.16	2.5	0.11	1.7	0.26	4.2
Highway Segment	Collision with Pedestrian	0.17	2.8	0.00	0.0	0.17	2.8
Highway Segment	Total Segment Single Vehicle Crashes	0.74	11.7	0.87	13.8	1.61	25.5
Highway Segment	Angle Collision	0.06	0.9	0.19	3.0	0.25	4.0
Highway Segment	Driveway-related Collision	0.07	1.1	0.19	3.0	0.26	4.1
Highway Segment	Head-on Collision	0.03	0.4	0.01	0.2	0.04	0.6
Highway Segment	Other Multi-vehicle Collision	0.02	0.3	0.09	1.5	0.12	1.8
Highway Segment	Rear-end Collision	1.01	16.1	2.11	33.4	3.12	49.5
Highway Segment	Sideswipe, Opposite Direction Collision	0.01	0.1	0.03	0.5	0.03	0.5
Highway Segment	Sideswipe, Same Direction Collision	0.07	1.2	0.80	12.7	0.88	13.9
Highway Segment	Total Segment Multiple Vehicle Crashes	1.27	20.1	3.43	54.4	4.69	74.5
Highway Segment	Total Highway Segment Crashes	2.00	31.8	4.30	68.2	6.30	100.0
	Total Crashes	2.00	31.8	4.30	68.2	6.30	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4SG
Calibration Factor: 1

Table 10. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/ Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 171 at I40 WB		2016: 19910	2016: 11000	2	2	yes	false	0	0	2	2	no	50	6	0	0	4
2	4SG2x2le5	SR 171 at I40 EB		2016: 19910	2016: 5500	1	1	yes	false	0	1	0	1	no	50	5	0	0	6
3	4SG2x2le5	SR 171 at Belinda		2016: 19910	2016: 10000	4	3	yes	false	0	2	2	4	no	50	7	0	0	6
4	4SG2x2le5	SR 171 at Crossings		2016: 19910	2016: 10000	3	2	yes	false	2	2	0	4	no	50	6	0	0	9
6	4SG2x2le5	SR 171 at Providence W		2016: 19910	2016: 10000	4	3	yes	false	0	4	0	4	no	50	5	0	0	4
7	4SG2x2le5	SR 171 at TriStar		2016: 19910	2016: 10000	3	2	yes	false	1	3	0	4	no	50	4	0	0	3
8	4SG2x2le5	SR 171 at SR 265		2016: 19910	2016: 3960	2	0	no	false	2	2	0	4	no	50	3	0	0	1

Table 11. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 171 at I40 WB	3.59	0.32	3.5924
2	4SG	SR 171 at I40 EB	4.04	0.44	4.0408
3	4SG	SR 171 at Belinda	2.59	0.24	2.5869
4	4SG	SR 171 at Crossings	3.39	0.31	3.3863
6	4SG	SR 171 at Providence W	2.86	0.26	2.8634
7	4SG	SR 171 at TriStar	3.34	0.31	3.3383
8	4SG	SR 171 at SR 265	3.59	0.41	3.5895

Table 12. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Bicycle	0.34	1.5	0.00	0.0	0.34	1.5
Highway Segment	Collision with Pedestrian	0.21	0.9	0.00	0.0	0.21	0.9
Highway Segment		0.55	2.4	0.00	0.0	0.55	2.4
Highway Segment	Total Highway Segment Crashes	0.55	2.4	0.00	0.0	0.55	2.4
Intersection	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Fixed Object	0.28	1.2	0.90	3.8	1.18	5.0
Intersection	Non-Collision	0.05	0.2	0.04	0.1	0.09	0.4
Intersection	Collision with Other Object	0.03	0.1	0.07	0.3	0.10	0.4
Intersection	Other Single-vehicle Collision	0.01	0.1	0.02	0.1	0.04	0.2
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Total Intersection Single Vehicle Crashes	0.38	1.6	1.03	4.4	1.41	6.0
Intersection	Angle Collision	2.44	10.4	3.51	15.0	5.96	25.5
Intersection	Head-on Collision	0.34	1.5	0.43	1.8	0.78	3.3
Intersection	Other Multi-vehicle Collision	0.39	1.7	3.04	13.0	3.42	14.6
Intersection	Rear-end Collision	3.17	13.5	6.95	29.7	10.12	43.3
Intersection	Sideswipe	0.70	3.0	0.46	2.0	1.16	4.9
Intersection	Total Intersection Multiple Vehicle Crashes	7.04	30.1	14.40	61.5	21.43	91.6
Intersection	Total Intersection Crashes	7.41	31.7	15.43	66.0	22.84	97.6
	Total Crashes	7.96	34.0	15.43	66.0	23.40	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2016 SR 265

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

SR 265
Existing Geometry
2016

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 4:14 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 13:12:59 CDT 2017
IHSDM Version: v12.1.0 (Mar 24, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2016 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: SR 265 Existing
Site Set Comment: Created Thu Sep 21 09:25:02 CDT 2017
Site Set Version: v1

Evaluation Title: SR 265 Existing Geometry 2016
Evaluation Comment: Created Thu Sep 21 13:12:28 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2016
Last Year of Analysis: 2016
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	SR 265	Existing Geometry	1.5200	2016: 3960	10.00	10.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	10.0	4	no	None (0)	no	no	0.00	0.0000	0	0.00	no
2	2U	SR 265	Existing Geometry	0.1600	2016: 3960	10.00	10.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	6.0	4	no	None (0)	no	no	550.00	0.1600	0	1.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	SR 265	Existing Geometry	1.5200	2.77	1.8220	1.26
2	2U	SR 265	Existing Geometry	0.1600	0.42	2.6497	1.83

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.04	1.2	0.40	12.5	0.39	12.1
Highway Segment	Collision with Bicycle	0.00	0.1	0.00	0.1	0.01	0.2
Highway Segment	Other Single-vehicle Collision	0.01	0.2	0.06	2.0	0.07	2.1
Highway Segment	Overturned	0.04	1.2	0.03	1.0	0.08	2.5
Highway Segment	Collision with Pedestrian	0.01	0.2	0.00	0.1	0.01	0.3
Highway Segment	Run Off Road	0.56	17.5	1.09	34.3	1.66	52.1
Highway Segment	Total Single Vehicle Crashes	0.65	20.5	1.59	49.9	2.21	69.3
Highway Segment	Angle Collision	0.10	3.2	0.16	4.9	0.27	8.5
Highway Segment	Head-on Collision	0.04	1.1	0.01	0.2	0.05	1.6
Highway Segment	Other Multiple-vehicle Collision	0.03	0.8	0.07	2.0	0.09	2.7
Highway Segment	Rear-end Collision	0.17	5.3	0.27	8.3	0.45	14.2
Highway Segment	Sideswipe	0.04	1.2	0.08	2.6	0.12	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.37	11.7	0.57	18.0	0.98	30.7
Highway Segment	Total Highway Segment Crashes	1.03	32.2	2.17	67.9	3.19	100.0
	Total Crashes	1.03	32.2	2.17	67.9	3.19	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Urban Arterial Site Set CPM Evaluation

Type: 3ST
Calibration Factor: 1

Table 4. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout
1	3ST2x2le5	SR 265 at Pleasant Grove	3-leg stop	2016: 3960	2016: 3000	0	0	no	false
2	3ST2x2le5	SR 265 at Tillman	3-leg stop	2016: 3960	2016: 300	0	0	no	false
4	3ST2x2le5	SR 265 at Cook	3-leg stop	2016: 3960	2016: 500	0	0	no	false

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	3ST	SR 265 at Pleasant Grove	3-leg stop	0.69	0.34	0.6846
2	3ST	SR 265 at Tillman	3-leg stop	0.25	0.16	0.2459
4	3ST	SR 265 at Cook	3-leg stop	0.31	0.20	0.3083

Table 6. Expected 3ST Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Bicycle	0.02	1.5	0.00	0.0	0.02	1.5
Highway Segment	Collision with Pedestrian	0.03	2.0	0.00	0.0	0.03	2.0
Highway Segment		0.04	3.6	0.00	0.0	0.04	3.6
Highway Segment	Total Highway Segment Crashes	0.04	3.6	0.00	0.0	0.04	3.6
Intersection	Collision with Animal	0.00	0.0	0.01	0.4	0.01	0.4
Intersection	Collision with Fixed Object	0.11	8.9	0.23	18.6	0.34	27.5
Intersection	Non-Collision	0.01	1.2	0.01	0.7	0.02	1.9
Intersection	Collision with Other Object	0.01	1.0	0.03	2.1	0.04	3.1
Intersection	Other Single-vehicle Collision	0.01	0.5	0.01	0.5	0.01	1.0
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.1	0.00	0.1
Intersection	Total Intersection Single Vehicle Crashes	0.14	11.6	0.28	22.4	0.42	34.0
Intersection	Angle Collision	0.10	8.4	0.12	10.0	0.23	18.3
Intersection	Head-on Collision	0.01	1.1	0.01	0.9	0.02	2.0
Intersection	Other Multi-vehicle Collision	0.02	1.6	0.11	8.9	0.13	10.5
Intersection	Rear-end Collision	0.13	10.3	0.21	16.7	0.34	27.0
Intersection	Sideswipe	0.04	3.1	0.02	1.5	0.06	4.6
Intersection	Total Intersection Multiple Vehicle Crashes	0.30	24.4	0.47	38.0	0.77	62.4
Intersection	Total Intersection Crashes	0.45	36.1	0.75	60.3	1.20	96.4
	Total Crashes	0.49	39.7	0.75	60.3	1.24	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4ST
Calibration Factor: 1

Table 7. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout
1	4ST2x2le5	SR 265 at Adams	4-leg stop	2016: 3960	2016: 3000	0	0	no	false

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4ST	SR 265 at Adams	4-leg stop	1.14	0.45	1.1385

Table 9. Expected 4ST Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Bicycle	0.02	1.7	0.00	0.0	0.02	1.7
Highway Segment	Collision with Pedestrian	0.02	2.1	0.00	0.0	0.02	2.1
Highway Segment		0.04	3.8	0.00	0.0	0.04	3.8
Highway Segment	Total Highway Segment Crashes	0.04	3.8	0.00	0.0	0.04	3.8
Intersection	Collision with Animal	0.00	0.0	0.00	0.3	0.00	0.3
Intersection	Collision with Fixed Object	0.04	3.5	0.12	10.2	0.15	13.6
Intersection	Non-Collision	0.01	0.9	0.01	0.6	0.02	1.5
Intersection	Collision with Other Object	0.01	0.5	0.01	0.8	0.01	1.3
Intersection	Other Single-vehicle Collision	0.00	0.3	0.00	0.1	0.00	0.3
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Total Intersection Single Vehicle Crashes	0.06	5.1	0.14	12.0	0.20	17.1
Intersection	Angle Collision	0.14	11.8	0.20	17.5	0.33	29.3
Intersection	Head-on Collision	0.01	1.1	0.02	1.6	0.03	2.7
Intersection	Other Multi-vehicle Collision	0.02	1.6	0.13	11.3	0.15	12.9
Intersection	Rear-end Collision	0.10	9.1	0.22	19.5	0.33	28.6
Intersection	Sideswipe	0.04	3.2	0.03	2.3	0.06	5.5
Intersection	Total Intersection Multiple Vehicle Crashes	0.31	26.9	0.59	52.2	0.90	79.0
Intersection	Total Intersection Crashes	0.36	32.0	0.73	64.2	1.09	96.2
	Total Crashes	0.41	35.8	0.73	64.2	1.14	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Type: 4SG

Calibration Factor: 1

Table 10. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 265 at SR 171	4-leg signal	2016: 19910	2016: 3960	2	0	yes	false	2	2	0	4	no	50	3	0	0	1

Table 11. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 265 at SR 171	4-leg signal	3.27	0.38	3.2707

Table 12. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Bicycle	0.05	1.5	0.00	0.0	0.05	1.5
Highway Segment	Collision with Pedestrian	0.02	0.6	0.00	0.0	0.02	0.6
Highway Segment		0.07	2.1	0.00	0.0	0.07	2.1
Highway Segment	Total Highway Segment Crashes	0.07	2.1	0.00	0.0	0.07	2.1
Intersection	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Fixed Object	0.04	1.1	0.12	3.8	0.16	4.9
Intersection	Non-Collision	0.01	0.2	0.01	0.1	0.01	0.4
Intersection	Collision with Other Object	0.00	0.1	0.01	0.3	0.01	0.4
Intersection	Other Single-vehicle Collision	0.00	0.1	0.00	0.1	0.01	0.2
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Total Intersection Single Vehicle Crashes	0.05	1.5	0.14	4.4	0.19	5.9
Intersection	Angle Collision	0.35	10.6	0.49	15.0	0.84	25.6
Intersection	Head-on Collision	0.05	1.5	0.06	1.8	0.11	3.3
Intersection	Other Multi-vehicle Collision	0.06	1.7	0.42	13.0	0.48	14.7
Intersection	Rear-end Collision	0.45	13.7	0.97	29.7	1.42	43.4
Intersection	Sideswipe	0.10	3.0	0.06	2.0	0.16	5.0
Intersection	Total Intersection Multiple Vehicle Crashes	1.00	30.5	2.01	61.5	3.01	92.0
Intersection	Total Intersection Crashes	1.05	32.0	2.15	65.9	3.20	97.9
	Total Crashes	1.12	34.1	2.15	65.9	3.27	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2040 ADAMS LANE

