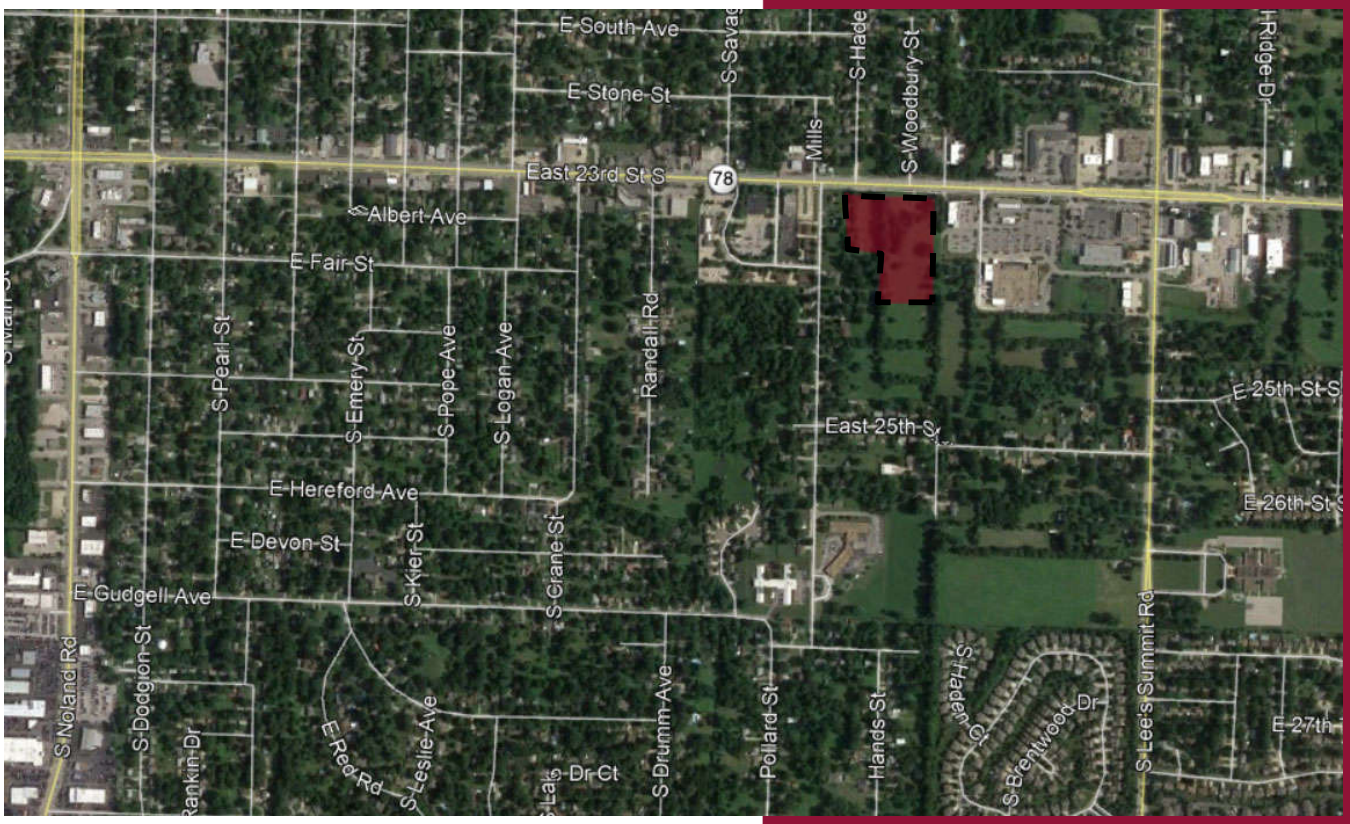
# McBee Landing Traffic Impact Study

23rd Street at Haden Street
Independence, Missouri





TranSystems
EXPERIENCE | Transportation

Prepared for:
McBee's Coffee 'n Car Wash

Prepared by TranSystems
June 2020

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June 22, 2020

Mr. Steven McBee
McBee's Coffee 'n Carwash
126 N. Market Street
Gallatin, MO 64640

**Re: McBee Landing Traffic Impact Study**
**23rd Street and Haden Street**
**Independence, Missouri**

Dear Mr. McBee:

In response to your request and authorization, TranSystems has completed a traffic impact study for the proposed commercial development to be generally located in the south side of 23rd Street at Haden Street in Independence, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

Included in this study is a discussion of the anticipated impact of the proposed development on the adjacent street network and identified improvements to mitigate deficiencies for the following scenarios:

- Existing Conditions
- Existing plus Development Conditions
- Future Year 2040 Conditions

We trust that the enclosed information proves beneficial to you, the Missouri Department of Transportation, and the City of Independence in this phase of the development process. We appreciate the opportunity to be of service to you and will be available to review this study at your convenience.

Sincerely,
**TRANSYSTEMS**

By: _____ By: _____

Jeffrey J. Wilke, PE, PTOE Emma Martin, EIT

EHM:JJW/ehm/P101200135
Enclosure

## Introduction

TranSystems has completed a traffic impact study for the proposed McBee Landing residential and commercial development to be generally located along the south side of 23rd Street at Haden Street in Independence, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system. The location of the development site relative to the major streets in the area is shown on ***Figure A-1*** in ***Appendix A***.

This study also contains a description of the proposed development and the surrounding transportation infrastructure along with trip generation estimates, trip distribution estimates, capacity analyses, and a summary of the findings.

## Proposed Development Plan

The proposed development consists of both residential and commercial land uses. The commercial portion of the development consists of an automated car wash and office space located along the south side of 23rd Street. Multifamily residential units for senior living will be located to south of the commercial businesses. The current development plan is included on ***Figure A-2*** in ***Appendix A*** for reference.

Access to the site will be provided from two new drives along 23rd Street. The first driveway will be aligned across 23rd Street from Haden Street. This drive will provide access to the offices and senior living land uses. The second driveway will be aligned across 23rd Street from Woodbury Street, and will primarily be an access for the car wash. A new drive is also proposed to be constructed onto Kings Highway, providing an alternate access point for the development in the future.

## Study Area

To assess the impacts of the proposed development, the intersections listed below were identified for study during the A.M. and P.M. peak periods.

- 23rd Street and Kings Highway
- 23rd Street and Haden Street
- 23rd Street and Woodbury Street

### Traffic Counts

Traffic counts were not collected at the time of this study due to the COVID-19 pandemic. The Governor of Missouri issued a Stay-At-Home order for the entire state from April 6, 2020 through May 3, 2020 to limit the spread of the virus. Schools and many businesses were closed. The closures have significantly altered traffic patterns, and will continue to do so as many businesses continue to operate on a limited basis and many professionals continue to work from home.

Turning-movement traffic volume counts were obtained from the Missouri Department of Transportation (MoDOT) 2019 Average Annual Daily Traffic Map for the segment of 23rd Street near the development site. The maps provided the A.M. and P.M. peak hour traffic volumes by direction of travel. Turning

movement counts at the study intersections were estimated based on street network characteristics, land uses in the surrounding area, and engineering judgement. The existing lane configurations, traffic control devices, and estimated peak hour volumes have been illustrated in ***Figures A-3*** through ***A-5***.

### Surrounding Street Network and Land Uses

The development site is located on roughly 11 acres of undeveloped land. The site is bounded by 23rd Street on the north. The 23rd Street corridor is generally lined with commercial businesses, but there are also some single-family residences. To the east, south and west, the site is bounded by single-family residences, with some larger lot sizes. Along the northeast edge of the site there is a tire store and parking lot, which is part of a larger shopping center that includes a HyVee grocery store.

Adjacent to the development site, 23rd Street is a five-lane highway with a posted speed limit of 40 mph. Within the City of Independence, 23rd Street is part of the state highway system as MO-78 Highway, and is classified by MoDOT as a principal arterial roadway. The street is generally 68 feet wide, with five-lanes, including a center two-way left-turn lane. There are paved four-foot shoulders on each side of the street, along with curb and gutter. Sidewalks are provided along the north and south sides of the street. The alignment of the roadway is straight with some slight vertical curvature.

Kings Highway is classified by the City of Independence as a collector street. It is a 24-foot wide, two-lane street with a posted speed limit of 25 mph. South of 23rd Street there are curbs and gutters with sidewalk along only the west side of the street. The street provides access to the residential neighborhood to the south, including Hanthorn Early Education School, as well as some commercial businesses to the west of Kings Highway.

Haden Street is a two-lane local street that provides access to the residential neighborhood to the north of 23rd Street. It has no shoulders, curbs, or gutters. Woodbury Street is also a local street and has similar characteristics. Woodbury Street is not continuous to the north and provides local access only to the adjacent residences. There is no sidewalk and no posted speed limit on either local street.

## Analysis

The scope of analysis for the assessment of the proposed development's impact on the surrounding transportation system is based in large part on the recommended practices of the Institute of Transportation Engineers (ITE), as outlined in their Traffic Engineering Handbook. ITE is a nationally-recognized organization of transportation professionals with members from both private and public sectors. The analysis of the proposed development's impact included development of trip generation and trip distribution estimates as well as a traffic operations assessment for each study scenario. The study also addresses access management criteria provided in MODOT's Engineering Policy Guide (EPG). Each of the analysis methodologies and findings are described in the subsequent sections.

### Driveway Spacing

The MoDOT EPG provides recommended spacings between driveways based on the type of highway. For major non-freeway routes in urban areas, the minimum driveway spacing is 440 feet. The proposed site

driveways are spaced closer together than the minimum spacing. The driveway at the Haden Street intersection is 210 feet east of Kings Highway and 330 feet west of Woodbury Street. The driveway at the Woodbury Street intersection is 210 feet west of Slayton Street.

While the proposed driveway spacings are less than the minimum spacing recommendations in the EPG, it should be noted that the driveways are all aligned with existing intersections. The EPG states that driveways should be lined up across the public roadway from each other whenever possible.

## Sight Distance

Sight distances and methods for measurement are provided in A Policy on Geometric Design of Highways and Streets (7th Edition), also referred to as the AASHTO Green Book published by the American Association of State Highway and Transportation Officials (AASHTO). Intersection sight distance is provided at intersections to allow the drivers of stopped vehicles to depart from their approach and enter or cross the uncontrolled street. These distances are generous, allowing enough distance for the stopped driver to complete their turning or crossing maneuver without requiring through traffic on the uncontrolled street to reduce their speed. Stopping sight distance is the minimum distance required to allow for a vehicle to stop before reaching a stationary object in its path.

Sight distances were measured in the field at each proposed site driveway intersection. The measurements and AASHTO recommended sight distances for each direction of travel are shown in ***Table 1***.

**Table 1**
**Intersection Sight Distances**

| Location | Direction Looking | Measured Sight Distance, feet | Recommended Intersection Sight Distance, feet | Recommended Stopping Sight Distance, feet |
|---|---|---|---|---|
| 23rd Street at Haden Street | East | >600 | 500 | 305 |
| | West | >600 | 385 | 305 |
| 23rd Street at Woodbury Street | East | >600 | 500 | 305 |
| | West | 500 | 385 | 305 |

The sight distance measurements indicate that sight distances are adequate at the both of the proposed site driveway intersections along 23rd Street. There is a slight crest vertical curve to the west of the intersection of Woodbury Street and 23rd Street that limits sight lines, however the measured sight distance exceeds the recommended sight distance for a right-turn movement from a stop controlled roadway.

## Trip Generation

Trip generation estimates were prepared using the Institute of Transportation Engineer's Trip Generation, 10th Edition. The Automated Car Wash land use (ITE code 948) does not provide information regarding average weekday and A.M. peak hour data, however it was estimated using other similar auto-oriented

land uses and engineering judgement. ***Table 2*** shows the expected trips to be generated by the proposed development. Additional information related to trip generation is included in ***Appendix B***.

**Table 2**
**Proposed Development Trip Generation**

| Land Use | Intensity | ITE Code | Average Weekday | A.M. Peak Hour | | | P.M. Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | In | Out | Total | In | Out |
| Automated Car Wash | 5,200 sf | 948 | 400 | 8 | 4 | 4 | 74 | 37 | 37 |
| General Office Building | 10,400 sf | 710 | 168 | 36 | 31 | 5 | 14 | 2 | 12 |
| Senior Adult Housing - Detached | 68 units | 251 | 401 | 31 | 10 | 21 | 36 | 22 | 14 |
| ***Total Development Trips*** | | | ***969*** | ***75*** | ***45*** | ***30*** | ***124*** | ***61*** | ***63*** |
| *Pass-by Trips (40% of car wash)* | | | - | - | - | - | *30* | *15* | *15* |
| *Non-Pass-by Trips* | | | *969* | *75* | *45* | *30* | *94* | *46* | *48* |
| **Total New Development Trips** | | | **969** | **75** | **45** | **30** | **94** | **46** | **48** |

Pass-by traffic occurs when drivers stop at the proposed development while in route to their final destination. Pass-by traffic is common for car washes. A pass-by percentage of 40% was assumed for the car wash since it will be an auto-oriented business located along a heavily traveled corridor.

## Trip Distribution

The estimated trips generated by the proposed development were distributed onto the surrounding street network based on the trip distributions summarized in ***Table 3***. These distributions are based on traffic counts, the expected service area of the development and engineering judgment.

**Table 3**
**Trip Distribution**

| Direction To/From | Percentage |
|---|---|
| East on 23rd Street | 50% |
| West on 23rd Street | 50% |
| **Total** | **100%** |

## Traffic Operation Assessment

An assessment of traffic operations was made for the scenarios listed below.

- Existing Conditions
- Existing plus Development Conditions
- Future Year (2040)

The study intersections were evaluated using the Synchro traffic analysis software package. Calculations were performed based on the methodologies outlined in the Highway Capacity Manual (HCM), 6th Edition, which is published by the Transportation Research Board. The operating conditions at an intersection are graded by the "level of service" experienced by drivers. Level of service (LOS) describes the quality of traffic operating conditions and is rated from "A" to "F". LOS A represents the least congested condition with free-flow movement of traffic and minimal delays. LOS F generally indicates severely congested conditions with excessive delays to motorists. Intermediate grades of B, C, D, and E reflect incremental increases in the average delay per stopped vehicle. Delay is measured in seconds per vehicle. ***Table 4*** shows the upper limit of delay associated with each level of service for signalized and unsignalized intersections.

**Table 4**
**Intersection Level of Service Delay Thresholds**

| Level of Service (LOS) | Signalized | Unsignalized |
|---|---|---|
| A | ≤ 10 Seconds | ≤ 10 Seconds |
| B | ≤ 20 Seconds | ≤ 15 Seconds |
| C | ≤ 35 Seconds | ≤ 25 Seconds |
| D | ≤ 55 Seconds | ≤ 35 Seconds |
| E | ≤ 80 Seconds | ≤ 50 Seconds |
| F | > 80 Seconds | > 50 Seconds |

While LOS measurements apply to both signalized and unsignalized intersections, there are significant differences between how these intersections operate and how they are evaluated. LOS for signalized intersections reflects the operation of the intersection as a whole.

Unsignalized intersections, in contrast, are evaluated based on the movement groupings which are required to yield to other traffic. Typically, these are the left turns off of the major street and the side-street approaches for two-way stop-controlled intersections. At unsignalized intersections lower LOS ratings (D, E and F) do not, in themselves, indicate the need for additional improvements. Many times there are convenient alternative routes to avoid the longer delays. Other times the volumes on the unsignalized approaches are relatively minor when compared to the major street traffic, and improvements such as a traffic signal installation may increase the average delay to all users of the intersection.

The decision to install a traffic signal, which is often considered when lower LOS ratings are projected, should be based on engineering studies and the warrants for traffic signal installation as outlined in the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD). Signals are typically not recommended in locations where there are convenient alternative paths, or if the installation of a traffic signal would have negative impacts on the surrounding transportation system.

The LOS rating deemed acceptable varies by community, facility type and traffic control device. Most communities in the region have identified LOS D as the minimum desirable goal for signalized intersections.

However, at unsignalized intersections LOS D, E, or even F are often considered acceptable for low to moderate traffic volumes where the installation of a traffic signal is not warranted by the conditions at the intersection, or the location has been deemed undesirable for signalization.

Traffic queues were also evaluated as part of the analyses. Long traffic queues which extend beyond the amount of storage available, either between intersections or within turn lanes, can have significant impacts on operations. The projected vehicular queues were analyzed to ensure the analyses are reflective of the physical constraints of the study intersections and to identify if additional storage is needed for turn lanes.

## Existing Conditions

The results of the existing conditions intersection analyses are summarized in ***Table 5***. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-3*** through ***A-5***. The Synchro output files are included in ***Appendix C***.

**Table 5**
**Intersection Operational Analysis**
**Existing Conditions**

| Intersection | A.M. Peak Hour | | P.M. Peak Hour | |
|---|---|---|---|---|
| *Movement* | LOS[1] | Delay[2] | LOS[1] | Delay[2] |
| **23rd Street and Kings Highway** | | | | |
| *Northbound* | ***E*** | ***42.4*** | ***F*** | ***>100*** |
| *Westbound Left-Turn* | *A* | *9.9* | *B* | *14.3* |
| **23rd Street and Haden Street** | | | | |
| *Southbound* | *D* | *28.1* | *C* | *21.8* |
| *Eastbound Left-Turn* | *B* | *13.2* | *B* | *11.4* |
| **23rd Street and Woodbury Street** | | | | |
| *Southbound* | *D* | *25.0* | *C* | *11.3* |
| *Eastbound Left-Turn* | *B* | *13.1* | *B* | *20.8* |

1 – Level of Service
2 – Delay in seconds per vehicle

The results in ***Table 5*** indicate that two of the three study intersections currently operate at acceptable levels of service during the peak hours. The northbound movements at the Kings Highway intersection operate at LOS E and LOS F during the A.M. and P.M. peak hours, respectively. The lengthy delays are due to the high volume of through traffic on 23rd Street. While the delays are long, the 95th percentile queue lengths are three vehicles or less.

## Existing plus Development Conditions

The MoDOT Engineering Policy Guide also provides guidance on the need for turn lanes at intersections. According to the EPG, an eastbound right-turn lane is warranted on 23rd Street at Haden Street with the addition of development traffic. The turn lane warrant analysis is shown in ***Appendix C***. Although the traffic volumes do satisfy the warranting criteria during the P.M. peak hour, it should be noted that there are no right-turn lanes at any of the commercial driveways along the 23rd Street corridor in the vicinity of the site. The addition of a right-turn lane would have a nominal impact on the capacity analysis and LOS

at the intersection. For these reasons, an eastbound right-turn lane was not included in the capacity analysis for the Existing plus Development Conditions scenario.

Due to the heavy volume of through traffic on 23rd Street, long delays can be expected for side street traffic exiting the site. Delays will be especially long for northbound left-turn traffic, which has to cross both directions of traffic on 23rd Street. Right-turn movements will experience less delay as they are only opposed by one direction of traffic on 23rd Street. The driveway that aligns with Haden Street is the main access to the development site. In order to separate these movements at the main access and minimize delays for right-turn traffic, a northbound right-turn lane is recommended at the site driveway that aligns with Haden Street.

The results of the Existing plus Development conditions intersection analyses are summarized on the following page in ***Table 6***. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-6*** through ***A-8***. The Synchro output files are included in ***Appendix C***.

**Table 6**
**Intersection Operational Analysis**
**Existing plus Development Conditions**

| Intersection | A.M. Peak Hour | | P.M. Peak Hour | |
|---|---|---|---|---|
| *Movement* | LOS[1] | Delay[2] | LOS[1] | Delay[2] |
| **23rd Street and Kings Highway** | | | | |
| *Northbound* | ***E*** | ***44.8*** | ***F*** | ***>100*** |
| *Westbound Left-Turn* | *B* | *10.0* | *B* | *14.6* |
| **23rd Street and Haden Street** | | | | |
| *Northbound Left-Turn/Through* | ***F*** | ***93.8*** | ***F*** | ***>100*** |
| *Northbound Right-Turn* | *B* | *11.6* | *C* | *16.3* |
| *Southbound* | ***F*** | ***>100*** | ***F*** | ***>100*** |
| *Eastbound Left-Turn* | *B* | *13.2* | *B* | *11.4* |
| *Westbound Left-Turn* | *B* | *10.0* | *B* | *14.0* |
| **23rd Street and Woodbury Street** | | | | |
| *Northbound* | ***E*** | ***39.7*** | ***F*** | ***>100*** |
| *Southbound* | ***F*** | ***86.0*** | ***F*** | ***84.2*** |
| *Eastbound Left-Turn* | *B* | *13.2* | *B* | *11.3* |
| *Westbound Left-Turn* | *A* | *9.9* | *B* | *14.2* |

1 – Level of Service
2 – Delay in seconds per vehicle

The results in ***Table 6*** indicate that most of the side street movements are projected to operate at LOS E or LOS F with the addition of development traffic. The long delays are due to the high volume of through traffic on 23rd Street. The traffic signal on 23rd Street at the commercial driveway east of the site will interrupt the flow of through traffic and create gaps for drivers to enter 23rd Street. Although long delays are projected in this scenario, all 95th percentile queues are projected to be no more than four vehicles during each of the peak hours.

While delays are projected to be long in this scenario, the side-street volumes are relatively low and are well below the minimum thresholds for signalization. As such, no further improvements are identified at this time to address the low levels of service. In the long-term a connection should eventually be made to the east of the site to allow site traffic to access the existing signalized intersection at 23rd Street and the commercial driveway to the east of the site. This connection would require easements from private property owners and reconfiguration of existing parking lots, so it will take extensive cooperation between several property owners for this to occur.

## Future Year (2040) Conditions

This scenario provides an estimate of future traffic conditions in year 2040 by considering the addition of background traffic growth to the existing plus development traffic volumes. To estimate future background traffic growth, the existing traffic volumes at the study intersections were assumed to increase at a rate of 0.5% per year. This modest growth rate is consistent with a mature developed area.

The results of the Future Year (2040) Conditions intersection analyses are summarized in ***Table 7***. The study intersections were evaluated with the lane configurations, traffic volumes, and traffic control devices shown on ***Figures A-9*** through ***A-11***. The Synchro output files are included in ***Appendix C***.

**Table 7**
**Intersection Operational Analysis**
**Future Year 2040**

| Intersection | A.M. Peak Hour | | P.M. Peak Hour | |
|---|---|---|---|---|
| *Movement* | LOS[1] | Delay[2] | LOS[1] | Delay[2] |
| **23rd Street and Kings Highway** | | | | |
| *Northbound* | ***F*** | ***66.1*** | ***F*** | ***>100*** |
| *Westbound Left-Turn* | *B* | *10.4* | *C* | *16.2* |
| **23rd Street and Haden Street** | | | | |
| *Northbound Left-Turn/Through* | ***F*** | ***>100*** | ***F*** | ***>100*** |
| *Northbound Right-Turn* | *B* | *12.1* | *C* | *17.7* |
| *Southbound* | ***F*** | ***>100*** | ***F*** | ***>100*** |
| *Eastbound Left-Turn* | *B* | *14.4* | *B* | *12.2* |
| *Westbound Left-Turn* | *B* | *10.5* | *C* | *15.4* |
| **23rd Street and Woodbury Street** | | | | |
| *Northbound* | ***E*** | ***50.8*** | ***F*** | ***>100*** |
| *Southbound* | ***F*** | ***>100*** | ***F*** | ***>100*** |
| *Eastbound Left-Turn* | *B* | *14.4* | *B* | *12.1* |
| *Westbound Left-Turn* | *A* | *10.2* | *B* | *15.7* |

1 – Level of Service
2 – Delay in seconds per vehicle

The results in the table are similar to the previous scenario. Most side street movements are projected to operate at LOS F during the peak hours. All side street traffic volumes are anticipated to remain below the minimum thresholds for traffic signal installation.

## Summary

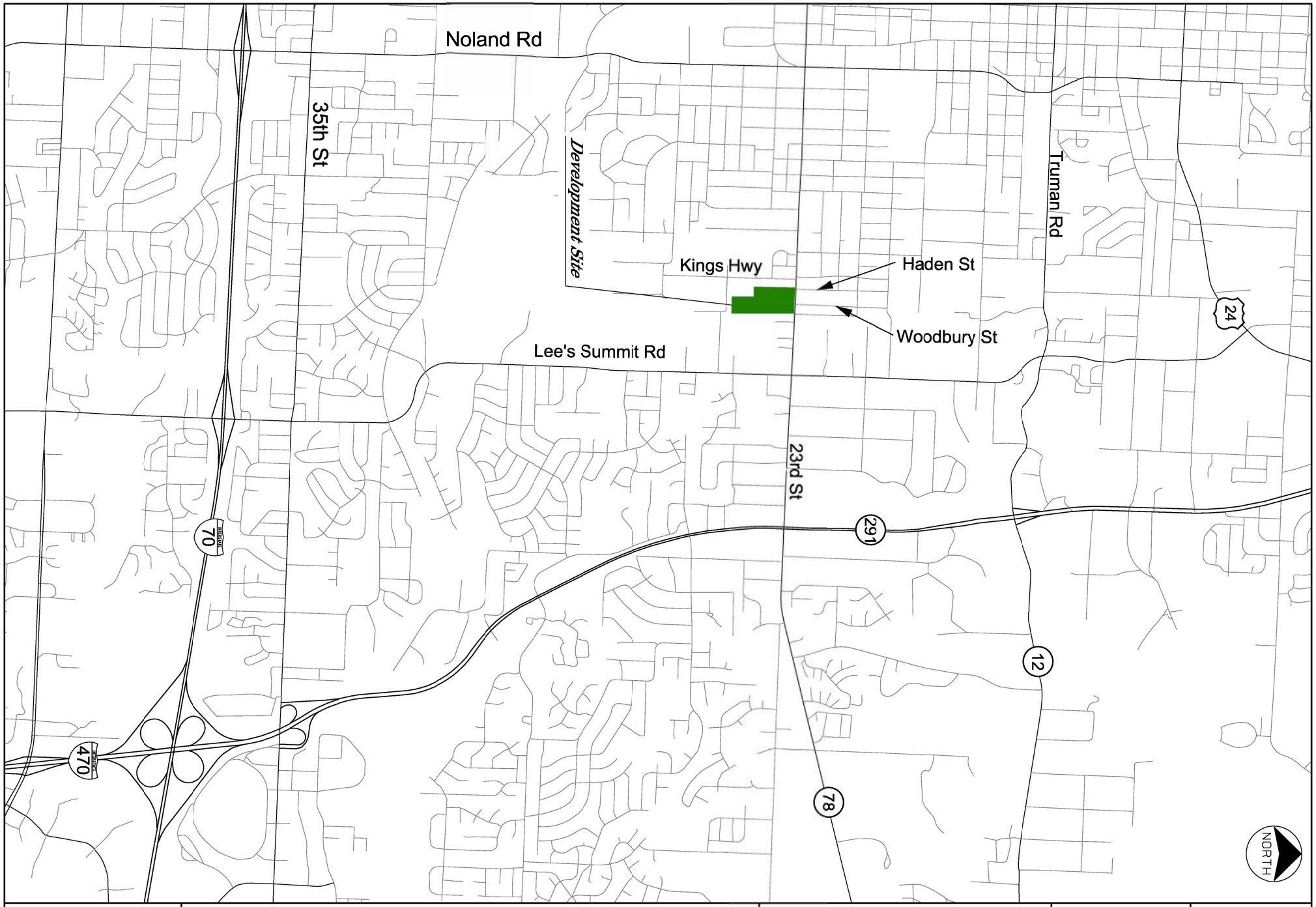
TranSystems has completed a traffic impact study for the proposed residential and commercial development to be generally located along the south side of 23rd Street at Haden Street in Independence, Missouri. The purpose of this study was to assess the impact of the proposed development on the surrounding transportation system.

The proposed development plan includes two new site driveways on 23rd Street. Each driveway is aligned across 23rd Street from an existing intersection on the north side of the road. Sight distances are adequate from each proposed site driveway.

With the addition of development traffic, most side street movements at the study intersections are projected to operate at level of service E or F during the peak hours. This is due mostly to the high volume of through traffic on 23rd Street. To reduce delays for northbound traffic existing the site, the site driveway that aligns with Haden Street should be constructed with two outbound lanes to allow northbound right-turn traffic to bypass queued left-turning vehicles.

While delays are projected to be long with the addition of development traffic, the side-street volumes are relatively low and are well below the minimum thresholds for signalization. As such, no further improvements are identified at this time to address the low levels of service. In the long-term a connection should eventually be made to the east of the site to allow site traffic to access the existing signalized intersection at 23rd Street and the commercial driveway to the east of the site.

# Appendix A - Figures

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|---|---|---|---|---|
| TranSystems | LOCATION MAP | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-1 |

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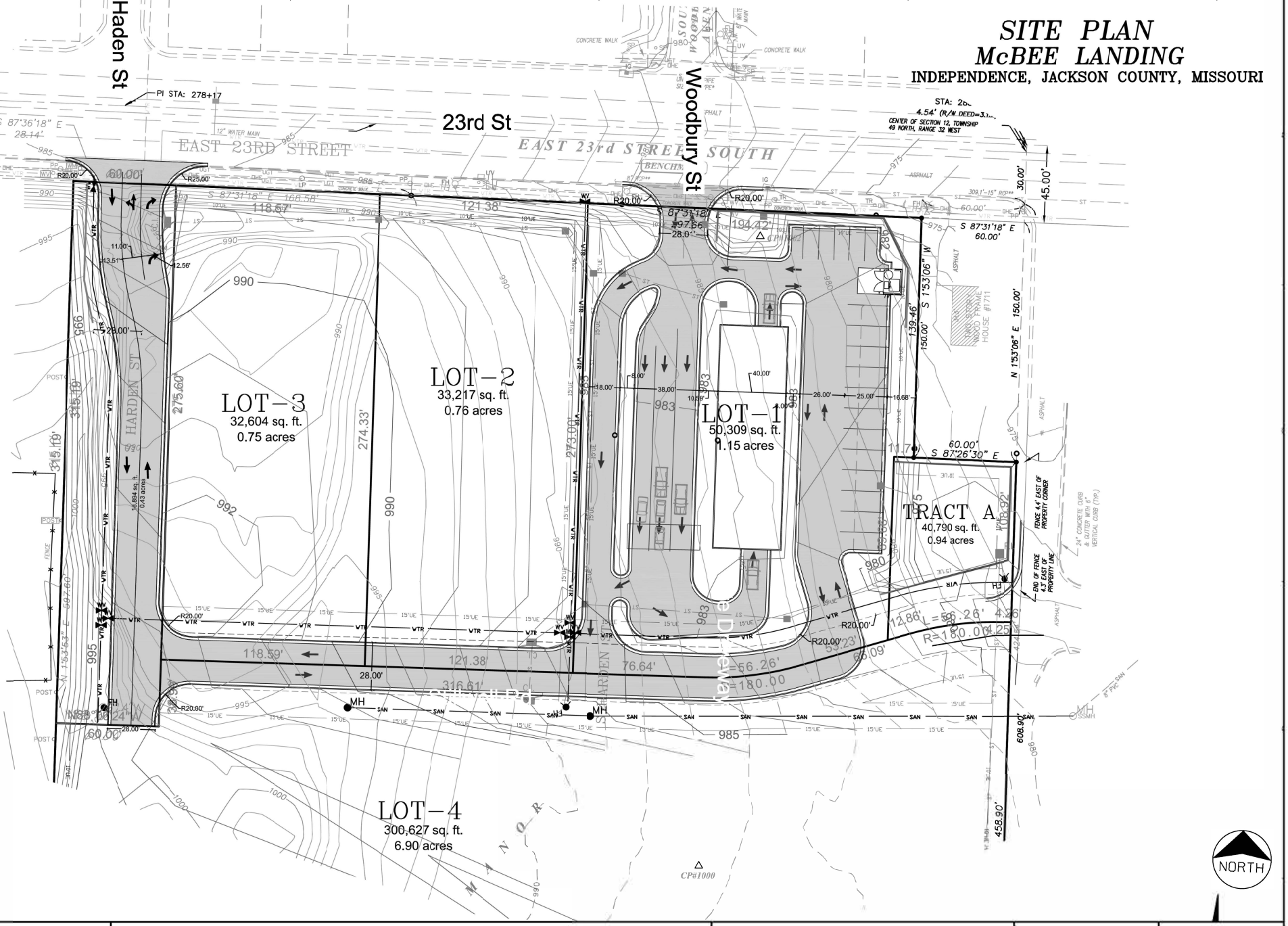
# SITE PLAN
## McBEE LANDING
### INDEPENDENCE, JACKSON COUNTY, MISSOURI