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

Adams Lane
Existing Geometry
2040

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 5:11 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 17:11:00 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: Adams Lane
Site Set Comment: Created Thu Sep 21 14:39:57 CDT 2017
Site Set Version: v1

Evaluation Title: Adams Lane Existing 2040
Evaluation Comment: Created Thu Sep 21 17:10:35 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	Adams Lane		1.0000	2040: 13505	10.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.0	3	no	None (0)	no	no	0.00	0.0000	0	0.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	Adams Lane	1.0000	5.44	5.4434	1.10

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.07	1.2	0.68	12.5	0.66	12.1
Highway Segment	Collision with Bicycle	0.01	0.1	0.00	0.1	0.01	0.2
Highway Segment	Other Single-vehicle Collision	0.01	0.2	0.11	2.0	0.11	2.1
Highway Segment	Overturned	0.07	1.2	0.06	1.0	0.14	2.5
Highway Segment	Collision with Pedestrian	0.01	0.2	0.00	0.1	0.02	0.3
Highway Segment	Run Off Road	0.95	17.5	1.87	34.3	2.84	52.1
Highway Segment	Total Single Vehicle Crashes	1.11	20.5	2.72	49.9	3.77	69.3
Highway Segment	Angle Collision	0.18	3.2	0.27	4.9	0.46	8.5
Highway Segment	Head-on Collision	0.06	1.1	0.01	0.2	0.09	1.6
Highway Segment	Other Multiple-vehicle Collision	0.04	0.8	0.11	2.0	0.15	2.7
Highway Segment	Rear-end Collision	0.29	5.3	0.45	8.3	0.77	14.2
Highway Segment	Sideswipe	0.07	1.2	0.14	2.6	0.20	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.64	11.7	0.98	18.0	1.67	30.7
Highway Segment	Total Highway Segment Crashes	1.75	32.2	3.70	67.9	5.44	100.0
	Total Crashes	1.75	32.2	3.70	67.9	5.44	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2040 I-40

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

I-40
Existing Geometry
2040

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 5:20 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 17:19:30 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: I-40 Existing
Site Set Comment: Created Thu Sep 21 14:44:31 CDT 2017
Site Set Version: v1

Evaluation Title: I-40 Existing 2040
Evaluation Comment: Created Thu Sep 21 17:19:09 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Freeway Segment Site Set CPM Evaluation

Type: Freeway
Calibration Factor: FI_MV=1.0, PDO_MV=1.0, FI_SV=1.0, PDO_SV=1.0

Table 1. Evaluation Freeway Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway	I40	SR 45 to SR 171	5.7200	2040: 111725

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway	I40	SR 45 to SR 171	5.7200	125.03	21.8583	0.54

Table 3. Expected Freeway Freeway Sites Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.8034	2.1238	11.4911	24.9141	85.6968
Total	0.8034	2.1238	11.4911	24.9141	85.6968

Table 4. Expected Freeway Site Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.05	0.0	0.66	0.5	0.71	0.6
Highway Segment	Collision with Fixed Object	8.75	7.0	21.45	17.2	30.19	24.1
Highway Segment	Collision with Other Object	0.62	0.5	4.16	3.3	4.78	3.8
Highway Segment	Other Single-vehicle Collision	2.52	2.0	3.21	2.6	5.72	4.6
Highway Segment	Collision with Parked Vehicle	0.18	0.1	0.48	0.4	0.66	0.5
Highway Segment	Total Single Vehicle Crashes	12.11	9.7	29.95	24.0	42.07	33.6
Highway Segment	Right-Angle Collision	0.84	0.7	1.00	0.8	1.85	1.5
Highway Segment	Head-on Collision	0.22	0.2	0.11	0.1	0.33	0.3
Highway Segment	Other Multi-vehicle Collision	0.84	0.7	1.34	1.1	2.18	1.7
Highway Segment	Rear-end Collision	20.41	16.3	38.46	30.8	58.88	47.1
Highway Segment	Sideswipe, Same Direction Collision	4.90	3.9	14.83	11.9	19.73	15.8
Highway Segment	Total Multiple Vehicle Crashes	27.22	21.8	55.74	44.6	82.96	66.4
Highway Segment	Total Highway Segment Crashes	39.33	31.5	85.70	68.5	125.03	100.0
	Total Crashes	39.33	31.5	85.70	68.5	125.03	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Speed Change Site Set CPM Evaluation

Type: Ramp Exit Speed Change
Calibration Factor: FI_EX=1.0, PDO_EX=1.0

Table 5. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	0.2000	2040: 111725
2	Eight-lane Freeway Speed Change	I-40	SR 171 Off Ramp	0.2000	2040: 111725

Table 6. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	2.67	13.3748	0.66
2	Eight-lane Freeway Speed Change	I-40	SR 171 Off Ramp	2.67	13.3748	0.66

Table 7. Expected Exit Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0214	0.0569	0.3093	0.6834	1.6039
2	0.0214	0.0569	0.3093	0.6834	1.6039
Total	0.0428	0.1137	0.6187	1.3668	3.2079

Table 8. Expected Exit Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.02	0.4	0.02	0.4
Highway Segment	Collision with Fixed Object	0.42	7.8	0.66	12.4	1.08	20.3
Highway Segment	Collision with Other Object	0.03	0.6	0.10	1.8	0.13	2.4
Highway Segment	Other Single-vehicle Collision	0.10	2.0	0.07	1.4	0.18	3.3
Highway Segment	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Total Single Vehicle Crashes	0.56	10.4	0.86	16.0	1.42	26.5
Highway Segment	Right-Angle Collision	0.02	0.4	0.04	0.7	0.06	1.2
Highway Segment	Head-on Collision	0.01	0.2	0.01	0.1	0.02	0.3
Highway Segment	Other Multi-vehicle Collision	0.03	0.6	0.05	1.0	0.09	1.6
Highway Segment	Rear-end Collision	1.18	22.0	1.81	33.9	2.99	55.9
Highway Segment	Sideswipe, Same Direction Collision	0.34	6.3	0.44	8.3	0.78	14.6
Highway Segment	Total Multiple Vehicle Crashes	1.58	29.6	2.35	44.0	3.93	73.5
Highway Segment	Total Highway Segment Crashes	2.14	40.0	3.21	60.0	5.35	100.0
	Total Crashes	2.14	40.0	3.21	60.0	5.35	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance Speed Change
Calibration Factor: FI_EN=1.0, PDO_EN=1.0

Table 9. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	0.2000	2040: 111725
2	Eight-lane Freeway Speed Change	I-40	SR 171 On Ramp	0.2000	2040: 11725

Table 10. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	3.55	17.7717	0.87
2	Eight-lane Freeway Speed Change	I-40	SR 171 On Ramp	0.26	1.2950	0.60

Table 11. Expected Entrance Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0248	0.0658	0.3583	0.7915	2.3139
2	0.0022	0.0058	0.0316	0.0698	0.1496
Total	0.0270	0.0717	0.3899	0.8613	2.4635

Table 12. Expected Entrance Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.01	0.1	0.01	0.1
Highway Segment	Collision with Fixed Object	0.26	6.9	0.32	8.3	0.58	15.2
Highway Segment	Collision with Other Object	0.03	0.7	0.09	2.3	0.11	3.0
Highway Segment	Other Single-vehicle Collision	0.09	2.4	0.04	1.0	0.13	3.4
Highway Segment	Collision with Parked Vehicle	0.01	0.1	0.01	0.2	0.01	0.3
Highway Segment	Total Single Vehicle Crashes	0.38	10.1	0.46	12.0	0.84	22.1
Highway Segment	Right-Angle Collision	0.03	0.7	0.04	1.0	0.07	1.7
Highway Segment	Head-on Collision	0.01	0.1	0.00	0.1	0.01	0.2
Highway Segment	Other Multi-vehicle Collision	0.02	0.6	0.04	1.0	0.06	1.6
Highway Segment	Rear-end Collision	0.73	19.2	1.31	34.2	2.04	53.5
Highway Segment	Sideswipe, Same Direction Collision	0.18	4.7	0.62	16.3	0.80	21.0
Highway Segment	Total Multiple Vehicle Crashes	0.97	25.3	2.00	52.6	2.97	77.9
Highway Segment	Total Highway Segment Crashes	1.35	35.4	2.46	64.6	3.81	100.0
	Total Crashes	1.35	35.4	2.46	64.6	3.81	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Ramp Site Set CPM Evaluation

Type: Ramp Exit
Calibration Factor: EX_RAMP_MV_FI=1.0, EX_RAMP_MV_PDO=1.0, EX_RAMP_SV_FI=1.0, EX_RAMP_SV_PDO=1.0

Table 13. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	2040: 7825
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	2040: 14530

Table 14. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	0.44	1.9994	0.70
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	0.97	3.8664	0.73

Table 15. Expected Exit Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0055	0.0166	0.0709	0.1074	0.2395
2	0.0082	0.0248	0.0877	0.2411	0.6048
Total	0.0137	0.0415	0.1586	0.3484	0.8443

Table 16. Expected Exit Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.1	0.01	1.1	0.02	1.2
Highway Segment	Collision with Fixed Object	0.38	26.8	0.49	35.2	0.87	61.9
Highway Segment	Collision with Other Object	0.03	1.9	0.10	6.8	0.12	8.7
Highway Segment	Other Single-vehicle Collision	0.11	7.7	0.07	5.3	0.18	13.0
Highway Segment	Collision with Parked Vehicle	0.01	0.6	0.01	0.8	0.02	1.3
Highway Segment	Total Single Vehicle Crashes	0.52	37.1	0.69	49.1	1.21	86.2
Highway Segment	Right-Angle Collision	0.00	0.1	0.00	0.2	0.00	0.3
Highway Segment	Head-on Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Multi-vehicle Collision	0.00	0.1	0.00	0.3	0.01	0.4
Highway Segment	Rear-end Collision	0.03	2.2	0.11	7.5	0.14	9.7
Highway Segment	Sideswipe, Same Direction Collision	0.01	0.5	0.04	2.9	0.05	3.4
Highway Segment	Total Multiple Vehicle Crashes	0.04	2.9	0.15	10.9	0.19	13.8
Highway Segment	Total Highway Segment Crashes	0.56	40.0	0.84	60.0	1.41	100.0
	Total Crashes	0.56	40.0	0.84	60.0	1.41	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance
Calibration Factor: ENT_RAMP_MV_FI=1.0, ENT_RAMP_MV_PDO=1.0, ENT_RAMP_SV_FI=1.0, ENT_RAMP_SV_PDO=1.0

Table 17. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	2040: 7565
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	2040: 22575

Table 18. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	0.27	1.8158	0.66
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	1.74	6.9677	0.85

Table 19. Expected Entrance Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0024	0.0074	0.0468	0.0571	0.1587
2	0.0107	0.0326	0.1728	0.4040	1.1219
Total	0.0132	0.0399	0.2196	0.4611	1.2805

Table 20. Expected Entrance Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.1	0.01	0.7	0.01	0.8
Highway Segment	Collision with Fixed Object	0.29	14.7	0.45	22.2	0.74	36.8
Highway Segment	Collision with Other Object	0.02	1.0	0.09	4.3	0.11	5.3
Highway Segment	Other Single-vehicle Collision	0.09	4.2	0.07	3.3	0.15	7.5
Highway Segment	Collision with Parked Vehicle	0.01	0.3	0.01	0.5	0.02	0.8
Highway Segment	Total Single Vehicle Crashes	0.41	20.3	0.62	31.0	1.03	51.3
Highway Segment	Right-Angle Collision	0.01	0.5	0.01	0.6	0.02	1.1
Highway Segment	Head-on Collision	0.00	0.1	0.00	0.1	0.00	0.2
Highway Segment	Other Multi-vehicle Collision	0.01	0.5	0.02	0.8	0.03	1.3
Highway Segment	Rear-end Collision	0.24	12.1	0.45	22.5	0.70	34.6
Highway Segment	Sideswipe, Same Direction Collision	0.06	2.9	0.17	8.7	0.23	11.6
Highway Segment	Total Multiple Vehicle Crashes	0.33	16.1	0.66	32.6	0.98	48.7
Highway Segment	Total Highway Segment Crashes	0.73	36.4	1.28	63.6	2.01	100.0
	Total Crashes	0.73	36.4	1.28	63.6	2.01	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2040 SR 171

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

SR 171
Existing Geometry
2040

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 5:09 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 17:06:42 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: SR 171 Existing
Site Set Comment: Created Thu Sep 21 13:30:58 CDT 2017
Site Set Version: v1

Evaluation Title: SR 171 Existing 2040
Evaluation Comment: Created Thu Sep 21 17:06:14 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	SR 171	TriStar to SR 265	0.4800	2040: 71150	12.00	12.00	8.00	8.00	0.00	0.00	0.00	0.00	0.00	6.0	3	no	None (0)	no	no	0.00	0.0000	0	0.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	SR 171	TriStar to SR 265	0.4800	8.27	17.2385	0.66

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.10	1.2	1.03	12.5	1.00	12.1
Highway Segment	Collision with Bicycle	0.01	0.1	0.01	0.1	0.02	0.2
Highway Segment	Other Single-vehicle Collision	0.02	0.2	0.16	2.0	0.17	2.1
Highway Segment	Overturned	0.10	1.2	0.08	1.0	0.21	2.5
Highway Segment	Collision with Pedestrian	0.02	0.2	0.01	0.1	0.03	0.3
Highway Segment	Run Off Road	1.45	17.5	2.84	34.3	4.31	52.1
Highway Segment	Total Single Vehicle Crashes	1.70	20.5	4.13	49.9	5.73	69.3
Highway Segment	Angle Collision	0.27	3.2	0.41	4.9	0.70	8.5
Highway Segment	Head-on Collision	0.09	1.1	0.02	0.2	0.13	1.6
Highway Segment	Other Multiple-vehicle Collision	0.07	0.8	0.17	2.0	0.22	2.7
Highway Segment	Rear-end Collision	0.44	5.3	0.69	8.3	1.18	14.2
Highway Segment	Sideswipe	0.10	1.2	0.21	2.6	0.31	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.97	11.7	1.49	18.0	2.54	30.7
Highway Segment	Total Highway Segment Crashes	2.66	32.2	5.62	67.9	8.27	100.0
	Total Crashes	2.66	32.2	5.62	67.9	8.27	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Urban Arterial Site Set CPM Evaluation

Type: 3T
Calibration Factor: 1

Table 4. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	3T	SR 171	Providence toTriStar	0.2000	2040: 71150	3	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	3T	SR 171	Providence toTriStar	0.2000	10.52	52.6167	2.03

Table 6. Expected 3T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Collision with Bicycle	0.27	2.5	0.00	0.0	0.27	2.5
Highway Segment	Collision with Fixed Object	0.06	0.6	0.26	2.4	0.32	3.0
Highway Segment	Collision with Other Object	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Single-vehicle Collision	0.03	0.3	0.01	0.1	0.04	0.4
Highway Segment	Collision with Pedestrian	0.40	3.8	0.00	0.0	0.40	3.8
Highway Segment	Total Segment Single Vehicle Crashes	0.76	7.2	0.27	2.5	1.02	9.7
Highway Segment	Angle Collision	0.20	1.9	0.09	0.9	0.29	2.8
Highway Segment	Driveway-related Collision	0.47	4.4	1.46	13.8	1.92	18.3
Highway Segment	Head-on Collision	0.10	0.9	0.09	0.9	0.19	1.8
Highway Segment	Other Multi-vehicle Collision	0.10	0.9	0.09	0.9	0.19	1.8
Highway Segment	Rear-end Collision	2.45	23.3	3.94	37.4	6.39	60.7
Highway Segment	Sideswipe, Opposite Direction Collision	0.05	0.5	0.09	0.9	0.14	1.4
Highway Segment	Sideswipe, Same Direction Collision	0.00	0.0	0.36	3.5	0.37	3.5
Highway Segment	Total Segment Multiple Vehicle Crashes	3.37	32.0	6.13	58.3	9.50	90.3
Highway Segment	Total Highway Segment Crashes	4.13	39.2	6.40	60.8	10.52	100.0
	Total Crashes	4.13	39.2	6.40	60.8	10.52	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 5T
Calibration Factor: 1

Table 7. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	5T	SR 171	I-40 to Providence	0.6000	2040: 71150	1	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	5T	SR 171	I-40 to Providence	0.6000	24.94	41.5731	1.60

Table 9. Expected 5T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.01	0.0	0.09	0.4	0.10	0.4
Highway Segment	Collision with Bicycle	1.16	4.6	0.00	0.0	1.16	4.6
Highway Segment	Collision with Fixed Object	0.16	0.7	1.43	5.7	1.59	6.4
Highway Segment	Collision with Other Object	0.00	0.0	0.11	0.5	0.12	0.5
Highway Segment	Other Single-vehicle Collision	0.24	1.0	0.23	0.9	0.47	1.9
Highway Segment	Collision with Pedestrian	0.69	2.8	0.00	0.0	0.69	2.8
Highway Segment	Total Segment Single Vehicle Crashes	2.26	9.1	1.86	7.5	4.12	16.5
Highway Segment	Angle Collision	0.25	1.0	0.86	3.5	1.11	4.5
Highway Segment	Driveway-related Collision	0.31	1.2	0.84	3.4	1.15	4.6
Highway Segment	Head-on Collision	0.11	0.4	0.06	0.2	0.17	0.7
Highway Segment	Other Multi-vehicle Collision	0.09	0.4	0.42	1.7	0.52	2.1
Highway Segment	Rear-end Collision	4.29	17.2	9.51	38.1	13.79	55.3
Highway Segment	Sideswipe, Opposite Direction Collision	0.02	0.1	0.13	0.5	0.15	0.6
Highway Segment	Sideswipe, Same Direction Collision	0.31	1.2	3.62	14.5	3.93	15.8
Highway Segment	Total Segment Multiple Vehicle Crashes	5.38	21.6	15.45	61.9	20.82	83.5
Highway Segment	Total Highway Segment Crashes	7.64	30.6	17.31	69.4	24.94	100.0
	Total Crashes	7.64	30.6	17.31	69.4	24.94	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4SG
Calibration Factor: 1

Table 10. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/ Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 171 at I40 WB		2040: 71150	2040: 22575	2	2	yes	false	0	0	2	2	no	50	6	0	0	4
2	4SG2x2le5	SR 171 at I40 EB		2040: 71150	2040: 14500	1	1	yes	false	0	1	0	1	no	50	5	0	0	6
3	4SG2x2le5	SR 171 at Belinda		2040: 71150	2040: 10000	4	3	yes	false	0	2	2	4	no	50	7	0	0	6
4	4SG2x2le5	SR 171 at Crossings		2040: 71150	2040: 10000	3	2	yes	false	2	2	0	4	no	50	6	0	0	9
6	4SG2x2le5	SR 171 at Providence W		2040: 71150	2040: 10000	4	3	yes	false	0	4	0	4	no	50	5	0	0	4
7	4SG2x2le5	SR 171 at TriStar		2040: 71150	2040: 10000	3	2	yes	false	1	3	0	4	no	50	4	0	0	3
8	4SG2x2le5	SR 171 at SR 265		2040: 71150	2040: 14000	2	0	no	false	2	2	0	4	no	50	3	0	0	1

Table 11. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 171 at I40 WB	16.07	0.47	16.0703
2	4SG	SR 171 at I40 EB	19.21	0.61	19.2100
3	4SG	SR 171 at Belinda	9.77	0.33	9.7717
4	4SG	SR 171 at Crossings	12.79	0.43	12.7889
6	4SG	SR 171 at Providence W	10.83	0.37	10.8324
7	4SG	SR 171 at TriStar	12.65	0.43	12.6459
8	4SG	SR 171 at SR 265	18.28	0.59	18.2757

Table 12. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.01	0.0	0.01	0.0
Intersection	Collision with Bicycle	1.47	1.5	0.00	0.0	1.47	1.5
Intersection	Collision with Fixed Object	0.55	0.5	2.70	2.7	3.25	3.3
Intersection	Non-Collision	0.10	0.1	0.11	0.1	0.21	0.2
Intersection	Collision with Other Object	0.05	0.1	0.22	0.2	0.27	0.3
Intersection	Other Single-vehicle Collision	0.03	0.0	0.07	0.1	0.10	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.26	0.3	0.00	0.0	0.26	0.3
Intersection	Total Intersection Single Vehicle Crashes	2.46	2.5	3.10	3.1	5.56	5.6
Intersection	Angle Collision	12.15	12.2	14.40	14.5	26.55	26.7
Intersection	Head-on Collision	1.72	1.7	1.77	1.8	3.49	3.5
Intersection	Other Multi-vehicle Collision	1.93	1.9	12.45	12.5	14.38	14.4
Intersection	Rear-end Collision	15.76	15.8	28.50	28.6	44.26	44.4
Intersection	Sideswipe	3.47	3.5	1.89	1.9	5.36	5.4
Intersection	Total Intersection Multiple Vehicle Crashes	35.02	35.2	59.01	59.3	94.03	94.4
Intersection	Total Intersection Crashes	37.48	37.6	62.12	62.4	99.59	100.0
	Total Crashes	37.48	37.6	62.12	62.4	99.59	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: EXISTING GEOMETRY 2040 SR 265

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

SR 265
Existing Geometry
2040

September 21, 2017

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Report Overview

Report Generated: Sep 21, 2017 5:08 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Thu Sep 21 17:00:11 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Existing
Project Comment: Existing Conditions
Project Unit System: U.S. Customary

Site Set: SR 265 Existing
Site Set Comment: Created Thu Sep 21 09:25:02 CDT 2017
Site Set Version: v1

Evaluation Title: SR 265 Existing 2040
Evaluation Comment: Created Thu Sep 21 16:59:46 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	SR 265	Existing Geometry	1.5200	2040: 14000	10.00	10.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	10.0	4	no	None (0)	no	no	0.00	0.0000	0	0.00	no
2	2U	SR 265	Existing Geometry	0.1600	2040: 14000	10.00	10.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	6.0	4	no	None (0)	no	no	550.00	0.1600	0	1.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	SR 265	Existing Geometry	1.5200	9.06	5.9596	1.17
2	2U	SR 265	Existing Geometry	0.1600	1.47	9.2148	1.80

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.13	1.2	1.32	12.5	1.27	12.1
Highway Segment	Collision with Bicycle	0.01	0.1	0.01	0.1	0.02	0.2
Highway Segment	Other Single-vehicle Collision	0.02	0.2	0.21	2.0	0.22	2.1
Highway Segment	Overturned	0.12	1.2	0.11	1.0	0.26	2.5
Highway Segment	Collision with Pedestrian	0.02	0.2	0.01	0.1	0.03	0.3
Highway Segment	Run Off Road	1.84	17.5	3.61	34.3	5.49	52.1
Highway Segment	Total Single Vehicle Crashes	2.16	20.5	5.26	49.9	7.30	69.3
Highway Segment	Angle Collision	0.34	3.2	0.52	4.9	0.90	8.5
Highway Segment	Head-on Collision	0.12	1.1	0.02	0.2	0.17	1.6
Highway Segment	Other Multiple-vehicle Collision	0.09	0.8	0.21	2.0	0.28	2.7
Highway Segment	Rear-end Collision	0.56	5.3	0.87	8.3	1.50	14.2
Highway Segment	Sideswipe	0.13	1.2	0.27	2.6	0.39	3.7
Highway Segment	Total Multiple Vehicle Crashes	1.23	11.7	1.90	18.0	3.23	30.7
Highway Segment	Total Highway Segment Crashes	3.39	32.2	7.15	67.9	10.53	100.0
	Total Crashes	3.39	32.2	7.15	67.9	10.53	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Urban Arterial Site Set CPM Evaluation

Type: 3ST
Calibration Factor: 1

Table 4. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout
1	3ST2x2le5	SR 265 at Pleasant Grove	3-leg stop	2040: 14000	2040: 4450	0	0	no	false
2	3ST2x2le5	SR 265 at Tillman	3-leg stop	2040: 14000	2040: 300	0	0	no	false
4	3ST2x2le5	SR 265 at Cook	3-leg stop	2040: 14000	2040: 500	0	0	no	false

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	3ST	SR 265 at Pleasant Grove	3-leg stop	2.43	0.41	2.4316
2	3ST	SR 265 at Tillman	3-leg stop	0.78	0.15	0.7749
4	3ST	SR 265 at Cook	3-leg stop	0.96	0.18	0.9617