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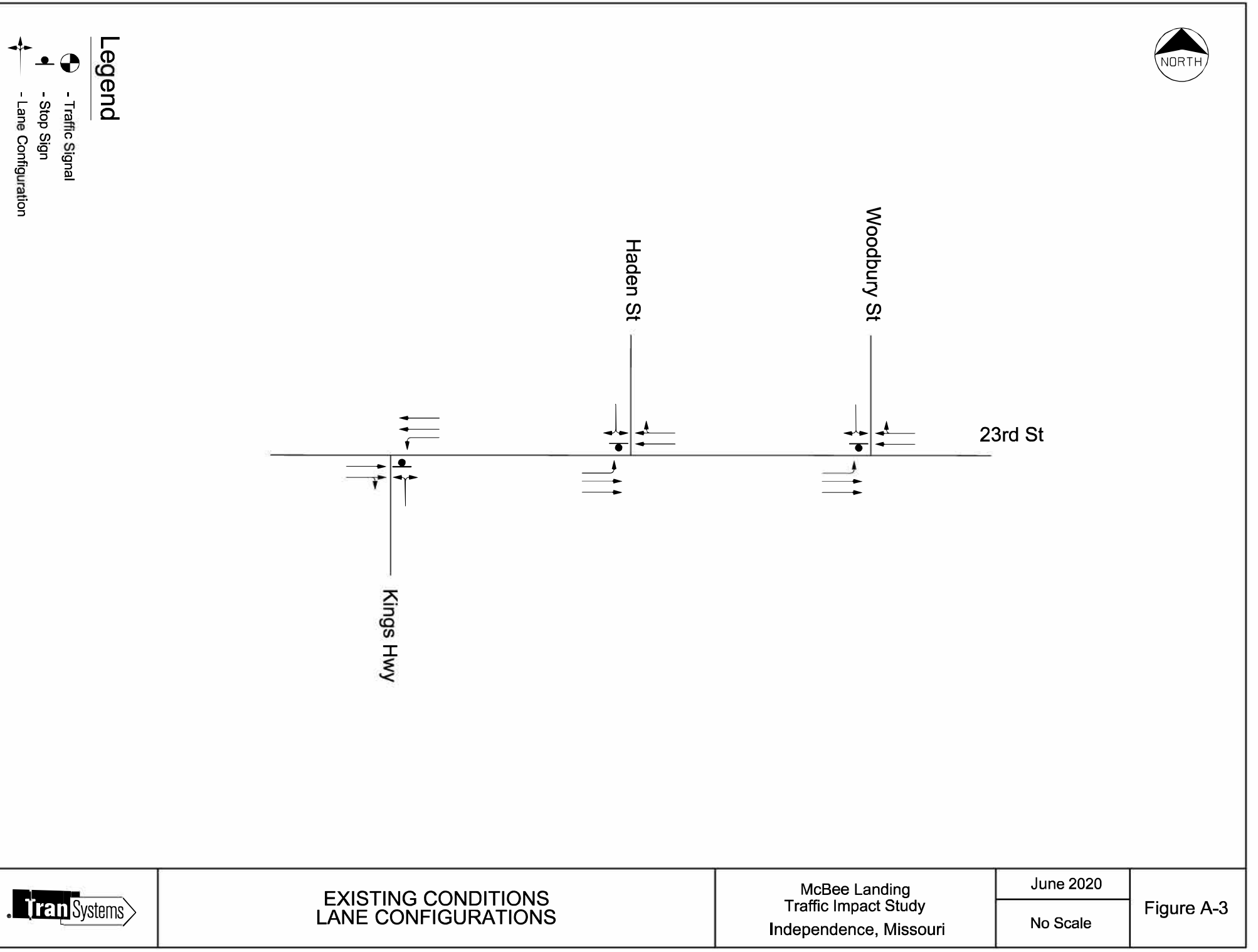
| TranSystems | SITE PLAN | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-2 |

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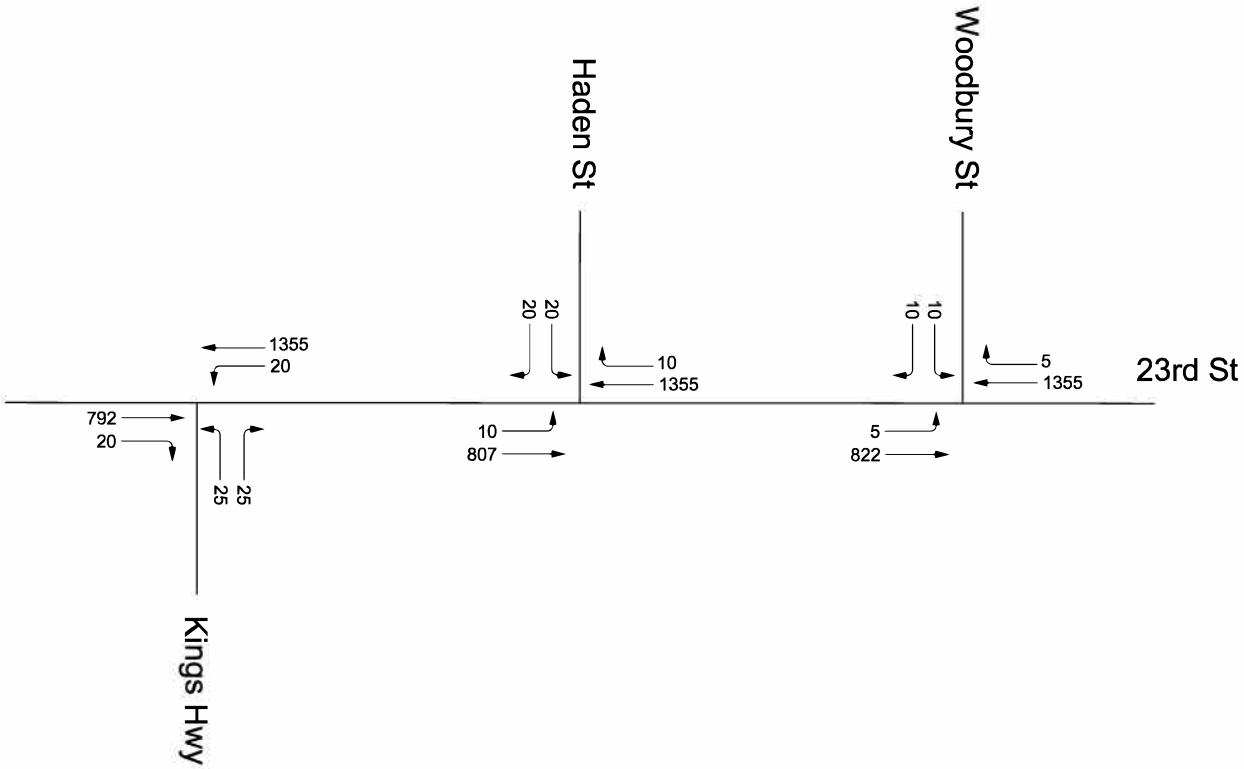
|---|---|---|---|---|
| TranSystems | EXISTING CONDITIONS<br>LANE CONFIGURATIONS | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-3 |

Legend

123 - Total Hourly Volume

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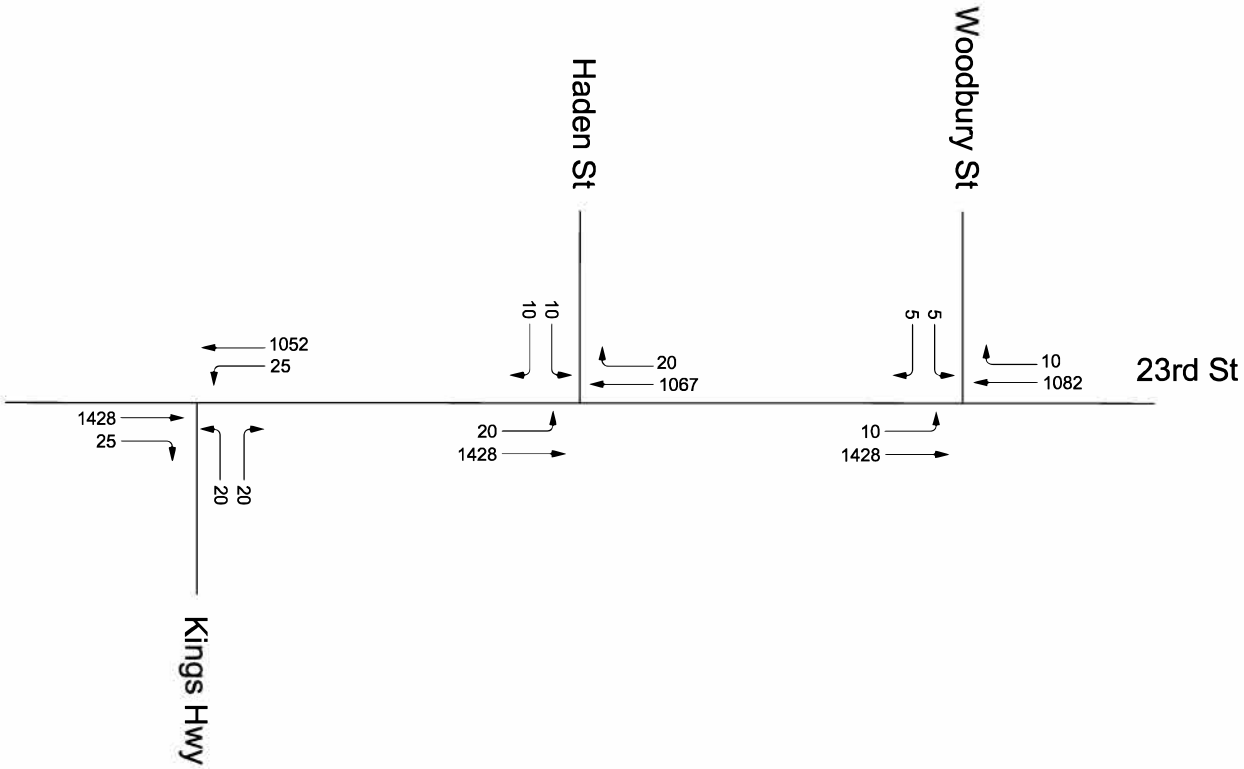
| TranSystems | EXISTING CONDITIONS<br>A.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-4 |

Legend

123 - Total Hourly Volume

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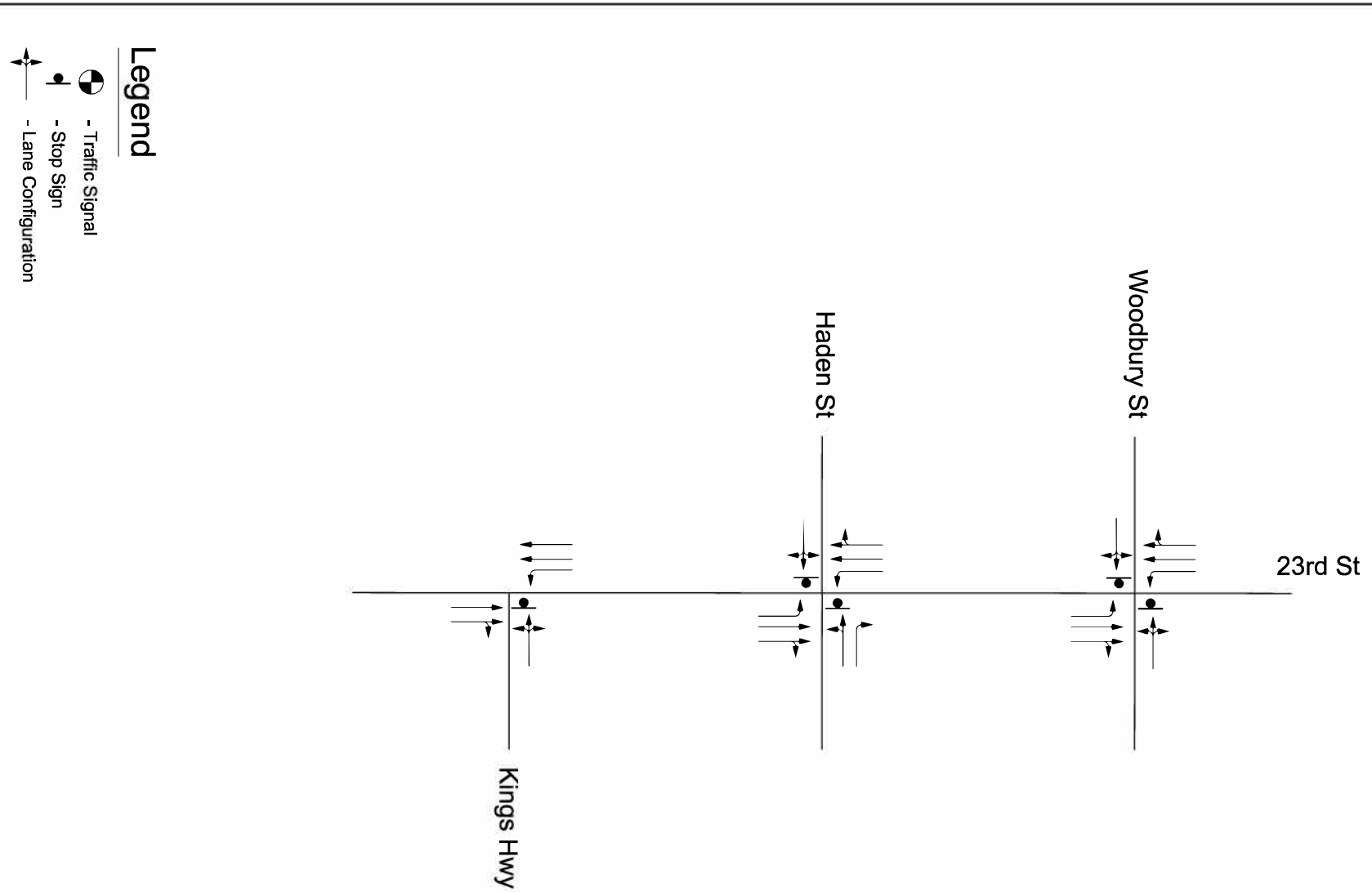
| TranSystems | EXISTING CONDITIONS<br>P.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-5 |