Table 6. Expected 3ST Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.01	0.2	0.01	0.2
Intersection	Collision with Bicycle	0.06	1.5	0.00	0.0	0.06	1.5
Intersection	Collision with Fixed Object	0.14	3.3	0.33	8.0	0.47	11.3
Intersection	Non-Collision	0.02	0.5	0.01	0.3	0.03	0.7
Intersection	Collision with Other Object	0.02	0.4	0.04	0.9	0.05	1.3
Intersection	Other Single-vehicle Collision	0.01	0.2	0.01	0.2	0.02	0.4
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.08	2.0	0.00	0.0	0.08	2.0
Intersection	Total Intersection Single Vehicle Crashes	0.33	8.0	0.40	9.6	0.73	17.5
Intersection	Angle Collision	0.43	10.3	0.57	13.7	1.00	24.0
Intersection	Head-on Collision	0.06	1.4	0.05	1.2	0.11	2.6
Intersection	Other Multi-vehicle Collision	0.08	2.0	0.51	12.3	0.59	14.3
Intersection	Rear-end Collision	0.53	12.7	0.96	23.0	1.49	35.7
Intersection	Sideswipe	0.16	3.8	0.09	2.1	0.24	5.9
Intersection	Total Intersection Multiple Vehicle Crashes	1.26	30.1	2.18	52.3	3.44	82.5
Intersection	Total Intersection Crashes	1.59	38.1	2.58	61.9	4.17	100.0
	Total Crashes	1.59	38.1	2.58	61.9	4.17	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4ST
Calibration Factor: 1

Table 7. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout
1	4ST2x2le5	SR 265 at Adams	4-leg stop	2040: 14000	2040: 13500	0	0	no	false

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4ST	SR 265 at Adams	4-leg stop	4.21	0.42	4.2072

Table 9. Expected 4ST Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.01	0.2	0.01	0.2
Intersection	Collision with Bicycle	0.07	1.7	0.00	0.0	0.07	1.7
Intersection	Collision with Fixed Object	0.06	1.4	0.22	5.3	0.28	6.8
Intersection	Non-Collision	0.02	0.4	0.01	0.3	0.03	0.7
Intersection	Collision with Other Object	0.01	0.2	0.02	0.4	0.03	0.6
Intersection	Other Single-vehicle Collision	0.01	0.1	0.00	0.0	0.01	0.2
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.09	2.1	0.00	0.0	0.09	2.1
Intersection	Total Intersection Single Vehicle Crashes	0.25	6.0	0.27	6.3	0.52	12.3
Intersection	Angle Collision	0.66	15.6	0.74	17.5	1.39	33.1
Intersection	Head-on Collision	0.06	1.5	0.07	1.6	0.13	3.0
Intersection	Other Multi-vehicle Collision	0.09	2.1	0.48	11.3	0.57	13.5
Intersection	Rear-end Collision	0.51	12.0	0.82	19.5	1.33	31.5
Intersection	Sideswipe	0.18	4.3	0.10	2.3	0.28	6.6
Intersection	Total Intersection Multiple Vehicle Crashes	1.49	35.5	2.20	52.3	3.69	87.7
Intersection	Total Intersection Crashes	1.74	41.5	2.46	58.5	4.21	100.0
	Total Crashes	1.74	41.5	2.46	58.5	4.21	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4SG
Calibration Factor: 1

Table 10. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 265 at SR 171	4-leg signal	2040: 30875	2040: 14000	2	0	yes	false	2	2	0	4	no	50	3	0	0	1

Table 11. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 265 at SR 171	4-leg signal	6.93	0.42	6.9347

Table 12. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Bicycle	0.10	1.5	0.00	0.0	0.10	1.5
Intersection	Collision with Fixed Object	0.07	0.9	0.24	3.5	0.31	4.4
Intersection	Non-Collision	0.01	0.2	0.01	0.1	0.02	0.3
Intersection	Collision with Other Object	0.01	0.1	0.02	0.3	0.03	0.4
Intersection	Other Single-vehicle Collision	0.00	0.1	0.01	0.1	0.01	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.03	0.5	0.00	0.0	0.03	0.5
Intersection	Total Intersection Single Vehicle Crashes	0.22	3.2	0.28	4.0	0.50	7.2
Intersection	Angle Collision	0.76	11.0	1.03	14.9	1.80	25.9
Intersection	Head-on Collision	0.11	1.6	0.13	1.8	0.23	3.4
Intersection	Other Multi-vehicle Collision	0.12	1.7	0.89	12.9	1.01	14.6
Intersection	Rear-end Collision	0.99	14.3	2.05	29.5	3.04	43.8
Intersection	Sideswipe	0.22	3.1	0.14	2.0	0.35	5.1
Intersection	Total Intersection Multiple Vehicle Crashes	2.20	31.7	4.24	61.1	6.44	92.8
Intersection	Total Intersection Crashes	2.42	34.9	4.52	65.1	6.93	100.0
	Total Crashes	2.42	34.9	4.52	65.1	6.93	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: PROPOSED GEOMETRY 2040 ADAMS LANE

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

Adams Lane
Proposed
2040

September 22, 2017

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Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Fri Sep 22 12:19:11 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Proposed
Project Comment: Proposed Conditions
Project Unit System: U.S. Customary

Site Set: Adams Lane Proposed
Site Set Comment: Created Thu Sep 21 14:39:57 CDT 2017
Site Set Version: v1

Evaluation Title: Proposed Adams 2040
Evaluation Comment: Created Fri Sep 22 12:18:45 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Urban Arterial Site Set CPM Evaluation

Type: 4D
Calibration Factor: 1

Table 1. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Effective Median Width (ft)	Median Type	Type of Parking/ Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/ Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	4D	Proposed Adams/Providence		1.0000	2040: 20345	0	2	0	0	2	0	0	no	no	5.00	100.0	12.00	Traversable Median	No Parking	0.000	No Parking	0.000	Low

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	4D	Proposed Adams/Providence	1.0000	6.15	6.1522	0.83

Table 3. Expected 4D Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.05	0.8	0.05	0.8
Highway Segment	Collision with Bicycle	0.07	1.2	0.00	0.0	0.07	1.2
Highway Segment	Collision with Fixed Object	0.08	1.4	0.67	10.8	0.75	12.2
Highway Segment	Collision with Other Object	0.01	0.1	0.01	0.2	0.02	0.3
Highway Segment	Other Single-vehicle Collision	0.08	1.3	0.09	1.4	0.17	2.7
Highway Segment	Collision with Pedestrian	0.38	6.2	0.00	0.0	0.38	6.2
Highway Segment	Total Segment Single Vehicle Crashes	0.62	10.1	0.82	13.3	1.44	23.4
Highway Segment	Angle Collision	0.05	0.8	0.12	1.9	0.17	2.8
Highway Segment	Driveway-related Collision	0.03	0.5	0.08	1.4	0.12	1.9
Highway Segment	Head-on Collision	0.03	0.4	0.02	0.4	0.05	0.8
Highway Segment	Other Multi-vehicle Collision	0.06	1.0	0.23	3.8	0.30	4.8
Highway Segment	Rear-end Collision	1.07	17.4	2.19	35.6	3.26	53.0
Highway Segment	Sideswipe, Opposite Direction Collision	0.01	0.2	0.00	0.1	0.02	0.3
Highway Segment	Sideswipe, Same Direction Collision	0.06	1.0	0.74	12.0	0.80	13.0
Highway Segment	Total Segment Multiple Vehicle Crashes	1.32	21.5	3.39	55.1	4.71	76.6
Highway Segment	Total Highway Segment Crashes	1.95	31.6	4.21	68.4	6.15	100.0
	Total Crashes	1.95	31.6	4.21	68.4	6.15	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: PROPOSED GEOMETRY 2040 I-40

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

I-40
Proposed
2040

September 22, 2017

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Report Overview

Report Generated: Sep 22, 2017 2:36 PM
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Evaluation Date: Fri Sep 22 14:36:23 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
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Project Title: I-40 at SR 265 IAR 2040 Proposed
Project Comment: Proposed Conditions
Project Unit System: U.S. Customary

Site Set: I-40 Proposed 2040
Site Set Comment: Created Thu Sep 21 14:44:31 CDT 2017
Site Set Version: v1

Evaluation Title: I-40 Build 2040
Evaluation Comment: Created Fri Sep 22 14:35:49 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Freeway Segment Site Set CPM Evaluation

Type: Freeway
Calibration Factor: FI_MV=1.0, PDO_MV=1.0, FI_SV=1.0, PDO_SV=1.0

Table 1. Evaluation Freeway Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway	I40	SR 45 to SR 265	3.9200	2040: 115725
2	Eight-lane Freeway	I40	within SR 265 Ramps	0.4000	2040: 90185
3	Ten-lane Freeway	I40	SR 265 to SR 171	1.0000	2040: 97675

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway	I40	SR 45 to SR 265	3.9200	90.63	23.1199	0.55
2	Eight-lane Freeway	I40	within SR 265 Ramps	0.4000	7.25	18.1120	0.55
3	Ten-lane Freeway	I40	SR 265 to SR 171	1.4000	24.73	17.6640	0.50

Table 3. Expected Freeway Freeway Sites Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.5779	1.5278	8.2663	17.9223	62.3357
2	0.0495	0.1308	0.7076	1.5341	4.8228
3	0.1763	0.4660	2.5212	5.4663	16.0998
Total	0.8037	2.1245	11.4951	24.9227	83.2584

Table 4. Expected Freeway Site Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.05	0.0	0.64	0.5	0.69	0.6
Highway Segment	Collision with Fixed Object	8.77	7.2	20.89	17.0	29.66	24.2
Highway Segment	Collision with Other Object	0.62	0.5	4.05	3.3	4.67	3.8
Highway Segment	Other Single-vehicle Collision	2.53	2.1	3.12	2.5	5.65	4.6
Highway Segment	Collision with Parked Vehicle	0.18	0.1	0.47	0.4	0.65	0.5
Highway Segment	Total Single Vehicle Crashes	12.14	9.9	29.17	23.8	41.32	33.7
Highway Segment	Right-Angle Collision	0.84	0.7	0.97	0.8	1.82	1.5
Highway Segment	Head-on Collision	0.22	0.2	0.11	0.1	0.33	0.3
Highway Segment	Other Multi-vehicle Collision	0.84	0.7	1.30	1.1	2.14	1.7
Highway Segment	Rear-end Collision	20.40	16.6	37.32	30.4	57.72	47.1
Highway Segment	Sideswipe, Same Direction Collision	4.90	4.0	14.39	11.7	19.28	15.7
Highway Segment	Total Multiple Vehicle Crashes	27.20	22.2	54.09	44.1	81.29	66.3
Highway Segment	Total Highway Segment Crashes	39.35	32.1	83.26	67.9	122.60	100.0
	Total Crashes	39.35	32.1	83.26	67.9	122.60	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Speed Change Site Set CPM Evaluation

Type: Ramp Exit Speed Change
Calibration Factor: FI_EX=1.0, PDO_EX=1.0

Table 5. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	0.2000	2040: 115725
2	Eight-lane Freeway Speed Change	I-40	SR 265 EB Off Ramp	0.2000	2040: 115725

Table 6. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 Off Ramp	2.76	13.8149	0.65
2	Eight-lane Freeway Speed Change	I-40	SR 265 EB Off Ramp	2.76	13.8149	0.65

Table 7. Expected Exit Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0221	0.0587	0.3193	0.7055	1.6574
2	0.0221	0.0587	0.3193	0.7055	1.6574
Total	0.0442	0.1174	0.6387	1.4109	3.3148

Table 8. Expected Exit Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.02	0.4	0.02	0.4
Highway Segment	Collision with Fixed Object	0.43	7.8	0.69	12.4	1.12	20.3
Highway Segment	Collision with Other Object	0.04	0.6	0.10	1.8	0.14	2.4
Highway Segment	Other Single-vehicle Collision	0.11	2.0	0.08	1.4	0.18	3.3
Highway Segment	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Total Single Vehicle Crashes	0.58	10.4	0.89	16.0	1.46	26.5
Highway Segment	Right-Angle Collision	0.02	0.4	0.04	0.7	0.06	1.2
Highway Segment	Head-on Collision	0.01	0.2	0.01	0.1	0.02	0.3
Highway Segment	Other Multi-vehicle Collision	0.04	0.6	0.05	1.0	0.09	1.6
Highway Segment	Rear-end Collision	1.21	22.0	1.87	33.9	3.09	55.9
Highway Segment	Sideswipe, Same Direction Collision	0.35	6.3	0.46	8.3	0.81	14.6
Highway Segment	Total Multiple Vehicle Crashes	1.63	29.6	2.43	44.0	4.06	73.5
Highway Segment	Total Highway Segment Crashes	2.21	40.0	3.31	60.0	5.53	100.0
	Total Crashes	2.21	40.0	3.31	60.0	5.53	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance Speed Change
Calibration Factor: FI_EN=1.0, PDO_EN=1.0

Table 9. Speed Change Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	0.2000	2040: 115725
3	Eight-lane Freeway Speed Change	I-40	SR 265 WB On Ramp	0.2000	2040: 115725

Table 10. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	Eight-lane Freeway Speed Change	I-40	US 45 On Ramp	3.72	18.6205	0.88
3	Eight-lane Freeway Speed Change	I-40	SR 265 WB On Ramp	3.85	19.2357	0.91

Table 11. Expected Entrance Speed Change Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0262	0.0695	0.3781	0.8353	2.4150
3	0.0286	0.0760	0.4137	0.9139	2.4150
Total	0.0548	0.1455	0.7918	1.7492	4.8299

Table 12. Expected Entrance Speed Change Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.01	0.1	0.01	0.1
Highway Segment	Collision with Fixed Object	0.53	7.0	0.62	8.2	1.16	15.3
Highway Segment	Collision with Other Object	0.05	0.7	0.17	2.3	0.23	3.0
Highway Segment	Other Single-vehicle Collision	0.18	2.4	0.08	1.0	0.26	3.4
Highway Segment	Collision with Parked Vehicle	0.01	0.1	0.01	0.2	0.03	0.3
Highway Segment	Total Single Vehicle Crashes	0.78	10.3	0.90	11.9	1.68	22.1
Highway Segment	Right-Angle Collision	0.05	0.7	0.08	1.0	0.13	1.7
Highway Segment	Head-on Collision	0.01	0.1	0.01	0.1	0.02	0.2
Highway Segment	Other Multi-vehicle Collision	0.05	0.6	0.07	1.0	0.12	1.6
Highway Segment	Rear-end Collision	1.49	19.7	2.56	33.8	4.05	53.5
Highway Segment	Sideswipe, Same Direction Collision	0.36	4.8	1.22	16.1	1.58	20.9
Highway Segment	Total Multiple Vehicle Crashes	1.96	25.9	3.93	51.9	5.89	77.9
Highway Segment	Total Highway Segment Crashes	2.74	36.2	4.83	63.8	7.57	100.0
	Total Crashes	2.74	36.2	4.83	63.8	7.57	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Freeway Ramp Site Set CPM Evaluation

Type: Ramp Exit
Calibration Factor: EX_RAMP_MV_FI=1.0, EX_RAMP_MV_PDO=1.0, EX_RAMP_SV_FI=1.0, EX_RAMP_SV_PDO=1.0

Table 13. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	2040: 8325
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	2040: 4625
3	One-lane Ramp Exit	I-40	SR 265 EB Off Ramp	0.2000	2040: 12845
4	One-lane Ramp Exit	I-40	SR 265 WB Off Ramp	0.2000	2040: 3740

Table 14. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Exit	I-40	US 45 Off Ramp	0.2200	0.46	2.0933	0.69
2	Two-lane Ramp Exit	I-40	SR 171 Off Ramp	0.2500	0.40	1.6020	0.95
3	One-lane Ramp Exit	I-40	SR 265 EB Off Ramp	0.2000	0.62	3.1094	0.66
4	One-lane Ramp Exit	I-40	SR 265 WB Off Ramp	0.2000	0.00	0.0000	0.00

Table 15. Expected Exit Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0057	0.0174	0.0742	0.1123	0.2508
2	0.0035	0.0105	0.0373	0.1024	0.2468
3	0.0097	0.0294	0.1222	0.1491	0.3114
4	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.0189	0.0574	0.2337	0.3639	0.8091

Table 16. Expected Exit Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.2	0.02	1.1	0.02	1.2
Highway Segment	Collision with Fixed Object	0.46	31.2	0.51	34.3	0.97	65.5
Highway Segment	Collision with Other Object	0.03	2.2	0.10	6.7	0.13	8.9
Highway Segment	Other Single-vehicle Collision	0.13	9.0	0.08	5.1	0.21	14.1
Highway Segment	Collision with Parked Vehicle	0.01	0.6	0.01	0.8	0.02	1.4
Highway Segment	Total Single Vehicle Crashes	0.64	43.2	0.71	48.0	1.35	91.2
Highway Segment	Right-Angle Collision	0.00	0.1	0.00	0.1	0.00	0.2
Highway Segment	Head-on Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Multi-vehicle Collision	0.00	0.1	0.00	0.2	0.00	0.2
Highway Segment	Rear-end Collision	0.03	1.7	0.07	4.5	0.09	6.2
Highway Segment	Sideswipe, Same Direction Collision	0.01	0.4	0.03	1.8	0.03	2.2
Highway Segment	Total Multiple Vehicle Crashes	0.03	2.2	0.10	6.6	0.13	8.8
Highway Segment	Total Highway Segment Crashes	0.67	45.4	0.81	54.6	1.48	100.0
	Total Crashes	0.67	45.4	0.81	54.6	1.48	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: Ramp Entrance
Calibration Factor: ENT_RAMP_MV_FI=1.0, ENT_RAMP_MV_PDO=1.0, ENT_RAMP_SV_FI=1.0, ENT_RAMP_SV_PDO=1.0

Table 17. Ramp Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	2040: 8065
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	2040: 11880
3	One-lane Ramp Entrance	I-40	SR 265 EB On Ramp	0.2000	2040: 3750
4	Two-lane Ramp Entrance	I-40	SR 265 WB On Ramp	0.2000	2040: 12695

Table 18. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Effective Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	One-lane Ramp Entrance	I-40	US 45 On Ramp	0.1500	0.29	1.9140	0.65
2	Two-lane Ramp Entrance	I-40	SR 171 On Ramp	0.2500	0.90	3.6138	0.83
3	One-lane Ramp Entrance	I-40	SR 265 EB On Ramp	0.2000	0.21	1.0397	0.76
4	Two-lane Ramp Entrance	I-40	SR 265 WB On Ramp	0.2000	0.65	3.2497	0.70

Table 19. Expected Entrance Ramp Crash Severity

Site No.	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
1	0.0026	0.0077	0.0492	0.0601	0.1675
2	0.0052	0.0159	0.0843	0.1972	0.6008
3	0.0019	0.0058	0.0368	0.0449	0.1186
4	0.0030	0.0090	0.0465	0.0877	0.5037
Total	0.0127	0.0384	0.2169	0.3899	1.3906

Table 20. Expected Entrance Ramp Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.1	0.02	0.9	0.02	1.0
Highway Segment	Collision with Fixed Object	0.34	16.4	0.58	28.3	0.92	44.7
Highway Segment	Collision with Other Object	0.02	1.2	0.11	5.5	0.14	6.7
Highway Segment	Other Single-vehicle Collision	0.10	4.7	0.09	4.2	0.18	9.0
Highway Segment	Collision with Parked Vehicle	0.01	0.3	0.01	0.6	0.02	1.0
Highway Segment	Total Single Vehicle Crashes	0.47	22.7	0.81	39.6	1.28	62.3
Highway Segment	Right-Angle Collision	0.01	0.3	0.01	0.5	0.02	0.8
Highway Segment	Head-on Collision	0.00	0.1	0.00	0.1	0.00	0.1
Highway Segment	Other Multi-vehicle Collision	0.01	0.3	0.01	0.7	0.02	1.0
Highway Segment	Rear-end Collision	0.14	7.1	0.40	19.5	0.55	26.6
Highway Segment	Sideswipe, Same Direction Collision	0.04	1.7	0.15	7.5	0.19	9.2
Highway Segment	Total Multiple Vehicle Crashes	0.19	9.4	0.58	28.3	0.77	37.7
Highway Segment	Total Highway Segment Crashes	0.66	32.1	1.39	67.9	2.05	100.0
	Total Crashes	0.66	32.1	1.39	67.9	2.05	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

IHSDM PREDICTIVE CRASH ANALYSIS: PROPOSED GEOMETRY 2040 SR 171

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

SR 171
Proposed
2040

September 22, 2017

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Report Overview

Report Generated: Sep 22, 2017 12:04 PM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Fri Sep 22 12:04:31 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Proposed
Project Comment: Proposed Conditions
Project Unit System: U.S. Customary

Site Set: SR 171 Proposed
Site Set Comment: Created Thu Sep 21 13:30:58 CDT 2017
Site Set Version: v1

Evaluation Title: SR 171 Proposed 2040
Evaluation Comment: Created Fri Sep 22 12:04:08 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Rural Two Lane Site Set CPM Evaluation

Type: 2U
Calibration Factor: 1

Table 1. Evaluation Segment Site - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Left Side Lane Width (ft)	Right Side Lane Width (ft)	Left Side Paved Shoulder Width (ft)	Right Side Paved Shoulder Width (ft)	Left Side Gravel Shoulder Width (ft)	Right Side Gravel Shoulder Width (ft)	Left Side Turf Shoulder Width (ft)	Right Side Turf Shoulder Width (ft)	Grade (%)	Driveway Density (driveways/mi)	Roadside Hazard Rating	Centerline Rumble Strip	Passing Lanes	TWLT Lane	Lighting	Curve Radius (ft)	Curve Length (mi)	Presence of Spirals	Superelevation Variance (%)	Automated Speed Enforcement
1	2U	SR 171	TriStar to SR 265	0.4800	2040: 71150	12.00	12.00	8.00	8.00	0.00	0.00	0.00	0.00	0.00	6.0	3	no	None (0)	no	no	0.00	0.0000	0	0.00	no

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	2U	SR 171	TriStar to SR 265	0.4800	8.27	17.2385	0.66

Table 3. Expected 2U Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.10	1.2	1.03	12.5	1.00	12.1
Highway Segment	Collision with Bicycle	0.01	0.1	0.01	0.1	0.02	0.2
Highway Segment	Other Single-vehicle Collision	0.02	0.2	0.16	2.0	0.17	2.1
Highway Segment	Overturned	0.10	1.2	0.08	1.0	0.21	2.5
Highway Segment	Collision with Pedestrian	0.02	0.2	0.01	0.1	0.03	0.3
Highway Segment	Run Off Road	1.45	17.5	2.84	34.3	4.31	52.1
Highway Segment	Total Single Vehicle Crashes	1.70	20.5	4.13	49.9	5.73	69.3
Highway Segment	Angle Collision	0.27	3.2	0.41	4.9	0.70	8.5
Highway Segment	Head-on Collision	0.09	1.1	0.02	0.2	0.13	1.6
Highway Segment	Other Multiple-vehicle Collision	0.07	0.8	0.17	2.0	0.22	2.7
Highway Segment	Rear-end Collision	0.44	5.3	0.69	8.3	1.18	14.2
Highway Segment	Sideswipe	0.10	1.2	0.21	2.6	0.31	3.7
Highway Segment	Total Multiple Vehicle Crashes	0.97	11.7	1.49	18.0	2.54	30.7
Highway Segment	Total Highway Segment Crashes	2.66	32.2	5.62	67.9	8.27	100.0
	Total Crashes	2.66	32.2	5.62	67.9	8.27	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Urban Arterial Site Set CPM Evaluation

Type: 3T
Calibration Factor: 1

Table 4. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length (mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	3T	SR 171	Providence toTriStar	0.2000	2040: 71150	3	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	3T	SR 171	Providence toTriStar	0.2000	10.52	52.6167	2.03

Table 6. Expected 3T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Collision with Bicycle	0.27	2.5	0.00	0.0	0.27	2.5
Highway Segment	Collision with Fixed Object	0.06	0.6	0.26	2.4	0.32	3.0
Highway Segment	Collision with Other Object	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Other Single-vehicle Collision	0.03	0.3	0.01	0.1	0.04	0.4
Highway Segment	Collision with Pedestrian	0.40	3.8	0.00	0.0	0.40	3.8
Highway Segment	Total Segment Single Vehicle Crashes	0.76	7.2	0.27	2.5	1.02	9.7
Highway Segment	Angle Collision	0.20	1.9	0.09	0.9	0.29	2.8
Highway Segment	Driveway-related Collision	0.47	4.4	1.46	13.8	1.92	18.3
Highway Segment	Head-on Collision	0.10	0.9	0.09	0.9	0.19	1.8
Highway Segment	Other Multi-vehicle Collision	0.10	0.9	0.09	0.9	0.19	1.8
Highway Segment	Rear-end Collision	2.45	23.3	3.94	37.4	6.39	60.7
Highway Segment	Sideswipe, Opposite Direction Collision	0.05	0.5	0.09	0.9	0.14	1.4
Highway Segment	Sideswipe, Same Direction Collision	0.00	0.0	0.36	3.5	0.37	3.5
Highway Segment	Total Segment Multiple Vehicle Crashes	3.37	32.0	6.13	58.3	9.50	90.3
Highway Segment	Total Highway Segment Crashes	4.13	39.2	6.40	60.8	10.52	100.0
	Total Crashes	4.13	39.2	6.40	60.8	10.52	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 5T
Calibration Factor: 1

Table 7. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Type of Parking/Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	5T	SR 171	I-40 to Providence	0.6000	2040: 44535	1	0	0	0	0	0	0	yes	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Low
2	5T	SR 171	Providence to SR 265	0.6800	2040: 28860	3	0	0	0	0	0	0	no	no	5.00	100.0	No Parking	0.000	No Parking	0.000	Intermediate/High

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	5T	SR 171	I-40 to Providence	0.6000	14.90	24.8401	1.53
2	5T	SR 171	Providence to SR 265	0.6800	11.60	17.0575	1.62