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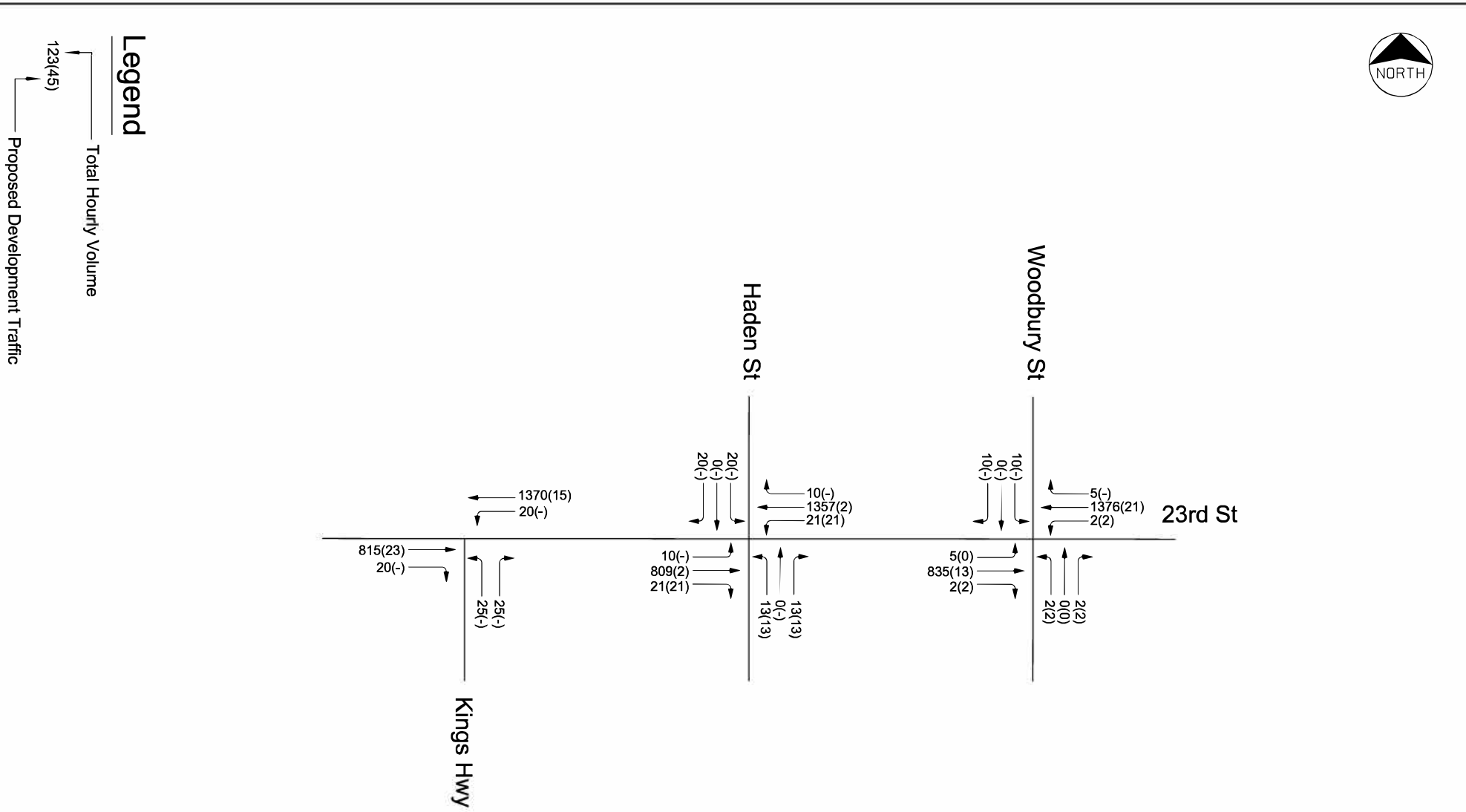
| TranSystems | EXISTING PLUS DEVELOPMENT CONDITIONS<br>LANE CONFIGURATIONS | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-6 |

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| TranSystems | EXISTING PLUS DEVELOPMENT CONDITIONS<br>A.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-7 |

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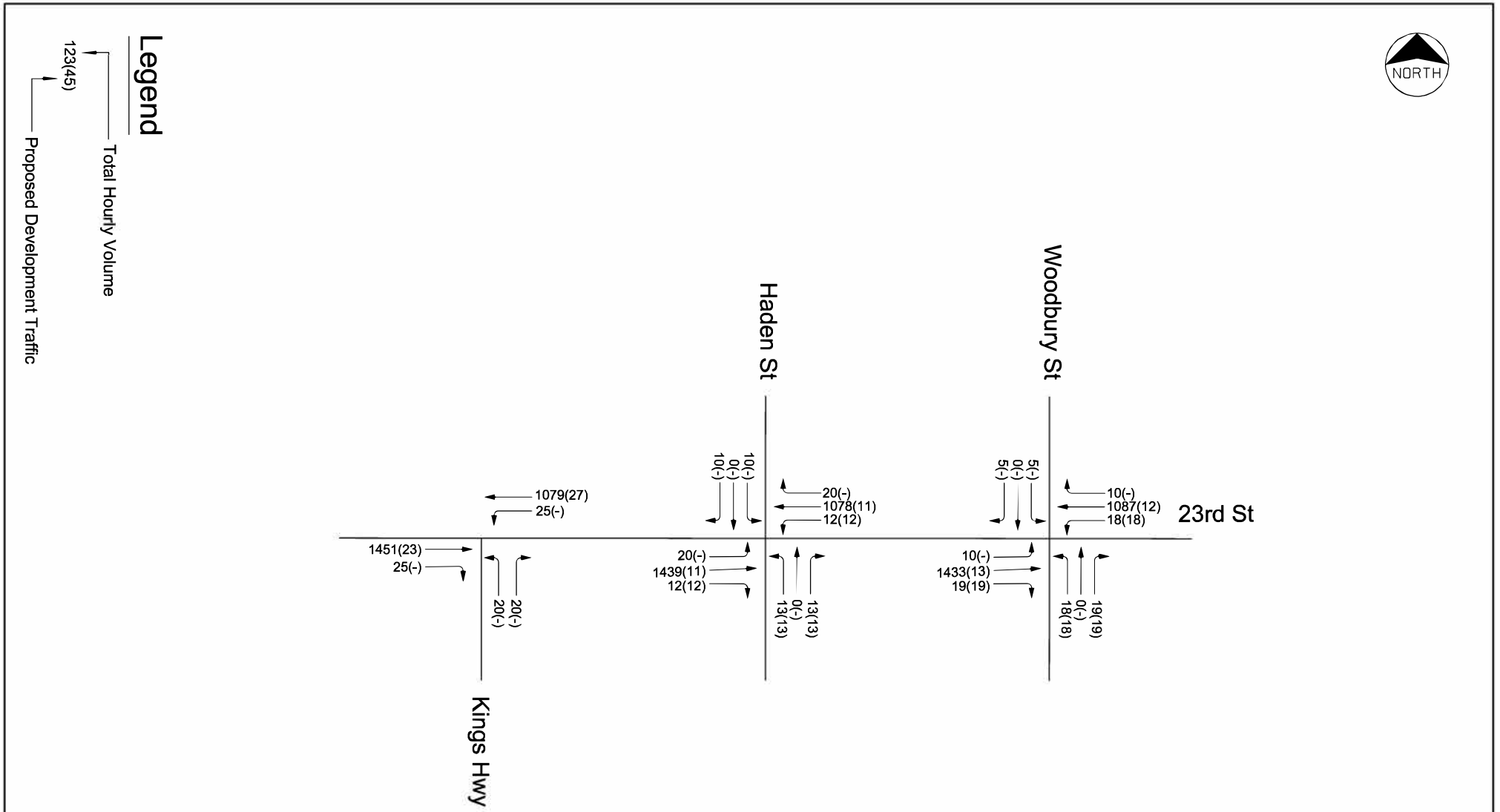


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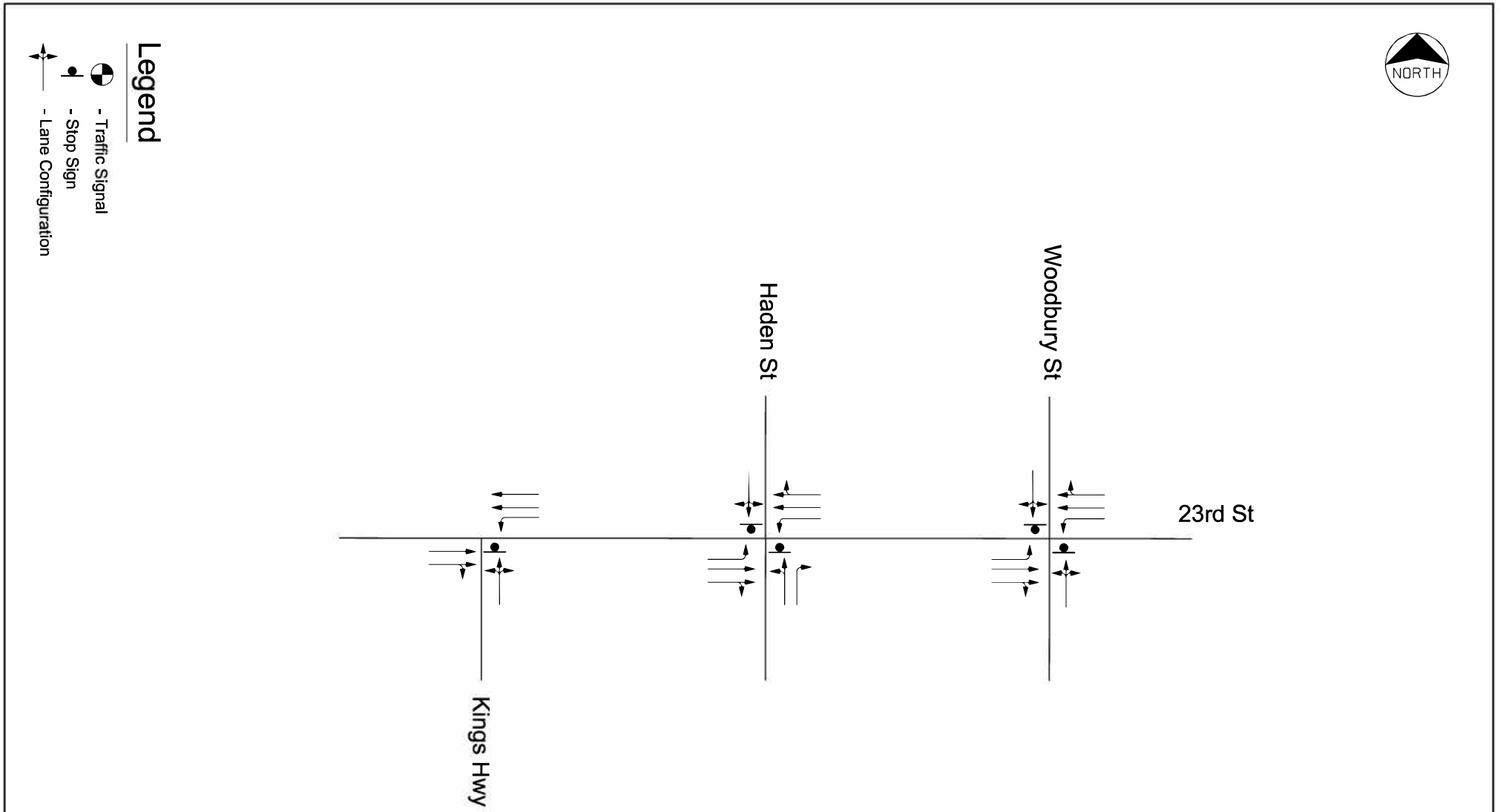
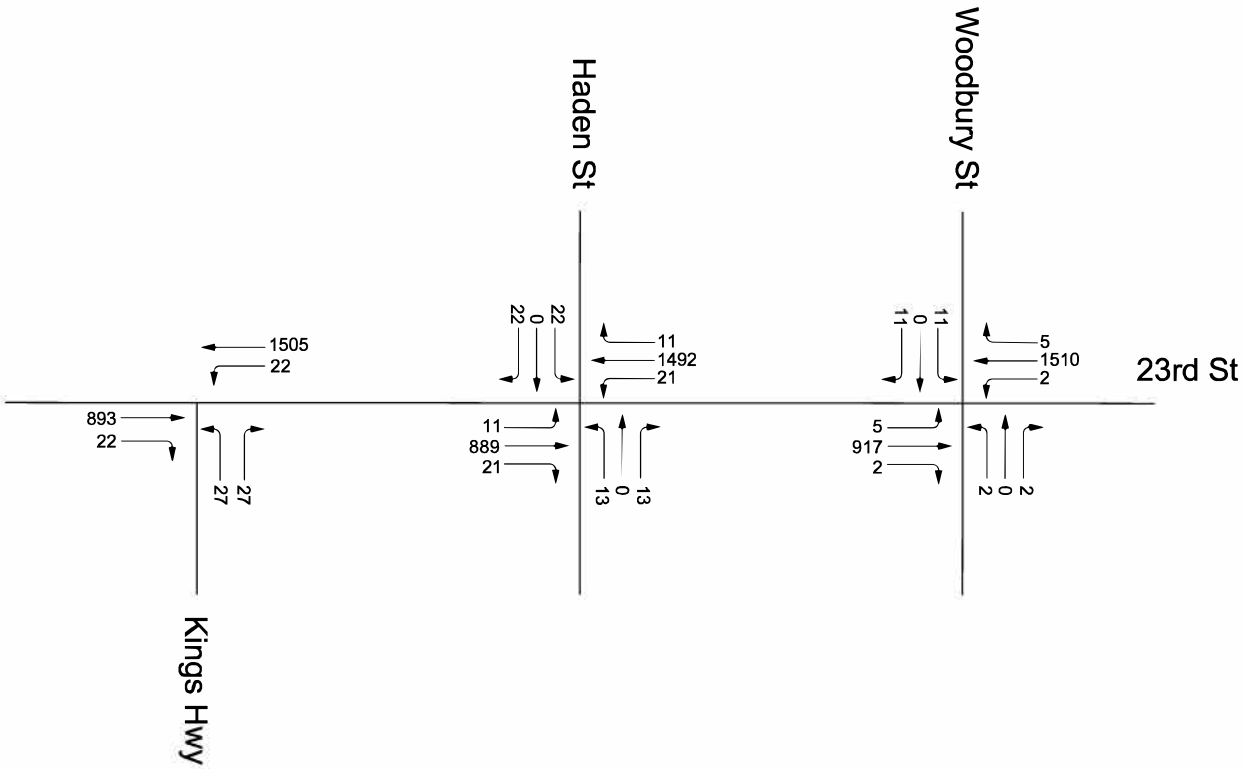
|---|---|---|---|---|
| TranSystems | EXISTING PLUS DEVELOPMENT CONDITIONS<br>P.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-8 |




| | | | | |
|---|---|---|---|---|
| TranSystems | FUTURE YEAR 2040<br>LANE CONFIGURATIONS | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-9 |

Legend

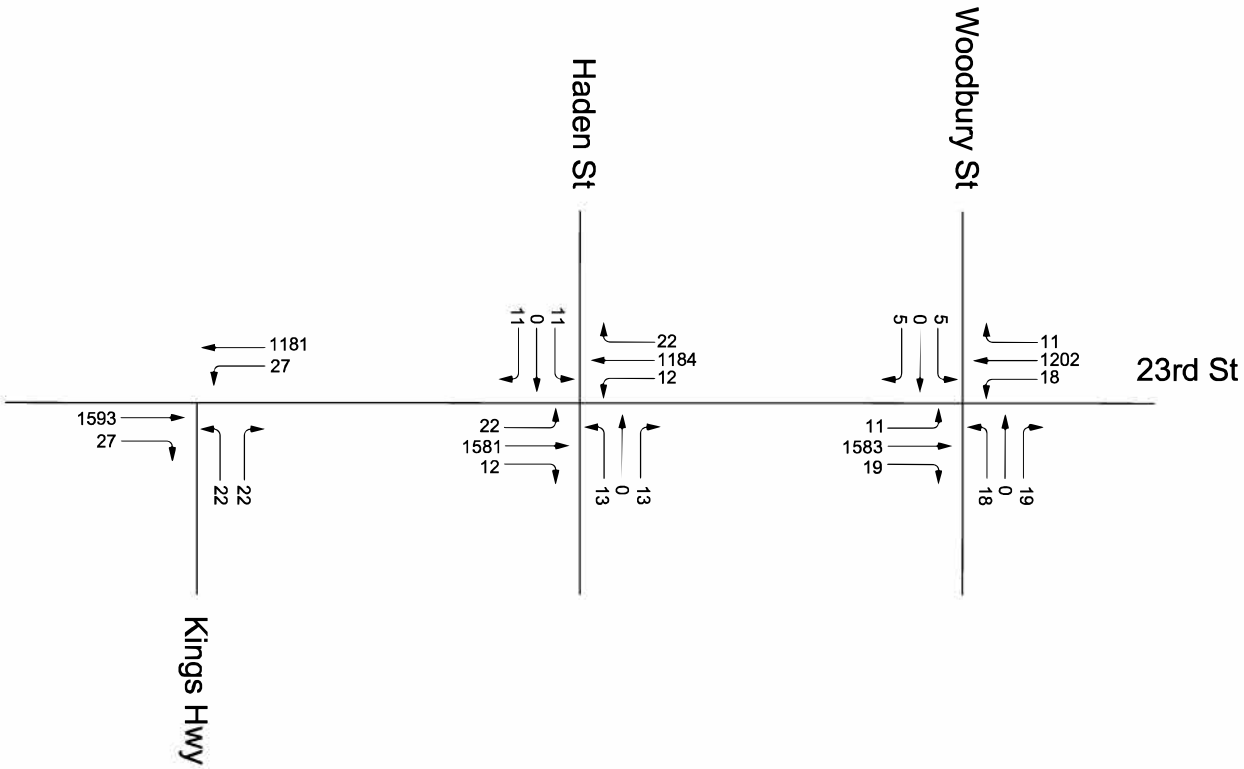
123 - Total Future Hourly Volume




| | | | | |
|---|---|---|---|---|
| TranSystems | FUTURE YEAR 2040<br>A.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-10 |

## Legend

123 - Total Future Hourly Volume




| | | | | |
|---|---|---|---|---|
| TranSystems | FUTURE YEAR 2040<br>P.M. PEAK HOUR TRAFFIC VOLUMES | McBee Landing<br>Traffic Impact Study<br>Independence, Missouri | June 2020<br>No Scale | Figure A-11 |

# Appendix B – Trip Generation and Distribution

See attached worksheets.