Table 9. Expected 5T Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.01	0.0	0.13	0.5	0.14	0.5
Highway Segment	Collision with Bicycle	0.82	3.1	0.00	0.0	0.82	3.1
Highway Segment	Collision with Fixed Object	0.29	1.1	2.09	7.9	2.38	9.0
Highway Segment	Collision with Other Object	0.00	0.0	0.17	0.6	0.17	0.6
Highway Segment	Other Single-vehicle Collision	0.42	1.6	0.33	1.3	0.75	2.8
Highway Segment	Collision with Pedestrian	0.67	2.5	0.00	0.0	0.67	2.5
Highway Segment	Total Segment Single Vehicle Crashes	2.22	8.4	2.72	10.3	4.94	18.6
Highway Segment	Angle Collision	0.26	1.0	0.85	3.2	1.11	4.2
Highway Segment	Driveway-related Collision	0.52	2.0	1.42	5.4	1.94	7.3
Highway Segment	Head-on Collision	0.11	0.4	0.06	0.2	0.17	0.6
Highway Segment	Other Multi-vehicle Collision	0.09	0.4	0.42	1.6	0.51	1.9
Highway Segment	Rear-end Collision	4.38	16.5	9.40	35.5	13.78	52.0
Highway Segment	Sideswipe, Opposite Direction Collision	0.02	0.1	0.13	0.5	0.15	0.6
Highway Segment	Sideswipe, Same Direction Collision	0.32	1.2	3.58	13.5	3.90	14.7
Highway Segment	Total Segment Multiple Vehicle Crashes	5.70	21.5	15.86	59.9	21.56	81.4
Highway Segment	Total Highway Segment Crashes	7.92	29.9	18.59	70.1	26.50	100.0
	Total Crashes	7.92	29.9	18.59	70.1	26.50	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4SG
Calibration Factor: 1

Table 10. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/ Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 171 at I40 WB		2040: 44535	2040: 11880	2	2	yes	false	0	0	2	2	no	50	6	0	0	4
2	4SG2x2le5	SR 171 at I40 EB		2040: 44535	2040: 10580	1	1	yes	false	0	1	0	1	no	50	5	0	0	6
3	4SG2x2le5	SR 171 at Belinda		2040: 44535	2040: 10000	4	3	yes	false	0	2	2	4	no	50	7	0	0	6
4	4SG2x2le5	SR 171 at Crossings		2040: 44535	2040: 10000	3	2	yes	false	2	2	0	4	no	50	6	0	0	9
6	4SG2x2le5	SR 171 at Providence W		2040: 44535	2040: 10000	4	3	yes	false	0	4	0	4	no	50	5	0	0	4
7	4SG2x2le5	SR 171 at TriStar		2040: 28860	2040: 10000	3	2	yes	false	1	3	0	4	no	50	4	0	0	3
8	4SG2x2le5	SR 171 at SR 265		2040: 28860	2040: 25910	4	4	no	false	0	0	4	4	no	50	7	0	0	1

Table 11. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 171 at I40 WB	8.47	0.41	8.4663
2	4SG	SR 171 at I40 EB	10.91	0.54	10.9125
3	4SG	SR 171 at Belinda	5.98	0.30	5.9773
4	4SG	SR 171 at Crossings	7.82	0.39	7.8233
6	4SG	SR 171 at Providence W	6.62	0.33	6.6239
7	4SG	SR 171 at TriStar	4.91	0.35	4.9113
8	4SG	SR 171 at SR 265	4.54	0.23	4.5429

Table 12. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.00	0.0	0.01	0.0
Intersection	Collision with Bicycle	0.72	1.5	0.00	0.0	0.72	1.5
Intersection	Collision with Fixed Object	0.39	0.8	1.57	3.2	1.95	4.0
Intersection	Non-Collision	0.07	0.1	0.06	0.1	0.13	0.3
Intersection	Collision with Other Object	0.04	0.1	0.13	0.3	0.16	0.3
Intersection	Other Single-vehicle Collision	0.02	0.0	0.04	0.1	0.06	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.25	0.5	0.00	0.0	0.25	0.5
Intersection	Total Intersection Single Vehicle Crashes	1.49	3.0	1.80	3.7	3.29	6.7
Intersection	Angle Collision	5.62	11.4	7.26	14.7	12.88	26.2
Intersection	Head-on Collision	0.79	1.6	0.89	1.8	1.69	3.4
Intersection	Other Multi-vehicle Collision	0.89	1.8	6.28	12.7	7.17	14.6
Intersection	Rear-end Collision	7.29	14.8	14.37	29.2	21.66	44.0
Intersection	Sideswipe	1.60	3.3	0.95	1.9	2.56	5.2
Intersection	Total Intersection Multiple Vehicle Crashes	16.21	32.9	29.75	60.4	45.96	93.3
Intersection	Total Intersection Crashes	17.70	35.9	31.55	64.1	49.26	100.0
	Total Crashes	17.70	35.9	31.55	64.1	49.26	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

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September 22, 2017

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Report Overview

Report Generated: Sep 22, 2017 11:04 AM
Report Template: System: Single Page [System] (sscpm3, Sep 21, 2017 4:10 PM)

Evaluation Date: Fri Sep 22 11:03:57 CDT 2017
IHSDM Version: v13.0.0 (Sep 13, 2017)
Site Set Crash Prediction Module: v|ModuleInfo.moduleVersion| (|ModuleInfo.moduleDate|)

User Name: storeyj
Organization Name: Gresham, Smith and Partners
Phone:
E-Mail: jon_storey@gspnet.com

Project Title: I-40 at SR 265 IAR 2040 Proposed
Project Comment: Proposed Conditions
Project Unit System: U.S. Customary

Site Set: SR 265 Proposed
Site Set Comment: Created Thu Sep 21 09:25:02 CDT 2017
Site Set Version: v1

Evaluation Title: SR 265 Proposed 2040
Evaluation Comment: Created Fri Sep 22 11:03:35 CDT 2017
Policy for Superelevation: AASHTO 2011 U.S. Customary
Calibration: HSM Configuration
Crash Distribution: HSM Configuration
Model/CMF: HSM Configuration
First Year of Analysis: 2040
Last Year of Analysis: 2040
Empirical-Bayes Analysis: None

Urban Arterial Site Set CPM Evaluation

Type: 4D
Calibration Factor: 1

Table 1. Evaluation Segment - Homogeneous Sites

Site No.	Type	Highway	Site Description	Length(mi)	AADT	Number of Major Commercial Driveways	Number of Minor Commercial Driveways	Number of Major Industrial/Institutional Driveways	Number of Minor Industrial/Institutional Driveways	Number of Major Residential Driveways	Number of Minor Residential Driveways	Number of Other Driveways	Lighting	Automated Speed Enforcement	Offset to Fixed Objects (ft)	Fixed-Object Density (fixed objects/mi)	Effective Median Width (ft)	Median Type	Type of Parking/ Land Use - Right Side	Proportion of Right Side Curb Length with Parking	Type of Parking/ Land Use - Left Side	Proportion of Left Side Curb Length with Parking	Speed Category
1	4D	SR 265	Pleasant Grove to WB Ramps	0.3600	2040: 19985	0	0	0	0	0	0	0	no	no	20.00	0.0	12.00	Non-Traversable Median	No Parking	0.000	No Parking	0.000	Low
2	4D	SR 265	WB Ramps to Reloc Adams	0.7000	2040: 40000	0	0	0	0	0	0	0	yes	no	20.00	0.0	12.00	Non-Traversable Median	No Parking	0.000	No Parking	0.000	Low
4	4D	SR 265	Reloc Adams to SR 171	0.6200	2040: 22000	0	1	0	1	0	9	0	no	no	20.00	50.0	12.00	Traversable Median	No Parking	0.000	No Parking	0.000	Intermediate/High

Table 2. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Length (mi)	Expected No. Crashes for Evaluation Period	Crash Rate (crashes/mi/yr)	Travel Crash Rate (crashes/million veh-mi)
1	4D	SR 265	Pleasant Grove to WB Ramps	0.3600	1.46	4.0628	0.56
2	4D	SR 265	WB Ramps to Reloc Adams	0.7000	6.13	8.7535	0.60
4	4D	SR 265	Reloc Adams to SR 171	0.6200	2.95	4.7575	0.59

Table 3. Expected 4D Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Highway Segment	Collision with Animal	0.00	0.0	0.07	0.6	0.07	0.6
Highway Segment	Collision with Bicycle	0.11	1.0	0.00	0.0	0.11	1.0
Highway Segment	Collision with Fixed Object	0.12	1.1	0.87	8.3	0.99	9.4
Highway Segment	Collision with Other Object	0.01	0.1	0.02	0.2	0.02	0.2
Highway Segment	Other Single-vehicle Collision	0.11	1.1	0.12	1.1	0.23	2.2
Highway Segment	Collision with Pedestrian	0.53	5.0	0.00	0.0	0.53	5.0
Highway Segment	Total Segment Single Vehicle Crashes	0.87	8.2	1.07	10.2	1.94	18.4
Highway Segment	Angle Collision	0.09	0.9	0.22	2.1	0.32	3.0
Highway Segment	Driveway-related Collision	0.02	0.2	0.05	0.5	0.07	0.7
Highway Segment	Head-on Collision	0.05	0.4	0.04	0.4	0.09	0.9
Highway Segment	Other Multi-vehicle Collision	0.11	1.1	0.44	4.2	0.55	5.2
Highway Segment	Rear-end Collision	1.93	18.3	4.11	39.0	6.04	57.3
Highway Segment	Sideswipe, Opposite Direction Collision	0.02	0.2	0.01	0.1	0.03	0.3
Highway Segment	Sideswipe, Same Direction Collision	0.12	1.1	1.39	13.1	1.50	14.2
Highway Segment	Total Segment Multiple Vehicle Crashes	2.34	22.2	6.26	59.4	8.60	81.6
Highway Segment	Total Highway Segment Crashes	3.21	30.4	7.33	69.6	10.54	100.0
	Total Crashes	3.21	30.4	7.33	69.6	10.54	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 3ST
Calibration Factor: 1

Table 4. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout
1	3ST2x2le5	SR 265 at Pleasant Grove	3-leg stop	2040: 19985	2040: 7655	2	0	no	true
4	3ST2x2le5	SR 265 at Cook	3-leg stop	2040: 22000	2040: 500	2	0	no	false

Table 5. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	3ST	SR 265 at Pleasant Grove	3-leg stop	1.09	0.13	1.0921
4	3ST	SR 265 at Cook	3-leg stop	0.68	0.08	0.6822

Table 6. Expected 3ST Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.00	0.1	0.00	0.1
Intersection	Collision with Bicycle	0.03	1.5	0.00	0.0	0.03	1.5
Intersection	Collision with Fixed Object	0.04	2.4	0.11	6.2	0.15	8.6
Intersection	Non-Collision	0.01	0.3	0.00	0.2	0.01	0.6
Intersection	Collision with Other Object	0.01	0.3	0.01	0.7	0.02	1.0
Intersection	Other Single-vehicle Collision	0.00	0.1	0.00	0.2	0.01	0.3
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.04	2.0	0.00	0.0	0.04	2.0
Intersection	Total Intersection Single Vehicle Crashes	0.12	6.8	0.13	7.4	0.25	14.2
Intersection	Angle Collision	0.18	10.0	0.26	14.9	0.44	24.8
Intersection	Head-on Collision	0.02	1.3	0.02	1.3	0.05	2.6
Intersection	Other Multi-vehicle Collision	0.03	1.9	0.24	13.3	0.27	15.2
Intersection	Rear-end Collision	0.22	12.2	0.44	25.0	0.66	37.2
Intersection	Sideswipe	0.07	3.7	0.04	2.3	0.10	5.9
Intersection	Total Intersection Multiple Vehicle Crashes	0.52	29.1	1.01	56.7	1.52	85.8
Intersection	Total Intersection Crashes	0.64	35.9	1.14	64.1	1.77	100.0
	Total Crashes	0.64	35.9	1.14	64.1	1.77	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.
Type: 4SG
Calibration Factor: 1

Table 7. Evaluation Intersection Sites

Site No.	Type	Highway	Site Description	Major AADT	Minor AADT	Number of Approaches with Left-Turn Lanes	Number of Approaches with Right-Turn Lanes	Presence of Lighting	Replaced with Roundabout	Number of Approaches with Permissive Left-Turn Phasing	Number of Approaches with Permissive/ Protected or Protected/Permissive Left-Turn Phasing	Number of Approaches with Protected Left-Turn Phasing	Number of Approaches on which Right Turn on Red is Prohibited	Presence of Red-Light Cameras	Pedestrian Volumes Crossing all Intersection Legs (crossings/day)	Max. Number of Lanes Crossed by Pedestrians	Number of Bus Stops within 1000 ft of Intersection	Number of Schools within 1000 ft of Intersection	Number of Alcohol Sales Establishments within 1000 ft of Intersection
1	4SG2x2le5	SR 265 at SR 171	4-leg signal	2040: 31290	2040: 25910	4	0	yes	false	2	2	0	4	no	50	3	0	0	1
2	4SG2x2le5	SR 265 at Reloc Adams	4-leg signal	2040: 40190	2040: 20345	4	4	yes	false	0	0	2	4	no	240	7	0	0	4
3	4SG2x2le5	SR 265 at I-40 WB	4-leg signal	2040: 39715	2040: 12695	2	2	yes	false	0	0	2	2	no	240	6	0	0	4
4	4SG2x2le5	SR 265 at I-40 EB	4-leg signal	2040: 39175	2040: 12845	2	2	yes	false	0	0	2	2	no	240	6	0	0	4

Table 8. Expected Crash Frequencies and Rates by Site

Site No.	Type	Highway	Site Description	Expected No. Crashes for Evaluation Period	Expected No. Crashes/Year (crashes/million veh)	Expected Crash Rate (crashes/yr)
1	4SG	SR 265 at SR 171	4-leg signal	6.62	0.32	6.6211
2	4SG	SR 265 at Reloc Adams	4-leg signal	6.29	0.28	6.2872
3	4SG	SR 265 at I-40 WB	4-leg signal	7.66	0.40	7.6615
4	4SG	SR 265 at I-40 EB	4-leg signal	7.57	0.40	7.5737

Table 9. Expected 4SG Crash Type Distribution

Element Type	Crash Type	Fatal and Injury		Property Damage Only		Total	
		Crashes	Crashes (%)	Crashes	Crashes (%)	Crashes	Crashes (%)
Intersection	Collision with Animal	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Bicycle	0.41	1.5	0.00	0.0	0.41	1.5
Intersection	Collision with Fixed Object	0.24	0.8	0.93	3.3	1.16	4.1
Intersection	Non-Collision	0.04	0.2	0.04	0.1	0.08	0.3
Intersection	Collision with Other Object	0.02	0.1	0.07	0.3	0.10	0.3
Intersection	Other Single-vehicle Collision	0.01	0.0	0.02	0.1	0.04	0.1
Intersection	Collision with Parked Vehicle	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Collision with Pedestrian	0.27	1.0	0.00	0.0	0.27	1.0
Intersection	Total Intersection Single Vehicle Crashes	1.00	3.5	1.06	3.8	2.06	7.3
Intersection	Angle Collision	3.15	11.2	4.15	14.8	7.30	25.9
Intersection	Head-on Collision	0.44	1.6	0.51	1.8	0.95	3.4
Intersection	Other Multi-vehicle Collision	0.50	1.8	3.59	12.8	4.09	14.5
Intersection	Rear-end Collision	4.08	14.5	8.22	29.2	12.30	43.7
Intersection	Sideswipe	0.90	3.2	0.54	1.9	1.44	5.1
Intersection	Total Intersection Multiple Vehicle Crashes	9.07	32.2	17.01	60.5	26.08	92.7
Intersection	Total Intersection Crashes	10.07	35.8	18.08	64.2	28.14	100.0
	Total Crashes	10.07	35.8	18.08	64.2	28.14	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

HSM CMF (DIAMOND INTERCHANGE TO DDI INTERCHANGE)

CMF / CRF Details

CMF ID: 6891

Convert diamond interchange to Diverging Diamond Interchange (DDI) or Double Crossover Diamond (DCD)

Description: Convert a diamond interchange to a Diverging Diamond Interchange (DDI) or a Double Crossover Diamond (DCD)

Prior Condition: Conventional diamond interchange

Category: Interchange design

Study: *Safety Evaluation of Diverging Diamond Interchanges in Missouri*, Edara et al., 2015

Star Quality Rating:	★★★★☆ [View score details]

Crash Modification Factor (CMF)	
Value:	0.592
Adjusted Standard Error:	
Unadjusted Standard Error:	0.029

Crash Reduction Factor (CRF)	
Value:	40.8 *(This value indicates a **decrease** in crashes)*
Adjusted Standard Error:	
Unadjusted Standard Error:	2.9

Applicability	
Crash Type:	All
Crash Severity:	All
Roadway Types:	All
Number of Lanes:	multilane
Road Division Type:	
Speed Limit:	Crossroad 35-40: Freeway 60-65
Area Type:	Not specified
Traffic Volume:	
Time of Day:	All
If countermeasure is intersection-based	
Intersection Type:	Other
Intersection Geometry:	No values chosen.
Traffic Control:	Other

Major Road Traffic Volume:	32604 to 151923 Annual Average Daily Traffic (AADT)
Minor Road Traffic Volume:	16087 to 29275 Annual Average Daily Traffic (AADT)

Development Details

Date Range of Data Used:	2005 to 2013
Municipality:	
State:	MO
Country:	USA
Type of Methodology Used:	Before/after using empirical Bayes or full Bayes
Sample Size Used:	

Other Details

Included in Highway Safety Manual?	No
Date Added to Clearinghouse:	
Comments:	This CMF applies to the entire interchange footprint (i.e., ramp terminals, ramp segments, speed-change lanes, crossroad, and freeway segment).

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.

APPENDIX G: COST ESTIMATES

Diamond Interchange Build Alternative
DDI Build Alternative

DIAMOND INTERCHANGE BUILD ALTERNATIVE

Route:	**I-40 with SR 265 (Central Pike)**
Description:	**Proposed Diamond Interchange**
	with Improvements to SR265, Adams Lane, John Hager Rd.
County:	**Wilson**
Length:	**0.34 mile SR 265, 1.06 miles length of interchange improvement along I-40**
Date:	**8/23/2016**

	UNIT	QUANT. - DI		UNIT COST	TOTAL (DI)
RIGHT-OF-WAY COST					
LAND	AC	38		$22,146	$ 841,535
COMMERCIAL	EACH	0		N/A	N/A
RESIDENTIAL	EACH	1		$15,000	$ 15,000
				SUBTOTAL	**$ 856,535**
CONSTRUCTION COST					
CLEAR AND GRUBBING					$ 120,000
EARTHWORK					$ 480,000
PAVEMENT REMOVAL					$ 5,750
DRAINAGE (INCLUDING EROSION CONTROL)					$ 1,087,638
STRUCTURES					$ 3,052,000
RAILROAD CROSSING OR SEPARATION					$ -
PAVING (INCLUDING CURB, GUTTER AND SIDEWALK)					$ 5,851,413
MAINTENANCE OF TRAFFIC					$ 886,146
TOPSOIL					$ 6,500
SEEDING					$ 34,320
SODDING					$ 18,960
SIGNING AND STRIPING					$ 124,781
LIGHTING					$ 650,000
SIGNALIZATION					$ 320,000
FENCE					$ 154,800
GUARDRAIL					$ 62,760
OTHER CONST. ITEMS (15%)					$ 1,928,260
				SUBTOTAL	**$ 14,783,327**
UTILITY COST					
OVERHEAD ELECTRIC	MI.	0.303		$100,000	$ 30,303
TELEPHONE	MI.	0.303		$75,000	$ 22,727
WATER	MI.	0.047		$350,000	$ 16,572
SEWER	MI.	0.047		$165,000	$ 7,813
CABLE	MI.	0.303		$30,000	$ 9,091
GAS	MI.	0.047		$205,000	$ 9,706
				SUBTOTAL	**$ 96,212**
MOBILIZATION (5% OF CONSTRUCTION COST)					
				SUBTOTAL	**$ 739,166**
CONTINGENCY (10% OF CONSTRUCTION COST AND UTILITIES)					**$ 1,561,871**
TOTAL CONSTRUCTION COST					**$ 17,180,577**
PRELIMINARY ENGINEERING (10% OF TOTAL CONSTRUCTION COST)					**$ 1,718,058**
TOTAL COST*					**$ 19,755,169**

**** For estimating future project costs, a compounded inflation rate of 10% per year will be applied from the date of this estimate.***

**** **Note: Assumes 20" water line can remain in place.***

Summary of Detailed Cost Estimates

Diamond Interchange (DI)

	UNIT	QUANTITY	UNIT COST	TOTAL
CLEAR AND GRUBBING				
INTERCHANGE	AC	30	$4,000.00	$120,000
			SUBTOTAL	**$120,000**
EARTHWORK				
INTERCHANGE	CY	80000	$6.00	$480,000
			SUBTOTAL	**$480,000**
PAVEMENT REMOVAL				
LOCAL ROADS AND PORTIONS OF SR 265 (202-03.01)	CY	500	$11.50	$5,750
			SUBTOTAL	**$5,750**
DRAINAGE (INCLUDING EROSION CONTROL)				
CATCH BASINS (611-12.02)	EACH	81	$5,500.00	$445,638
DRAINAGE PIPE (607-03.02)	LF	6000	$92.00	$552,000
SILT FENCE (209-08.03)	LF	9000	$2.00	$18,000
SEDIMENT FILTER TUBES (740-11.02)	LF	1000	$5.00	$5,000
SEDIMENT REMOVAL (209-05)	CY	2500	$20.00	$50,000
CATCH BASIN PROTECTION (209-40.33)	EACH	15	$400.00	$6,000
CHECK DAMS (209-08.08)	EACH	20	$350.00	$7,000
EROSION CONTROL BLANKET (805-12.01)	SY	2000	$2.00	$4,000
			SUBTOTAL	**$1,087,638**
STRUCTURES				
BRIDGE	SF	25100	$120.00	$3,012,000
BRIDGE REMOVAL	LS	1	$40,000.00	$40,000
			SUBTOTAL	**$3,052,000**
RAILROAD CROSSING OR SEPARATION				
NONE	SF	0	$85.00	$0
			SUBTOTAL	**$0**
PAVING (INCLUDES CURB, GUTTER & SIDEWALK)				
(10" SR265, 8" SIDE RDS, 6" RAMPS)MINERAL AGG BASE GRADING "D" (303-01)	TON	66702	$22.00	$1,467,450
(3")AC MIX (PG64-22) GR "A" (307-01.01)	TON	3052	$79.00	$241,082
(2")AC MIX (PG64-22) GR "BM-2" (307-01.08)	TON	1997	$79.00	$157,781
(3.25")AC MIX (PG70-22) GR "A" (307-02.01)	TON	6097	$66.00	$402,431
(3")PERF AC (PG70-22) GR "A-S" (307-01.21)	TON	4405	$60.00	$264,279
(2")AC MIX (PG70-22) GR "B-M2" (307-02.08)	TON	3686	$88.00	$324,390
(4")TREATED PERMEABLE BASE (313-03)	SY	21258	$18.00	$382,643
BITUMINOUS MATERIAL FOR PRIME COAT (402-01)	TON	97	$536.00	$52,109
AGGREGATE FOR COVER MATERIAL (402-02)	TON	385	$35.00	$13,475
BITUMINOUS MATERIAL FOR TACK COAT (403-01)	TON	19	$590.00	$11,488
(1.5")ACS (PG64-22) GR "E" (411-01.07)	TON	542	$85.00	$46,088
(1.25")AC MIX (PG70-22) GR "D" (411-01.10)	TON	1164	$79.00	$91,995
(1.25")AC MIX (PG64-22) GR "D" (411-02.10)	TON	2714	$86.00	$233,393
PORTLAND CEM CON (PLAIN) 10" (501-01.03)	SY	21214	$69.00	$1,463,758
UNDERDRAIN (710-02)	LF	4000	$8.00	$32,000
CURB AND GUTTER (702-03)	CY	1289	$300.00	$386,635
COLD PLANING BITUMINOUS PAVEMENT (415-01.02)	SY	33333	$2.00	$66,666
SIDEWALK (701-01.01)	SF	45000	$4.75	$213,750
			SUBTOTAL	**$5,851,413**
MAINTENANCE OF TRAFFIC				
TRAFFIC CONTROL (5% OF CONSTRUCTION COST)	LS	1	$598,446.06	$598,446
TRAFFIC CONTROL SIGNAGE (712-06)	SF	1000	$8.00	$8,000
PORTABLE BARRIER RAIL (705-04.50)	LF	5000	$28.00	$140,000
PORTABLE IMPACT ATTENUATOR (705-08.11)	EACH	6	$6,000.00	$36,000
REMOVE & RELOCATE BARRIER RAIL (712-02.36)	LF	2500	$20.00	$50,000
FLEXIBLE DRUMS (712-04.02)	EACH	500	$20.00	$10,000
WARNING LIGHTS (712-05.01)	EACH	250	$30.00	$7,500
ARROW BOARD (712-08.03)	EACH	2	$1,100.00	$2,200
CHANGEABLE MESSAGE SIGN UNIT (713-16.01)	EACH	2	$2,000.00	$4,000
TEMPORARY STRIPING	LF	10000	$3.00	$30,000
			SUBTOTAL	**$886,146**
TOPSOIL				
TOPSOIL (203-04)	CY	1000	$6.50	$6,500
			SUBTOTAL	**$6,500**
SEEDING				
SEEDING WITH MULCH (801-01)	UNIT	1200	$27.00	$32,400