# McBee Landing TIS
## Independence, Missouri
### Trip Generation

| Land Use | Intensity | ITE Code | Daily | A.M. Peak Hour | | | | | P.M. Peak Hour | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | % In | % Out | In | Out | Total | % In | % Out | In | Out |
| Automated Car Wash | 5,200 sf | 948 | 400 | 8 | 50% | 50% | 4 | 4 | 74 | 50% | 50% | 37 | 37 |
| Office Building | 10,400 sf | 710 | 168 | 36 | 86% | 14% | 31 | 5 | 14 | 16% | 84% | 2 | 12 |
| Senior Adult Housing - Detachated | 68 units | 251 | 401 | 31 | 33% | 67% | 10 | 21 | 36 | 61% | 39% | 22 | 14 |
| ***Total Proposed Development Trips*** | | | ***969*** | ***75*** | | | ***45*** | ***30*** | ***124*** | | | ***61*** | ***63*** |
| Pass-by Trips | | | - | - | | | - | - | 30 | | | 15 | 15 |
| Non-Pass by Trips | | | ***969*** | 75 | | | ***45*** | ***30*** | ***94*** | | | ***46*** | ***48*** |
| ***Total New Proposed Development Trips*** | | | ***969*** | ***75*** | | | ***45*** | ***30*** | ***94*** | | | ***46*** | ***48*** |

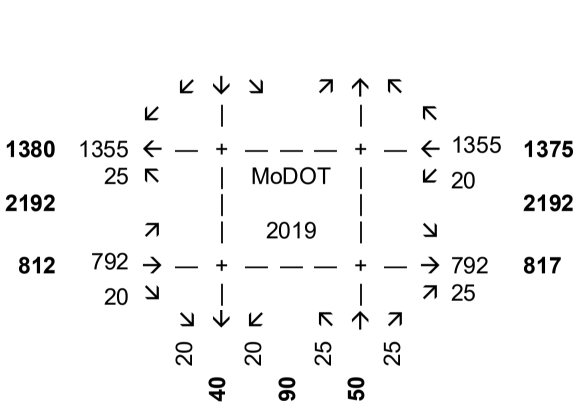
**Notes -**

- Trip generation estimates were developed using ITE's Trip Generation, 10th Edition.

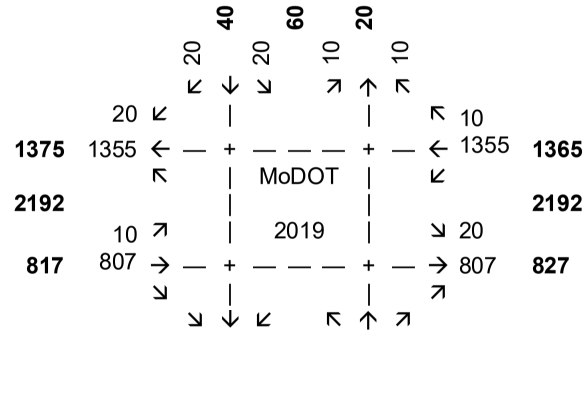
# McBee Landing TIS
## Independence, Missouri

## Existing Conditions
## A.M. Peak Hour

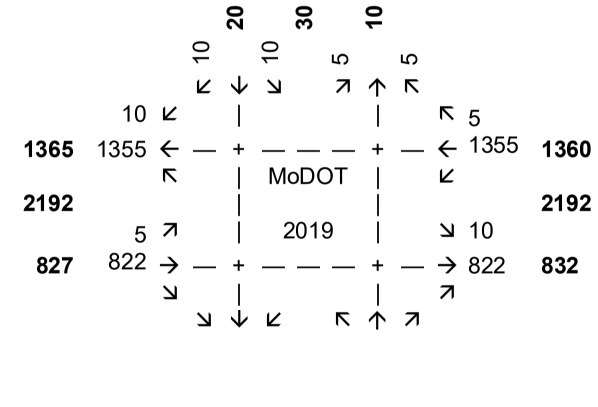
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



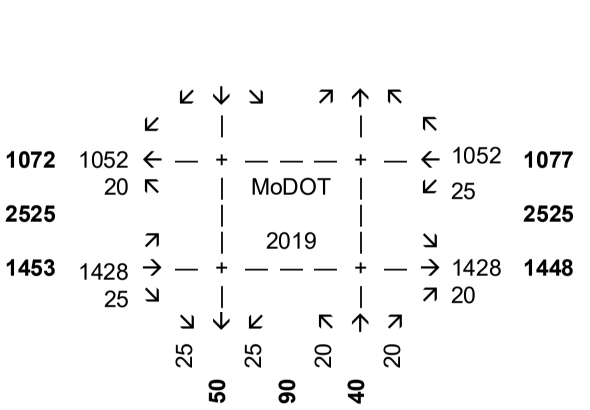

### 23rd St (Mo-78) and Woodbury St



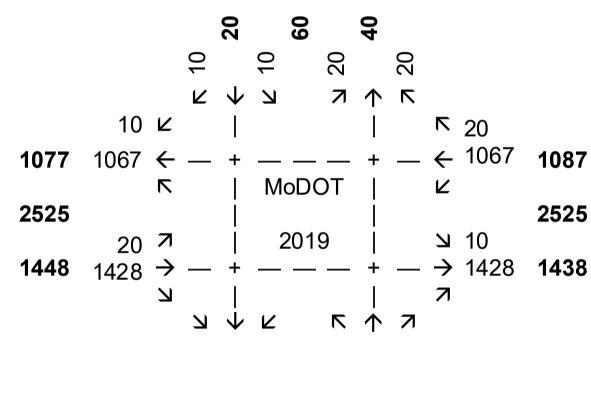
# McBee Landing TIS
## Independence, Missouri

## Existing Conditions
## P.M. Peak Hour

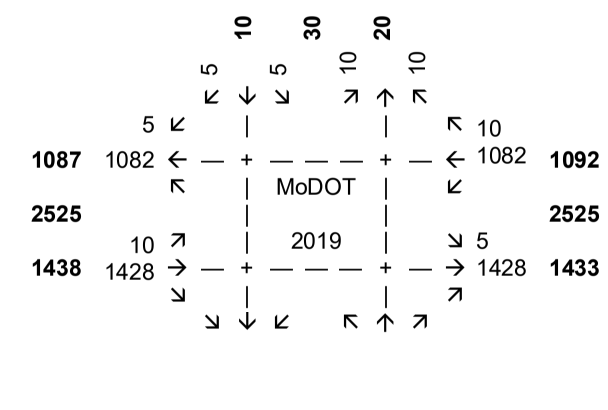
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



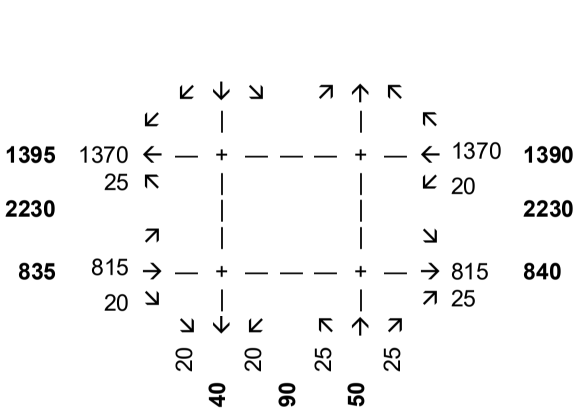

### 23rd St (Mo-78) and Woodbury St



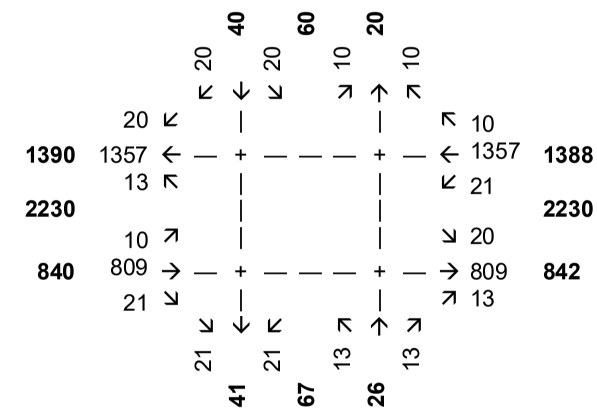
# McBee Landing TIS
## Independence, Missouri

## Existing plus Development Conditions
## A.M. Peak Hour

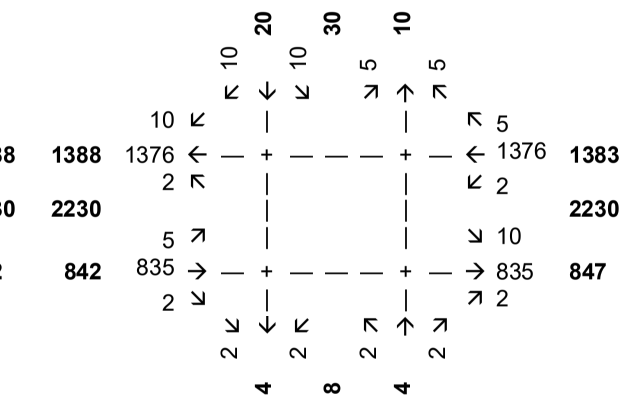
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



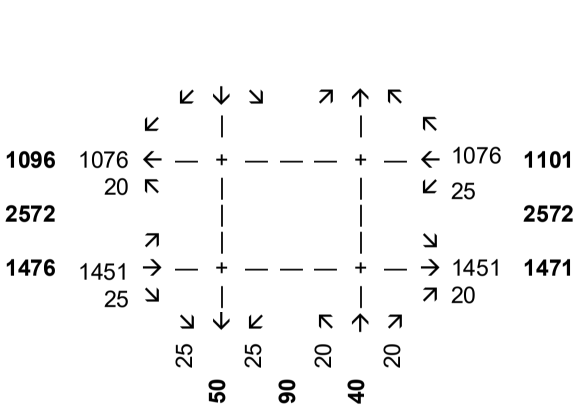
### 23rd St (Mo-78) and Woodbury St



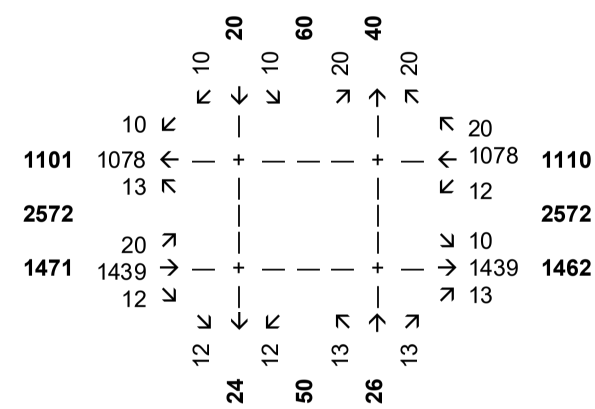
# McBee Landing TIS
## Independence, Missouri

## Existing plus Development Conditions
## P.M. Peak Hour

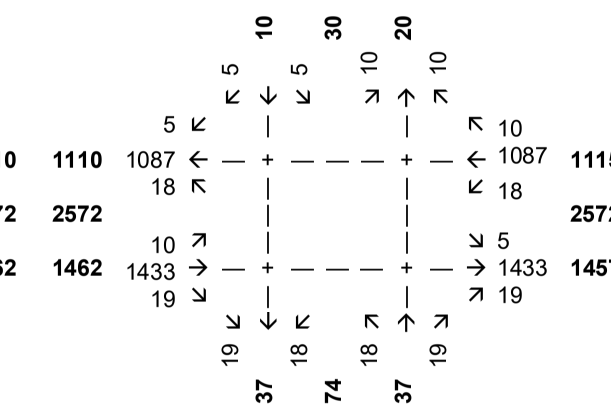
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



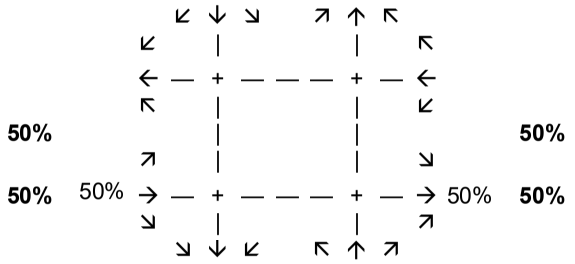

### 23rd St (Mo-78) and Woodbury St



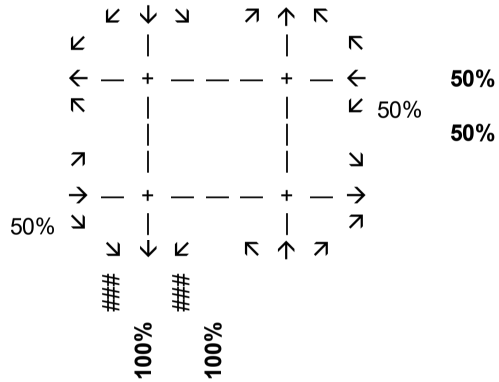
# McBee Landing TIS
## Independence, Missouri