WATER (801-03)	M.G.	120	$16.00	$1,920
			SUBTOTAL	**$34,320**
SODDING				
SODDING (803-01)	SY	6000	$3.00	$18,000
WATER (801-03)	M.G.	60	$16.00	$960
			SUBTOTAL	**$18,960**
SIGNING AND STRIPING				
STEEL I-BEAMS & WF-BEAMS(BREAKAWAY) SIGN SUPPORT (713-04.02)	LB.	5888.4	$4.00	$23,554
"U" SECTION STEEL POSTS (713-11.01)	LB.	676	$3.50	$2,366
PERFORATED/KNOCKOUT SQUARE TUBE POST (713-11.02)	LB.	801	$4.50	$3,603
FLAT SHEET ALUMINUM SIGNS (0.080" THICK) (713-13.02)	S.F.	100	$13.00	$1,300
FLAT SHEET ALUMINUM SIGNS (0.100" THICK) (713-13.03)	S.F.	374	$14.50	$5,423
EXTRUDED ALUMINUM PANEL SIGNS (713-14)	S.F.	2415	$24.00	$57,960
PAVEMENT ARROWS/BIKE LANE MARKINGS (716-05.09)	EACH	37	$225.00	$8,325
STRIPING (716-05.01)	LM	8.9	$2,500.00	$22,250
			SUBTOTAL	**$124,781**
LIGHTING				
INTERCHANGE LIGHTING	LS	1	$650,000.00	$650,000
			SUBTOTAL	**$650,000**
SIGNALIZATION				
SR 265@INTERCHANGE RAMPS	LS	2	$160,000.00	$320,000
			SUBTOTAL	**$320,000**
FENCE				
AT INTERCHANGE (707-01.11)	LF	8600	$18.00	$154,800
			SUBTOTAL	**$154,800**
GUARDRAIL				
GUARDRAIL (705-02.01)	LF	2000	$20.00	$40,000
END TERMINALS (705-04.04)	EACH	8	$2,000.00	$16,000
GUARDRAIL AT BRIDGE ENDS (705-01.01)	LF	104	$65.00	$6,760
			SUBTOTAL	**$62,760**

	Land Value	Size	Unit Value
tract 1	431900	95.75	4510.7
tract 2	376500	156	2413.5
tract 3	140300	10	14030.0
tract 4	107700	4.21	25581.9
tract 5	87100	4	21775.0
tract 6	157600	16	9850.0
tract 7			
tract 8			
tract 9			
tract 10			
			$13,027
		ROW Factor 1.7	**$22,145.65**

DDI BUILD ALTERNATIVE

Route: I-40 Interchange with SR 265 (Central Pike)
Description: Proposed Diverging Diamond Interchange with Improvements to SR265, Adams Lane, John Hager Rd.
County: Wilson
Length: 0.34 mile SR 265, 1.06 miles length of interchange improvement along I-40
Date: 9/29/2016

	UNIT	QUANT. - DDI		UNIT COST	TOTAL (DDI)
RIGHT-OF-WAY COST					
LAND	AC	38		$22,146	$ 841,535
COMMERCIAL	EACH	0		N/A	N/A
RESIDENTIAL	EACH	1		$15,000	$ 15,000
				SUBTOTAL	**$ 856,535**
CONSTRUCTION COST					
CLEAR AND GRUBBING					$ 160,000
EARTHWORK					$ 480,000
PAVEMENT REMOVAL					$ 5,750
DRAINAGE (INCLUDING EROSION CONTROL)					$ 1,212,250
STRUCTURES					$ 3,100,000
RAILROAD CROSSING OR SEPARATION					$ -
PAVING (INCLUDING CURB, GUTTER AND SIDEWALK)					$ 6,217,655
MAINTENANCE OF TRAFFIC					$ 922,308
TOPSOIL					$ 9,750
SEEDING					$ 40,740
SODDING					$ 15,800
SIGNING AND STRIPING					$ 147,450
LIGHTING					$ 650,000
SIGNALIZATION					$ 400,000
FENCE					$ 180,000
GUARDRAIL					$ 72,760
OTHER CONST. ITEMS (15%)					$ 2,042,169
				SUBTOTAL	**$ 15,656,632**
UTILITY COST					
OVERHEAD ELECTRIC	MI.	0.3030	0	$100,000	$ 30,303
TELEPHONE	MI.	0.3030	0	$75,000	$ 22,727
WATER	MI.	0.0473	0	$350,000	$ 16,572
SEWER	MI.	0.0473	0	$165,000	$ 7,813
CABLE	MI.	0.3030	0	$30,000	$ 9,091
GAS	MI.	0.0473	0	$205,000	$ 9,706
				SUBTOTAL	**$ 96,212**
MOBILIZATION (5% OF CONSTRUCTION COST)					
				SUBTOTAL	**$ 782,832**
CONTINGENCY (10% OF CONSTRUCTION COST AND UTILITIES)					**$ 1,653,568**
TOTAL CONSTRUCTION COST					**$ 18,189,243**
PRELIMINARY ENGINEERING (10% OF TOTAL CONSTRUCTION COST)					**$ 1,818,924**
TOTAL COST*					**$ 20,864,702**

For estimating future project costs, a compounded inflation rate of 10% per year will be applied from the date of this estimate.

**** **Note: Assumes 20" water line can remain in place.***

Summary of Detailed Cost Estimates

Diverging Diamond Interchange (DDI)

	UNIT	QUANTITY	UNIT COST	TOTAL
CLEAR AND GRUBBING				
Exit xx Interchange Area	AC	40	$4,000.00	$160,000
			SUBTOTAL	**$160,000**
EARTHWORK				
INTERCHANGE	CY	80000	$6.00	$480,000
			SUBTOTAL	**$480,000**
PAVEMENT REMOVAL				
LOCAL ROADS AND PORTIONS OF SR 265 (202-03.01)	CY	500	$11.50	$5,750
			SUBTOTAL	**$5,750**
DRAINAGE (INCLUDING EROSION CONTROL)				
CATCH BASINS (611-12.02)	EACH	94	$5,500.00	$514,250
DRAINAGE PIPE (607-03.02)	LF	6500	$92.00	$598,000
SILT FENCE (209-08.03)	LF	10000	$2.00	$20,000
SEDIMENT FILTER TUBES (740-11.02)	LF	1000	$5.00	$5,000
SEDIMENT REMOVAL (209-05)	CY	3000	$20.00	$60,000
CATCH BASIN PROTECTION (209-40.33)	EACH	10	$400.00	$4,000
CHECK DAMS (209-08.08)	EACH	20	$350.00	$7,000
EROSION CONTROL BLANKET (805-12.01)	SY	2000	$2.00	$4,000
			SUBTOTAL	**$1,212,250**
STRUCTURES				
BRIDGE	SF	25500	$120.00	$3,060,000
BRIDGE REMOVAL	LS	1	$40,000.00	$40,000
			SUBTOTAL	**$3,100,000**
RAILROAD CROSSING OR SEPARATION				
NONE	SF	0	$85.00	$0
			SUBTOTAL	**$0**
PAVING (INCLUDES CURB, GUTTER & SIDEWALK)				
(10" SR265, 8" SIDE RDS, 6" RAMPS)MINERAL AGG BASE GRADING "D" (303-01)	TON	65240	$22.00	$1,435,290
(3")AC MIX (PG64-22) GR "A" (307-01.01)	TON	3086	$79.00	$243,783
(2")AC MIX (PG64-22) GR "BM-2" (307-01.08)	TON	2020	$79.00	$159,555
(3.25")AC MIX (PG70-22) GR "A" (307-02.01)	TON	5430	$66.00	$358,391
(3")PERF AC (PG70-22) GR "A-S" (307-01.21)	TON	3923	$60.00	$235,359
(2")AC MIX (PG70-22) GR "B-M2" (307-02.08)	TON	3283	$88.00	$288,893
(4")TREATED PERMEABLE BASE (313-03)	SY	26391	$18.00	$475,035
BITUMINOUS MATERIAL FOR PRIME COAT (402-01)	TON	90	$536.00	$48,480
AGGREGATE FOR COVER MATERIAL (402-02)	TON	358	$35.00	$12,536
BITUMINOUS MATERIAL FOR TACK COAT (403-01)	TON	18	$590.00	$10,688
(1.5")ACS (PG64-22) GR "E" (411-01.07)	TON	526	$85.00	$44,687
(1.25")AC MIX (PG70-22) GR "D" (411-01.10)	TON	1178	$79.00	$93,050
(1.25")AC MIX (PG64-22) GR "D" (411-02.10)	TON	2407	$86.00	$206,984
PORTLAND CEM CON (PLAIN) 10" (501-01.03)	SY	26346	$69.00	$1,817,843
UNDERDRAIN (710-02)	LF	4000	$8.00	$32,000
CURB AND GUTTER (702-03)	CY	1487	$300.00	$446,163
COLD PLANING BITUMINOUS PAVEMENT (415-01.02)	SY	33333	$2.00	$66,666
SIDEWALK (701-01.01)	SF	51000	$4.75	$242,250
			SUBTOTAL	**$6,217,655**
MAINTENANCE OF TRAFFIC				
TRAFFIC CONTROL (5% OF CONSTRUCTION COST)	LS	1	$634,607.73	$634,608
TRAFFIC CONTROL SIGNAGE (712-06)	SF	1000	$8.00	$8,000
PORTABLE BARRIER RAIL (705-04.50)	LF	5000	$28.00	$140,000
PORTABLE IMPACT ATTENUATOR (705-08.11)	EACH	6	$6,000.00	$36,000
REMOVE & RELOCATE BARRIER RAIL (712-02.36)	LF	2500	$20.00	$50,000
FLEXIBLE DRUMS (712-04.02)	EACH	500	$20.00	$10,000
WARNING LIGHTS (712-05.01)	EACH	250	$30.00	$7,500
ARROW BOARD (712-08.03)	EACH	2	$1,100.00	$2,200
CHANGEABLE MESSAGE SIGN UNIT (713-16.01)	EACH	2	$2,000.00	$4,000
TEMPORARY STRIPING	LF	10000	$3.00	$30,000
			SUBTOTAL	**$922,308**
TOPSOIL				
TOPSOIL (203-04)	CY	1500	$6.50	$9,750
			SUBTOTAL	**$9,750**
SEEDING				
SEEDING WITH MULCH (801-01)	UNIT	1500	$27.00	$40,500

WATER (801-03)	M.G.	15	$16.00	$240
			SUBTOTAL	**$40,740**
SODDING				
SODDING (803-01)	SY	5000	$3.00	$15,000
WATER (801-03)	M.G.	50	$16.00	$800
			SUBTOTAL	**$15,800**
SIGNING AND STRIPING				
STEEL I-BEAMS & WF-BEAMS(BREAKAWAY) SIGN SUPPORT (713-04.02)	LB.	7118	$4.00	$28,474
"U" SECTION STEEL POSTS (713-11.01)	LB.	2067	$3.50	$7,235
PERFORATED/KNOCKOUT SQUARE TUBE POST (713-11.02)	LB.	1588	$4.50	$7,148
FLAT SHEET ALUMINUM SIGNS (0.080" THICK) (713-13.02)	S.F.	227	$13.00	$2,946
FLAT SHEET ALUMINUM SIGNS (0.100" THICK) (713-13.03)	S.F.	654	$14.50	$9,483
EXTRUDED ALUMINUM PANEL SIGNS (713-14)	S.F.	2435	$24.00	$58,440
PAVEMENT ARROWS/BIKE LANE MARKINGS (716-05.09)	EACH	51	$225.00	$11,475
STRIPING (716-05.01)	LM	8.9	$2,500.00	$22,250
			SUBTOTAL	**$147,450**
LIGHTING				
INTERCHANGE LIGHTING	LS	1	$650,000.00	$650,000
			SUBTOTAL	**$650,000**
SIGNALIZATION				
SR 265@INTERCHANGE RAMPS	LS	2	$200,000.00	$400,000
			SUBTOTAL	**$400,000**
FENCE				
AT INTERCHANGE (707-01.11)	LF	10000	$18.00	$180,000
			SUBTOTAL	**$180,000**
GUARDRAIL				
GUARDRAIL (705-02.01)	LF	2500	$20.00	$50,000
END TERMINALS (705-04.04)	EACH	8	$2,000.00	$16,000
GUARDRAIL AT BRIDGE ENDS (705-01.01)	LF	104	$65.00	$6,760
			SUBTOTAL	**$72,760**

	Land Value	Size	Unit Value
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tract 7			
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tract 10			
			$13,027
		ROW Factor 1.7	**$22,145.65**