## Trip Distribution
## Inbound

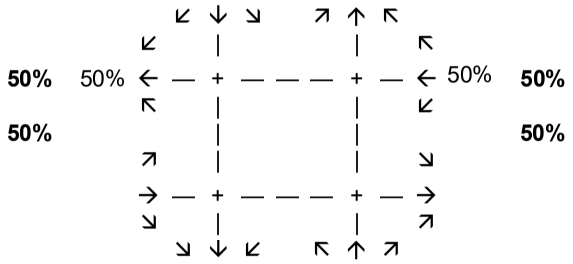
**23rd St (Mo-78) and Kings Hwy**




**23rd St (Mo-78) and Haden St**



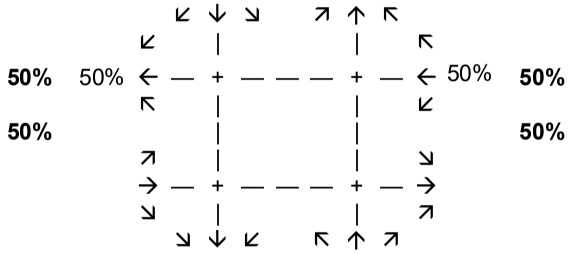

**23rd St (Mo-78) and Woodbury St**



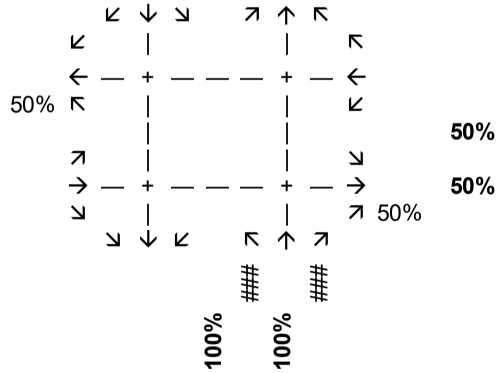
# McBee Landing TIS
## Independence, Missouri

## Trip Distribution
## Outbound

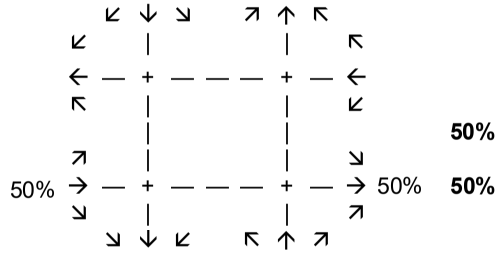
**23rd St (Mo-78) and Kings Hwy**




**23rd St (Mo-78) and Haden St**



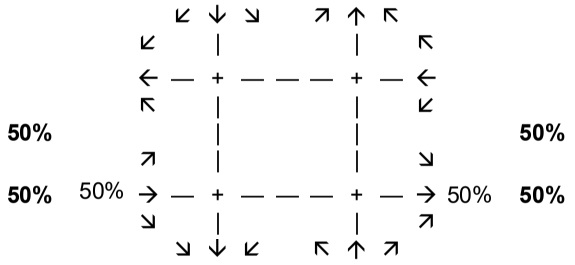

**23rd St (Mo-78) and Woodbury St**



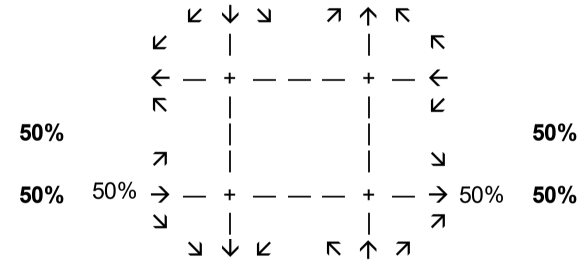
# McBee Landing TIS
## Independence, Missouri

## Trip Distribution
## Inbound

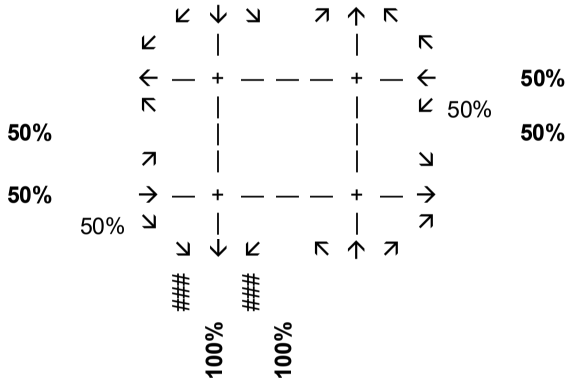
**23rd St (Mo-78) and Kings Hwy**




**23rd St (Mo-78) and Haden St**



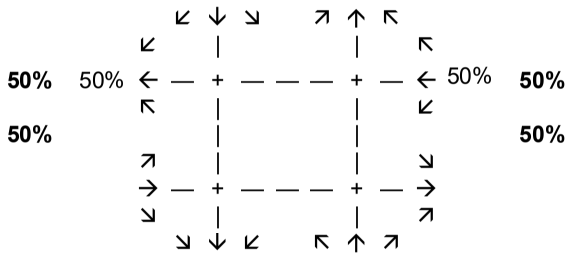

**23rd St (Mo-78) and Woodbury St**



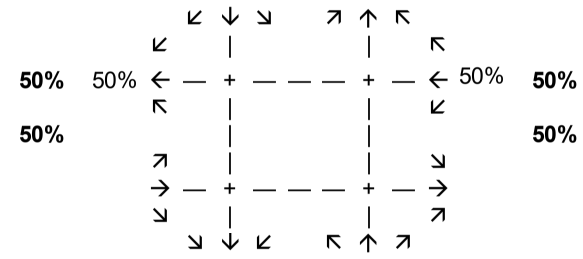
# McBee Landing TIS
## Independence, Missouri

## Trip Distribution
## Outbound

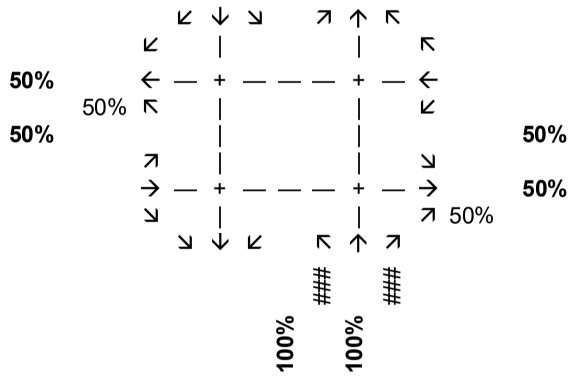
**23rd St (Mo-78) and Kings Hwy**




**23rd St (Mo-78) and Haden St**



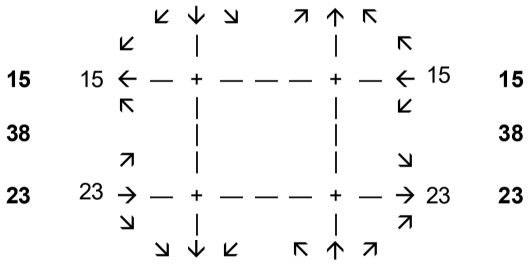

**23rd St (Mo-78) and Woodbury St**



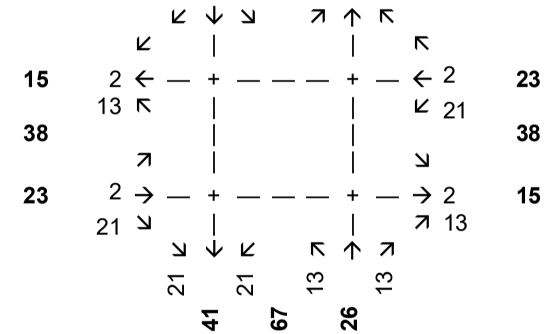
# McBee Landing TIS
## Independence, Missouri

## Development Trips
## A.M. Peak Hour

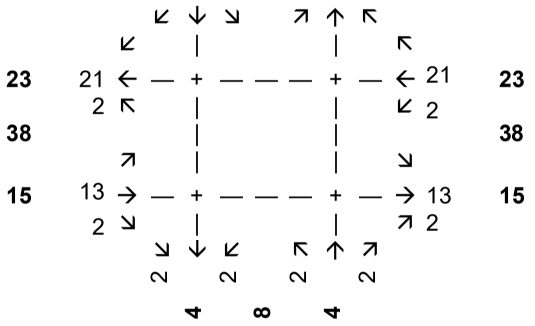
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



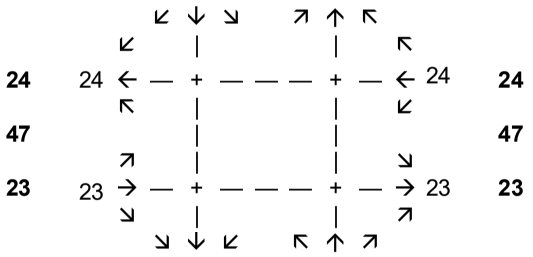

### 23rd St (Mo-78) and Woodbury St



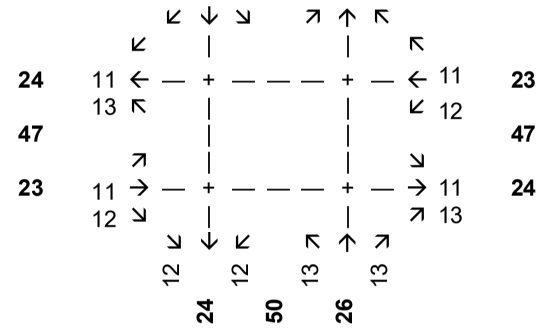
# McBee Landing TIS
## Independence, Missouri

## Development Trips
## P.M. Peak Hour

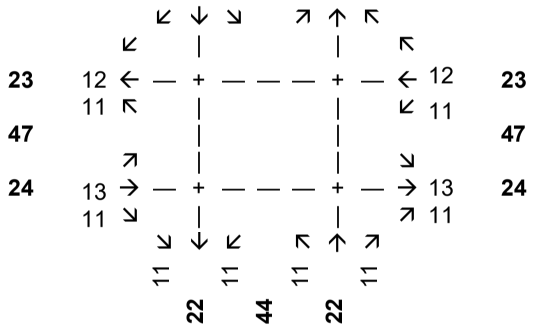
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



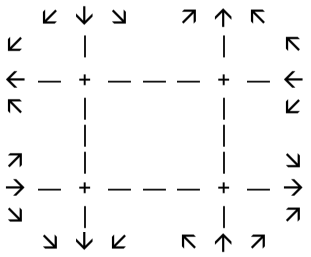

### 23rd St (Mo-78) and Woodbury St



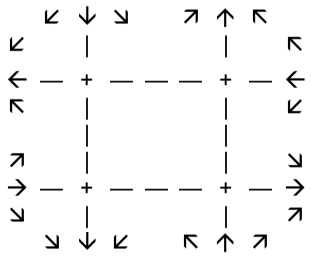
# McBee Landing TIS
## Independence, Missouri

## Pass-by Trips
## P.M. Peak Hour

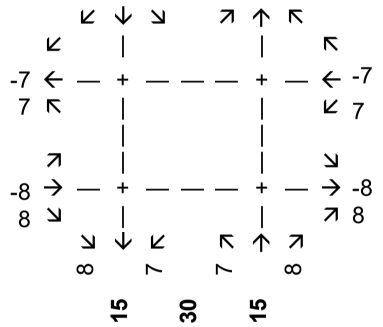
**23rd St (Mo-78) and Kings Hwy**



**23rd St (Mo-78) and Haden St**



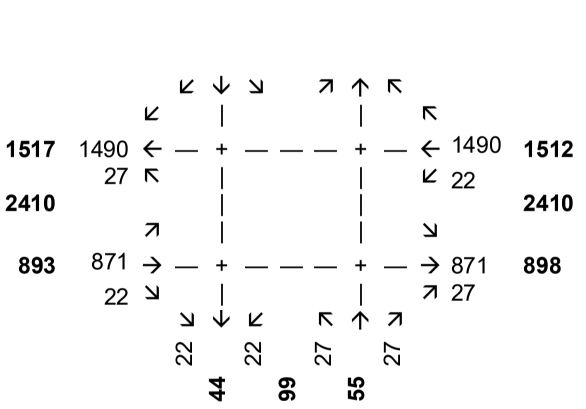
**23rd St (Mo-78) and Woodbury St**



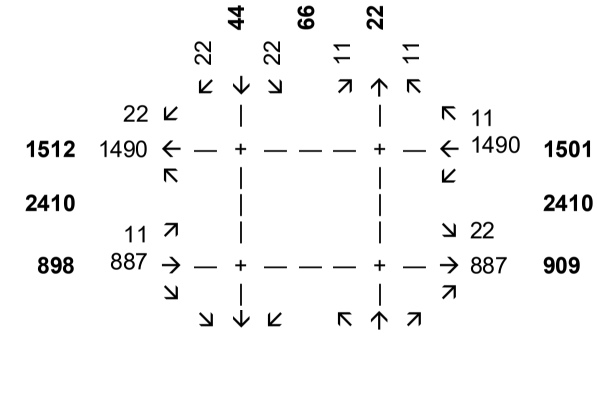
# McBee Landing TIS
## Independence, Missouri

## Future Year 2040
## A.M. Peak Hour

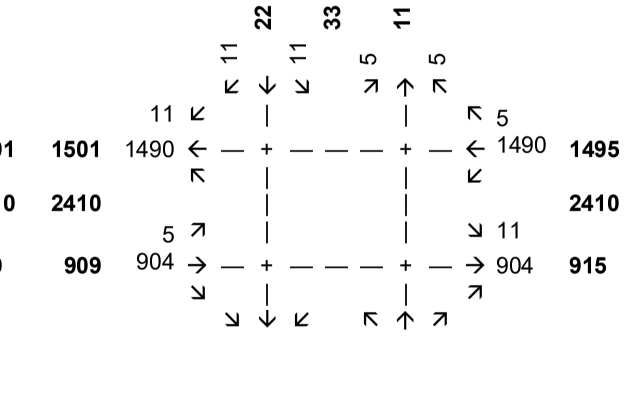
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



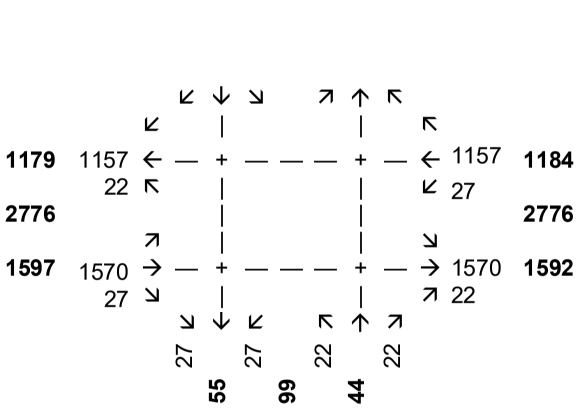

### 23rd St (Mo-78) and Woodbury St



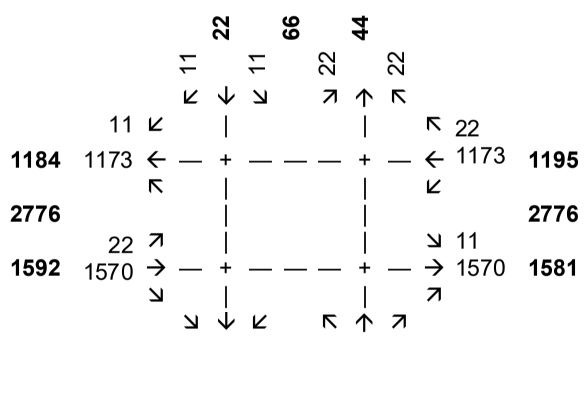
# McBee Landing TIS
## Independence, Missouri

## Future Year 2040
## P.M. Peak Hour

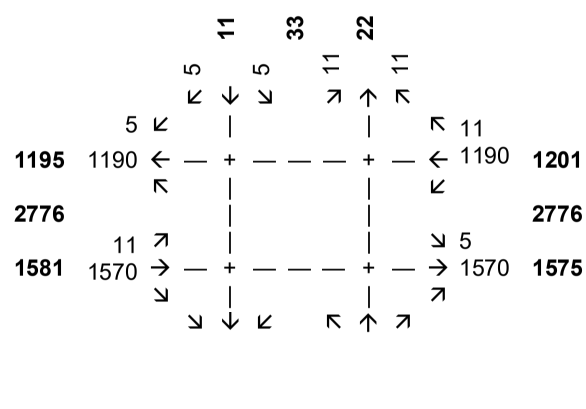
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



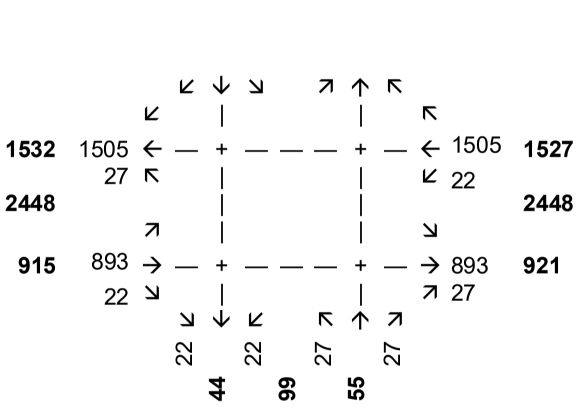

### 23rd St (Mo-78) and Woodbury St



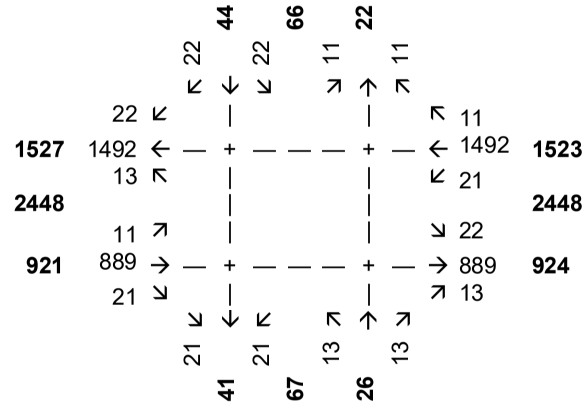
# McBee Landing TIS
## Independence, Missouri

## Future Year + Dev
## A.M. Peak Hour

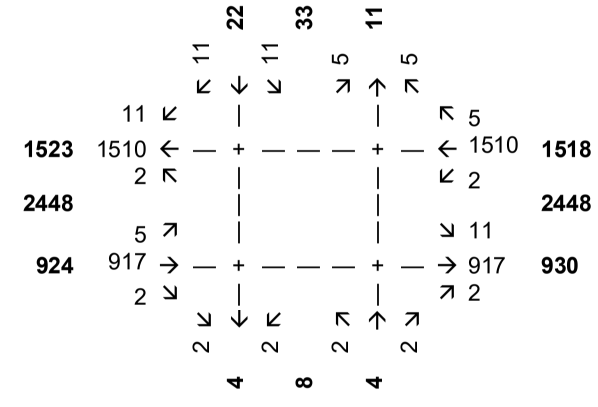
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St



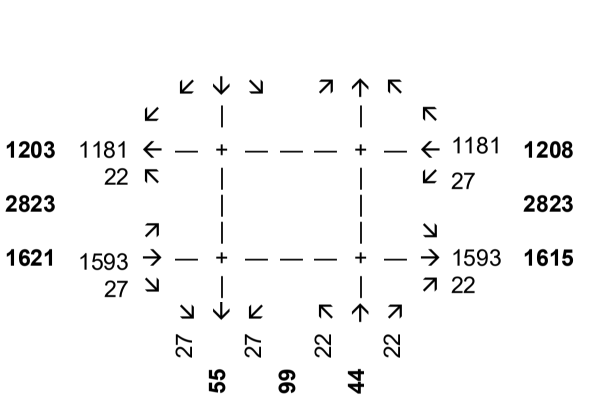

### 23rd St (Mo-78) and Woodbury St



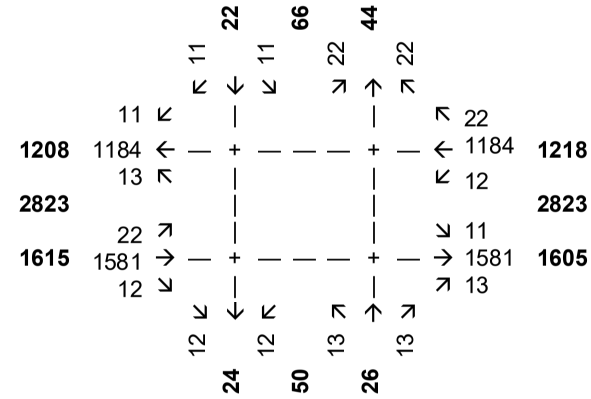
# McBee Landing TIS
## Independence, Missouri

## Future Year + Dev
## P.M. Peak Hour

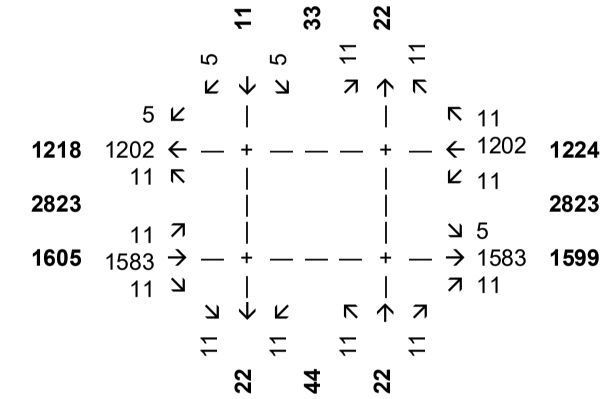
### 23rd St (Mo-78) and Kings Hwy




### 23rd St (Mo-78) and Haden St




### 23rd St (Mo-78) and Woodbury St



# Appendix C – Capacity Analysis Reports

See attached worksheets.

| Intersection | |
|---|---|
| Int Delay, s/veh | 1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 792 | 20 | 20 | 1355 | 25 | 25 |
| Future Vol, veh/h | 792 | 20 | 20 | 1355 | 25 | 25 |
| 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 | - | 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 | 861 | 22 | 22 | 1473 | 27 | 27 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 883 | 0 | 1653 | 442 |
| Stage 1 | - | - | - | - | 872 | - |
| Stage 2 | - | - | - | - | 781 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 762 | - | 89 | 563 |
| Stage 1 | - | - | - | - | 369 | - |
| Stage 2 | - | - | - | - | 412 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 762 | - | 86 | 563 |
| Mov Cap-2 Maneuver | - | - | - | - | 86 | - |
| Stage 1 | - | - | - | - | 369 | - |
| Stage 2 | - | - | - | - | 400 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.1 | 42.4 |
| HCM LOS | | | E |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 149 | - | - | 762 | - |
| HCM Lane V/C Ratio | 0.365 | - | - | 0.029 | - |
| HCM Control Delay (s) | 42.4 | - | - | 9.9 | - |
| HCM Lane LOS | E | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.5 | - | - | 0.1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 10 | 807 | 1355 | 10 | 20 | 20 |
| Future Vol, veh/h | 10 | 807 | 1355 | 10 | 20 | 20 |
| 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 | - | - | - | 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 | 877 | 1473 | 11 | 22 | 22 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1484 | 0 | - | 0 | 1940 | 742 |
| Stage 1 | - | - | - | - | 1479 | - |
| Stage 2 | - | - | - | - | 461 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 449 | - | - | - | 57 | 358 |
| Stage 1 | - | - | - | - | 176 | - |
| Stage 2 | - | - | - | - | 601 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 449 | - | - | - | 56 | 358 |
| Mov Cap-2 Maneuver | - | - | - | - | 138 | - |
| Stage 1 | - | - | - | - | 172 | - |
| Stage 2 | - | - | - | - | 601 | - |

| 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) | 449 | - | - | - | 199 |
| HCM Lane V/C Ratio | 0.024 | - | - | - | 0.218 |
| HCM Control Delay (s) | 13.2 | - | - | - | 28.1 |
| HCM Lane LOS | B | - | - | - | D |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.3 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 5 | 822 | 1355 | 5 | 10 | 10 |
| Future Vol, veh/h | 5 | 822 | 1355 | 5 | 10 | 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 | - | - | - | 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 | 893 | 1473 | 5 | 11 | 11 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1478 | 0 | - | 0 | 1933 | 739 |
| Stage 1 | - | - | - | - | 1476 | - |
| Stage 2 | - | - | - | - | 457 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 452 | - | - | - | 58 | 360 |
| Stage 1 | - | - | - | - | 176 | - |
| Stage 2 | - | - | - | - | 604 | - |
| Platoon blocked, % | | | - | - | - | |
| Mov Cap-1 Maneuver | 452 | - | - | - | 57 | 360 |
| Mov Cap-2 Maneuver | - | - | - | - | 140 | - |
| Stage 1 | - | - | - | - | 174 | - |
| Stage 2 | - | - | - | - | 604 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0 | 25 |
| HCM LOS | | | D |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 452 | - | - | - | 202 |
| HCM Lane V/C Ratio | 0.012 | - | - | - | 0.108 |
| HCM Control Delay (s) | 13.1 | - | - | - | 25 |
| HCM Lane LOS | B | - | - | - | D |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.4 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1428 | 25 | 25 | 1052 | 20 | 20 |
| Future Vol, veh/h | 1428 | 25 | 25 | 1052 | 20 | 20 |
| 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 | - | 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 | 1552 | 27 | 27 | 1143 | 22 | 22 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1579 | 0 | 2192 | 790 |
| Stage 1 | - | - | - | - | 1566 | - |
| Stage 2 | - | - | - | - | 626 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 413 | - | 39 | 333 |
| Stage 1 | - | - | - | - | 158 | - |
| Stage 2 | - | - | - | - | 495 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 413 | - | 36 | 333 |
| Mov Cap-2 Maneuver | - | - | - | - | 36 | - |
| Stage 1 | - | - | - | - | 158 | - |
| Stage 2 | - | - | - | - | 463 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.3 | 135 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 65 | - | - | 413 | - |
| HCM Lane V/C Ratio | 0.669 | - | - | 0.066 | - |
| HCM Control Delay (s) | 135 | - | - | 14.3 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 2.9 | - | - | 0.2 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.3 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 20 | 1428 | 1067 | 20 | 10 | 10 |
| Future Vol, veh/h | 20 | 1428 | 1067 | 20 | 10 | 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 | - | - | - | 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 | 22 | 1552 | 1160 | 22 | 11 | 11 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1182 | 0 | - | 0 | 1991 | 591 |
| Stage 1 | - | - | - | - | 1171 | - |
| Stage 2 | - | - | - | - | 820 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 587 | - | - | - | 53 | 450 |
| Stage 1 | - | - | - | - | 257 | - |
| Stage 2 | - | - | - | - | 393 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 587 | - | - | - | 51 | 450 |
| Mov Cap-2 Maneuver | - | - | - | - | 160 | - |
| Stage 1 | - | - | - | - | 247 | - |
| Stage 2 | - | - | - | - | 393 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0 | 21.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 587 | - | - | - | 236 |
| HCM Lane V/C Ratio | 0.037 | - | - | - | 0.092 |
| HCM Control Delay (s) | 11.4 | - | - | - | 21.8 |
| HCM Lane LOS | B | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.3 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.1 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 10 | 1428 | 1082 | 10 | 5 | 5 |
| Future Vol, veh/h | 10 | 1428 | 1082 | 10 | 5 | 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 | - | - | - | 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 | 1552 | 1176 | 11 | 5 | 5 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 1187 | 0 | - | 0 | 1980 | 594 |
| Stage 1 | - | - | - | - | 1182 | - |
| Stage 2 | - | - | - | - | 798 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 584 | - | - | - | 54 | 448 |
| Stage 1 | - | - | - | - | 254 | - |
| Stage 2 | - | - | - | - | 404 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 584 | - | - | - | 53 | 448 |
| Mov Cap-2 Maneuver | - | - | - | - | 163 | - |
| Stage 1 | - | - | - | - | 249 | - |
| Stage 2 | - | - | - | - | 404 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0 | 20.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 584 | - | - | - | 239 |
| HCM Lane V/C Ratio | 0.019 | - | - | - | 0.045 |
| HCM Control Delay (s) | 11.3 | - | - | - | 20.8 |
| HCM Lane LOS | B | - | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 815 | 20 | 20 | 1370 | 25 | 25 |
| Future Vol, veh/h | 815 | 20 | 20 | 1370 | 25 | 25 |
| 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 | - | 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 | 886 | 22 | 22 | 1489 | 27 | 27 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 908 | 0 | 1686 | 454 |
| Stage 1 | - | - | - | - | 897 | - |
| Stage 2 | - | - | - | - | 789 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 745 | - | 85 | 553 |
| Stage 1 | - | - | - | - | 358 | - |
| Stage 2 | - | - | - | - | 408 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 745 | - | 82 | 553 |
| Mov Cap-2 Maneuver | - | - | - | - | 82 | - |
| Stage 1 | - | - | - | - | 358 | - |
| Stage 2 | - | - | - | - | 396 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.1 | 44.8 |
| HCM LOS | | | E |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 143 | - | - | 745 | - |
| HCM Lane V/C Ratio | 0.38 | - | - | 0.029 | - |
| HCM Control Delay (s) | 44.8 | - | - | 10 | - |
| HCM Lane LOS | E | - | - | A | - |
| HCM 95th %tile Q(veh) | 1.6 | - | - | 0.1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 809 | 21 | 21 | 1357 | 10 | 13 | 0 | 13 | 20 | 0 | 20 |
| Future Vol, veh/h | 10 | 809 | 21 | 21 | 1357 | 10 | 13 | 0 | 13 | 20 | 0 | 20 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | 0 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 879 | 23 | 23 | 1475 | 11 | 14 | 0 | 14 | 22 | 0 | 22 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1486 | 0 | 0 | 902 | 0 | 0 | 1697 | 2445 | 451 | 1989 | 2451 | 743 |
| Stage 1 | - | - | - | - | - | - | 913 | 913 | - | 1527 | 1527 | - |
| Stage 2 | - | - | - | - | - | - | 784 | 1532 | - | 462 | 924 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 448 | - | - | 749 | - | - | 60 | 31 | 556 | 36 | 31 | 358 |
| Stage 1 | - | - | - | - | - | - | 294 | 350 | - | 123 | 178 | - |
| Stage 2 | - | - | - | - | - | - | 352 | 177 | - | 549 | 346 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 448 | - | - | 749 | - | - | 54 | 29 | 556 | 34 | 29 | 358 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 54 | 29 | - | 34 | 29 | - |
| Stage 1 | - | - | - | - | - | - | 287 | 341 | - | 120 | 172 | - |
| Stage 2 | - | - | - | - | - | - | 320 | 172 | - | 522 | 337 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 0.2 | 52.7 | 147 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 54 | 556 | 448 | - | - | 749 | - | - | 62 |
| HCM Lane V/C Ratio | 0.262 | 0.025 | 0.024 | - | - | 0.03 | - | - | 0.701 |
| HCM Control Delay (s) | 93.8 | 11.6 | 13.2 | 0.2 | - | 10 | - | - | 147 |
| HCM Lane LOS | F | B | B | A | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 0.9 | 0.1 | 0.1 | - | - | 0.1 | - | - | 3 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 5 | 835 | 2 | 2 | 1376 | 5 | 2 | 0 | 2 | 10 | 0 | 10 |
| Future Vol, veh/h | 5 | 835 | 2 | 2 | 1376 | 5 | 2 | 0 | 2 | 10 | 0 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 908 | 2 | 2 | 1496 | 5 | 2 | 0 | 2 | 11 | 0 | 11 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1501 | 0 | 0 | 910 | 0 | 0 | 1671 | 2424 | 455 | 1967 | 2423 | 751 |
| Stage 1 | - | - | - | - | - | - | 919 | 919 | - | 1503 | 1503 | - |
| Stage 2 | - | - | - | - | - | - | 752 | 1505 | - | 464 | 920 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 442 | - | - | 744 | - | - | 63 | 32 | 552 | 37 | 32 | 353 |
| Stage 1 | - | - | - | - | - | - | 292 | 348 | - | 127 | 183 | - |
| Stage 2 | - | - | - | - | - | - | 368 | 182 | - | 548 | 348 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 442 | - | - | 744 | - | - | 60 | 32 | 552 | 36 | 32 | 353 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 60 | 32 | - | 36 | 32 | - |
| Stage 1 | - | - | - | - | - | - | 289 | 344 | - | 126 | 182 | - |
| Stage 2 | - | - | - | - | - | - | 356 | 181 | - | 540 | 344 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0 | 39.7 | 86 |
| HCM LOS | | | E | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 108 | 442 | - | - | 744 | - | - | 65 |
| HCM Lane V/C Ratio | 0.04 | 0.012 | - | - | 0.003 | - | - | 0.334 |
| HCM Control Delay (s) | 39.7 | 13.2 | - | - | 9.9 | - | - | 86 |
| HCM Lane LOS | E | B | - | - | A | - | - | F |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 1.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.4 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1451 | 25 | 25 | 1079 | 20 | 20 |
| Future Vol, veh/h | 1451 | 25 | 25 | 1079 | 20 | 20 |
| 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 | - | 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 | 1577 | 27 | 27 | 1173 | 22 | 22 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1604 | 0 | 2232 | 802 |
| Stage 1 | - | - | - | - | 1591 | - |
| Stage 2 | - | - | - | - | 641 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 404 | - | 36 | 327 |
| Stage 1 | - | - | - | - | 153 | - |
| Stage 2 | - | - | - | - | 487 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 404 | - | 34 | 327 |
| Mov Cap-2 Maneuver | - | - | - | - | 34 | - |
| Stage 1 | - | - | - | - | 153 | - |
| Stage 2 | - | - | - | - | 454 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.3 | 147 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 62 | - | - | 404 | - |
| HCM Lane V/C Ratio | 0.701 | - | - | 0.067 | - |
| HCM Control Delay (s) | 147 | - | - | 14.6 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 3 | - | - | 0.2 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 20 | 1439 | 12 | 12 | 1078 | 20 | 13 | 0 | 13 | 10 | 0 | 10 |
| Future Vol, veh/h | 20 | 1439 | 12 | 12 | 1078 | 20 | 13 | 0 | 13 | 10 | 0 | 10 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | 0 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 22 | 1564 | 13 | 13 | 1172 | 22 | 14 | 0 | 14 | 11 | 0 | 11 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1194 | 0 | 0 | 1577 | 0 | 0 | 2227 | 2835 | 789 | 2035 | 2830 | 597 |
| Stage 1 | - | - | - | - | - | - | 1615 | 1615 | - | 1209 | 1209 | - |
| Stage 2 | - | - | - | - | - | - | 612 | 1220 | - | 826 | 1621 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 580 | - | - | 414 | - | - | 24 | 17 | 333 | 33 | 17 | 446 |
| Stage 1 | - | - | - | - | - | - | 108 | 161 | - | 194 | 254 | - |
| Stage 2 | - | - | - | - | - | - | 447 | 251 | - | 332 | 160 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 580 | - | - | 414 | - | - | 22 | 16 | 333 | 30 | 16 | 446 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 22 | 16 | - | 30 | 16 | - |
| Stage 1 | - | - | - | - | - | - | 104 | 155 | - | 187 | 246 | - |
| Stage 2 | - | - | - | - | - | - | 422 | 243 | - | 306 | 154 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0.2 | 168.2 | 105.4 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 22 | 333 | 580 | - | - | 414 | - | - | 56 |
| HCM Lane V/C Ratio | 0.642 | 0.042 | 0.037 | - | - | 0.032 | - | - | 0.388 |
| HCM Control Delay (s) | $ 320 | 16.3 | 11.4 | - | - | 14 | - | - | 105.4 |
| HCM Lane LOS | F | C | B | - | - | B | - | - | F |
| HCM 95th %tile Q(veh) | 1.9 | 0.1 | 0.1 | - | - | 0.1 | - | - | 1.4 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 1433 | 19 | 18 | 1087 | 10 | 18 | 0 | 19 | 5 | 0 | 5 |
| Future Vol, veh/h | 10 | 1433 | 19 | 18 | 1087 | 10 | 18 | 0 | 19 | 5 | 0 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | - | 0 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 1558 | 21 | 20 | 1182 | 11 | 20 | 0 | 21 | 5 | 0 | 5 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1193 | 0 | 0 | 1579 | 0 | 0 | 2222 | 2824 | 790 | 2029 | - | 597 |
| Stage 1 | - | - | - | - | - | - | 1591 | 1591 | - | 1228 | - | - |
| Stage 2 | - | - | - | - | - | - | 631 | 1233 | - | 801 | - | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | - | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | - | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | - | 3.32 |
| Pot Cap-1 Maneuver | 581 | - | - | 413 | - | - | 24 | 17 | 333 | 34 | 0 | 446 |
| Stage 1 | - | - | - | - | - | - | 112 | 166 | - | 189 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 436 | 247 | - | 344 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 581 | - | - | 413 | - | - | 23 | 16 | 333 | 30 | - | 446 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 23 | 16 | - | 30 | - | - |
| Stage 1 | - | - | - | - | - | - | 110 | 163 | - | 185 | - | - |
| Stage 2 | - | - | - | - | - | - | 410 | 235 | - | 317 | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.2 | 251.9 | 84.2 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 44 | 581 | - | - | 413 | - | - | 56 |
| HCM Lane V/C Ratio | 0.914 | 0.019 | - | - | 0.047 | - | - | 0.194 |
| HCM Control Delay (s) | 251.9 | 11.3 | - | - | 14.2 | - | - | 84.2 |
| HCM Lane LOS | F | B | - | - | B | - | - | F |
| HCM 95th %tile Q(veh) | 3.7 | 0.1 | - | - | 0.1 | - | - | 0.6 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.5 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 893 | 22 | 22 | 1505 | 27 | 27 |
| Future Vol, veh/h | 893 | 22 | 22 | 1505 | 27 | 27 |
| 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 | - | 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 | 971 | 24 | 24 | 1636 | 29 | 29 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 995 | 0 | 1849 | 498 |
| Stage 1 | - | - | - | - | 983 | - |
| Stage 2 | - | - | - | - | 866 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 691 | - | 66 | 518 |
| Stage 1 | - | - | - | - | 323 | - |
| Stage 2 | - | - | - | - | 372 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 691 | - | 64 | 518 |
| Mov Cap-2 Maneuver | - | - | - | - | 64 | - |
| Stage 1 | - | - | - | - | 323 | - |
| Stage 2 | - | - | - | - | 359 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.1 | 66.1 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 114 | - | - | 691 | - |
| HCM Lane V/C Ratio | 0.515 | - | - | 0.035 | - |
| HCM Control Delay (s) | 66.1 | - | - | 10.4 | - |
| HCM Lane LOS | F | - | - | B | - |
| HCM 95th %tile Q(veh) | 2.4 | - | - | 0.1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 11 | 889 | 21 | 33 | 1492 | 11 | 13 | 0 | 13 | 22 | 0 | 22 |
| Future Vol, veh/h | 11 | 889 | 21 | 33 | 1492 | 11 | 13 | 0 | 13 | 22 | 0 | 22 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | 0 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 966 | 23 | 36 | 1622 | 12 | 14 | 0 | 14 | 24 | 0 | 24 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1634 | 0 | 0 | 989 | 0 | 0 | 1885 | 2708 | 495 | 2207 | 2713 | 817 |
| Stage 1 | - | - | - | - | - | - | 1002 | 1002 | - | 1700 | 1700 | - |
| Stage 2 | - | - | - | - | - | - | 883 | 1706 | - | 507 | 1013 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 393 | - | - | 695 | - | - | 43 | 21 | 520 | 25 | 21 | 320 |
| Stage 1 | - | - | - | - | - | - | 260 | 318 | - | 96 | 146 | - |
| Stage 2 | - | - | - | - | - | - | 307 | 145 | - | 516 | 315 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 393 | - | - | 695 | - | - | 37 | 19 | 520 | ~ 23 | 19 | 320 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 37 | 19 | - | ~ 23 | 19 | - |
| Stage 1 | - | - | - | - | - | - | 252 | 308 | - | 93 | 138 | - |
| Stage 2 | - | - | - | - | - | - | 269 | 137 | - | 487 | 305 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.4 | 0.2 | 82.6 | $ 320.2 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 37 | 520 | 393 | - | - | 695 | - | - | 43 |
| HCM Lane V/C Ratio | 0.382 | 0.027 | 0.03 | - | - | 0.052 | - | - | 1.112 |
| HCM Control Delay (s) | 153.1 | 12.1 | 14.4 | 0.2 | - | 10.5 | - | - | $ 320.2 |
| HCM Lane LOS | F | B | B | A | - | B | - | - | F |
| HCM 95th %tile Q(veh) | 1.3 | 0.1 | 0.1 | - | - | 0.2 | - | - | 4.5 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 5 | 917 | 2 | 2 | 1510 | 5 | 2 | 0 | 2 | 11 | 0 | 11 |
| Future Vol, veh/h | 5 | 917 | 2 | 2 | 1510 | 5 | 2 | 0 | 2 | 11 | 0 | 11 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 997 | 2 | 2 | 1641 | 5 | 2 | 0 | 2 | 12 | 0 | 12 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1646 | 0 | 0 | 999 | 0 | 0 | 1833 | 2658 | 500 | 2157 | 2657 | 823 |
| Stage 1 | - | - | - | - | - | - | 1008 | 1008 | - | 1648 | 1648 | - |
| Stage 2 | - | - | - | - | - | - | 825 | 1650 | - | 509 | 1009 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 389 | - | - | 689 | - | - | 47 | 22 | 516 | 27 | 22 | 317 |
| Stage 1 | - | - | - | - | - | - | 258 | 316 | - | 103 | 155 | - |
| Stage 2 | - | - | - | - | - | - | 333 | 155 | - | 515 | 316 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 389 | - | - | 689 | - | - | 45 | 22 | 516 | 27 | 22 | 317 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 45 | 22 | - | 27 | 22 | - |
| Stage 1 | - | - | - | - | - | - | 255 | 312 | - | 102 | 155 | - |
| Stage 2 | - | - | - | - | - | - | 320 | 155 | - | 506 | 312 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0 | 50.8 | 130.7 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 83 | 389 | - | - | 689 | - | - | 50 |
| HCM Lane V/C Ratio | 0.052 | 0.014 | - | - | 0.003 | - | - | 0.478 |
| HCM Control Delay (s) | 50.8 | 14.4 | - | - | 10.2 | - | - | 130.7 |
| HCM Lane LOS | F | B | - | - | B | - | - | F |
| HCM 95th %tile Q(veh) | 0.2 | 0 | - | - | 0 | - | - | 1.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.9 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 1593 | 27 | 27 | 1181 | 22 | 22 |
| Future Vol, veh/h | 1593 | 27 | 27 | 1181 | 22 | 22 |
| 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 | - | 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 | 1732 | 29 | 29 | 1284 | 24 | 24 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 1761 | 0 | 2447 | 881 |
| Stage 1 | - | - | - | - | 1747 | - |
| Stage 2 | - | - | - | - | 700 | - |
| Critical Hdwy | - | - | 4.14 | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | - | - | 2.22 | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | - | - | 351 | - | 26 | 290 |
| Stage 1 | - | - | - | - | 125 | - |
| Stage 2 | - | - | - | - | 454 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 351 | - | 24 | 290 |
| Mov Cap-2 Maneuver | - | - | - | - | 24 | - |
| Stage 1 | - | - | - | - | 125 | - |
| Stage 2 | - | - | - | - | 416 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.4 | $ 307.4 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 44 | - | - | 351 | - |
| HCM Lane V/C Ratio | 1.087 | - | - | 0.084 | - |
| HCM Control Delay (s) | $ 307.4 | - | - | 16.2 | - |
| HCM Lane LOS | F | - | - | C | - |
| HCM 95th %tile Q(veh) | 4.5 | - | - | 0.3 | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.2 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 22 | 1581 | 12 | 12 | 1184 | 22 | 13 | 0 | 13 | 11 | 0 | 11 |
| Future Vol, veh/h | 22 | 1581 | 12 | 12 | 1184 | 22 | 13 | 0 | 13 | 11 | 0 | 11 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | 0 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 24 | 1718 | 13 | 13 | 1287 | 24 | 14 | 0 | 14 | 12 | 0 | 12 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1311 | 0 | 0 | 1731 | 0 | 0 | 2443 | 3110 | 866 | 2232 | 3104 | 656 |
| Stage 1 | - | - | - | - | - | - | 1773 | 1773 | - | 1325 | 1325 | - |
| Stage 2 | - | - | - | - | - | - | 670 | 1337 | - | 907 | 1779 | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | 5.54 | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 |
| Pot Cap-1 Maneuver | 524 | - | - | 360 | - | - | 16 | 11 | 297 | 23 | 11 | 408 |
| Stage 1 | - | - | - | - | - | - | 86 | 134 | - | 164 | 223 | - |
| Stage 2 | - | - | - | - | - | - | 413 | 220 | - | 297 | 133 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 524 | - | - | 360 | - | - | 15 | 10 | 297 | 21 | 10 | 408 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 15 | 10 | - | 21 | 10 | - |
| Stage 1 | - | - | - | - | - | - | 82 | 128 | - | 156 | 215 | - |
| Stage 2 | - | - | - | - | - | - | 386 | 212 | - | 270 | 127 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0.2 | 284.5 | 184.5 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 15 | 297 | 524 | - | - | 360 | - | - | 40 |
| HCM Lane V/C Ratio | 0.942 | 0.048 | 0.046 | - | - | 0.036 | - | - | 0.598 |
| HCM Control Delay (s) | $ 551.2 | 17.7 | 12.2 | - | - | 15.4 | - | - | 184.5 |
| HCM Lane LOS | F | C | B | - | - | C | - | - | F |
| HCM 95th %tile Q(veh) | 2.2 | 0.1 | 0.1 | - | - | 0.1 | - | - | 2.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 7.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 11 | 1583 | 19 | 18 | 1202 | 11 | 18 | 0 | 19 | 5 | 0 | 5 |
| Future Vol, veh/h | 11 | 1583 | 19 | 18 | 1202 | 11 | 18 | 0 | 19 | 5 | 0 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | - | - | - | 0 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 1721 | 21 | 20 | 1307 | 12 | 20 | 0 | 21 | 5 | 0 | 5 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1319 | 0 | 0 | 1742 | 0 | 0 | 2450 | 3115 | 871 | 2238 | - | 660 |
| Stage 1 | - | - | - | - | - | - | 1756 | 1756 | - | 1353 | - | - |
| Stage 2 | - | - | - | - | - | - | 694 | 1359 | - | 885 | - | - |
| Critical Hdwy | 4.14 | - | - | 4.14 | - | - | 7.54 | 6.54 | 6.94 | 7.54 | - | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | - | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.54 | 5.54 | - | 6.54 | - | - |
| Follow-up Hdwy | 2.22 | - | - | 2.22 | - | - | 3.52 | 4.02 | 3.32 | 3.52 | - | 3.32 |
| Pot Cap-1 Maneuver | 520 | - | - | 357 | - | - | ~ 16 | 11 | 294 | 23 | 0 | 406 |
| Stage 1 | - | - | - | - | - | - | 88 | 137 | - | 158 | 0 | - |
| Stage 2 | - | - | - | - | - | - | 399 | 215 | - | 306 | 0 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 520 | - | - | 357 | - | - | ~ 15 | 10 | 294 | 20 | - | 406 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | ~ 15 | 10 | - | 20 | - | - |
| Stage 1 | - | - | - | - | - | - | 86 | 134 | - | 154 | - | - |
| Stage 2 | - | - | - | - | - | - | 372 | 203 | - | 278 | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.2 | $ 507.8 | 134 |
| HCM LOS | | | F | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 29 | 520 | - | - | 357 | - | - | 38 |
| HCM Lane V/C Ratio | 1.387 | 0.023 | - | - | 0.055 | - | - | 0.286 |
| HCM Control Delay (s) | $ 507.8 | 12.1 | - | - | 15.7 | - | - | 134 |
| HCM Lane LOS | F | B | - | - | C | - | - | F |
| HCM 95th %tile Q(veh) | 4.6 | 0.1 | - | - | 0.2 | - | - | 0.9 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |