

Traffic Impact Study for KUSH Development

1401 W. 23rd Street
Lawrence, Kansas

Prepared
for
Opus Development Company, LLC

Prepared
By



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Introduction

Proposed Redevelopment

The proposed “KUSH” redevelopment is a mixed-use project located at 1401 W. 23rd Street in Lawrence, Kansas. The site is bounded by W. 23rd Street on the north; a small supermarket (*Natural Grocers*) on the east; Naismith Drive on the southeast; W. 24th Street on the south; a multi-family residential complex on the southwest; and a couple of restaurants on the northwest. The surrounding land uses consist of commercial developments along W. 23rd Street and a number of multi-family residential developments along W. 24th Street between Naismith Drive and Ousdahl Road (See the Location Map, Figure 1 of Appendix I).

The site is currently occupied by two buildings with several individual retail businesses, with a few vacant spaces. Under the proposed redevelopment plan, the existing buildings will be razed and replaced with a 3-story building – as shown in Figure 2 of Appendix I - consisting of:

- 119 dwelling units of student housing with 311 bedrooms (*ITE Land Use Code 225, Off-Campus Student Apartment, over ½ Mile from Campus*); and
- An 8,811 sq. ft. of retail space on the first floor facing W. 23rd Street. At the time of this study, specific use for this space was unknown. However, based on the information provided by the development team, the anticipated use for the space will likely be a high-turnover (sit-down) restaurant (*ITE Land Use Code 932*).

Parking for the site will be provided on the east and south sides of the site with 203 stalls.

Zoning – The project site is currently zoned *CS (Commercial Strip)*, except for a sliver on the south side that is zoned *RM32 (Multifamily residential)* - consistent with land use designations on Map 3-2 of the Horizon 2020. The proposed zoning for the site is *Smartcode Transect Zone T-5*.

Access – The site is currently served by four access drives as shown in Figure 1 of Appendix I and described below:

- Two on W. 23rd Street with centerline spacing of approximately 245 ft. The west driveway is a full-access point located near the west property line, and the east driveway is a restricted right-in/right-out/left-in access point located near the east property line.
- A cross access on Naismith Drive with its centerline approximately 450 ft. south of the W. 23rd Street centerline (clear distance of approximately 400 ft.)
- A cross access to the adjoining property to the east (*Natural Grocers* parking lot) with its centerline approximately 130 ft. south of the W. 23rd Street centerline (clear distance of approximately 90 ft.)

Under the proposed redevelopment plan:

- The west driveway on W. 23rd Street will be eliminated;
- A new full-access driveway will be constructed on W. 24th Street directly across from the middle entrance to *The Rockland* apartment complex as illustrated on the Site Plan, Figure 2 of Appendix I;
- The east driveway on W. 23rd Street and the two cross access drives to the east will remain at their current locations to serve the site.

Study Area

Per request by the City staff at the *Municipal Services and Operation Department*, the following intersections are identified in the study area for this project

- W. 23rd Street and Naismith Drive (signalized, coordinated);
- W. 23rd Street and Ousdahl Road (signalized, coordinated);
- W. 23rd Street and the existing two driveways to the site;
- Naismith Drive and the existing cross access drive to the site;
- W. 24th Street and the newly proposed access drive to the site; and
- W. 24th Street and Ousdahl Road

Purpose

The purpose of this study is to:

1. Evaluate the existing operating conditions of traffic at the subject intersections, and recommend mitigation measures as needed (“Existing” Case Scenario);
2. Assess impact of the trips generated by the proposed redevelopment project on the subject intersections, and recommend off-site improvements as needed (“Existing + Project” Case Scenario);
3. Assess cumulative impact of the proposed redevelopment project and other approved developments in the proximity of this site (as identified by the City staff), and recommend off-site improvements as needed (“Existing + Project + Approved Projects” Case Scenario); and
4. Evaluate the operating conditions of traffic in the study area for target year 2040 (“Future” Case Scenario).

Data Collection and Summary

Roadway Network Characteristics

In the vicinity of the redevelopment site:

- W. 23rd Street is a 4-lane divided roadway with a two-way center left-turn lane and pavement width of 55 ft. It is designated as a “Principal Arterial” on the City’s T2040 Thoroughfare Map and has posted speed limit of 35 mph. On street parking is prohibited on both sides of the street.
- Naismith Drive is designated as a “Collector” on the City’s T2040 Thoroughfare Map. North of W. 23rd Street, it is a 4-lane divided roadway with a 70 ft. wide raised median with a large drainage channel in the middle, and posted speed limit of 30 mph. On-street parking is prohibited on both sides of the street north of W. 23rd Street.

South of W. 23rd Street, Naismith Drive transitions from a 4-lane divided roadway at its intersection with W. 23rd Street to a 24 ft. wide street (one lane in each direction) at approximately 320 ft. south of W. 23rd Street and continues south for

another 300 ft. before its horizontal alignment take a sharp turn onto W. 24th Street. The curve is delineated with several chevron signs (*W1-8*) and has advance horizontal alignment warning sign "*TURN (W1-1)*" with advisory speed plaque (*W13-1P*) of 20 mph in each direction. On-street parking is not prohibited on either side of street.

- W. 24th Street is a two-way, 24 ft. wide roadway designated as a "Collector" on the City's T2040 Thoroughfare Map. Speed limit is not posted, hence the statutory speed limit of 30 mph is assumed. On-street parking is not prohibited on either side of the street.
- Ousdahl Road is a two-way, 24 ft. wide roadway designated as a "Collector" on the City's T2040 Thoroughfare Map. Speed limit is not posted, hence the statutory speed limit of 30 mph is assumed. On-street parking is prohibited on the west side of the street.
- The intersection of W. 23rd and Naismith Drive is controlled by a coordinated-actuated traffic signal along W. 23rd Street with camera detection on all approaches. The signal operates under "*protected only*" left-turn phasing scheme in all directions. The lane configurations at this intersection are as follows:
 - Eastbound and westbound approach each has a dedicated left-turn lane (part of the center left-turn lane) and two through lanes with the outside lane shared by right-turn movement;
 - Northbound approach has a dedicated left-turn lane with storage length of approximately 80 ft., a through lane, and a dedicated right-turn lane with storage length of approximately 80 ft.; and
 - Southbound approach has a defacto left-turn lane, and a shared through/right-turn lane.
- The intersection of W. 23rd and Ousdahl Road is also controlled by a coordinated-actuated traffic signal along W. 23rd Street with camera detection on all approaches. The signal operates under "*protected/permmissive*" left-turn phasing scheme in all directions. The lane configurations at this intersection are as follows:

- Eastbound and westbound approach each has a dedicated left-turn lane (part of the center left-turn lane) and two through lanes with the outside lane shared by right-turn movement;
 - Northbound approach has a dedicated left-turn lane with storage length of approximately 90 ft., and a shared through/right-turn lane; and
 - Southbound approach has a dedicated left-turn lane with storage length of approximately 75 ft., and a shared through/right-turn lane.
- The intersection of W. 24th Street and Ousdahl Road is an offset “T” intersection with offset distance of approximately 165 ft.; controlled by stop sign on W. 24th Street.
 - The existing cross access driveway connecting the site’s parking lot to Naismith Drive is a “T” intersection controlled by a substandard stop sign.

Traffic Counts

At the time of this study, a mill and overlay project was underway along W. 23rd Street east of Ousdahl Road with the outside lanes closed to traffic resulting in skewed traffic patterns along the corridor. Therefore, most recent turning movement counts – obtained from the City’s 3-year traffic count program at signalized intersections - were used for analysis of the intersections of W. 23rd Street with Naismith Drive and Ousdahl Road. Records show that the latest counts were conducted on 4/28/2016 and 4/14/2015 at Naismith Drive and Ousdahl Road, respectively.

The remaining intersections under study were counted during both morning and afternoon peak-hours of typical weekdays from 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. when KU classes were in session. Results, as illustrated in Figures 3 and 4 of Appendix I and summarized in Appendix V, indicate that in the study area:

- On a typical weekday, morning peak occurs sometime between 7:30 and 9:00.
 - W. 23rd Street carries approximately 1,950 vph with directional distribution of approximately 55% - 45% (eastbound – westbound).
 - Naismith Drive carries approximately 450 vph north of W. 23rd Street with directional distribution of approximately 65% - 35% (northbound –

- southbound). South of W. 23rd Street, traffic volumes drop from approximately 215 vph (at the signal) to approximately 160 vph (at W. 24th Street) with directional distribution of approximately 83% - 17%, (northbound – southbound) and 70% - 30%, (northbound – southbound), respectively.
- Traffic volumes on W. 24th Street vary from approximately 160 vph on the east end (at Naismith Drive) to approximately 90 vph on the west end (at Ousdahl Road). Directional distribution of traffic reverses from approximately 60% - 40% (eastbound – westbound) on the eastern half of the street to 40% - 60% (eastbound – westbound) on the western half.
 - Ousdahl Road carries approximately 445 vph north of W. 23rd Street with directional distribution of 55% - 45% (northbound – southbound). South of W. 23rd Street, traffic volumes drop from approximately 235 vph (at the signal) to approximately 95 vph (south of W. 24th Street) with directional distribution of approximately 50% - 50% (northbound – southbound) and 65% - 35% (northbound – southbound), respectively.
 - Total entering traffic volumes at the intersections under study are approximately:
 - 2,235 vph at W. 23rd Street and Naismith Drive;
 - 150 vph at Naismith Drive and cross access to the site;
 - 180 vph at W. 24th Street and middle access driveway to *The Rockland* apartments;
 - 130 vph at W. 24th Street and Ousdahl Road; and
 - 2,370 vph at W. 23rd Street and Ousdahl Road.
 - On a typical weekday, afternoon peak occurs sometime between 4:45 and 6:00 p.m.
 - W. 23rd Street carries approximately 2,650 vph with directional distribution of approximately 45% - 55% (eastbound – westbound) west of Naismith Drive, and 50% – 50% east of Naismith Drive.
 - Naismith Drive carries approximately 710 vph north of W. 23rd Street with directional distribution of approximately 30% - 70% (northbound –

- southbound). South of W. 23rd Street, traffic volumes drop from approximately 375 vph (at the signal) to approximately 310 vph (at W. 24th Street) with directional distribution of approximately 55% - 45%, (northbound – southbound) and 35% - 65%, (northbound – southbound), respectively.
- Traffic volumes on W. 24th Street vary from approximately 310 vph on the east end (at Naismith Drive) to approximately 210 vph on the west end (at Ousdahl Road). Directional distribution of traffic changes from approximately 70% - 30% (eastbound – westbound) on the eastern half of the street to 40% - 60% (eastbound – westbound) on the western half.
 - Ousdahl Road carries approximately 415 vph north of W. 23rd Street with directional distribution of 50% - 50% (northbound – southbound). South of W. 23rd Street, traffic volumes drop from approximately 355 vph (at the signal) to approximately 250 vph (south of W. 24th Street) with directional distribution of approximately 45% - 55% (northbound – southbound).
 - Total entering traffic volumes at the intersections under study are approximately:
 - 3,155 vph at W. 23rd Street and Naismith Drive;
 - 365 vph at Naismith Drive and cross access to the site;
 - 350 vph at W. 24th Street and middle access driveway to *The Rockland* apartments;
 - 315 vph at W. 24th Street and Ousdahl Road; and
 - 3,015 vph at W. 23rd Street and Ousdahl Road.

Traffic Signal Data

Based on the information obtained from the City, traffic signals along W. 23rd Street are coordinated and have 120 and 150 seconds cycle lengths during morning and afternoon peak-hours of typical weekdays, respectively. For the purpose of this analysis, all parameters of the current signal timing plan and phasing schemes are utilized in order to maintain the existing coordination between the signals along the corridor (See timing details in Appendix VI).

Transit Services

The study area is currently served by a coordinated transit service between *Lawrence Transit System* and *KU on Wheels* via:

- *Route #11* running every ½ hour in the north/south direction, connecting the study area to KU campus and downtown to the north; and 33rd and Iowa Street to the south with the nearest stops
 - On W. 24th Street approximately 270 ft. (walking distance) west of the project site - *Stops #39 (northbound) and #40 (southbound)*.
 - On Naismith Drive south of W. 23rd Street approximately 330 ft. (walking distance) from the project site - *Stop #41 (northbound)*.
 - On Naismith Drive north of W. 23rd Street approximately 330 ft. (walking distance) from the project site – *Stop #110 (southbound)*.
- *Route #5* running every ½ hour in the east/west direction, connecting the study area to 33rd & Iowa Street to the south; and East Hill Business Park to the east with the nearest stops
 - On W. 23rd Street west of Naismith Drive approximately 720 ft. (walking distance) from the project site – *Stop #42 (eastbound)*.
 - On W. 23rd Street east of Naismith Drive approximately 800 ft. (walking distance) from the project site – *Stop #43 (westbound)*.

Maps of the routes and their schedules are included in Appendix VII.

Existing and Planned Bikeways

According to the *City's T2040 Bicycle System Map* (See Appendix VII for details):

- Naismith Drive north of W. 23rd Street is designated as a *bike route (existing)*.
- Naismith Drive between W. 23rd Street and W. 24th Street is designated as a *shared use path (existing)*; continuing south as an off-road path connecting W. 24th Street to W. 29th Terrace.
- W. 24th Street between Naismith Drive and Ridge Court is designated as *planned (future) bike route*.
- Ousdahl Road between W. 19th Street and W. 27th Street is also designated as *planned (future) bike route*.

Evaluation of the Existing Operating Conditions

Volume/Capacity Analysis

A volume/capacity analysis (using Synchro 10 Software and methodologies outlined in the 6th Edition of the Highway Capacity Manual (HCM) published by the Transportation Research Board) was conducted to determine level-of-service (LOS) for all movements at the subject intersections during both morning and afternoon peak-hours of a typical weekday.

Level-of-service, as defined in the HCM, describes the quality of traffic operating conditions and ranges from “A” to “F”, with LOS “A” representing the best (most desirable with minimum delay) conditions and LOS “F” the worst (severely congested with excessive delays). The following chart outlines the level-of-service criteria for un-signalized and signalized intersections.

Level-Of-Service	Control Delay for Unsignalized Intersections (seconds/vehicle)	Control Delay for Signalized Intersections (seconds/vehicle)
A	0 – 10	0 - 10
B	> 10 – 15	> 10 - 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

Results of the analysis for the existing traffic volumes and operating conditions (e.g. signal timing and phasing) are shown in Appendix II and summarized in Table 1 below.

Table 1
Summary of V/C¹ Analysis for “Existing” Case Scenario
(Existing “Traffic Volumes and Signal Timing/Phasing”)

Intersection	Movement	(Typical Weekday)					
		Morning Peak-Hour			Afternoon Peak-Hour		
		LOS ²	V/C ¹	95% Queue (veh)	LOS ²	V/C ¹	95% Queue (veh)
W. 23 rd Street and Site Access	EB (TR)	A	Free Flow	0	A	Free Flow	0
	WB (L)	B	0.01	1	B	0.03	1
	WB (T)	A	Free Flow	0	A	Free Flow	0
	NB (R)	B	< 0.01	1	B	0.04	1
W. 23 rd Street and Naismith Drive (Using Existing Signal Timing Plan and Phasing Scheme) ³	EB (L)	D	0.37	5	F	0.67	6
	EB (TR)	B	0.45	20	B	0.57	7
	WB (L)	D	0.07	1	F	0.49	4
	WB (TR)	C	0.56	15	C	0.74	30
	NB (L)	D	0.10	2	F	0.57	5
	NB (T)	E	0.49	6	E	0.43	6
	NB (R)	A	0.27	1	A	0.22	1
	SB (L)	E	0.43	4	F	0.91	15
	SB (TR)	B	0.25	3	E	0.91	14
	Intersection	C	Delay:	24.9 (sec/veh)	D	Delay:	37.9 (sec/veh)
Naismith Drive and Site Access	EB (LR)	A	0.01	1	B	0.06	1
	NB (LT)	A	< 0.01	1	A	< 0.01	1
	SB (TR)	A	Free Flow	0	A	Free Flow	0
W. 24 th Street and Site Access	EB (TR)	A	Free Flow	0	A	Free Flow	0
	WB (LT)	A	0.01	1	A	0.03	1
	NB (LR)	A	0.06	1	B	0.08	1
	SB (LTR)	N/A	N/A	N/A	N/A	N/A	N/A
W. 24 th Street and Ousdahl Road	WB (LR)	A	0.06	1	B	0.16	1
	NB (TR)	A	Free Flow	0	A	Free Flow	0
	SB (LT)	A	0.01	1	A	0.02	1

1. V/C = Volume/Capacity Ratio

2. LOS = Level-Of-Service

3. Source: City MSO Department

Table 1 (Cont'd)

**Summary of V/C¹ Analysis for “Existing” Case Scenario
(Existing “Traffic Volumes and Signal Timing/Phasing”)**

Intersection	Movement	(Typical Weekday)					
		Morning Peak-Hour			Afternoon Peak-Hour		
		LOS ²	V/C ¹	95% Queue (veh)	LOS ²	V/C ¹	95% Queue (veh)
W. 23 rd Street and Ousdahl Road (Using Existing Signal Timing Plan and Phasing Scheme) ³	EB (L)	A	0.40	3	B	0.32	2
	EB (TR)	B	0.46	14	B	0.54	20
	WB (L)	A	0.07	1	B	0.28	2
	WB (TR)	A	0.45	17	B	0.64	22
	NB (L)	D	0.11	2	D	0.38	4
	NB (TR)	D	0.49	5	D	0.44	6
	SB (L)	D	0.17	2	D	0.21	3
	SB (TR)	D	0.65	7	E	0.76	9
	Intersection	B	Delay: 14.5 (sec/veh)		C	Delay: 23.4 (sec/veh)	

1. V/C = Volume/Capacity Ratio

2. LOS = Level-Of-Service

3. Source: City MSO Department

- Intersection of W. 23rd Street and Naismith Drive operates at LOS “C” and “D” during morning and afternoon peak-hours, respectively.
 - Eastbound/westbound approaches operate at LOS “C” and higher during both peak-hours;
 - Northbound approach operates at LOS “D” during both peak-hours with $v/c \leq 0.57$; and
 - Southbound approach operates at LOS “D” during morning peak-hour with $v/c \leq 0.43$, and LOS “F” during afternoon peak-hour with v/c ratio approaching 1.0.
- Intersection of W. 23rd Street and Ousdahl Road operates at LOS “B” and “C” during morning and afternoon peak-hours, respectively.
 - Eastbound/westbound approaches operate at LOS “B” and higher during both peak-hours;
 - Northbound approach operates at LOS “D” during both peak-hours with $v/c \leq 0.49$; and

- Southbound approach operates at LOS “D” during morning peak-hour with $v/c \leq 0.65$, and LOS “E” during afternoon peak-hour with $v/c \leq 0.76$.
- Individual movements at all other intersections in the study area operate at LOS “B” and higher during both peak-hours.

Sight Distance Analysis

The existing cross access on Naismith Drive and the proposed access drive on W. 24th Street are both located near a horizontal curve (turn) that connects Naismith Drive to W. 24th Street. A sight distance analysis, using the guidelines suggested in the “Green Book” published by the American Association of State Highway and Transportation Officials (AASHTO), 6th Edition, was conducted to evaluate adequacy of intersection sight distance (ISD) and stopping sight distance (SSD) at these driveway locations. Results, as described below, indicate that line of sight for certain movements is obstructed by some overgrown vegetation and tree branches.

Cross Access Driveway on Naismith Drive

Operating speed on Naismith Drive = 25 mph (assume 5 mph over the advisory speed plaque)	
Approach grades on Naismith Drive and cross access driveway = +/- 3%	
Req. ISD for outbound left-turn movement = 280 ft. vs. 255 ft. (measured)	RESTRICTED
Req. ISD for outbound right-turn movement = 240 ft. vs. 245 ft. (measured)	MARGINAL
Req. SSD for northbound left-turn from Naismith Drive = 155 ft. vs. 245 ft. (measured)	OK
Req. SSD for southbound right-turn from Naismith Drive = 155 ft. vs. 405 ft. (measured)	OK

Proposed Access Drive on W. 24th Street

Operating speed on W. 24 th Street = 25 mph (assumed 5 mph over the advisory speed plaque)	
Approach grade on W. 24 th Street and proposed access driveway = +/- 3%	
Req. ISD for outbound left-turn movement = 280 ft. vs. 620 ft. (measured)	OK
Req. ISD for outbound right-turn movement = 240 ft. vs. 280 ft. (measured)	OK
Req. SSD for eastbound left-turn from W. 24 th Street = 155 ft. vs. 775 ft.	OK
Req. SSD for westbound right-turn from W. 24 th Street = 155 ft. vs. 265 ft.	OK

Trip Generation Analysis

Trip generation of a proposed land development project is typically estimated using trip generation rates suggested by the *Institute of Transportation Engineers (ITE), Trip Generation Manual (currently the 10th Edition)*. For this analysis, *ITE land use codes 225 (Off-Campus Student Apartments) and 932 (High-Turnover, Sit-Down Restaurant)* with “number of bedrooms” and “gross floor area” as their respective independent variables were selected. *Weighted Average Rate Method* and *Regression Equation Method* were both evaluated and the method following the criteria suggested in the *ITE Trip Generation Handbook, 3rd Edition* with statistical significance is selected for each land use (See first page of Appendix III for the guidelines). Results, as summarized in Table 2 and shown in Appendix III, are described in the following paragraphs.

Total Unadjusted Trips (Unadjusted External + Internal Capture)

- On average, 145 trip-ends (64 inbound, 81 outbound) during morning peak-hour of a typical weekday;
- On average, 181 trip-ends (102 inbound, 71 outbound) during afternoon peak-hour of a typical weekday; and
- On average, 2,223 (+/-) trip-ends (two-way volumes) during 24-hour period of a typical weekday.

Internal Capture Trips

The above-mentioned unadjusted trip numbers represent sum of the trips for single-use, free-standing sites for each proposed land use in a suburb setting. However, at mixed-use development sites with two or more complementary land uses, there is potential for interaction among the uses that are referred to as “*internal capture trips*”. As a result, the total external trip numbers may be less than the simple sum of the trips generated by each use separately.

The proposed redevelopment under study is a mixed-use project consisting of “residential” and “retail” components with potential for internal capture trips. Using the guidelines suggested in the *ITE Trip Generation Handbook, 3rd Edition* in conjunction

with the NCHRP Report 684 “Internal Capture Trip Estimation Tool”, the internal capture rate for this project is estimated at 12% and 14% during morning and afternoon peak-hours, respectively. Results, as summarized in Table 2 and shown in Appendix IV, indicate that the internal capture trips are:

- On average, 18 trip-ends (9 inbound, 9 outbound) during morning peak-hour of a typical weekday; and
- On average, 25 trip-ends (13 inbound, 12 outbound) during afternoon peak-hour of a typical weekday.

Unadjusted External Trips

The *unadjusted external trips* are calculated as follows:

- On average, 127 trip-ends (55 inbound, 72 outbound) during morning peak-hour of a typical weekday;
- On average, 156 trip-ends (89 inbound, 67 outbound) during afternoon peak-hour of a typical weekday; and

Adjustment for Pass-By Trips

The resulting number of trips after adjustment for “*internal capture trips*” represents total vehicles entering and exiting the site at its proposed driveway(s). Because one of the components of the proposed uses for this site is retail-oriented, it attracts a portion of its trips from traffic passing the site on the way from origin to an ultimate destination. These retail trips are called “*pass-by*” trips and do not add new traffic to the adjacent street network. These trips are typically estimated using values suggested by the ITE Trip Generation Handbook, 3rd Edition. However, a zero value is assumed for this analysis.

Adjustment for Multimodal Use

The proposed redevelopment site is located in a fully-developed area with frequent transit services to/from KU campus, downtown Lawrence, and W. 3rd Street and Iowa Street. Trip generation numbers presented in the previous paragraphs do not reflect those for urban infill sites such as this site. These types of redevelopment sites often result in fewer vehicle trips due to modal shifts:

- More walking because of close proximity of complementary uses;
- More transit ridership because of convenient, frequent transit services; and
- More bicycling because of bicycle facilities and amenities available in and adjacent to the site.

Therefore, it is reasonable to assume that the external trips for this project are subject to a 5% discount due to transit and bicycle use (See Table 2 for details).

Adjustment for Current Use

Field observations were conducted during both peak-hours of a typical day to count traffic in and out of the existing retail center at the project site. Results, as shown at the end of Appendix V, indicate that the project site currently generates:

- On average, 17 trip-ends (9 inbound and 8 outbound) during morning peak-hour of adjacent street; and
- On average, 59 trip-ends (29 inbound and 30 outbound) during afternoon peak-hour of adjacent street.

Therefore, the site-generated external trips are further adjusted to estimate the *net added new trips* generated by the proposed redevelopment (See Table 2 for details).

Adjusted External Trips (Net Added New Trips)

The proposed redevelopment project is anticipated to add new trips to the street network of the following magnitudes (See Table 2 for details):

- On average, 103 trip-ends (43 inbound, 60 outbound) during morning peak-hour of a typical weekday;
- On average, 89 trip-ends (56 inbound, 33 outbound) during afternoon peak-hour of a typical weekday; and
- On average, 1,580 (+/-) trip-ends (two-way volumes) during 24-hour period of a typical weekday.

Analysis Time Period

An overview of the existing traffic volumes in the study area and their peak characteristics, in conjunction with estimated trips generated by the proposed redevelopment project, indicate that the most critical peak period will likely occur during the afternoon peak-hour of a typical weekday. However, for the purpose of this study, both morning and afternoon peak-hour periods are analyzed.

Trip Distribution and Assignment Analysis

Distribution of trips generated by the proposed redevelopment project is assumed to be somewhat similar to the overall existing traffic patterns in the study area with consideration given to the layout of the parking lot and location of the access drives as described below:

- 80% to/from north and east
 - 32% using the proposed access on W. 24th Street.
 - 32% using the existing cross access on Naismith Drive.
 - 16% using the existing $\frac{3}{4}$ access on W. 23rd Street.
- 20% to/from west and south
 - 8% using the existing cross access on Naismith Drive.
 - 12% using the proposed access on W. 24th Street.

Figure 5 of Appendix I illustrates these patterns in detail. Using these distribution patterns, site-generated traffic is assigned to the street network as illustrated in Figure 6 of Appendix I.

Table 2

Summary of Trip Generation Calculations^{1,2} for the Proposed "KUSH" Redevelopment (Peak-Hours of Adjacent Street Network)

Land Use (ITE CODE)	Setting/ Location	Size	Typical Weekday						
			24-hr, 2-Way Volume (vpd)	AM Peak-Hour ³ (vph)			PM Peak-Hour ³ (vph)		
				Enter	Exit	Total	Enter	Exit	Total
Off-Campus Student Apartments (225)*	Gen. Urban/Suburban	311 bedrooms	1,235	16	41	57	49	46	95
High-Turnover Restaurant (932)	Gen. Urban/Suburban	8,811 GFA	988	48	40	88	53	33	86
Total Unadjusted Trips (Build-Out)			2,223	64	81	145	102	79	181
Adjustment for Internal Capture Trips (AM Peak = 12%; PM Peak = 14%) ⁵				-9	-9	-18	-13	-12	-25
Unadjusted External Trips (Build-Out)				55	72	127	89	67	156
Adjustment for Multi-Modal Use (assume 5% for combined transit & bicycle)				-3	-4	-7	-4	-3	-7
Adjusted External Trips (Build-Out)				52	68	120	84	63	148
Adjustment for Existing Retail Center (Based on Field Data Collection)				-9	-8	-17	-29	-30	-59
External Trips added to the Street Network			1580⁶	43	60	103	55	33	89

NOTES:

- 1) Trip generation numbers in this table are calculated using the rates suggested in the *ITE Trip Generation Manual, 10th Edition*.
- 2) Number of trips are determined by both Weighted Average Rate Method and the Regression Equation Method and the method that meets the criteria suggested in the *ITE Trip Generation Handbook, 3rd Edition* with statistical significance is selected for analysis (* denotes use of Reg. Eq.)
- 3) Peak-hour of adjacent street network.
- 4) GFA = Gross Floor Area
- 5) Calculated using the *NCHRP 684, Internal Trip Capture Estimation Tool*. However, for this study, a 20% rate is assumed for both AM and PM peak hours.
- 6) Using K-Factor of 15.3% (24-hr volumes/AM peak-hour: 2,223/145)

Impact Analysis for “Existing + KUSH” Case Scenario

Volume/Capacity Analysis

Following the same procedure mentioned earlier, a volume/capacity analysis was conducted to determine level-of-service during both morning and afternoon peak-hours of a typical weekday for “*Existing + Proposed Redevelopment*” case scenario (See Figures 7 and 8 of Appendix I for projected peak-hour traffic volumes). Results, as shown in Appendix II and summarized in Table 3 indicate that level-of-service for individual movements in the study area, *generally*, remain unchanged with slightly higher delay values and v/c ratios.

Impact Analysis for “Existing + KUSH + Approved Projects” Scenario

Based on the information provided by the City staff, currently, there are no other approved development projects near the study area.

Impact Analysis for Target Year 2040 (Future Case Scenario)

Volume/Capacity Analysis

Because the site is located in a mostly developed dense-urban area, an annual growth rate of 1.0% may be assumed to estimate the background traffic volumes for target year 2040. Conversely, it is anticipated that completion of the South Lawrence Trafficway (SLT) in 2016 will potentially reduce traffic volumes along the W. 23rd Street; yet to be evaluated. Therefore, analysis for target year 2040 is omitted from this study until such time that current counts can be obtained upon completion of the mill and overlay project along W. 23rd Street.

Table 3
Summary of V/C¹ Analysis for “Existing + KUSH” Case Scenario”
(Existing Signal Timing/Phasing)

Intersection	Movement	(Typical Weekday)					
		Morning Peak-Hour			Afternoon Peak-Hour		
		LOS ²	V/C ¹	95% Queue (veh)	LOS ²	V/C ¹	95% Queue (veh)
W. 23 rd Street and Site Access	EB (TR)	A	Free Flow	0	A	Free Flow	0
	WB (L)	B	0.02	1	B	0.04	1
	WB (T)	A	Free Flow	0	A	Free Flow	0
	NB (R)	B	0.03	1	B	0.05	1
W. 23 rd Street and Naismith Drive (Using Existing Signal Timing Plan and Phasing Scheme) ³	EB (L)	D	0.41	5	F	0.69	6
	EB (TR)	C	0.47	20	B	0.60	7
	WB (L)	E	0.15	2	F	0.58	4
	WB (TR)	C	0.56	15	C	0.77	30
	NB (L)	D	0.10	2	F	0.57	5
	NB (T)	E	0.59	6	E	0.42	6
	NB (R)	A	0.31	1	A	0.23	1
	SB (L)	E	0.43	4	F	0.91	15
	SB (TR)	C	0.32	4	F	0.93	18
	Intersection	C	Delay:	27.8 (sec/veh)	D	Delay:	40.6 (sec/veh)
Naismith Drive and Site Access	EB (LR)	A	0.04	1	B	0.09	1
	NB (LT)	A	< 0.01	1	A	< 0.01	1
	SB (TR)	A	Free Flow	0	A	Free Flow	0
W. 24 th Street and Site Access	EB (LTR)	A	< 0.01	1	A	< 0.01	1
	WB (LTR)	A	0.01	1	A	0.03	1
	NB (LTR)	A	0.06	1	B	0.09	1
	SB (LTR)	A	0.04	1	B	0.03	1
W. 24 th Street and Ousdahl Road	WB (LR)	A	0.07	1	B	0.17	1
	NB (TR)	A	Free Flow	0	A	Free Flow	0
	SB (LT)	A	0.01	1	A	0.03	1

2. V/C = Volume/Capacity Ratio

2. LOS = Level-Of-Service

3. Source: City MSO Department

Table 3 (Cont'd)
Summary of V/C¹ Analysis for “Existing + KUSH” Case Scenario”
(Existing Signal Timing/Phasing)

Intersection	Movement	(Typical Weekday)					
		Morning Peak-Hour			Afternoon Peak-Hour		
		LOS ²	V/C ¹	95% Queue (veh)	LOS ²	V/C ¹	95% Queue (veh)
W. 23 rd Street and Ousdahl Road (Using Existing Signal Timing Plan and Phasing Scheme) ³	EB (L)	B	0.41	3	B	0.33	2
	EB (TR)	B	0.47	14	B	0.56	20
	WB (L)	A	0.07	1	B	0.29	2
	WB (TR)	A	0.47	17	B	0.66	22
	NB (L)	D	0.12	2	D	0.38	4
	NB (TR)	D	0.51	5	D	0.40	6
	SB (L)	D	0.17	2	D	0.20	3
	SB (TR)	D	0.65	7	E	0.76	9
	Intersection	B	Delay: 15.2 (sec/veh)		C	Delay: 24.6 (sec/veh)	

2. V/C = Volume/Capacity Ratio

2. LOS = Level-Of-Service

3. Source: City MSO Department

Summary & Recommendations

This study evaluates the existing operating conditions of traffic at the key intersections in the study area as identified by the City staff. Results of the operational analysis for the existing conditions are summarized in Table 1 with additional details in Figures 3 and 4 of Appendix I, and Appendix II. The study also assesses impact of traffic generated by the proposed “KUSH” redevelopment (at build-out) on the street network. Results of the site-generation and operational analyses for the post-development conditions are summarized in Tables 2 and 3 with additional details in Figures 5 thru 8 of Appendix I, and Appendices II and III.

Existing Conditions

- Results of a volume/capacity analysis indicate that, under the existing traffic and operating conditions, a number of the individual movements at the signalized

intersections in the study area operate at capacity.

- The intersection of W. 23rd Street and Naismith Drive operates at LOS “C” and “D” during morning and afternoon peak-hours of a typical weekday with a number of the individual movements operating at LOS “E” and “F” with v/c ratio of 0.91 for southbound approach.
- The intersection of W. 23rd Street and Ousdahl Road operates at LOS “B” and “C” during morning and afternoon peak-hours of a typical weekday with southbound approach operating at LOS “E” with v/c ratio of 0.76.

As stated earlier, at the time of this study, a mill and overlay project was in progress on W. 23rd Street in the study area resulting in skewed traffic patterns on W. 23rd Street; hence most recent traffic volumes obtained from the city records were used for analysis. These counts were taken in 2015 and 2016 when the South Lawrence Trafficway (SLT) was still under construction.

Recommended Mitigation Measure – Monitor traffic volumes at both signalized intersections in the study area to evaluate impact of the SLT project on reduction of traffic volumes along the W. 23rd Street corridor with potential operational improvements including modification of signal timing plan and phasing scheme while maintaining coordination with other signals in the network.

- Results of a sight distance analysis indicate that existing overgrown vegetation and tree branches along west side of Naismith Drive restrict sight distance for traffic exiting the site at the cross access on Naismith Drive.

Recommended Mitigation Measure – Remove/trim vegetation/tree branches along west side of Naismith Drive on both sides of the driveway to provide for clear departure sight triangles in each direction.

Existing + Proposed “KUSH” Redevelopment

- Results of a trip generation analysis indicate that the net added external trips generated by the “KUSH” redevelopment are 103 and 89 trip-ends during morning and afternoon peak-hours of a typical weekday. Results of a volume/capacity analysis indicate that with this added traffic, LOS at the signalized intersections in the study area remains unchanged with slight increase in the delay values for some of the individual movements.

Recommended Mitigation Measure – Continue monitoring traffic volumes and signal operation at both signalized intersections in the study area for potential operational improvements including modification of signal timing plan and phasing scheme while maintaining coordination with other signals in the network.

- Results of the volume/capacity analysis also indicate that individual movements at all other intersections in the study area operate at LOS “B” and higher with no evidence of any operational deficiency.
- The existing stop sign at the cross access on Naismith Drive is sub-standard.
- **Recommended Mitigation Measure** – Replace the existing sign with a new STOP (R1-1) sign.

APPENDIX I

Figures

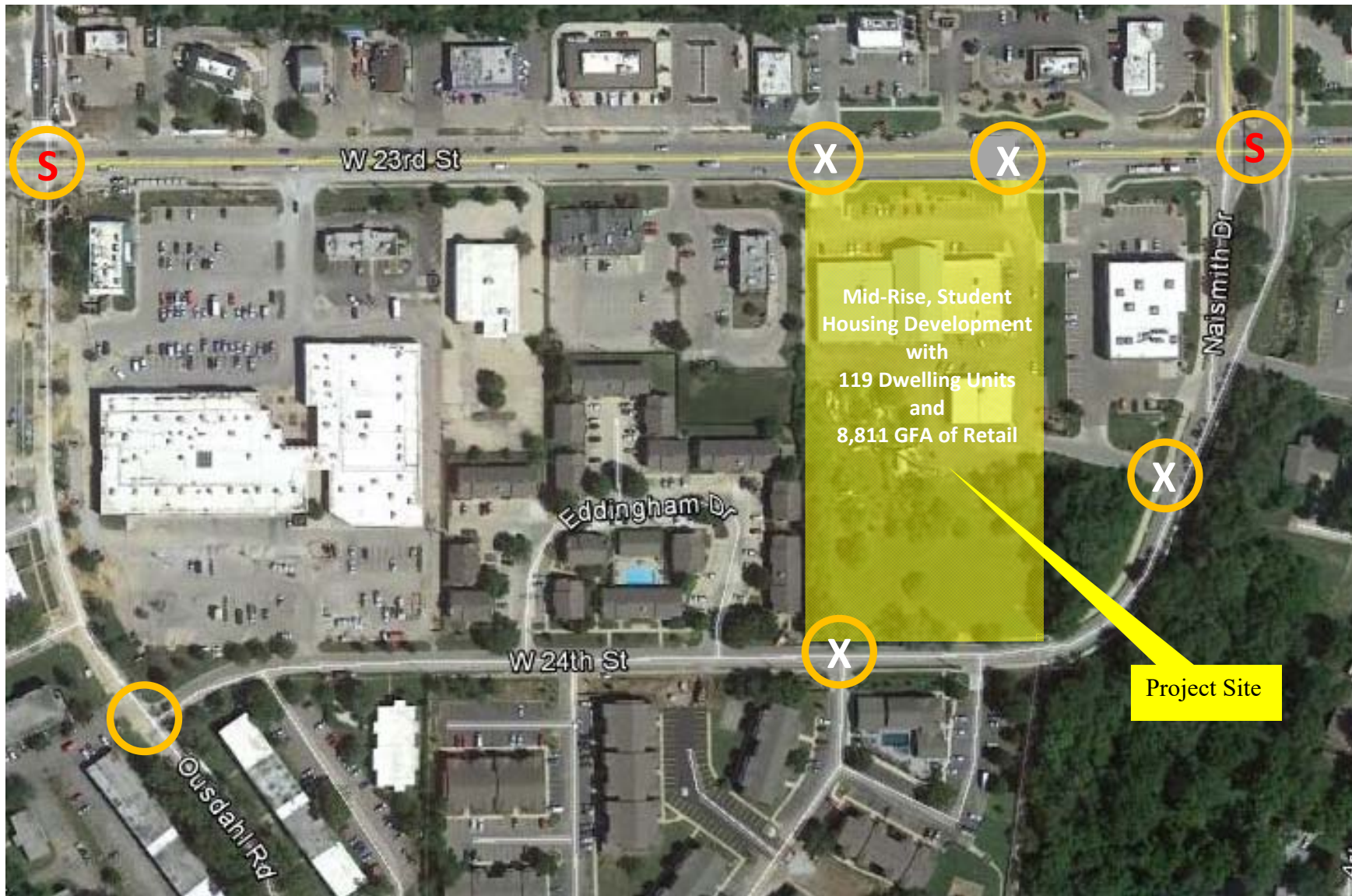


Figure 1- Location Map and Proposed Study Area

X Site Access Points

S Existing Traffic Signal

○ Proposed Study Intersections



PROJECT INFORMATION T5

Site Area 4.445 Acres
 Units Provided 119
 Bedrooms Provided 311

Floor Plate Size
 Floor 1 49,330 gsf
 Floors 2-3 45,439 gsf
 Total 140,208 gsf

Retail 8,811sf

Parking Provided 203 spaces

T5 Parking Analysis
 Apartments at 1.0/unit 119 spaces
 Retail at 3/1000 26 spaces
 Parking Subtotal 145 spaces
 Shared Parking Req't 121 spaces

Amenity/Lobby Area 6,744 sf

Unit Mix

Type	# of	Beds	
4BR	47	188	60%
3BR	5	15	5%
2BR	42	82	27%
1BR	14	14	4%
St/Mc	11	11	4%
Total	119	311	

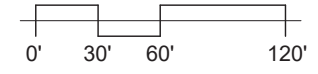


Figure 3 - Existing Traffic Volumes (Morning Peak-Hour of a Typical Weekday, 2015 - 2018)

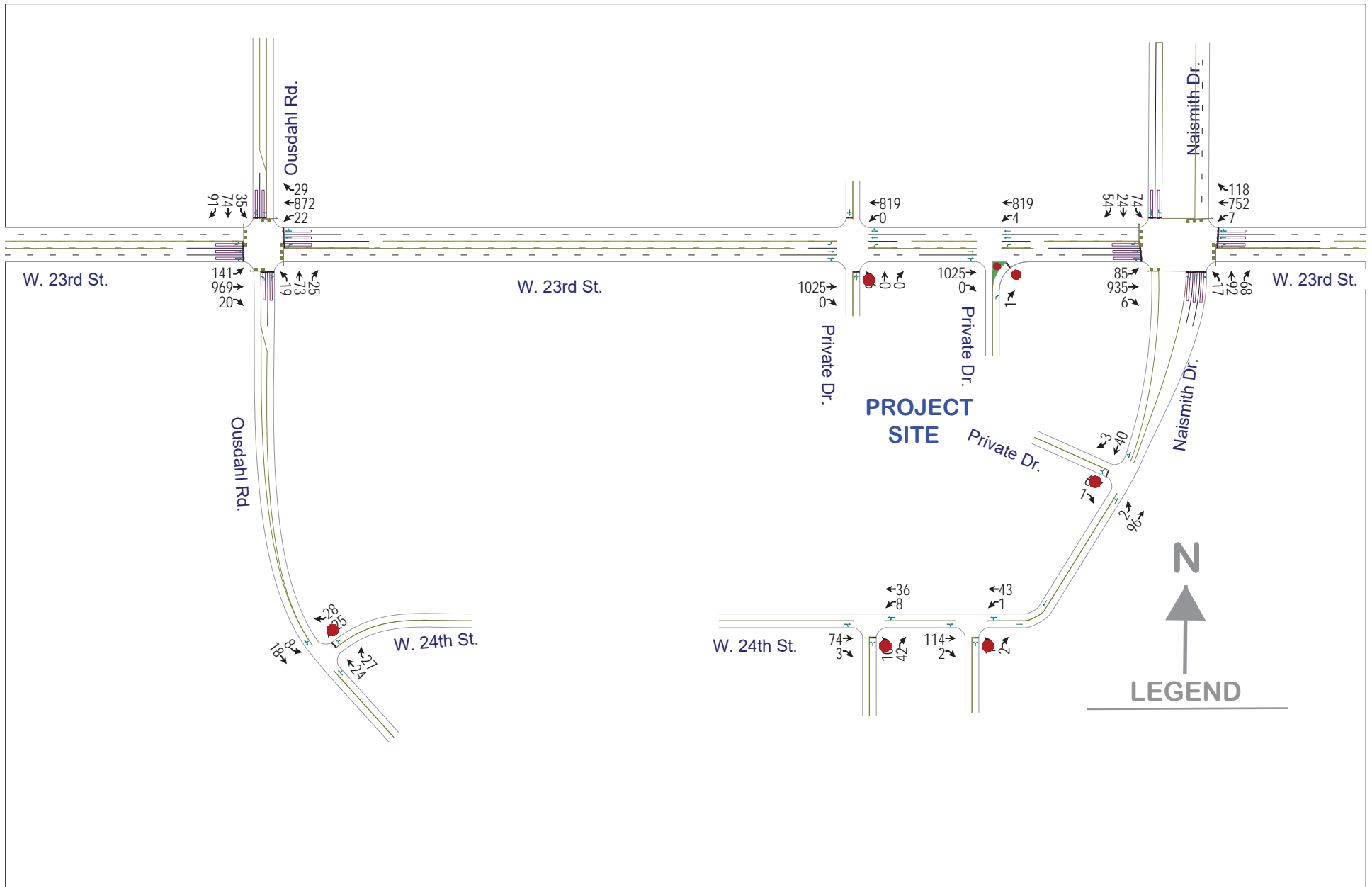


Figure 4 - Existing Traffic Volumes (Afternoon Peak-Hour of a Typical Weekday, 2015 - 2018)

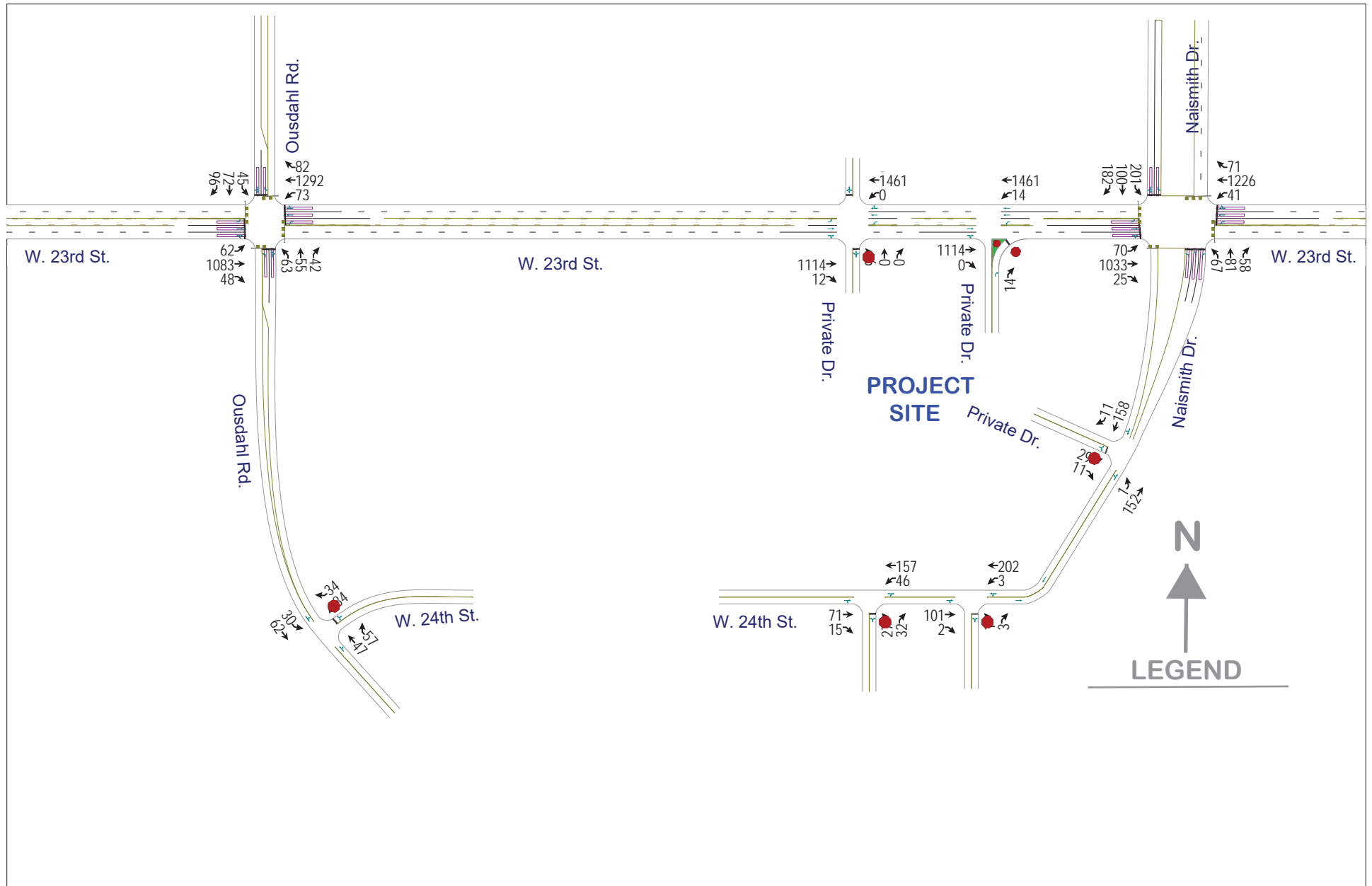


Figure 5 - Trip Distribution Patterns for the Proposed Redevelopment (Peak-Hours of a Typical Weekday)

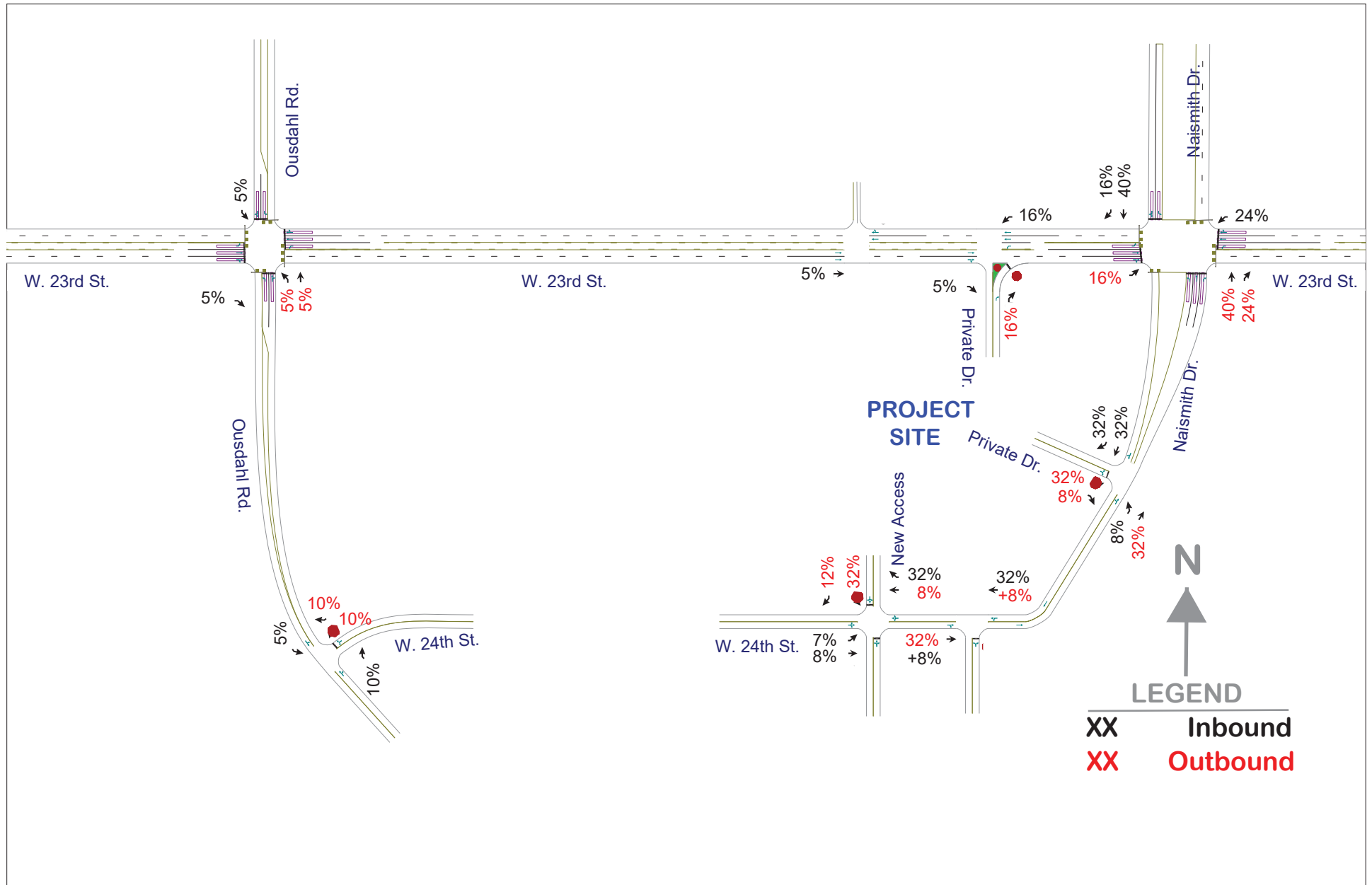


Figure 6 - Site-Generated Adjusted External Trips for the Proposed Redevelopment (Peak-Hours of a Typical Weekday)

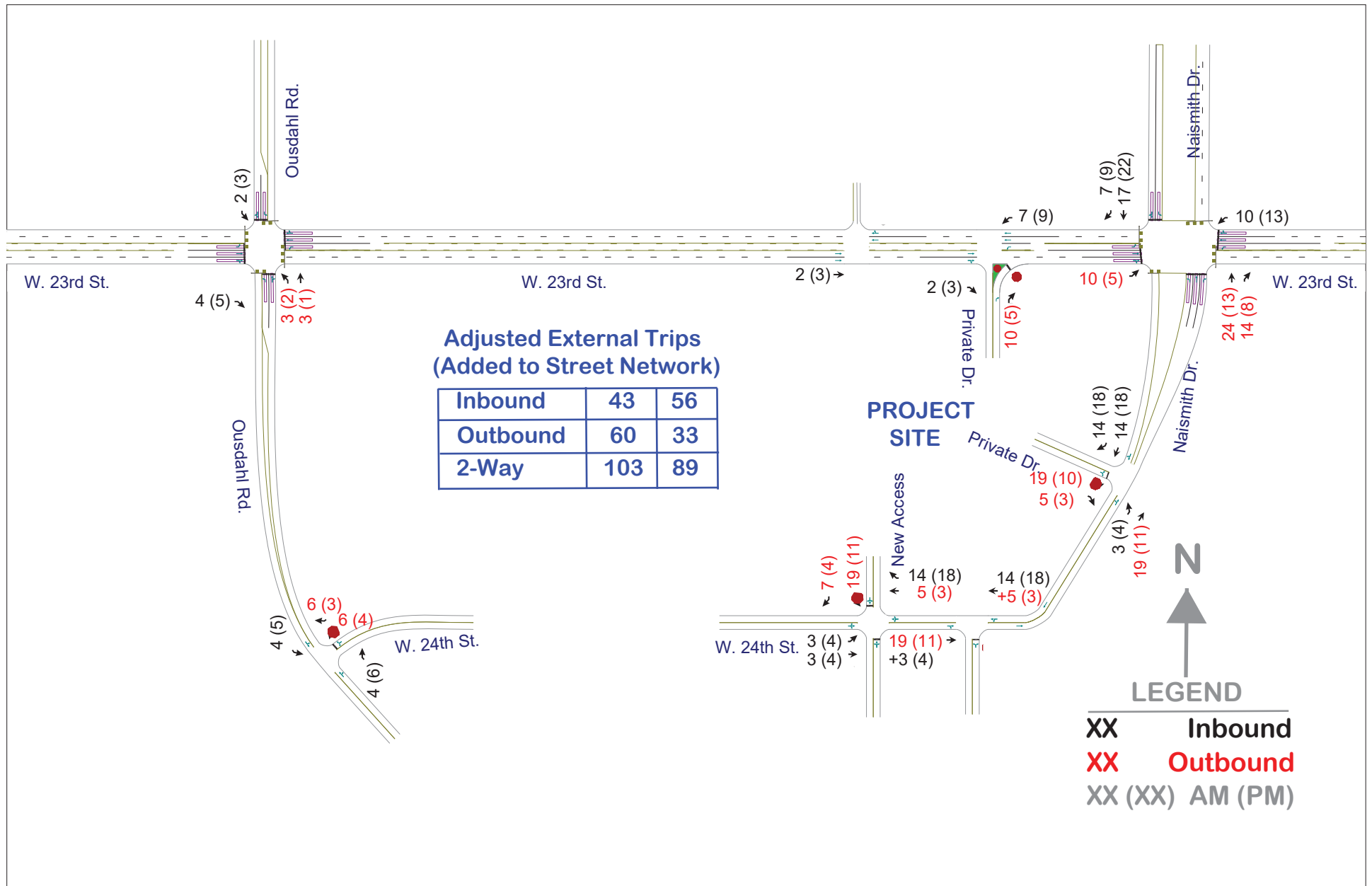


Figure 7 - "Existing + Proposed Redevelopment" Traffic Volumes (Morning Peak-Hour of a Typical Weekday)

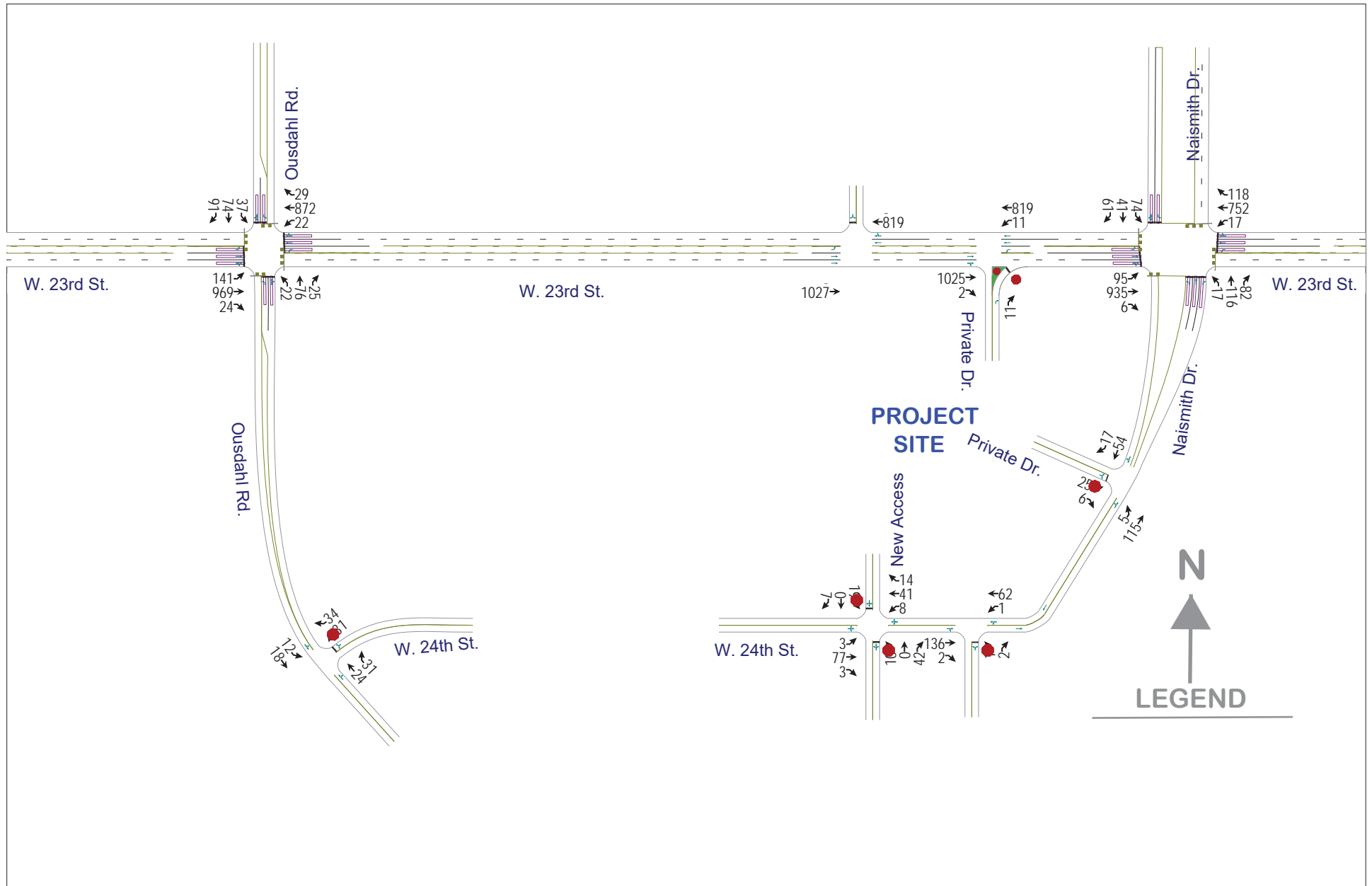
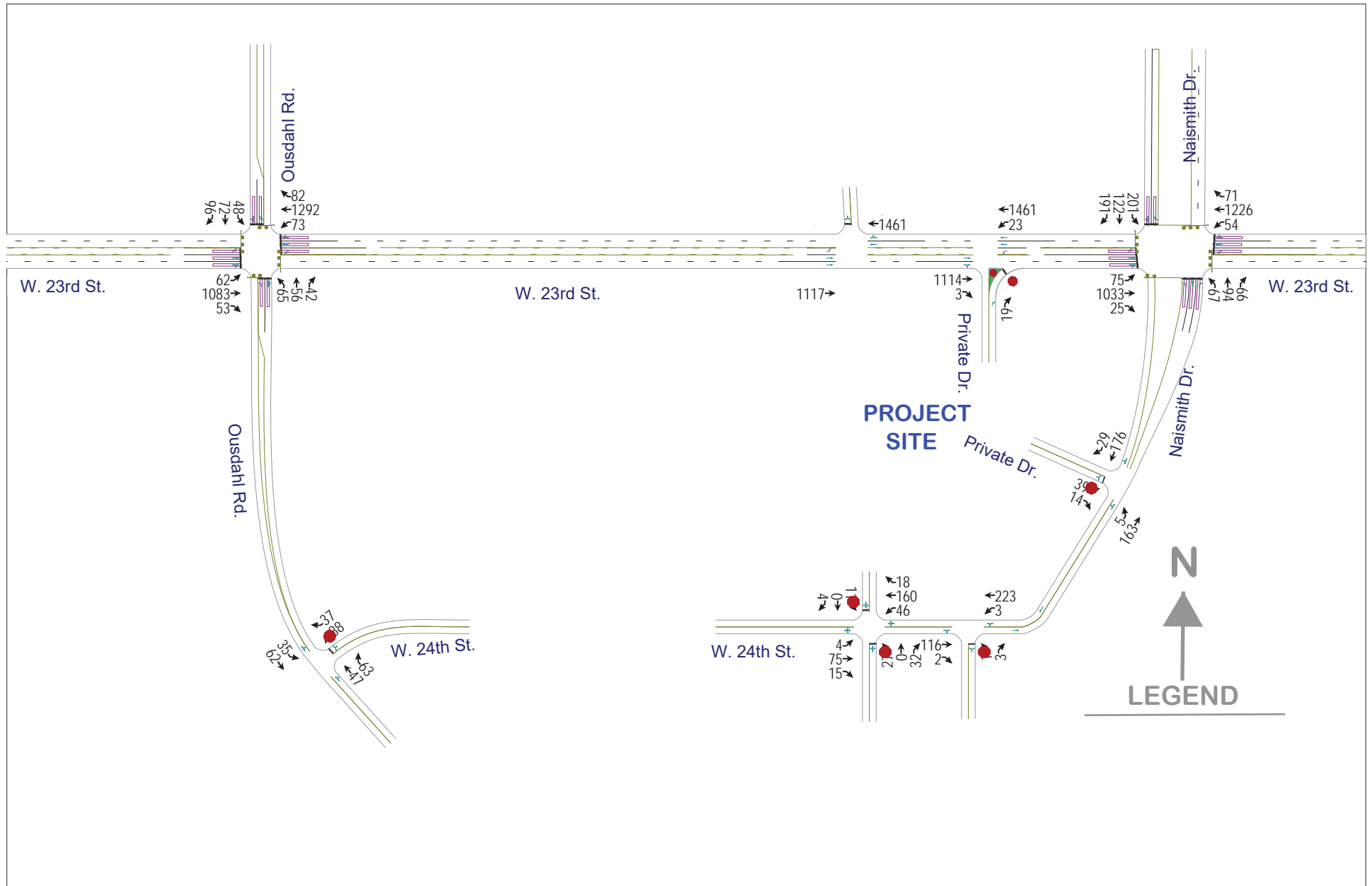


Figure 8 - "Existing + Proposed Redevelopment" Traffic Volumes (Afternoon Peak-Hour of a Typical Weekday)



APPENDIX II






















Results of Volume/Capacity Analysis
Using
Synchro 10 Software
(HCM 6th Edition Methodology)

“Existing” Traffic Volumes
Existing Operating Conditions (e.g. Signal Timing & Phasing)

23rd Street & Naismith Drive

Existing Traffic Volumes and Operating Conditions

Morning Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	935	6	7	752	118	17	92	68	74	24	54
Future Volume (vph)	85	935	6	7	752	118	17	92	68	74	24	54
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	160		0	180		0	90		90	350		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			245			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.980				0.850		0.896	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3536	0	1770	3468	0	1770	1863	1583	1770	1669	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3536	0	1770	3468	0	1770	1863	1583	1770	1669	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			15				118			59
Link Speed (mph)		35			35			30				30
Link Distance (ft)		320			418			427				355
Travel Time (s)		6.2			8.1			9.7				8.1
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
Adj. Flow (vph)	92	1016	7	8	817	128	18	100	74	80	26	59
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	1023	0	8	945	0	18	100	74	80	85	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	17.0	13.0		8.0	13.0		12.0	13.0	13.0	12.0	13.0	
Minimum Split (s)	22.0	47.0		20.0	45.0		20.0	33.0	33.0	20.0	33.0	
Total Split (s)	22.0	47.0		20.0	45.0		20.0	33.0	33.0	20.0	33.0	
Total Split (%)	18.3%	39.2%		16.7%	37.5%		16.7%	27.5%	27.5%	16.7%	27.5%	
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)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effect Green (s)	17.0	77.8		8.0	58.4		12.0	13.3	13.3	12.7	20.8	
Actuated g/C Ratio	0.14	0.65		0.07	0.49		0.10	0.11	0.11	0.11	0.17	
v/c Ratio	0.37	0.45		0.07	0.56		0.10	0.49	0.27	0.43	0.25	
Control Delay	38.6	19.9		54.0	24.0		50.7	58.7	4.3	57.5	19.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	38.6	19.9		54.0	24.0		50.7	58.7	4.3	57.5	19.9	
LOS	D	B		D	C		D	E	A	E	B	
Approach Delay		21.5			24.3			37.0			38.2	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	66	356		6	270		13	74	0	59	15	
Queue Length 95th (ft)	115	500		22	361		36	130	13	109	65	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		240			338			347				275
Turn Bay Length (ft)	160			180			90		90	350		
Base Capacity (vph)	250	2294		221	1696		221	419	447	221	437	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.37	0.45		0.04	0.56		0.08	0.24	0.17	0.36	0.19	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 119 (99%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 24.9

Intersection LOS: C

Intersection Capacity Utilization 63.7%

ICU Level of Service B

Analysis Period (min) 15























Splits and Phases: 3: Naismith Dr. / Naismith Dr. & W. 23rd St.

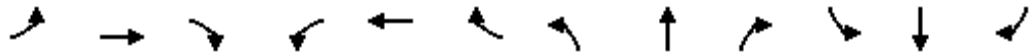


23rd Street & Naismith Drive

Existing Traffic Volumes and Operating Conditions

Afternoon Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	1033	25	41	1226	71	67	81	58	201	100	182
Future Volume (vph)	70	1033	25	41	1226	71	67	81	58	201	100	182
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	160		0	180		0	90		90	350		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			245			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.992				0.850		0.903	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3525	0	1770	3511	0	1770	1863	1583	1770	1682	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3525	0	1770	3511	0	1770	1863	1583	1770	1682	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5				131			56
Link Speed (mph)		35			35			30				30
Link Distance (ft)		320			418			427				355
Travel Time (s)		6.2			8.1			9.7				8.1
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
Adj. Flow (vph)	76	1123	27	45	1333	77	73	88	63	218	109	198
Shared Lane Traffic (%)												
Lane Group Flow (vph)	76	1150	0	45	1410	0	73	88	63	218	307	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	18.0	76.0		17.0	75.0		18.0	31.0	31.0	26.0	39.0	
Total Split (s)	18.0	76.0		17.0	75.0		18.0	31.0	31.0	26.0	39.0	
Total Split (%)	12.0%	50.7%		11.3%	50.0%		12.0%	20.7%	20.7%	17.3%	26.0%	
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)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effect Green (s)	9.7	85.6		7.7	81.4		10.8	16.5	16.5	20.4	26.0	
Actuated g/C Ratio	0.06	0.57		0.05	0.54		0.07	0.11	0.11	0.14	0.17	
v/c Ratio	0.67	0.57		0.49	0.74		0.57	0.43	0.22	0.91	0.91	
Control Delay	107.9	13.3		87.0	31.1		84.4	66.6	1.7	101.9	79.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	107.9	13.3		87.0	31.1		84.4	66.6	1.7	101.9	79.6	
LOS	F	B		F	C		F	E	A	F	E	
Approach Delay		19.1			32.8			54.1			88.9	
Approach LOS		B			C			D			F	
Queue Length 50th (ft)	79	156		44	551		70	81	0	212	247	
Queue Length 95th (ft)	138	176		87	751		126	133	0	#363	349	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		240			338			347			275	
Turn Bay Length (ft)	160			180			90		90	350		
Base Capacity (vph)	153	2012		141	1907		153	310	373	247	413	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.50	0.57		0.32	0.74		0.48	0.28	0.17	0.88	0.74	

Intersection Summary

Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	78 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	37.9
Intersection LOS:	D
Intersection Capacity Utilization	80.9%
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: 3: Naismith Dr. / Naismith Dr. & W. 23rd St.



Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	1	2	96	40	3
Future Vol, veh/h	6	1	2	96	40	3
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	7	1	2	104	43	3

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	153	45	46	0	0
Stage 1	45	-	-	-	-
Stage 2	108	-	-	-	-
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	839	1025	1562	-	-
Stage 1	977	-	-	-	-
Stage 2	916	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	838	1025	1562	-	-
Mov Cap-2 Maneuver	838	-	-	-	-
Stage 1	976	-	-	-	-
Stage 2	916	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1562	-	860	-	-
HCM Lane V/C Ratio	0.001	-	0.009	-	-
HCM Control Delay (s)	7.3	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	29	11	1	152	158	11
Future Vol, veh/h	29	11	1	152	158	11
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	32	12	1	165	172	12

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	345	178	184	0	0
Stage 1	178	-	-	-	-
Stage 2	167	-	-	-	-
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	652	865	1391	-	-
Stage 1	853	-	-	-	-
Stage 2	863	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	651	865	1391	-	-
Mov Cap-2 Maneuver	651	-	-	-	-
Stage 1	852	-	-	-	-
Stage 2	863	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1391	-	699	-	-
HCM Lane V/C Ratio	0.001	-	0.062	-	-
HCM Control Delay (s)	7.6	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	2	1	43	1	2
Future Vol, veh/h	114	2	1	43	1	2
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	124	2	1	47	1	2

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	126	0	174
Stage 1	-	-	-	-	125
Stage 2	-	-	-	-	49
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1460	-	816
Stage 1	-	-	-	-	901
Stage 2	-	-	-	-	973
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1460	-	815
Mov Cap-2 Maneuver	-	-	-	-	815
Stage 1	-	-	-	-	900
Stage 2	-	-	-	-	973

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	886	-	-	1460	-
HCM Lane V/C Ratio	0.004	-	-	0.001	-
HCM Control Delay (s)	9.1	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

24th Street & The Rockland East Access Existing Traffic Volumes and Operating Conditions




Afternoon Peak-Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	101	2	3	202	1	3
Future Vol, veh/h	101	2	3	202	1	3
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	110	2	3	220	1	3

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	112	0	337
Stage 1	-	-	-	-	111
Stage 2	-	-	-	-	226
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1478	-	658
Stage 1	-	-	-	-	914
Stage 2	-	-	-	-	812
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1478	-	657
Mov Cap-2 Maneuver	-	-	-	-	657
Stage 1	-	-	-	-	912
Stage 2	-	-	-	-	812

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	850	-	-	1478	-
HCM Lane V/C Ratio	0.005	-	-	0.002	-
HCM Control Delay (s)	9.3	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	74	3	8	36	10	42
Future Vol, veh/h	74	3	8	36	10	42
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	80	3	9	39	11	46
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	83	0	139	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	57	-
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	-	-	1514	-	854	978
Stage 1	-	-	-	-	941	-
Stage 2	-	-	-	-	966	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1514	-	849	978
Mov Cap-2 Maneuver	-	-	-	-	849	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	966	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	1.3	9			
HCM LOS				A		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	950	-	-	1514	-	
HCM Lane V/C Ratio	0.059	-	-	0.006	-	
HCM Control Delay (s)	9	-	-	7.4	0	
HCM Lane LOS	A	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0	-	

Intersection

Int Delay, s/veh 2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	71	15	46	157	27	32
Future Vol, veh/h	71	15	46	157	27	32
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	77	16	50	171	29	35

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	93	0	356 85
Stage 1	-	-	-	-	85 -
Stage 2	-	-	-	-	271 -
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	-	-	1501	-	642 974
Stage 1	-	-	-	-	938 -
Stage 2	-	-	-	-	775 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1501	-	618 974
Mov Cap-2 Maneuver	-	-	-	-	618 -
Stage 1	-	-	-	-	903 -
Stage 2	-	-	-	-	775 -

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	771	-	-	1501	-
HCM Lane V/C Ratio	0.083	-	-	0.033	-
HCM Control Delay (s)	10.1	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection

Int Delay, s/veh 4.1

Movement

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	8	18	24	27	25	28
Future Vol, veh/h	8	18	24	27	25	28
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	9	20	26	29	27	30

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	55	0	0	79	41
Stage 1	-	-	-	41	-
Stage 2	-	-	-	38	-
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	1550	-	-	924	1030
Stage 1	-	-	-	981	-
Stage 2	-	-	-	984	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1550	-	-	918	1030
Mov Cap-2 Maneuver	-	-	-	918	-
Stage 1	-	-	-	975	-
Stage 2	-	-	-	984	-

Approach

	SE	NW	SW
HCM Control Delay, s	2.3	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt

	NWT	NWR	SEL	SETSWLn1
Capacity (veh/h)	-	-	1550	- 974
HCM Lane V/C Ratio	-	-	0.006	- 0.059
HCM Control Delay (s)	-	-	7.3	0 8.9
HCM Lane LOS	-	-	A	A A
HCM 95th %tile Q(veh)	-	-	0	- 0.2

Intersection

Int Delay, s/veh 4.6

Movement

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	30	62	47	57	84	34
Future Vol, veh/h	30	62	47	57	84	34
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	33	67	51	62	91	37

Major/Minor

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	113	0	0
Stage 1	-	-	82
Stage 2	-	-	133
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1476	-	773
Stage 1	-	-	941
Stage 2	-	-	893
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1476	-	755
Mov Cap-2 Maneuver	-	-	755
Stage 1	-	-	919
Stage 2	-	-	893

Approach

Approach	SE	NW	SW
HCM Control Delay, s	2.4	0	10.3
HCM LOS			B





















Minor Lane/Major Mvmt

Minor Lane/Major Mvmt	NWT	NWR	SEL	SETSWLn1
Capacity (veh/h)	-	-	1476	808
HCM Lane V/C Ratio	-	-	0.022	0.159
HCM Control Delay (s)	-	-	7.5	10.3
HCM Lane LOS	-	-	A	B
HCM 95th %tile Q(veh)	-	-	0.1	0.6

23rd Street & Ousdahl Road

Existing Traffic Volumes and Operating Conditions

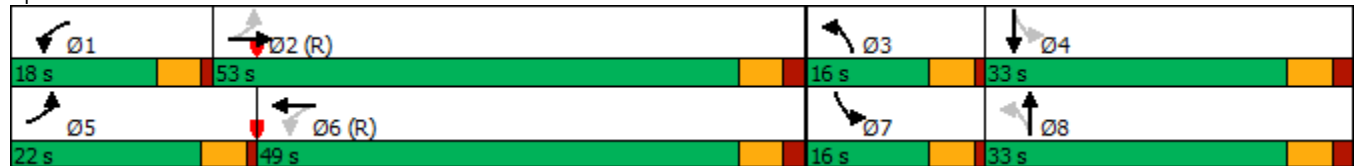
Morning Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	969	20	22	872	29	19	73	25	35	74	91
Future Volume (vph)	141	969	20	22	872	29	19	73	25	35	74	91
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	95		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			45			40		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.995			0.962				0.917
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3529	0	1770	3522	0	1770	1792	0	1770	1708	0
Flt Permitted	0.223			0.227			0.485			0.589		
Satd. Flow (perm)	415	3529	0	423	3522	0	903	1792	0	1097	1708	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			3			13				48
Link Speed (mph)		35			35			30				30
Link Distance (ft)		500			1035			738				363
Travel Time (s)		9.7			20.2			16.8				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
Adj. Flow (vph)	153	1053	22	24	948	32	21	79	27	38	80	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	1075	0	24	980	0	21	106	0	38	179	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	22.0	53.0		18.0	49.0		16.0	33.0		16.0	33.0	
Total Split (s)	22.0	53.0		18.0	49.0		16.0	33.0		16.0	33.0	
Total Split (%)	18.3%	44.2%		15.0%	40.8%		13.3%	27.5%		13.3%	27.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effect Green (s)	86.4	80.2		81.1	74.1		18.5	13.6		20.7	16.5	
Actuated g/C Ratio	0.72	0.67		0.68	0.62		0.15	0.11		0.17	0.14	
v/c Ratio	0.40	0.46		0.07	0.45		0.11	0.49		0.17	0.65	
Control Delay	9.5	12.9		3.0	6.3		36.2	50.5		37.4	45.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.5	12.9		3.0	6.3		36.2	50.5		37.4	45.9	
LOS	A	B		A	A		D	D		D	D	
Approach Delay		12.5			6.2			48.1			44.4	
Approach LOS		B			A			D			D	
Queue Length 50th (ft)	33	227		1	26		13	70		24	90	
Queue Length 95th (ft)	74	350		m4	418		32	120		49	167	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		420			955			658			283	
Turn Bay Length (ft)	100			150			95			80		
Base Capacity (vph)	495	2359		452	2175		242	413		265	421	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.46		0.05	0.45		0.09	0.26		0.14	0.43	

Intersection Summary	
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset: 42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	14.5
Intersection LOS:	B
Intersection Capacity Utilization	62.8%
ICU Level of Service	B
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	





















Splits and Phases: 6: Ousdahl Rd. & W. 23rd St. /W. 23rd St.



23rd Street & Ousdahl Road

Existing Traffic Volumes and Operating Conditions

Afternoon Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1083	48	73	1292	82	63	55	42	45	72	96
Future Volume (vph)	62	1083	48	73	1292	82	63	55	42	45	72	96
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	95		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			45			40		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.991			0.935				0.914
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3518	0	1770	3507	0	1770	1742	0	1770	1703	0
Flt Permitted	0.113			0.166			0.312			0.643		
Satd. Flow (perm)	210	3518	0	309	3507	0	581	1742	0	1198	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			6			24			41	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		500			1035			738			363	
Travel Time (s)		9.7			20.2			16.8			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
Adj. Flow (vph)	67	1177	52	79	1404	89	68	60	46	49	78	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	1229	0	79	1493	0	68	106	0	49	182	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	20.0	70.0		24.0	74.0		16.0	40.0		16.0	40.0	
Total Split (s)	20.0	70.0		24.0	74.0		16.0	40.0		16.0	40.0	
Total Split (%)	13.3%	46.7%		16.0%	49.3%		10.7%	26.7%		10.7%	26.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effect Green (s)	103.8	96.4		105.7	99.0		27.7	19.0		25.8	18.1	
Actuated g/C Ratio	0.69	0.64		0.70	0.66		0.18	0.13		0.17	0.12	
v/c Ratio	0.32	0.54		0.28	0.64		0.38	0.44		0.21	0.76	
Control Delay	11.8	17.6		13.0	19.8		51.8	50.7		46.4	68.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	11.8	17.6		13.0	19.8		51.8	50.7		46.4	68.0	
LOS	B	B		B	B		D	D		D	E	
Approach Delay		17.3			19.5			51.1			63.4	
Approach LOS		B			B			D			E	
Queue Length 50th (ft)	18	338		20	297		54	74		39	136	
Queue Length 95th (ft)	42	504		m55	554		91	131		71	213	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		420			955			658			283	
Turn Bay Length (ft)	100			150			95			80		
Base Capacity (vph)	309	2261		409	2317		198	413		264	417	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.22	0.54		0.19	0.64		0.34	0.26		0.19	0.44	

Intersection Summary	
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	76 (51%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	23.4
Intersection LOS:	C
Intersection Capacity Utilization	76.3%
ICU Level of Service	D
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Ousdahl Rd. & W. 23rd St. /W. 23rd St.



Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑		↑
Traffic Vol, veh/h	1025	0	4	819	0	1
Future Vol, veh/h	1025	0	4	819	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	50	-	-	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	1114	0	4	890	0	1

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	1114	0	-	557
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	-	3.32
Pot Cap-1 Maneuver	-	-	623	-	0	474
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	623	-	-	474
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	474	-	-	623	-
HCM Lane V/C Ratio	0.002	-	-	0.007	-
HCM Control Delay (s)	12.6	-	-	10.8	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑		↗
Traffic Vol, veh/h	1114	0	14	1461	0	14
Future Vol, veh/h	1114	0	14	1461	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	50	-	-	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	1211	0	15	1588	0	15

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1211	0	606
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	3.32
Pot Cap-1 Maneuver	-	-	572	0	440
Stage 1	-	-	-	0	-
Stage 2	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	572	-	440
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-























Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	440	-	-	572	-
HCM Lane V/C Ratio	0.035	-	-	0.027	-
HCM Control Delay (s)	13.5	-	-	11.5	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

**“Existing + Proposed Redevelopment” Traffic Volumes
Existing Operating Conditions (e.g. Signal Timing & Phasing)**

23rd Street & Naismith Drive
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	935	6	17	752	118	17	116	82	74	41	61
Future Volume (vph)	95	935	6	17	752	118	17	116	82	74	41	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	160		0	180		0	90		90	350		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			245			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.980				0.850		0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3536	0	1770	3468	0	1770	1863	1583	1770	1697	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3536	0	1770	3468	0	1770	1863	1583	1770	1697	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			15				118			57
Link Speed (mph)		35			35			30				30
Link Distance (ft)		320			418			427				355
Travel Time (s)		6.2			8.1			9.7				8.1
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
Adj. Flow (vph)	103	1016	7	18	817	128	18	126	89	80	45	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	1023	0	18	945	0	18	126	89	80	111	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	17.0	13.0		8.0	13.0		12.0	13.0	13.0	12.0	13.0	
Minimum Split (s)	22.0	47.0		20.0	45.0		20.0	33.0	33.0	20.0	33.0	
Total Split (s)	22.0	47.0		20.0	45.0		20.0	33.0	33.0	20.0	33.0	
Total Split (%)	18.3%	39.2%		16.7%	37.5%		16.7%	27.5%	27.5%	16.7%	27.5%	
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)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effect Green (s)	17.0	74.7		8.0	57.9		12.0	13.9	13.9	12.7	21.3	
Actuated g/C Ratio	0.14	0.62		0.07	0.48		0.10	0.12	0.12	0.11	0.18	
v/c Ratio	0.41	0.47		0.15	0.56		0.10	0.59	0.31	0.43	0.32	
Control Delay	39.2	24.4		56.1	24.7		50.7	61.8	6.6	57.5	25.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	39.2	24.4		56.1	24.7		50.7	61.8	6.6	57.5	25.2	
LOS	D	C		E	C		D	E	A	E	C	
Approach Delay		25.7			25.2			39.8			38.7	
Approach LOS		C			C			D			D	
Queue Length 50th (ft)	74	354		13	270		13	95	0	59	33	
Queue Length 95th (ft)	132	501		38	374		36	155	27	109	91	

23rd Street & Naismith Drive
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		240			338			347			275	
Turn Bay Length (ft)	160			180			90		90	350		
Base Capacity (vph)	250	2200		221	1679		221	419	447	221	442	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.41	0.47		0.08	0.56		0.08	0.30	0.20	0.36	0.25	























Intersection Summary	
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	119 (99%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.59
Intersection Signal Delay:	27.8
Intersection LOS:	C
Intersection Capacity Utilization	63.7%
ICU Level of Service	B
Analysis Period (min)	15

Splits and Phases: 3: Naismith Dr. / Naismith Dr. & W. 23rd St.



23rd Street & Naismith Drive
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	1033	25	54	1226	71	67	94	66	201	122	191
Future Volume (vph)	75	1033	25	54	1226	71	67	94	66	201	122	191
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	160		0	180		0	90		90	350		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25			25			245			0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.992				0.850		0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3525	0	1770	3511	0	1770	1863	1583	1770	1693	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	3525	0	1770	3511	0	1770	1863	1583	1770	1693	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5				131		48	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		320			418			427			355	
Travel Time (s)		6.2			8.1			9.7			8.1	
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
Adj. Flow (vph)	82	1123	27	59	1333	77	73	102	72	218	133	208
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	1150	0	59	1410	0	73	102	72	218	341	0
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Detector Phase	5	2		1	6		3	8	8	7	4	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	18.0	76.0		17.0	75.0		18.0	31.0	31.0	26.0	39.0	
Total Split (s)	18.0	76.0		17.0	75.0		18.0	31.0	31.0	26.0	39.0	
Total Split (%)	12.0%	50.7%		11.3%	50.0%		12.0%	20.7%	20.7%	17.3%	26.0%	
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)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effect Green (s)	10.0	81.7		8.6	78.1		10.8	19.5	19.5	20.4	29.0	
Actuated g/C Ratio	0.07	0.54		0.06	0.52		0.07	0.13	0.13	0.14	0.19	
v/c Ratio	0.69	0.60		0.58	0.77		0.57	0.42	0.23	0.91	0.93	
Control Delay	111.6	14.6		90.4	34.0		84.4	63.9	1.6	101.9	83.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	111.6	14.6		90.4	34.0		84.4	63.9	1.6	101.9	83.2	
LOS	F	B		F	C		F	E	A	F	F	
Approach Delay		21.0			36.2			51.8			90.5	
Approach LOS		C			D			D			F	
Queue Length 50th (ft)	85	159		57	593		70	92	0	212	285	
Queue Length 95th (ft)	145	178		106	751		126	150	0	#363	#441	

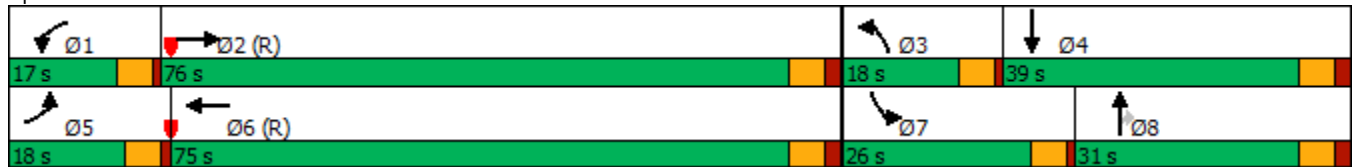
23rd Street & Naismith Drive
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		240			338			347			275	
Turn Bay Length (ft)	160			180			90		90	350		
Base Capacity (vph)	153	1921		141	1831		153	310	373	247	409	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.54	0.60		0.42	0.77		0.48	0.33	0.19	0.88	0.83	

Intersection Summary	
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	78 (52%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.93
Intersection Signal Delay:	40.6
Intersection LOS:	D
Intersection Capacity Utilization	82.6%
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: 3: Naismith Dr. / Naismith Dr. & W. 23rd St.



Naismith Drive & Site Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	25	6	5	115	54	17
Future Vol, veh/h	25	6	5	115	54	17
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	27	7	5	125	59	18

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	203	68	77	0	0
Stage 1	68	-	-	-	-
Stage 2	135	-	-	-	-
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	786	995	1522	-	-
Stage 1	955	-	-	-	-
Stage 2	891	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	783	995	1522	-	-
Mov Cap-2 Maneuver	783	-	-	-	-
Stage 1	951	-	-	-	-
Stage 2	891	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1522	-	817	-	-
HCM Lane V/C Ratio	0.004	-	0.041	-	-
HCM Control Delay (s)	7.4	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Naismith Drive & Site Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	39	14	5	163	176	29
Future Vol, veh/h	39	14	5	163	176	29
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	42	15	5	177	191	32

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	394	207	223	0	-	0
Stage 1	207	-	-	-	-	-
Stage 2	187	-	-	-	-	-
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	611	833	1346	-	-	-
Stage 1	828	-	-	-	-	-
Stage 2	845	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	609	833	1346	-	-	-
Mov Cap-2 Maneuver	609	-	-	-	-	-
Stage 1	825	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1346	-	656	-	-
HCM Lane V/C Ratio	0.004	-	0.088	-	-
HCM Control Delay (s)	7.7	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

24th Street & The Rockland East Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	136	2	1	62	1	2
Future Vol, veh/h	136	2	1	62	1	2
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	148	2	1	67	1	2

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	150	0	218
Stage 1	-	-	-	-	149
Stage 2	-	-	-	-	69
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1431	-	770
Stage 1	-	-	-	-	879
Stage 2	-	-	-	-	954
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1431	-	769
Mov Cap-2 Maneuver	-	-	-	-	769
Stage 1	-	-	-	-	878
Stage 2	-	-	-	-	954

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	850	-	-	1431	-
HCM Lane V/C Ratio	0.004	-	-	0.001	-
HCM Control Delay (s)	9.3	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

24th Street & The Rockland East Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	116	2	3	223	1	3
Future Vol, veh/h	116	2	3	223	1	3
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	126	2	3	242	1	3

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	128	0	375
Stage 1	-	-	-	-	127
Stage 2	-	-	-	-	248
Critical Hdwy	-	-	4.12	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	-	-	2.218	-	3.518
Pot Cap-1 Maneuver	-	-	1458	-	626
Stage 1	-	-	-	-	899
Stage 2	-	-	-	-	793
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1458	-	625
Mov Cap-2 Maneuver	-	-	-	-	625
Stage 1	-	-	-	-	897
Stage 2	-	-	-	-	793

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	825	-	-	1458	-
HCM Lane V/C Ratio	0.005	-	-	0.002	-
HCM Control Delay (s)	9.4	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

24th Street & The Rockland Middle Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Intersection												
Int Delay, s/veh	3.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	3	77	3	8	41	14	10	0	42	19	0	7
Future Vol, veh/h	3	77	3	8	41	14	10	0	42	19	0	7
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	-	-	-	-	-	-	-	-	-	-	-	-
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	3	84	3	9	45	15	11	0	46	21	0	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	60	0	0	87	0	0	167	170	86	186	164	53
Stage 1	-	-	-	-	-	-	92	92	-	71	71	-
Stage 2	-	-	-	-	-	-	75	78	-	115	93	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1544	-	-	1509	-	-	797	723	973	775	729	1014
Stage 1	-	-	-	-	-	-	915	819	-	939	836	-
Stage 2	-	-	-	-	-	-	934	830	-	890	818	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1544	-	-	1509	-	-	786	717	973	734	723	1014
Mov Cap-2 Maneuver	-	-	-	-	-	-	786	717	-	734	723	-
Stage 1	-	-	-	-	-	-	913	817	-	937	831	-
Stage 2	-	-	-	-	-	-	921	825	-	847	816	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.9			9.1			9.7		
HCM LOS							A			A		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	930	1544	-	-	1509	-	-	793
HCM Lane V/C Ratio	0.061	0.002	-	-	0.006	-	-	0.036
HCM Control Delay (s)	9.1	7.3	0	-	7.4	0	-	9.7
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1

24th Street & The Rockland Middle Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Intersection

Int Delay, s/veh 2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	75	15	46	160	18	27	0	32	11	0	4
Future Vol, veh/h	4	75	15	46	160	18	27	0	32	11	0	4
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	-	-	-	-	-	-	-	-	-	-	-	-
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	4	82	16	50	174	20	29	0	35	12	0	4

Major/Minor	Major1		Major2		Minor1		Minor2					
Conflicting Flow All	194	0	0	98	0	0	384	392	90	400	390	184
Stage 1	-	-	-	-	-	-	98	98	-	284	284	-
Stage 2	-	-	-	-	-	-	286	294	-	116	106	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1379	-	-	1495	-	-	574	544	968	560	545	858
Stage 1	-	-	-	-	-	-	908	814	-	723	676	-
Stage 2	-	-	-	-	-	-	721	670	-	889	807	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1379	-	-	1495	-	-	553	522	968	523	523	858
Mov Cap-2 Maneuver	-	-	-	-	-	-	553	522	-	523	523	-
Stage 1	-	-	-	-	-	-	905	812	-	721	650	-
Stage 2	-	-	-	-	-	-	690	645	-	854	805	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.5	10.5	11.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	721	1379	-	-	1495	-	-	584
HCM Lane V/C Ratio	0.089	0.003	-	-	0.033	-	-	0.028
HCM Control Delay (s)	10.5	7.6	0	-	7.5	0	-	11.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.1

24th Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Intersection						
Int Delay, s/veh	4.5					
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↕	↕		↕	
Traffic Vol, veh/h	12	18	24	31	31	34
Future Vol, veh/h	12	18	24	31	31	34
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	13	20	26	34	34	37

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	60	0	-	0	89 43
Stage 1	-	-	-	-	43 -
Stage 2	-	-	-	-	46 -
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	1544	-	-	-	912 1027
Stage 1	-	-	-	-	979 -
Stage 2	-	-	-	-	976 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1544	-	-	-	904 1027
Mov Cap-2 Maneuver	-	-	-	-	904 -
Stage 1	-	-	-	-	970 -
Stage 2	-	-	-	-	976 -

Approach	SE	NW	SW
HCM Control Delay, s	2.9	0	9
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SETSWLn1
Capacity (veh/h)	-	-	1544	- 964
HCM Lane V/C Ratio	-	-	0.008	- 0.073
HCM Control Delay (s)	-	-	7.4	0 9
HCM Lane LOS	-	-	A	A A
HCM 95th %tile Q(veh)	-	-	0	- 0.2

24th Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Intersection						
Int Delay, s/veh	4.7					
Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations		↶	↷		↶	↷
Traffic Vol, veh/h	35	62	47	63	88	37
Future Vol, veh/h	35	62	47	63	88	37
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	38	67	51	68	96	40





















Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	119	0	-	0	228 85
Stage 1	-	-	-	-	85 -
Stage 2	-	-	-	-	143 -
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	1469	-	-	-	760 974
Stage 1	-	-	-	-	938 -
Stage 2	-	-	-	-	884 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1469	-	-	-	739 974
Mov Cap-2 Maneuver	-	-	-	-	739 -
Stage 1	-	-	-	-	913 -
Stage 2	-	-	-	-	884 -

Approach	SE	NW	SW
HCM Control Delay, s	2.7	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SETSWLn1
Capacity (veh/h)	-	-	1469	- 796
HCM Lane V/C Ratio	-	-	0.026	- 0.171
HCM Control Delay (s)	-	-	7.5	0 10.5
HCM Lane LOS	-	-	A	A B
HCM 95th %tile Q(veh)	-	-	0.1	- 0.6

23rd Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	141	969	24	22	872	29	22	76	25	37	74	91
Future Volume (vph)	141	969	24	22	872	29	22	76	25	37	74	91
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	95		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			45			40		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.995			0.963			0.917	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3525	0	1770	3522	0	1770	1794	0	1770	1708	0
Flt Permitted	0.220			0.223			0.485			0.576		
Satd. Flow (perm)	410	3525	0	415	3522	0	903	1794	0	1073	1708	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			3			13			48	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		500			1035			738			363	
Travel Time (s)		9.7			20.2			16.8			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
Adj. Flow (vph)	153	1053	26	24	948	32	24	83	27	40	80	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	1079	0	24	980	0	24	110	0	40	179	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	22.0	53.0		18.0	49.0		16.0	33.0		16.0	33.0	
Total Split (s)	22.0	53.0		18.0	49.0		16.0	33.0		16.0	33.0	
Total Split (%)	18.3%	44.2%		15.0%	40.8%		13.3%	27.5%		13.3%	27.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effect Green (s)	84.1	77.9		78.7	71.7		19.9	13.8		22.1	16.5	
Actuated g/C Ratio	0.70	0.65		0.66	0.60		0.17	0.12		0.18	0.14	
v/c Ratio	0.41	0.47		0.07	0.47		0.12	0.51		0.17	0.65	
Control Delay	10.2	13.9		3.1	6.6		35.3	50.9		36.2	46.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	10.2	13.9		3.1	6.6		35.3	50.9		36.2	46.2	
LOS	B	B		A	A		D	D		D	D	
Approach Delay		13.4			6.5			48.1			44.4	
Approach LOS		B			A			D			D	
Queue Length 50th (ft)	36	242		1	28		15	71		25	99	
Queue Length 95th (ft)	74	354		m3	414		35	123		50	167	

23rd Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		420			955			658			283	
Turn Bay Length (ft)	100			150			95			80		
Base Capacity (vph)	484	2288		439	2105		259	413		283	421	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.47		0.05	0.47		0.09	0.27		0.14	0.43	





















Intersection Summary	
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	42 (35%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.65
Intersection Signal Delay:	15.2
Intersection LOS:	B
Intersection Capacity Utilization	65.3%
ICU Level of Service	C
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Ousdahl Rd. & W. 23rd St. /W. 23rd St.



23rd Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1083	53	73	1292	82	65	56	42	48	72	96
Future Volume (vph)	62	1083	53	73	1292	82	65	56	42	48	72	96
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	95		0	80		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			45			40		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.991			0.936			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3514	0	1770	3507	0	1770	1744	0	1770	1703	0
Flt Permitted	0.109			0.160			0.315			0.686		
Satd. Flow (perm)	203	3514	0	298	3507	0	587	1744	0	1278	1703	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			6			23			41	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		500			1035			738			363	
Travel Time (s)		9.7			20.2			16.8			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
Adj. Flow (vph)	67	1177	58	79	1404	89	71	61	46	52	78	104
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	1235	0	79	1493	0	71	107	0	52	182	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		3	8		7	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	20.0	70.0		24.0	74.0		16.0	40.0		16.0	40.0	
Total Split (s)	20.0	70.0		24.0	74.0		16.0	40.0		16.0	40.0	
Total Split (%)	13.3%	46.7%		16.0%	49.3%		10.7%	26.7%		10.7%	26.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Act Effect Green (s)	101.4	94.0		103.4	96.7		30.0	21.2		27.2	18.1	
Actuated g/C Ratio	0.68	0.63		0.69	0.64		0.20	0.14		0.18	0.12	
v/c Ratio	0.33	0.56		0.29	0.66		0.38	0.40		0.20	0.76	
Control Delay	12.3	18.5		13.8	21.6		50.8	50.0		46.0	68.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	12.3	18.5		13.8	21.6		50.8	50.0		46.0	68.0	
LOS	B	B		B	C		D	D		D	E	
Approach Delay		18.2			21.3			50.3			63.1	
Approach LOS		B			C			D			E	
Queue Length 50th (ft)	18	343		26	366		57	76		41	136	
Queue Length 95th (ft)	42	507		m52	556		95	134		74	213	

23rd Street & Ousdahl Road
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (ft)		420			955			658			283	
Turn Bay Length (ft)	100			150			95			80		
Base Capacity (vph)	301	2203		399	2262		208	413		292	417	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.22	0.56		0.20	0.66		0.34	0.26		0.18	0.44	

Intersection Summary	
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	150
Offset:	76 (51%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.76
Intersection Signal Delay:	24.6
Intersection LOS:	C
Intersection Capacity Utilization	76.3%
ICU Level of Service	D
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 6: Ousdahl Rd. & W. 23rd St. /W. 23rd St.



23rd Street & Site Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Morning Peak-Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑		↗
Traffic Vol, veh/h	1025	2	11	819	0	11
Future Vol, veh/h	1025	2	11	819	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	50	-	-	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	1114	2	12	890	0	12

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	1116	0	558
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	3.32
Pot Cap-1 Maneuver	-	-	622	0	473
Stage 1	-	-	-	0	-
Stage 2	-	-	-	0	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	622	-	473
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	473	-	-	622	-
HCM Lane V/C Ratio	0.025	-	-	0.019	-
HCM Control Delay (s)	12.8	-	-	10.9	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

23rd Street & Site Access
Existing Operating Conditions

"Existing + Redevelopment" Traffic Volumes
Afternoon Peak-Hour

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑		↖
Traffic Vol, veh/h	1114	3	23	1461	0	19
Future Vol, veh/h	1114	3	23	1461	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	50	-	-	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	1211	3	25	1588	0	21

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	1214	0	- 607
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-
Critical Hdwy	-	-	4.14	-	- 6.94
Critical Hdwy Stg 1	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-
Follow-up Hdwy	-	-	2.22	-	- 3.32
Pot Cap-1 Maneuver	-	-	570	-	0 439
Stage 1	-	-	-	-	0 -
Stage 2	-	-	-	-	0 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	570	-	- 439
Mov Cap-2 Maneuver	-	-	-	-	-
Stage 1	-	-	-	-	-
Stage 2	-	-	-	-	-

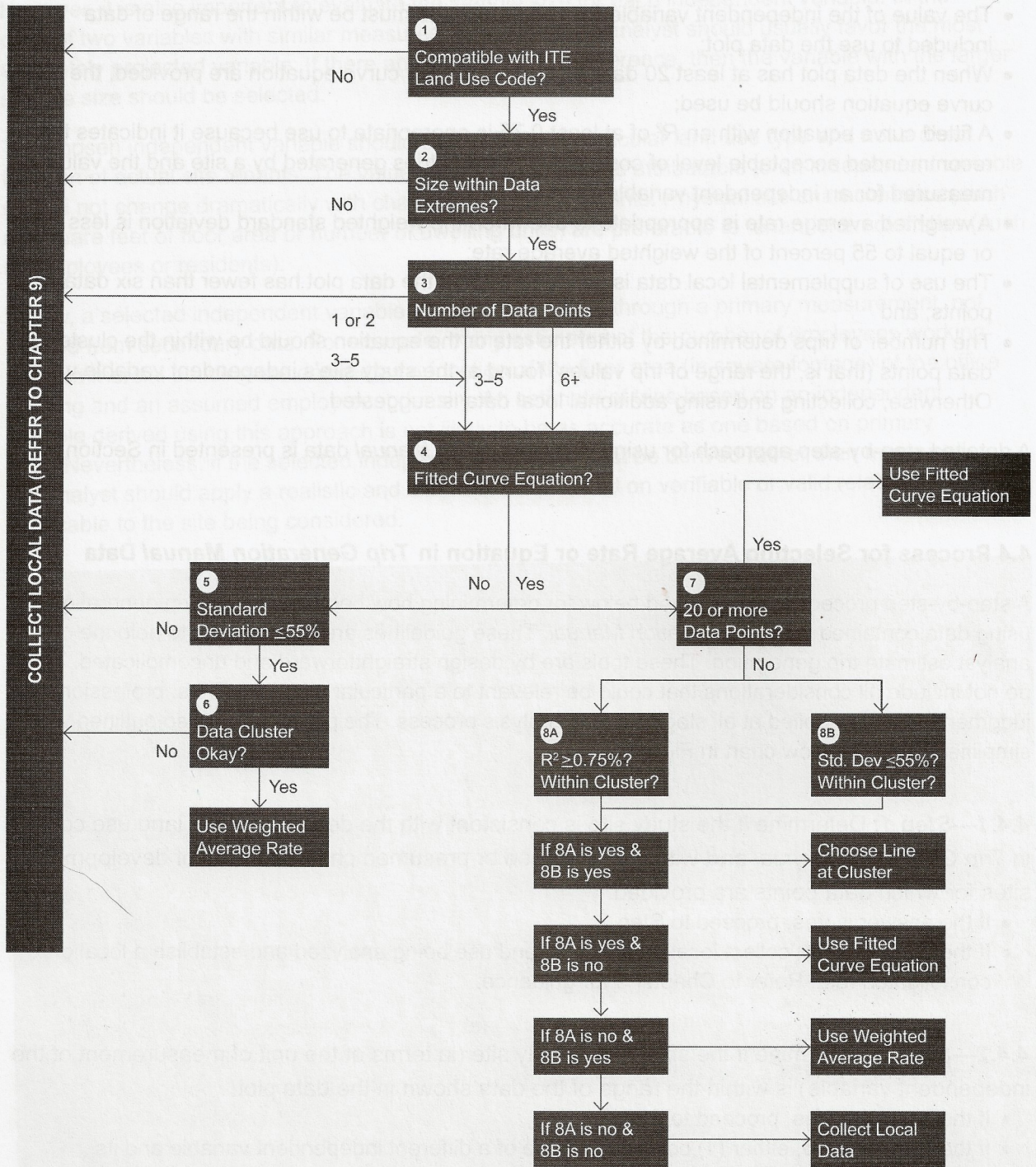
Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	13.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	439	-	-	570	-
HCM Lane V/C Ratio	0.047	-	-	0.044	-
HCM Control Delay (s)	13.6	-	-	11.6	-
HCM Lane LOS	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

APPENDIX III

Results of Trip Generation Analysis
Using
ITE Trip Generation Manual, 10th Edition

Figure 4.2 Process for Selecting Average Rate or Equation in Trip Generation Manual Data



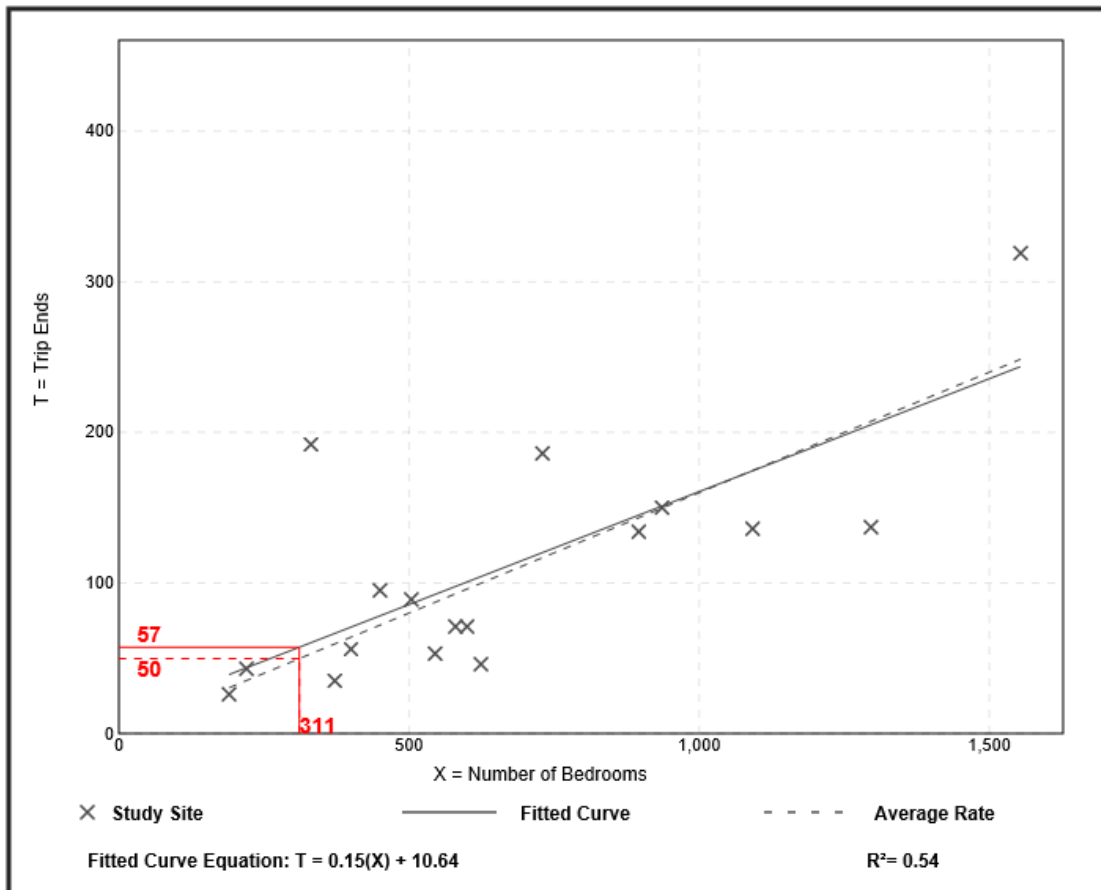
Off-Campus Student Apartment (225)

Vehicle Trip Ends vs: Bedrooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: Over 1/2 Mile from Campus
 Number of Studies: 17
 Avg. Num. of Bedrooms: 666
 Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.16	0.07 - 0.58	0.09

Data Plot and Equation



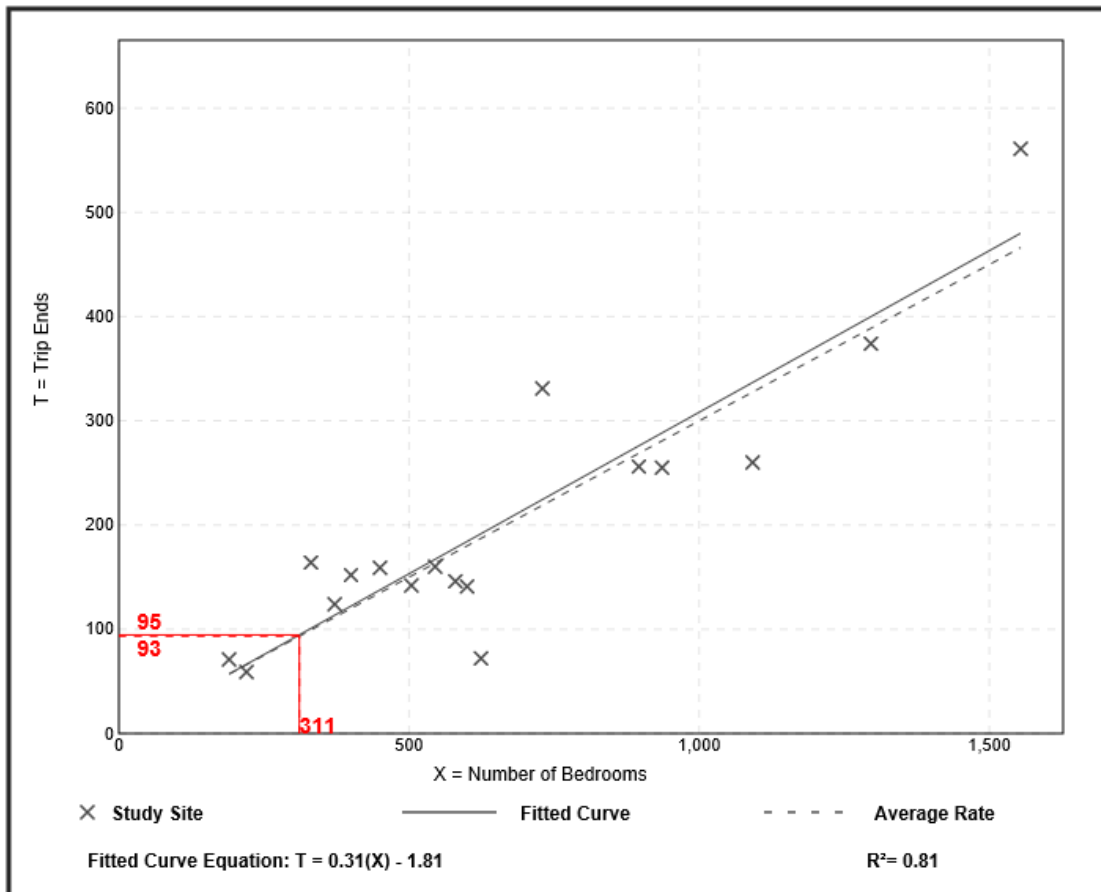
Off-Campus Student Apartment (225)

Vehicle Trip Ends vs: Bedrooms
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: Over 1/2 Mile from Campus
 Number of Studies: 17
 Avg. Num. of Bedrooms: 666
 Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.30	0.12 - 0.50	0.08

Data Plot and Equation



Off-Campus Student Apartment (225)

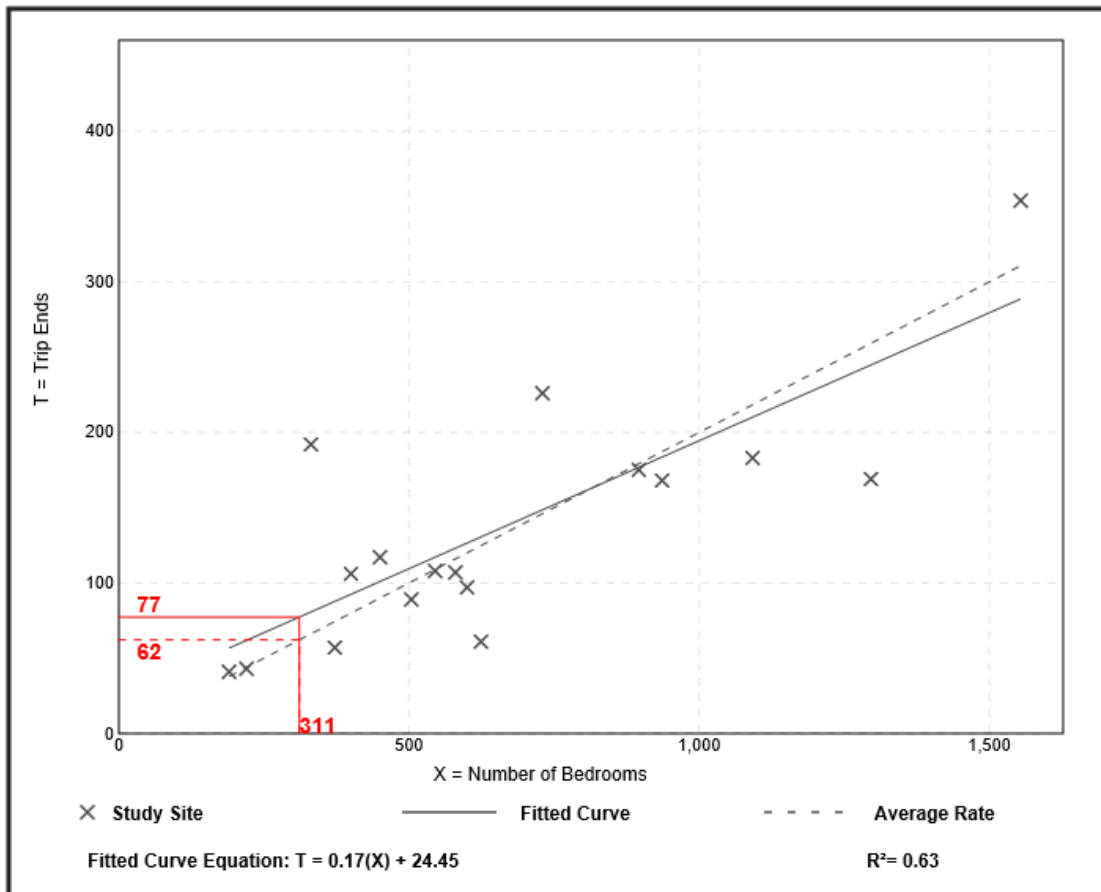
Vehicle Trip Ends vs: Bedrooms
On a: Weekday,
AM Peak Hour of Generator

Setting/Location: Over 1/2 Mile from Campus
 Number of Studies: 17
 Avg. Num. of Bedrooms: 666
 Directional Distribution: 40% entering, 60% exiting

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.20	0.10 - 0.58	0.09

Data Plot and Equation



Off-Campus Student Apartment (225)

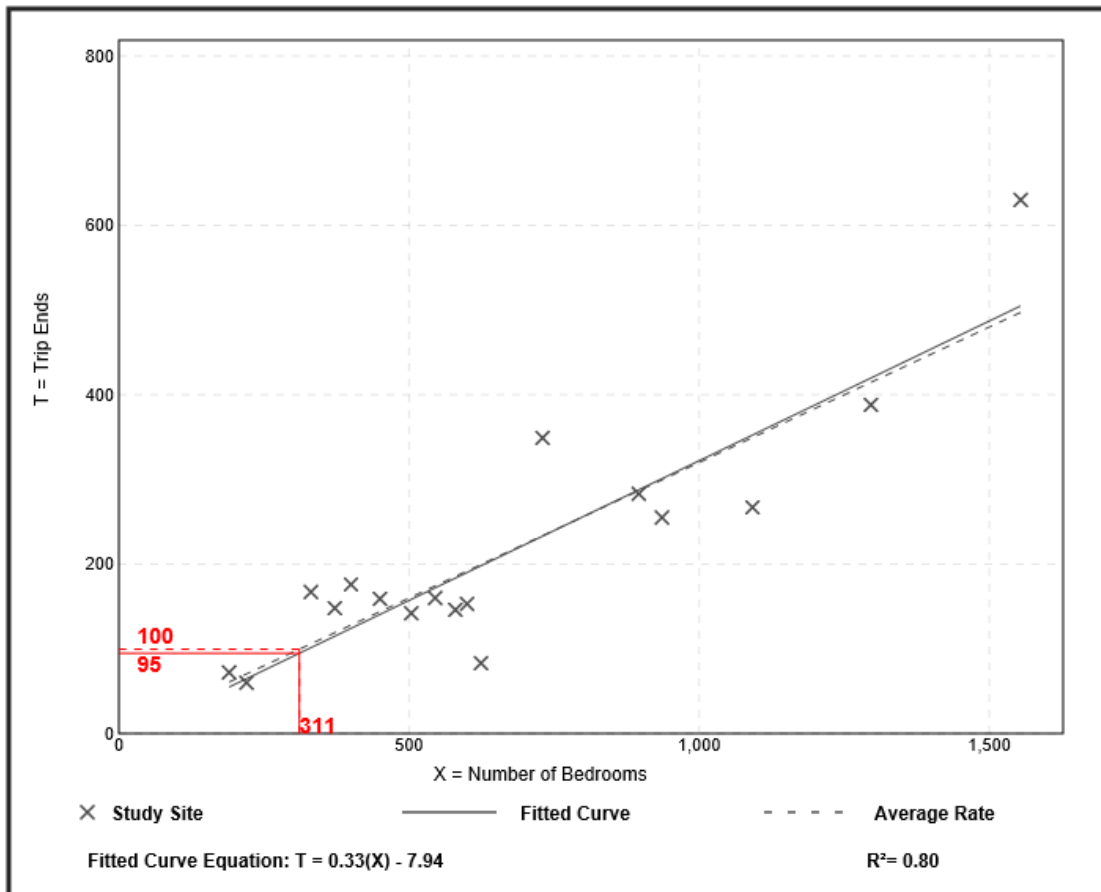
Vehicle Trip Ends vs: Bedrooms
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: Over 1/2 Mile from Campus
 Number of Studies: 17
 Avg. Num. of Bedrooms: 666
 Directional Distribution: 52% entering, 48% exiting

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
0.32	0.13 - 0.50	0.09

Data Plot and Equation



Off-Campus Student Apartment (225)

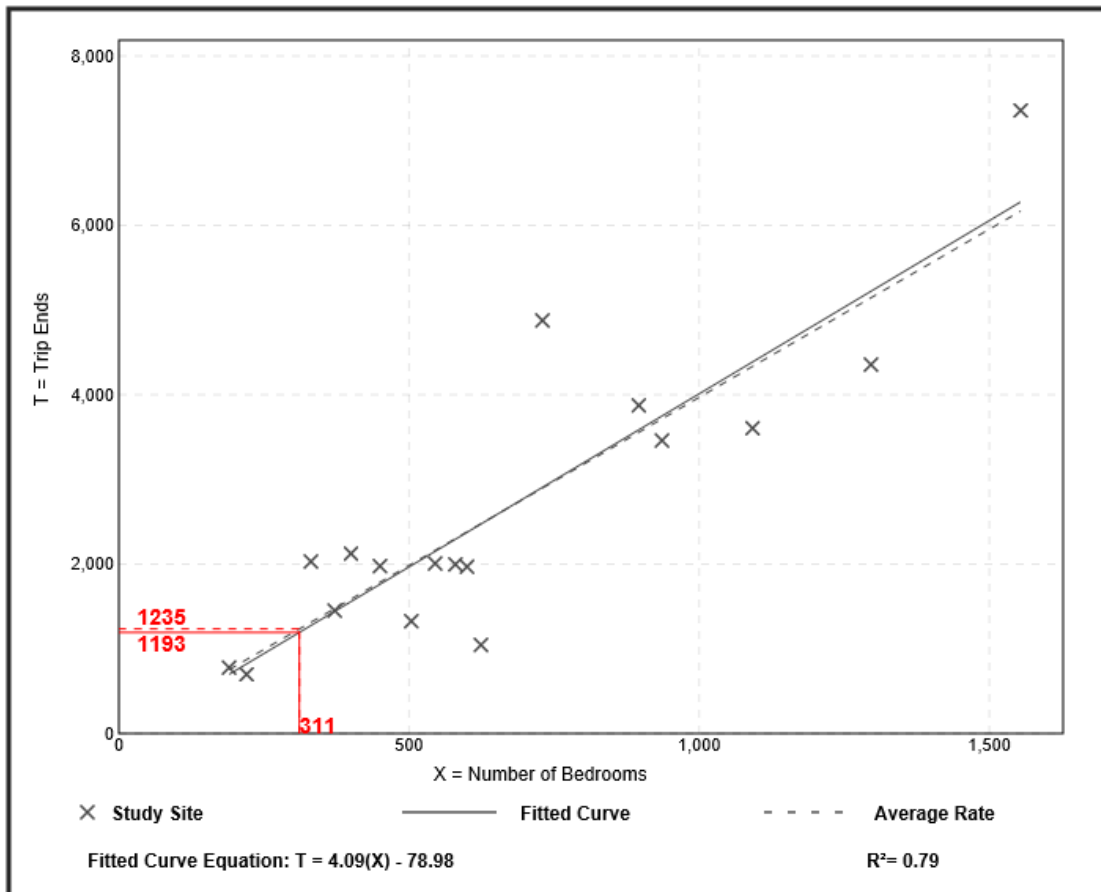
Vehicle Trip Ends vs: Bedrooms
On a: Weekday

Setting/Location: Over 1/2 Mile from Campus
Number of Studies: 17
Avg. Num. of Bedrooms: 666
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Bedroom

Average Rate	Range of Rates	Standard Deviation
3.97	1.68 - 6.68	1.17

Data Plot and Equation



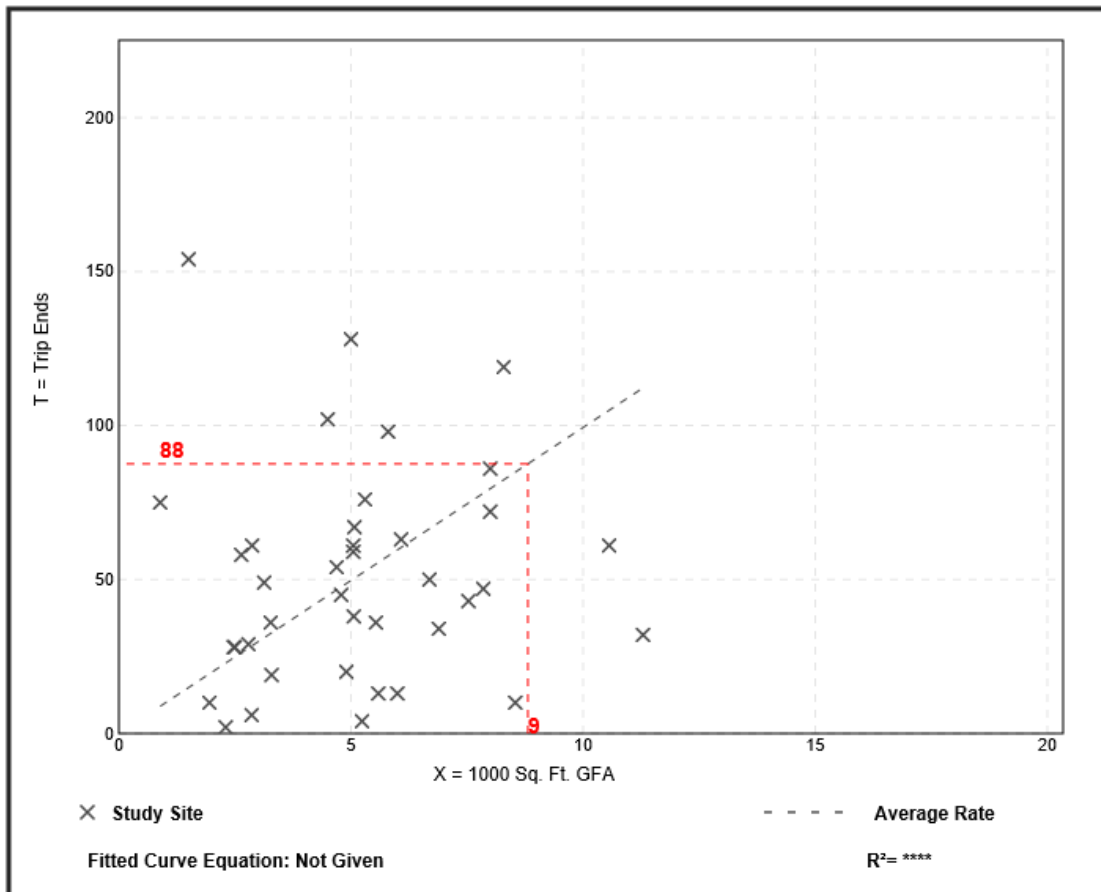
High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 39
 Avg. 1000 Sq. Ft. GFA: 5
 Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.94	0.76 - 102.39	11.33

Data Plot and Equation



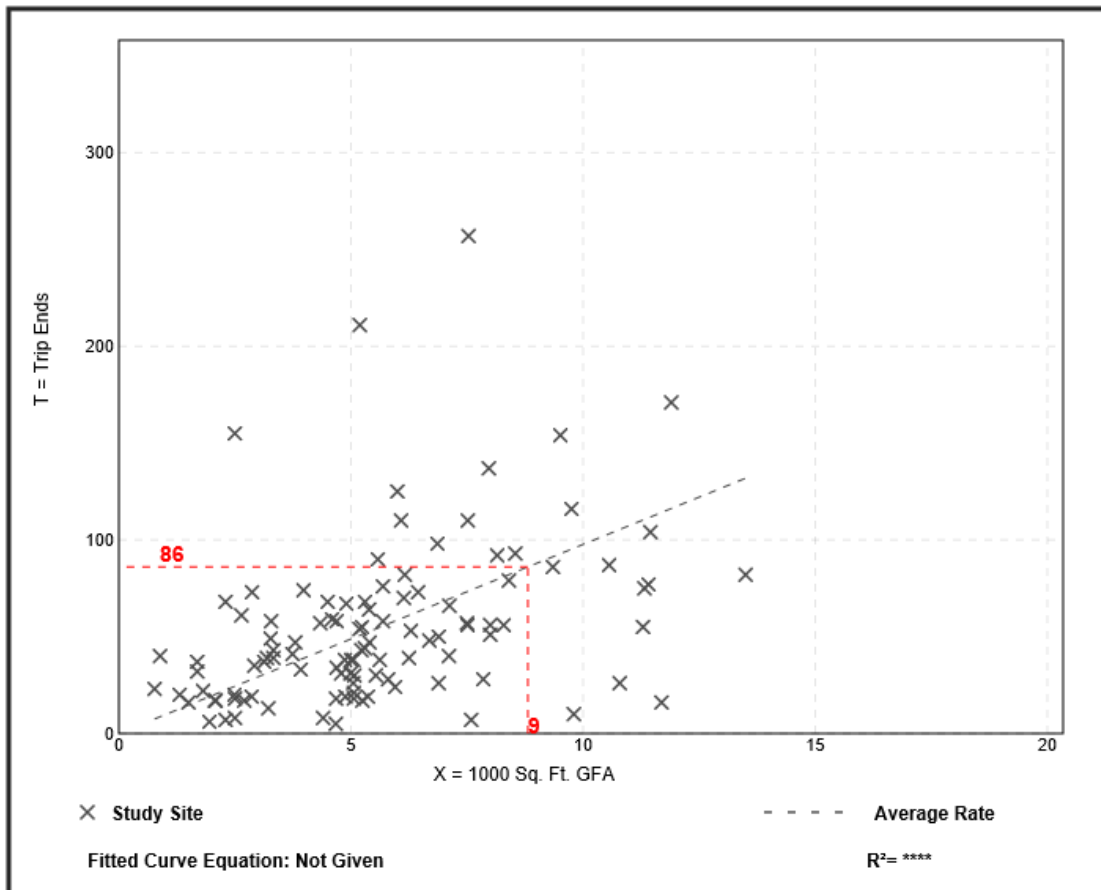
High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 107
 Avg. 1000 Sq. Ft. GFA: 6
 Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.77	0.92 - 62.00	7.37

Data Plot and Equation



High-Turnover (Sit-Down) Restaurant (932)

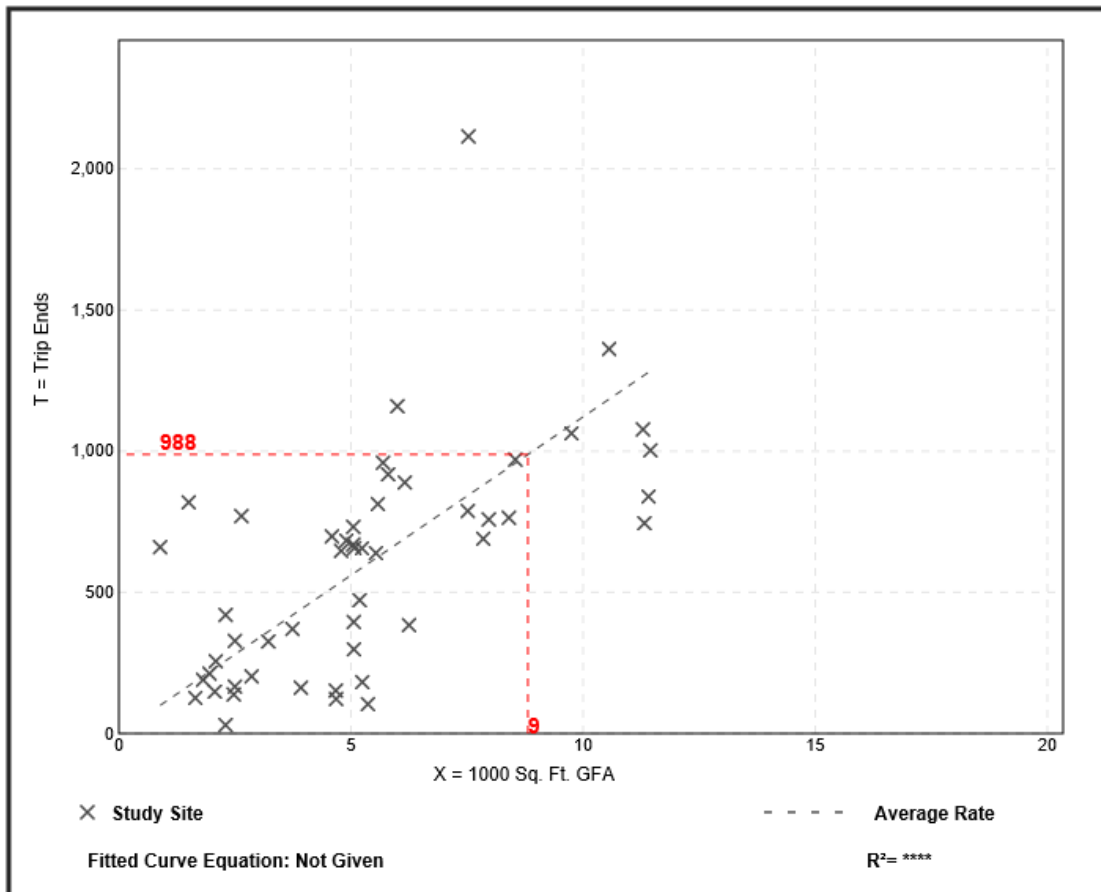
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 50
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
112.18	13.04 - 742.41	72.51

Data Plot and Equation



APPENDIX IV

Results of Internal Trip Capture Calculations
Using
NCHRP Report 684 Estimator
(ITE Trip Generation Handbook, 3rd Edition Methodology)

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Student Housing / Commercial	Organization:	MGS
Project Location:	1401 W. 23rd Street	Performed By:	MG
Scenario Description:	Build-Out	Date:	10/17/2018
Analysis Year:	2018	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant	932	8,811	GFA sq. ft.	88	48	40
Cinema/Entertainment				0	0	0
Residential	225	311	bedrooms	57	16	41
Hotel				0		
All Other Land Uses ²				0		
Total				145	64	81

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	4%	1%	1.00	4%	1%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	8	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	145	64	81
Internal Capture Percentage	12%	14%	11%
External Vehicle-Trips ³	125	54	71
External Transit-Trips ⁴	2	1	1
External Non-Motorized Trips ⁴	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	N/A	N/A
Restaurant	17%	3%
Cinema/Entertainment	N/A	N/A
Residential	6%	20%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	Student Housing / Commercial
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	48	48	1.00	40	40
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	16	16	1.00	41	41
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	12	6	0	0	2	1
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	0	8	0	0	0
Hotel	0	0	0	0	0	0

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office	0	0	11	0	0	0
Retail	0	0	24	0	0	0
Restaurant	0	0	0	0	1	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	10	0	0	0
Hotel	0	0	3	0	0	0

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	8	40	48	40	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	15	16	14	1	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	1	39	40	39	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	8	33	41	32	1	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Student Housing / Commercial	Organization:	MGS
Project Location:	1401 W. 23rd Street	Performed By:	MG
Scenario Description:	Build-Out	Date:	10/17/2018
Analysis Year:	2018	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				0		
Restaurant	932	8,811	GFA sq. ft.	86	53	33
Cinema/Entertainment				0		
Residential	225	311	bedrooms	95	49	46
Hotel				0		
All Other Land Uses ²				0		
Total				181	102	79

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	4%	1%	1.00	4%	1%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant					100	
Cinema/Entertainment						
Residential			100			
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	6	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	7	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	181	102	79
Internal Capture Percentage	14%	13%	16%
External Vehicle-Trips ³	151	87	64
External Transit-Trips ⁴	4	2	2
External Non-Motorized Trips ⁴	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	N/A	N/A
Restaurant	13%	18%
Cinema/Entertainment	N/A	N/A
Residential	12%	15%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	Student Housing / Commercial
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	0	0	1.00	0	0
Restaurant	1.00	53	53	1.00	33	33
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	49	49	1.00	46	46
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	1	14		3	6	2
Cinema/Entertainment	0	0	0		0	0
Residential	2	19	10	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	2	0
Retail	0		15	0	23	0
Restaurant	0	0		0	8	0
Cinema/Entertainment	0	0	2		2	0
Residential	0	0	7	0		0
Hotel	0	0	3	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	7	46	53	46	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	6	43	49	41	2	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	0	0	0	0	0
Restaurant	6	27	33	27	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	7	39	46	37	2	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Table 7.1a Adjusted Internal Trip Capture Rates for Trip Origins within a Multi-Use Development

Land Use Pairs		Weekday	
		AM Peak Hour	PM Peak Hour
From OFFICE	To Office	0.0%	0.0%
	To Retail	28.0%	20.0%
	To Restaurant	63.0%	4.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	1.0%	2.0%
	To Hotel	0.0%	0.0%
From RETAIL	To Office	29.0%	2.0%
	To Retail	0.0%	0.0%
	To Restaurant	13.0%	29.0%
	To Cinema/Entertainment	0.0%	4.0%
	To Residential	14.0%	26.0%
	To Hotel	0.0%	5.0%
From RESTAURANT	To Office	31.0%	3.0%
	To Retail	14.0%	41.0%
	To Restaurant	0.0%	0.0%
	To Cinema/Entertainment	0.0%	8.0%
	To Residential	4.0%	18.0%
	To Hotel	3.0%	7.0%
From CINEMA/ENTERTAINMENT	To Office	0.0%	2.0%
	To Retail	0.0%	21.0%
	To Restaurant	0.0%	31.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	8.0%
	To Hotel	0.0%	2.0%
From RESIDENTIAL	To Office	2.0%	4.0%
	To Retail	1.0%	42.0%
	To Restaurant	20.0%	21.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	0.0%
	To Hotel	0.0%	3.0%
From HOTEL	To Office	75.0%	0.0%
	To Retail	14.0%	16.0%
	To Restaurant	9.0%	68.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	2.0%
	To Hotel	0.0%	0.0%

Table 7.2a Adjusted Internal Trip Capture Rates for Trip Destinations within a Multi-Use Development

Land Use Pairs		Weekday	
		AM Peak Hour	PM Peak Hour
To OFFICE	From Office	0.0%	0.0%
	From Retail	4.0%	31.0%
	From Restaurant	14.0%	30.0%
	From Cinema/Entertainment	0.0%	6.0%
	From Residential	3.0%	57.0%
	From Hotel	3.0%	0.0%
To RETAIL	From Office	32.0%	8.0%
	From Retail	0.0%	0.0%
	From Restaurant	8.0%	50.0%
	From Cinema/Entertainment	0.0%	4.0%
	From Residential	17.0%	10.0%
	From Hotel	4.0%	2.0%
To RESTAURANT	From Office	23.0%	2.0%
	From Retail	50.0%	29.0%
	From Restaurant	0.0%	0.0%
	From Cinema/Entertainment	0.0%	3.0%
	From Residential	20.0%	14.0%
	From Hotel	6.0%	5.0%
To CINEMA/ENTERTAINMENT	From Office	0.0%	1.0%
	From Retail	0.0%	26.0%
	From Restaurant	0.0%	32.0%
	From Cinema/Entertainment	0.0%	0.0%
	From Residential	0.0%	0.0%
	From Hotel	0.0%	0.0%
To RESIDENTIAL	From Office	0.0%	4.0%
	From Retail	2.0%	46.0%
	From Restaurant	5.0%	16.0%
	From Cinema/Entertainment	0.0%	4.0%
	From Residential	0.0%	0.0%
	From Hotel	0.0%	0.0%
To HOTEL	From Office	0.0%	0.0%
	From Retail	0.0%	17.0%
	From Restaurant	4.0%	71.0%
	From Cinema/Entertainment	0.0%	1.0%
	From Residential	0.0%	12.0%
	From Hotel	0.0%	0.0%

APPENDIX V

Summary of Traffic Counts

PEAK AM Count

Signal Location	Last updated 2/23/17	Count AM Date	Begin Peak	Peak Volume	South Bound			West Bound			North Bound			East Bound			
					Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
19 th St.	Massachusetts St.	24-Feb-15	7:15	1689	78	124	55	27	360	29	15	292	184	106	314	105	48
19 th St.	Naismith Dr.	08-Apr-15	7:45	1518	31	47	42	69	349	36	57	203	36	14	425	209	49
19 th St.	Tennessee St.	26-Feb-15	7:15	1552	252	59	193	0	434	0	24	0	10	2	578	0	50
22 nd Terr.	Kasold Dr.	30-Apr-15	7:30	1209	33	505	10	2	1	1	7	545	45	30	1	29	51
23 rd St.	Alabama St.	03-Sep-15	7:15	2289	19	29	17	16	823	31	98	80	72	41	1013	50	52
23 rd St.	Barker Ave	01-Sep-15	7:15	2465	19	2	47	57	1270	18	4	4	3	8	1013	20	53
23 rd St.	Harper St.	13-Nov-14	7:15	2730	59	27	112	79	1118	22	90	64	92	14	999	54	54
23 rd St.	Haskell Rd.	18-Feb-16	7:15	3259	56	167	231	117	884	83	131	256	281	69	903	81	55
23 rd St.	Iowa St.	27-Apr-16	8:00	3386	126	380	217	184	415	127	158	598	58	80	619	424	59
23 rd St.	Louisiana St.	29-Mar-16	7:15	2883	80	166	101	118	830	90	166	276	70	35	828	123	56
23 rd St.	Massachusetts St.	23-Feb-16	7:30	2601	101	24	147	244	889	5	1	8	22	44	897	219	57
23 rd St.	Naismith Dr.	28-Apr-16	7:30	2232	54	24	74	118	752	7	68	92	17	6	935	85	58
23 rd St.	Ousdahl Rd.	14-Apr-15	7:45	2370	91	74	35	29	872	22	25	73	19	20	969	141	79
25 th St.	Iowa St.	23-Apr-15	7:30	1525	33	525	14	18	18	14	21	804	15	12	15	36	60
27 th	K-10	24-Mar-16	7:15	1029	141	6	106	168	297	0	1	6	2	1	255	46	194
27 th St.	Iowa St.	15-Sep-16	7:30	1582	46	372	21	65	85	59	36	639	28	22	100	112	61
31 st St.	Iowa St.	16-Feb-16	7:30	1848	79	209	58	149	200	113	112	500	49	44	241	94	63
31 st St.	Nieder Road	25-Aug-15	7:30	919	3	2	8	3	294	34	16	3	55	71	419	11	123
31 st St.	Ousdahl Rd.	09-Sep-15	7:15	1029	1	2	3	12	350	62	127	8	71	20	363	10	140
31 st St.	Post Office	26-Aug-15	7:30	1007	52	1	24	44	405	6	9	3	11	4	378	70	209
33 rd St.	Iowa St.	27-Aug-15	7:15	1439	62	316	47	47	23	26	73	618	65	41	40	81	64
34 th St.	Iowa St.	26-Jan-16	7:15	1175	6	323	27	13	1	14	38	707	19	18	0	9	65
Bob Billings	Wakarusa Dr.	11-Nov-14	7:45	1788	46	237	110	100	173	55	86	286	169	173	267	86	101
Clinton Pkwy.	Crestline	10-May-16	7:30	1937	10	3	2	19	582	30	32	9	31	60	1058	101	215
Clinton Pkwy.	Crossgate Dr.	12-Oct-16	7:45	2169	61	15	65	71	560	110	423	17	42	37	701	67	188
Clinton Pkwy.	Hawthorn Dr.	27-Oct-16	7:30	2006	79	4	24	14	685	11	46	3	9	4	1028	99	191
Clinton Pkwy.	Inverness Dr.	05-Apr-16	7:30	1846	10	188	116	42	386	180	227	116	102	114	358	7	66
Clinton Pkwy.	Kasold Dr.	25-Jan-17	7:45	2458	97	236	181	151	353	58	116	239	108	97	685	137	67
Clinton Pkwy.	Lawrence Ave.	22-Mar-16	7:30	2074	35	5	41	14	518	31	140	4	81	81	1108	16	68
Clinton Pkwy.	Wakarusa Dr.	03-Mar-16	7:30	1542	23	160	300	341	131	22	53	274	33	20	148	37	69
Harvard Rd.	Iowa St.	21-Apr-16	7:30	2228	14	1046	14	17	7	31	39	947	17	32	36	28	70
Peterson	Kasold	20-Apr-16	7:15	975	32	118	169	62	174	52	50	59	17	36	189	17	5
K-10	Iowa St.	23-Sep-15	7:15	1617	0	276	0	0	0	0	0	994	0	166	0	181	71
Teepee	N 3rd St	17-Sep-15	7:15	1191	0	400	68	63	2	330	149	169	3	5	2	0	210
23rd	O'Connell	03-Nov-15	7:00	2583	29	22	0	4	982	80	171	38	77	35	1071	74	241
6th St	K-10 (East Intersection)	19-Nov-15	7:30	1363	0	0	0	583	190	0	42	0	98	0	423	27	
6th St	K-10 (West Intersection)	19-Nov-15	7:15	856	4	0	223	0	250	38	0	0	0	114	227	0	
31st St	Haskell Av	01-Mar-16	7:00	750	27	43	3	8	155	10	23	197	20	11	191	62	
George Williar	Bob Billings	21-Sep-16	7:45	848	57	21	186	117	99	12	28	53	41	13	174	47	250



PEAK PM Count

Signal Location	Last Updated 2/23/17	Count PM Date	Begin Peak	Peak Volume	South Bound			West Bound			North Bound			East Bound			
					Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
19 th St.	Iowa St.	29-Apr-15	16:45	3525	18	1113	243	260	97	334	184	993	55	66	127	35	45
19 th St.	Kentucky St.	25-Feb-15	16:15	1564	0	0	0	191	407	11	8	35	0	21	607	284	46
19 th St.	Louisiana St.	07-Apr-15	16:45	2070	16	101	53	7	592	319	213	60	88	116	479	26	47
19 th St.	Massachusetts St.	24-Feb-15	17:00	2107	129	313	106	62	298	34	21	355	147	91	393	158	48
19 th St.	Naismith Dr.	08-Apr-15	17:00	2098	254	266	120	59	503	107	44	173	56	32	352	132	49
19 th St.	Tennessee St.	26-Feb-15	4:45	1939	425	119	217	0	406	0	19	0	4	13	736	0	50
22 nd Terr.	Kasold Dr.	30-Apr-15	17:00	1988	93	789	11	9	3	5	8	677	155	143	1	94	51
23 rd St.	Alabama St.	03-Sep-15	17:00	2825	30	54	21	33	1216	60	65	27	77	92	1124	26	52
23 rd St.	Barker Ave	01-Sep-15	16:45	2744	29	2	57	37	1299	8	14	4	19	17	1227	31	53
23 rd St.	Harper St.	13-Nov-14	16:45	3223	72	65	173	117	1287	38	55	66	51	58	1159	82	54
23 rd St.	Haskell Rd.	18-Feb-16	16:45	3697	77	328	253	129	1093	142	124	206	177	153	923	92	55
23 rd St.	Iowa St.	27-Apr-16	16:45	4438	315	811	257	223	711	281	164	572	117	120	570	297	59
23 rd St.	Louisiana St.	29-Mar-16	17:00	3781	116	333	130	43	1131	232	218	292	175	71	902	138	56
23 rd St.	Massachusetts St.	23-Feb-16	16:45	3297	171	26	238	272	1153	5	17	26	89	68	995	237	57
23 rd St.	Naismith Dr.	28-Apr-16	17:00	3155	182	100	201	71	1226	41	58	81	67	25	1033	70	58
23 rd St.	Ousdahl Rd.	14-Apr-15	17:00	3013	96	72	45	82	1292	73	42	55	63	48	1083	62	79
25 th St.	Iowa St.	23-Apr-15	16:45	2610	61	1219	33	26	31	61	30	969	44	45	39	52	60
27 th St	K-10	24-Mar-16	16:15	1378	33	98	153	155	323	54	29	50	10	30	367	76	194
27 th St.	Iowa St.	15-Sep-16	17:00	2944	155	1014	59	64	150	148	61	635	87	66	127	178	61
31 st St.	Iowa St.	16-Feb-16	16:30	3075	187	580	216	116	398	193	110	466	136	145	343	185	63
31 st St.	Nieder	15-Sep-15	16:45	2331	33	13	88	89	675	264	179	36	183	162	549	60	123
31 st St.	Ousdahl Rd.	09-Sep-15	17:00	1543	20	12	16	14	546	150	167	2	96	95	419	6	140
31 st St.	Post Office	26-Aug-15	16:15	1650	163	6	57	48	512	13	32	7	83	4	526	199	209
33 rd St.	Iowa St.	27-Aug-15	17:00	2338	155	677	264	218	65	68	81	528	57	80	61	84	64
34 th St.	Iowa St.	26-Jan-16	16:45	1627	23	736	34	86	9	102	60	459	43	48	12	15	65
Bob Billings	Wakarusa Dr.	11-Nov-14	16:45	1954	61	324	145	152	229	84	91	270	145	137	237	79	101
Clinton Pkwy.	Crestline	10-May-16	16:45	2475	137	12	16	5	1148	43	45	3	77	58	909	22	215
Clinton Pkwy.	Crossgate Dr.	12-Oct-16	17:00	2565	30	7	53	50	899	344	312	10	44	66	709	41	188
Clinton Pkwy.	Hawthorn Dr.	27-Oct-16	16:45	2641	196	6	52	89	1081	41	41	6	8	5	972	144	191
Clinton Pkwy.	Inverness Dr.	05-Apr-16	16:45	1792	17	89	75	93	539	163	105	72	61	44	519	15	66
Clinton Pkwy.	Kasold Dr.	25-Jan-17	16:45	3440	136	365	275	331	701	117	77	438	164	151	574	111	67
Clinton Pkwy.	Lawrence Ave.	20-Aug-13	17:00	2791	22	9	22	41	1248	118	77	8	133	159	920	34	68
Clinton Pkwy.	Wakarusa Dr.	03-Mar-16	16:45	1868	74	252	346	337	192	44	53	237	43	35	201	54	69
Harvard Rd.	Iowa St.	21-Apr-16	16:45	2695	15	1210	13	22	24	35	33	1268	26	21	14	14	70
Peterson	Kasold	20-Apr-16	17:00	1152	30	107	74	148	264	71	66	125	28	26	182	31	5
K-10	Iowa St.	23-Sep-15	17:00	1896	0	793	0	0	0	0	0	636	0	232	0	235	71
Teepee	N 3rd St	17-Sep-15	16:30	1297	0	195	75	71	3	222	356	354	11	10	0	0	210
23rd	O'connell	03-Nov-15	16:45	2799	61	40	2	2	1264	194	97	13	78	79	939	30	241
6th St	K-10 (East Intersection)	19-Nov-15	16:45	1651	0	0	0	270	327	0	111	0	123	0	807	13	
6th St	K-10 (West Intersection)	19-Nov-15	16:45	1416	47	0	571	0	378	72	0	0	0	119	229	0	
31st	Haskell Av	01-Mar-16	16:30	840	34	47	7	8	203	30	20	82	22	44	174	69	
George William	Bob Billings	21-Sep-16	17:00	789	53	31	111	129	143	37	16	20	12	23	146	68	250

Summary of Traffic Volume Counts

Naidmith Drive and Shared Access
 Morning Peak-Hours
 Sunny, Mild

File Name : Naismith & Drive-eam
 Site Code : 1
 Start Date : 10/18/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Naismith Drive Southbound					Westbound					Naismith Drive Northbound					Shared Access Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
07:00 AM	0	7	0	0	7	0	0	0	0	0	0	12	1	0	13	0	0	1	0	1	21
07:15 AM	1	7	0	0	8	0	0	0	0	0	0	15	1	0	16	0	0	2	0	2	26
07:30 AM	0	10	0	0	10	0	0	0	0	0	0	30	0	0	30	0	0	1	0	1	41
07:45 AM	1	14	0	0	15	0	0	0	0	0	0	35	1	0	36	0	0	3	0	3	54
Total	2	38	0	0	40	0	0	0	0	0	0	92	3	0	95	0	0	7	0	7	142
08:00 AM	0	12	0	0	12	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	24
08:15 AM	2	4	0	0	6	0	0	0	0	0	0	19	1	0	20	1	0	2	0	3	29
08:30 AM	1	5	0	0	6	0	0	0	0	0	0	16	0	0	16	0	0	2	0	2	24
08:45 AM	1	12	0	0	13	0	0	0	0	0	0	28	1	0	29	1	0	3	0	4	46
Total	4	33	0	0	37	0	0	0	0	0	0	75	2	0	77	2	0	7	0	9	123
Grand Total	6	71	0	0	77	0	0	0	0	0	0	167	5	0	172	2	0	14	0	16	265
Apprch %	7.8	92.2	0	0		0	0	0	0		0	97.1	2.9	0		12.5	0	87.5	0		
Total %	2.3	26.8	0	0	29.1	0	0	0	0	0	0	63	1.9	0	64.9	0.8	0	5.3	0	6	

Summary of Traffic Volume Counts

Naidmith Drive and Shared Access
 Morning Peak-Hours
 Sunny, Mild

File Name : Naidmith & Drive-eam
 Site Code : 1
 Start Date : 10/18/2018
 Page No : 2

Start Time	Naidmith Drive Southbound					Westbound					Naidmith Drive Northbound					Shared Access Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	10	0	0	10	0	0	0	0	0	0	30	0	0	30	0	0	1	0	1	41
07:45 AM	1	14	0	0	15	0	0	0	0	0	0	35	1	0	36	0	0	3	0	3	54
08:00 AM	0	12	0	0	12	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	24
08:15 AM	2	4	0	0	6	0	0	0	0	0	0	19	1	0	20	1	0	2	0	3	29
Total Volume	3	40	0	0	43	0	0	0	0	0	0	96	2	0	98	1	0	6	0	7	148
% App. Total	7	93	0	0		0	0	0	0		0	98	2	0		14.3	0	85.7	0		
PHF	.375	.714	.000	.000	.717	.000	.000	.000	.000	.000	.000	.686	.500	.000	.681	.250	.000	.500	.000	.583	.685

Summary of Traffic Volume Counts

Naismith Drive and Shared Access
 Afternoon Peak-Hours
 Sunny, Mild

File Name : Naismith & Drive-epm
 Site Code : 1
 Start Date : 10/17/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Naismith Drive Southbound					Westbound					Naismith Drive Northbound					Shared Access Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
03:45 PM	2	41	0	0	43	0	0	0	0	0	0	33	2	0	35	7	0	12	0	19	97
Total	2	41	0	0	43	0	0	0	0	0	0	33	2	0	35	7	0	12	0	19	97
04:00 PM	3	32	0	0	35	0	0	0	0	0	0	23	0	0	23	4	0	10	0	14	72
04:15 PM	2	37	0	0	39	0	0	0	0	0	0	35	2	0	37	3	0	7	0	10	86
04:30 PM	1	31	0	0	32	0	0	0	0	0	0	26	0	0	26	4	0	8	0	12	70
04:45 PM	3	25	0	0	28	0	0	0	0	0	0	39	0	0	39	4	0	9	0	13	80
Total	9	125	0	0	134	0	0	0	0	0	0	123	2	0	125	15	0	34	0	49	308
05:00 PM	1	48	0	0	49	0	0	0	0	0	0	38	0	0	38	3	0	5	0	8	95
05:15 PM	5	47	0	0	52	0	0	0	0	0	0	42	0	0	42	1	0	8	0	9	103
05:30 PM	2	38	0	0	40	0	0	0	0	0	0	33	1	0	34	3	0	7	0	10	84
05:45 PM	1	33	0	0	34	0	0	0	0	0	0	36	0	0	36	0	0	6	0	6	76
Total	9	166	0	0	175	0	0	0	0	0	0	149	1	0	150	7	0	26	0	33	358
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	20	332	0	0	352	0	0	0	0	0	0	305	5	0	310	29	0	72	0	101	763
Apprch %	5.7	94.3	0	0		0	0	0	0		0	98.4	1.6	0		28.7	0	71.3	0		
Total %	2.6	43.5	0	0	46.1	0	0	0	0	0	0	40	0.7	0	40.6	3.8	0	9.4	0	13.2	

Summary of Traffic Volume Counts

Naismith Drive and Shared Access
 Afternoon Peak-Hours
 Sunny, Mild

File Name : Naismith & Drive-epm
 Site Code : 1
 Start Date : 10/17/2018
 Page No : 2

Start Time	Naismith Drive Southbound					Westbound					Naismith Drive Northbound					Shared Access Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
Peak Hour Analysis From 03:45 PM to 06:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	3	25	0	0	28	0	0	0	0	0	0	39	0	0	39	4	0	9	0	13	80
05:00 PM	1	48	0	0	49	0	0	0	0	0	0	38	0	0	38	3	0	5	0	8	95
05:15 PM	5	47	0	0	52	0	0	0	0	0	0	42	0	0	42	1	0	8	0	9	103
05:30 PM	2	38	0	0	40	0	0	0	0	0	0	33	1	0	34	3	0	7	0	10	84
Total Volume	11	158	0	0	169	0	0	0	0	0	0	152	1	0	153	11	0	29	0	40	362
% App. Total	6.5	93.5	0	0		0	0	0	0		0	99.3	0.7	0		27.5	0	72.5	0		
PHF	.550	.823	.000	.000	.813	.000	.000	.000	.000	.000	.000	.905	.250	.000	.911	.688	.000	.806	.000	.769	.879

Summary of Traffic Volume Counts

W. 24th Street & The Rockland Middle Drive
 Morning Peak-Hours
 Sunny, Cool

File Name : 24th & Rockland-eam
 Site Code : 4
 Start Date : 10/24/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound					W. 24th Street Westbound					The Rockland Middle Drive Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
07:00 AM	0	0	0	0	0	0	6	4	0	10	4	0	0	0	4	0	12	0	0	12	26
07:15 AM	0	0	0	0	0	0	9	4	0	13	4	0	1	0	5	0	18	0	0	18	36
07:30 AM	0	0	0	0	0	0	5	2	0	7	8	0	1	0	9	1	18	0	0	19	35
07:45 AM	0	0	0	0	0	0	13	3	0	16	11	0	2	0	13	0	32	0	0	32	61
Total	0	0	0	0	0	0	33	13	0	46	27	0	4	0	31	1	80	0	0	81	158
08:00 AM	0	0	0	0	0	0	8	1	0	9	4	0	2	0	6	1	10	0	0	11	26
08:15 AM	0	0	0	0	0	0	6	1	0	7	14	0	1	0	15	1	13	0	0	14	36
08:30 AM	0	0	0	0	0	0	9	3	0	12	13	0	5	0	18	1	19	0	0	20	50
08:45 AM	0	0	0	0	0	0	10	3	0	13	10	0	0	0	10	2	23	0	0	25	48
Total	0	0	0	0	0	0	33	8	0	41	41	0	8	0	49	5	65	0	0	70	160
Grand Total	0	0	0	0	0	0	66	21	0	87	68	0	12	0	80	6	145	0	0	151	318
Apprch %	0	0	0	0	0	0	75.9	24.1	0		85	0	15	0		4	96	0	0		
Total %	0	0	0	0	0	0	20.8	6.6	0	27.4	21.4	0	3.8	0	25.2	1.9	45.6	0	0	47.5	

Summary of Traffic Volume Counts

W. 24th Street & The Rockland Middle Drive
 Morning Peak-Hours
 Sunny, Cool

File Name : 24th & Rockland-eam
 Site Code : 4
 Start Date : 10/24/2018
 Page No : 2

Start Time	Southbound					W. 24th Street Westbound					The Rockland Middle Drive Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	13	3	0	16	11	0	2	0	13	0	32	0	0	32	61
08:00 AM	0	0	0	0	0	0	8	1	0	9	4	0	2	0	6	1	10	0	0	11	26
08:15 AM	0	0	0	0	0	0	6	1	0	7	14	0	1	0	15	1	13	0	0	14	36
08:30 AM	0	0	0	0	0	0	9	3	0	12	13	0	5	0	18	1	19	0	0	20	50
Total Volume	0	0	0	0	0	0	36	8	0	44	42	0	10	0	52	3	74	0	0	77	173
% App. Total	0	0	0	0		0	81.8	18.2	0		80.8	0	19.2	0		3.9	96.1	0	0		
PHF	.000	.000	.000	.000	.000	.000	.692	.667	.000	.688	.750	.000	.500	.000	.722	.750	.578	.000	.000	.602	.709

Summary of Traffic Volume Counts

W. 24th Street & The Rockland Middle Drive
 Afternoon Peak-Hours
 Sunny, Mild

File Name : 24th & Rockland-epm
 Site Code : 4
 Start Date : 10/23/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Southbound					W. 24th Street Westbound					The Rockland Middle Drive Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
04:00 PM	0	0	0	0	0	0	44	14	0	58	1	0	5	0	6	2	30	0	0	32	96
04:15 PM	0	0	0	0	0	0	45	6	0	51	4	0	4	0	8	5	31	0	0	36	95
04:30 PM	0	0	0	0	0	0	25	12	0	37	8	0	4	0	12	3	26	0	0	29	78
04:45 PM	0	0	0	0	0	0	26	8	0	34	7	0	3	0	10	4	22	0	0	26	70
Total	0	0	0	0	0	0	140	40	0	180	20	0	16	0	36	14	109	0	0	123	339
05:00 PM	0	0	0	0	0	0	42	9	0	51	9	0	6	0	15	7	10	0	0	17	83
05:15 PM	0	0	0	0	0	0	41	16	0	57	8	0	8	0	16	1	16	0	0	17	90
05:30 PM	0	0	0	0	0	0	43	11	0	54	5	0	6	0	11	5	24	0	0	29	94
05:45 PM	0	0	0	0	0	0	31	10	0	41	10	0	7	0	17	2	21	0	0	23	81
Total	0	0	0	0	0	0	157	46	0	203	32	0	27	0	59	15	71	0	0	86	348
Grand Total	0	0	0	0	0	0	297	86	0	383	52	0	43	0	95	29	180	0	0	209	687
Apprch %	0	0	0	0	0	0	77.5	22.5	0		54.7	0	45.3	0		13.9	86.1	0	0		
Total %	0	0	0	0	0	0	43.2	12.5	0	55.7	7.6	0	6.3	0	13.8	4.2	26.2	0	0	30.4	

Summary of Traffic Volume Counts

W. 24th Street & The Rockland Middle Drive
 Afternoon Peak-Hours
 Sunny, Mild

File Name : 24th & Rockland-epm
 Site Code : 4
 Start Date : 10/23/2018
 Page No : 2

Start Time	Southbound					W. 24th Street Westbound					The Rockland Middle Drive Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	Right	Thru	Left		App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	42	9	0	51	9	0	6	0	15	7	10	0	0	17	83
05:15 PM	0	0	0	0	0	0	41	16	0	57	8	0	8	0	16	1	16	0	0	17	90
05:30 PM	0	0	0	0	0	0	43	11	0	54	5	0	6	0	11	5	24	0	0	29	94
05:45 PM	0	0	0	0	0	0	31	10	0	41	10	0	7	0	17	2	21	0	0	23	81
Total Volume	0	0	0	0	0	0	157	46	0	203	32	0	27	0	59	15	71	0	0	86	348
% App. Total	0	0	0	0	0	0	77.3	22.7	0		54.2	0	45.8	0		17.4	82.6	0	0		
PHF	.000	.000	.000	.000	.000	.000	.913	.719	.000	.890	.800	.000	.844	.000	.868	.536	.740	.000	.000	.741	.926

Summary of Vehicular Traffic Counts

Ousdahl Road & W. 24th Street
 Morning Peak-Hours
 Cloudy, Cold
 Other:

File Name : ousdahl&24-eam
 Site Code : 24
 Start Date : 12/13/2017
 Page No : 1

Groups Printed- Unshifted

Start Time	Ousdahl Road Southbound					W. 24th Street Westbound					Ousdahl Road Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	
07:00 AM	1	4	0	1	6	6	2	3	0	11	6	3	0	0	9	1	4	2	0	7	33
07:15 AM	0	4	0	1	5	5	2	8	1	16	4	6	0	0	10	0	3	5	3	11	42
07:30 AM	1	3	4	1	9	8	6	7	1	22	7	9	0	0	16	0	3	7	0	10	57
07:45 AM	1	7	4	0	12	9	3	7	2	21	10	6	1	2	19	0	3	4	1	8	60
Total	3	18	8	3	32	28	13	25	4	70	27	24	1	2	54	1	13	18	4	36	192
08:00 AM	0	13	6	1	20	2	3	4	0	9	8	7	1	0	16	1	1	2	0	4	49
08:15 AM	4	13	4	0	21	4	4	3	1	12	12	15	2	1	30	1	9	6	2	18	81
08:30 AM	7	15	4	1	27	10	3	5	1	19	8	18	1	0	27	0	3	10	0	13	86
08:45 AM	5	12	3	0	20	6	3	6	1	16	9	7	2	0	18	0	2	4	1	7	61
Total	16	53	17	2	88	22	13	18	3	56	37	47	6	1	91	2	15	22	3	42	277
Grand Total	19	71	25	5	120	50	26	43	7	126	64	71	7	3	145	3	28	40	7	78	469
Apprch %	15.8	59.2	20.8	4.2		39.7	20.6	34.1	5.6		44.1	49	4.8	2.1		3.8	35.9	51.3	9		
Total %	4.1	15.1	5.3	1.1	25.6	10.7	5.5	9.2	1.5	26.9	13.6	15.1	1.5	0.6	30.9	0.6	6	8.5	1.5	16.6	

Summary of Vehicular Traffic Counts

Ousdahl Road & W. 24th Street
 Morning Peak-Hours
 Cloudy, Cold
 Other:

File Name : ousdahl&24-eam
 Site Code : 24
 Start Date : 12/13/2017
 Page No : 2

Start Time	Ousdahl Road Southbound					W. 24th Street Westbound					Ousdahl Road Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	13	4	1	20	2	3	4	0	9	8	7	1	0	16	1	1	2	0	4	49
08:15 AM	4	13	4	0	21	4	4	3	1	12	12	15	2	1	30	1	9	6	2	18	81
08:30 AM	7	15	4	1	27	10	3	5	1	19	8	18	1	0	27	0	3	10	0	13	86
08:45 AM	5	12	3	0	20	6	3	6	1	16	9	7	2	0	18	0	2	4	1	7	61
Total Volume	16	53	17	2	88	22	13	18	3	56	37	47	6	1	91	2	15	22	3	42	277
% App. Total	18.2	60.2	19.3	2.3		39.3	23.2	32.1	5.4		40.7	51.6	6.6	1.1		4.8	35.7	52.4	7.1		
PHF	.571	.883	.708	.500	.815	.550	.813	.750	.750	.737	.771	.653	.750	.250	.758	.500	.417	.550	.375	.583	.805

Summary of Vehicular Traffic Counts

Ousdahl Road & 24th Street
 Afternoon Peak-Hours
 Cloudy, Cold

File Name : ousdahl&24-epm
 Site Code : 24
 Start Date : 12/13/2017
 Page No : 1

Groups Printed- Unshifted

Start Time	Ousdahl Road Southbound					W. 24th Street Westbound					Ousdahl Road Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	
04:00 PM	1	14	5	0	20	4	6	16	1	27	16	9	4	0	29	1	5	6	0	12	88
04:15 PM	4	12	4	0	20	10	2	17	0	29	10	8	1	0	19	0	5	5	1	11	79
04:30 PM	9	10	6	0	25	9	9	16	1	35	11	7	1	0	19	1	3	6	0	10	89
04:45 PM	3	19	1	0	23	7	6	20	1	34	14	11	0	0	25	0	8	5	1	14	96
Total	17	55	16	0	88	30	23	69	3	125	51	35	6	0	92	2	21	22	2	47	352
05:00 PM	5	9	8	0	22	6	7	29	0	42	15	15	0	0	30	4	10	9	0	23	117
05:15 PM	4	20	7	0	31	13	9	17	0	39	20	13	0	0	33	2	13	7	1	23	126
05:30 PM	3	17	6	0	26	8	8	19	1	36	12	9	0	0	21	0	7	6	0	13	96
05:45 PM	7	16	9	0	32	7	8	19	0	34	10	10	1	0	21	0	12	5	1	18	105
Total	19	62	30	0	111	34	32	84	1	151	57	47	1	0	105	6	42	27	2	77	444
Grand Total	36	117	46	0	199	64	55	153	4	276	108	82	7	0	197	8	63	49	4	124	796
Apprch %	18.1	58.8	23.1	0		23.2	19.9	55.4	1.4		54.8	41.6	3.6	0		6.5	50.8	39.5	3.2		
Total %	4.5	14.7	5.8	0	25	8	6.9	19.2	0.5	34.7	13.6	10.3	0.9	0	24.7	1	7.9	6.2	0.5	15.6	

Summary of Vehicular Traffic Counts

Ousdahl Road & 24th Street
 Afternoon Peak-Hours
 Cloudy, Cold

File Name : ousdahl&24-epm
 Site Code : 24
 Start Date : 12/13/2017
 Page No : 2

Start Time	Ousdahl Road Southbound					W. 24th Street Westbound					Ousdahl Road Northbound					W. 24th Street Eastbound					Int. Total
	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	Right	Thru	Left	Buses	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	5	9	8	0	22	6	7	17	0	30	15	13	0	0	30	4	10	9	0	23	117
05:15 PM	4	20	7	0	31	13	9	17	0	39	20	13	0	0	33	2	13	7	1	23	126
05:30 PM	3	17	6	0	26	8	8	19	1	36	12	9	0	0	21	0	7	6	0	13	96
05:45 PM	7	16	9	0	32	7	8	19	0	34	10	10	1	0	21	0	12	5	1	18	105
Total Volume	19	62	30	0	111	34	32	84	1	151	57	47	1	0	105	6	42	27	2	77	444
% App. Total	17.1	55.9	27	0		22.5	21.2	55.6	0.7		54.3	44.8	1	0		7.8	54.5	35.1	2.6		
PHF	.679	.775	.833	.000	.867	.654	.889	.724	.250	.899	.713	.783	.250	.000	.795	.375	.808	.750	.500	.837	.881

Summary of Traffic Volume Counts

Existing Retail Center (West of Natural Grocer)
 Morning Peak-Hours
 Sunny, Mild

File Name : Site-eam
 Site Code : 3
 Start Date : 10/18/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Driveways on W. 23rd Street Southbound					Cross Access Driveways to the East Westbound					Driveways on W. 23rd Street Northbound					Cross Access Driveways to the East Eastbound					Int. Total
	West Drive (Enter)	Thru	East Drive (Enter)	Peds	App. Total	North Drive (Enter)	Thru	South Drive (Enter)	Peds	App. Total	East Drive (Exit)	Thru	West Drive (Exit)	Peds	App. Total	South Drive (Exit)	Thru	North Drive (Exit)	Peds	App. Total	
07:00 AM	0	0	3	0	3	0	0	1	0	1	1	0	2	0	3	1	0	0	0	1	8
07:15 AM	0	0	3	0	3	0	0	2	0	2	0	0	0	0	0	2	0	0	0	2	7
07:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	3
07:45 AM	0	0	0	0	0	0	0	2	0	2	0	0	0	0	3	0	0	0	0	3	5
Total	0	0	8	0	8	0	0	5	0	5	1	0	2	0	3	7	0	0	0	7	23
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:15 AM	0	0	2	0	2	1	0	2	0	3	0	0	0	0	3	0	0	0	0	3	8
08:30 AM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2	0	0	0	0	2	3
08:45 AM	0	0	2	0	2	0	0	2	0	2	0	0	0	0	4	0	0	0	0	4	8
Total	0	0	4	0	4	1	0	5	0	6	0	0	1	0	1	9	0	0	0	9	20
Grand Total	0	0	12	0	12	1	0	10	0	11	1	0	3	0	4	16	0	0	0	16	43
Apprch %	0	0	100	0		9.1	0	90.9	0		25	0	75	0		100	0	0	0		
Total %	0	0	27.9	0	27.9	2.3	0	23.3	0	25.6	2.3	0	7	0	9.3	37.2	0	0	0	37.2	

Summary of Traffic Volume Counts

Existing Retail Center (West of Natural Grocers)
 Afternoon Peak-Hours
 Cloudy, Cool

File Name : Site-epm
 Site Code : 3
 Start Date : 3/28/2018
 Page No : 1

Groups Printed- Unshifted

Start Time	Driveways on W. 23rd Street Southbound					Cross Access Driveways to the East Westbound					Driveways on W. 23rd Street Northbound					Cross Access Driveways to the East Eastbound					Int. Total
	West Drive (Enter)		East Drive (Enter)		App. Total	North Drive (Enter)		South Drive (Enter)		App. Total	East Drive (Exit)		West Drive (Exit)		App. Total	South Drive (Exit)		North Drive (Exit)		App. Total	
04:00 PM	6	0	0	0	6	0	0	1	0	1	5	0	1	0	6	4	0	1	0	5	18
04:15 PM	4	0	2	0	6	0	0	3	0	3	3	0	3	0	6	2	0	0	0	2	17
04:30 PM	2	0	7	0	9	0	0	1	0	1	2	0	3	0	5	2	0	0	0	2	17
04:45 PM	0	0	5	0	5	0	0	1	0	1	4	0	2	0	6	3	0	1	0	4	16
Total	12	0	14	0	26	0	0	6	0	6	14	0	9	0	23	11	0	2	0	13	68
05:00 PM	6	0	3	0	9	0	0	0	0	0	4	0	1	0	5	2	0	0	0	2	16
05:15 PM	0	0	6	0	6	0	0	0	0	0	2	0	3	0	5	1	0	2	0	3	14
05:30 PM	3	0	6	0	9	1	0	2	0	3	3	0	1	0	4	4	0	0	0	4	20
05:45 PM	1	0	0	0	1	0	0	1	0	1	3	0	2	0	5	1	0	1	0	2	9
Total	10	0	15	0	25	1	0	3	0	4	12	0	7	0	19	8	0	3	0	11	59
Grand Total	22	0	29	0	51	1	0	9	0	10	26	0	16	0	42	19	0	5	0	24	127
Apprch %	43.1	0	56.9	0		10	0	90	0		61.9	0	38.1	0		79.2	0	20.8	0		
Total %	17.3	0	22.8	0	40.2	0.8	0	7.1	0	7.9	20.5	0	12.6	0	33.1	15	0	3.9	0	18.9	

APPENDIX VI

Current Signal Timing Plans

- W. 23rd Street and Naismith Drive
and
- W. 23rd Street and Ousdahl Road

Vehicle Basic Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	6	6	6	6	6	6	6	6	0	0	0	0	0	0	0	0
Passage	1	1.3	3	1	1	1.3	3	1	0	0	0	0	0	0	0	0
Maximum 1	15	45	15	30	15	45	15	30	0	0	0	0	0	0	0	0
Maximum 2	15	45	15	30	15	45	15	30	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Red Clearance	1	2	1	2	1	2	1	2	0	0	0	0	0	0	0	0
Green Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	5	0	5	0	5	0	5	0	0	0	0	0	0	0	0
Pedestrian Clear	0	28	0	17	0	25	0	18	0	0	0	0	0	0	0	0
Flashing Walk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walk Offset Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Offset Mode	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv

Dial 1/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	13	54	20	33	22	45	20	33
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	12	13	12	13	12	13	12	13
Min Ped Time	0	33	0	22	0	30	0	23

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	119	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 2/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	18	47	15	40	18	47	24	31
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	12	13	12	13	12	13	12	13
Min Ped Time	0	33	0	22	0	30	0	23

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	21	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	17	50	15	38	19	48	21	32
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	12	13	12	13	12	13	12	13
Min Ped Time	0	33	0	22	0	30	0	23

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	84	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length 150

Phase	1	2	3	4	5	6	7	8
Time	17	76	18	39	18	75	26	31
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	12	13	12	13	12	13	12	13
Min Ped Time	0	33	0	22	0	30	0	23

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								

Offset	1	2	3
Time	78	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Traffic

	Program			Pattern			Ph Func																
	Day	Hour	Min	Dial	Split	Offset	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	1	0	1	0	0	4																	
2	1	9	0	2	1	1																	
3	1	22	0	0	0	4																	
4	2	0	1	0	0	4																	
5	2	6	30	1	1	1																	
6	2	9	30	2	1	1																	
7	2	15	30	3	2	1																	
8	2	18	30	2	1	1																	
9	2	22	0	0	0	4																	
10	6	0	1	0	0	4																	
11	6	6	30	1	1	1																	
12	6	9	30	2	1	1																	
13	6	15	30	3	2	1																	
14	6	18	30	2	1	1																	
15	6	23	0	0	0	4																	
16	7	0	1	0	0	4																	
17	7	9	0	2	1	1																	
18	7	23	0	0	0	4																	

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Vehicle Basic Timing

Phase Bank 1																
Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Min. Green	6	10	6	6	6	10	6	6	0	0	0	0	0	0	0	0
Passage	1	2	2	3	1	2	2	3	0	0	0	0	0	0	0	0
Maximum 1	15	45	15	35	15	45	15	35	0	0	0	0	0	0	0	0
Maximum 2	15	35	0	28	15	35	0	28	0	0	0	0	0	0	0	0
Yellow Change	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Red Clearance	1	2	1	2	1	2	1	2	0	0	0	0	0	0	0	0
Green Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Delay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bike Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bike Passage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Pedestrian Timing

Phase Bank 1																
Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Walk	0	7	0	7	0	7	0	7	0	0	0	0	0	0	0	0
Pedestrian Clear	0	10	0	18	0	9	0	18	0	0	0	0	0	0	0	0
Alt Walk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alt Pedestrian Clear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flashing Walk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extended Pedestrian Clear	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm	0 - Nrm
Actuated Rest In Walk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walk Offset Time	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Walk Offset Mode	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv	0 - Adv

Dial 1/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	18	53	16	33	22	49	16	33
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5
Min Ped Time	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=17 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=16 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Offset	1	2	3
Time	42	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Correction	0 - Normal	0 - Normal	0 - Normal
Special Function	0	0	0
Maximum Mode	0 - None	0 - None	0 - None
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 2/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	18	53	16	33	18	53	16	33
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5
Min Ped Time	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=17 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=16 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Offset	1	2	3
Time	38	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Correction	0 - Normal	0 - Normal	0 - Normal
Special Function	0	0	0
Maximum Mode	0 - None	0 - None	0 - None
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 1

Cycle Length 120

Phase	1	2	3	4	5	6	7	8
Time	16	55	16	33	16	55	16	33
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5
Min Ped Time	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=17 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=16 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Offset	1	2	3
Time	40	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Correction	0 - Normal	0 - Normal	0 - Normal
Special Function	0	0	0
Maximum Mode	0 - None	0 - None	0 - None
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Dial 3/Split 2

Cycle Length 150

Phase	1	2	3	4	5	6	7	8
Time	24	70	16	40	20	74	16	40
Mode	0 - AP	1 - CP	0 - AP	0 - AP	0 - AP	1 - CP	0 - AP	0 - AP
Min Veh Time	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=17 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=12 Bnk2=5 Bnk3=5 Bnk4=5	Bnk1=13 Bnk2=5 Bnk3=5 Bnk4=5
Min Ped Time	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=17 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=16 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=0 Bnk2=0 Bnk3=0 Bnk4=0	Bnk1=25 Bnk2=0 Bnk3=0 Bnk4=0
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Phase	9	10	11	12	13	14	15	16
Time	0	0	0	0	0	0	0	0
Mode	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP	0 - AP
Min Veh Time								
Min Ped Time								
Phase Reduction	0	0	0	0	0	0	0	0
Phase Extension	0	0	0	0	0	0	0	0

Offset	1	2	3
Time	76	0	0
Mode	0 - Normal	0 - Normal	0 - Normal
Alt Sequence	0	0	0
Correction	0 - Normal	0 - Normal	0 - Normal
Special Function	0	0	0
Maximum Mode	0 - None	0 - None	0 - None
Ring 2 Lag Time	0	0	0
Ring 3 Lag Time	0	0	0
Ring 4 Lag Time	0	0	0

Traffic

	Program			Pattern			Ph Func																
	Day	Hour	Min	Dial	Split	Offset	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	1	6	0	0	0	4																	
2	1	9	0	2	1	1																	
3	1	22	0	0	0	4																	
4	2	6	0	0	0	4																	
5	2	6	30	1	1	1																	
6	2	9	30	2	1	1																	
7	2	15	30	0	0	4																	
8	2	16	0	3	2	1																	
9	2	18	30	2	1	1																	
10	2	22	0	0	0	4																	
11	4	6	0	0	0	4																	
12	4	6	30	1	1	1																	
13	4	9	30	2	1	1																	
14	4	14	0	0	0	4																	
15	4	15	0	2	1	1																	
16	4	16	0	3	2	1																	
17	4	18	30	2	1	1																	
18	4	22	0	0	0	4																	
19	6	6	0	0	0	4																	
20	6	6	30	1	1	1																	
21	6	9	30	2	1	1																	
22	6	15	30	0	0	4																	
23	6	16	0	3	2	1																	
24	6	18	30	2	1	1																	
25	6	22	0	0	0	4																	
26	7	6	0	0	0	4																	
27	7	9	0	2	1	1																	
28	7	22	0	0	0	4																	

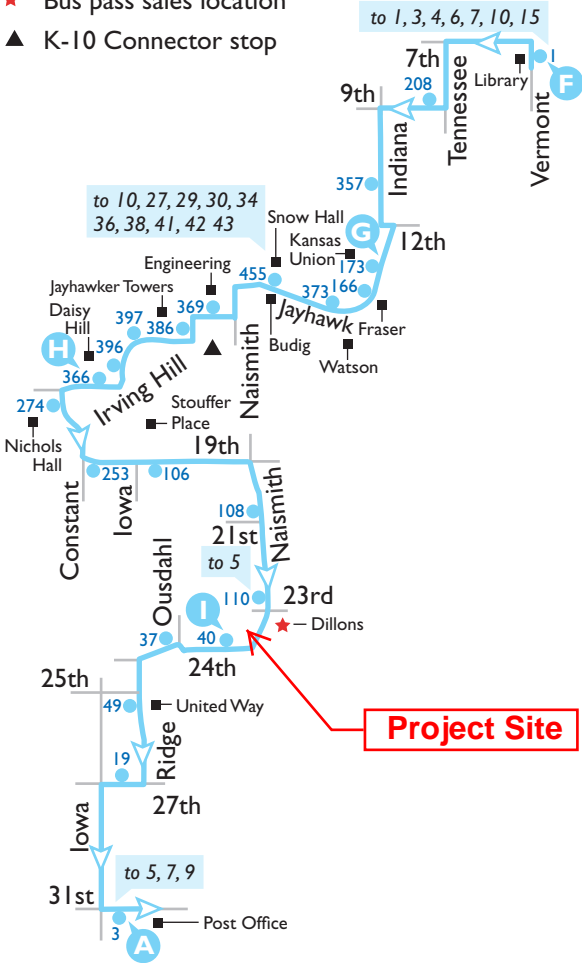
APPENDIX VII

Transit and Bike Systems Maps
(Source: City Website)



Downtown to KU to South Iowa Southbound

- A** Timing point
- Bus stop
- # Bus stop number
- ★ Bus pass sales location
- ▲ K-10 Connector stop



NOTE: Engel & Irving Hill

Because of overcrowding, Route 11 southbound will not stop at Engel & Irving Hill from 1:00 p.m. to 5:30 p.m. Monday through Friday on A Schedule only. Riders traveling southbound from campus should use Route 43 during this time. Policy applies to Route 11 southbound only; northbound route is not affected.

This route operates Monday–Saturday, except holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. It follows B Schedule on Saturdays, Class Breaks, and Summer Semester.

SOUTHBOUND

A Fall & Spring Semesters Classes in Session (Mon – Fri)

	F 7th & Vermont	G Kansas Union	H Engel & Irving Hill	I 24th & Naismith	A 31st & Iowa
AM	6:31	6:38	6:48	6:56	7:03
	7:01	7:08	7:18	7:26	7:33
	7:31	7:38	7:48	7:56	8:03
	8:01	8:08	8:18	8:26	8:33
	8:31	8:38	8:48	8:56	9:03
	9:01	9:08	9:18	9:26	9:33
	9:31	9:38	9:48	9:56	10:03
	10:01	10:08	10:18	10:26	10:33
	10:31	10:38	10:48	10:56	11:03
	11:01	11:08	11:18	11:26	11:33
PM	11:31	11:38	11:48	11:56	12:03
	12:01	12:08	12:18	12:26	12:33
	12:31	12:38	12:48	12:56	1:03
	1:01	1:08	See note.	1:26	1:33
	1:31	1:38	See note.	1:56	2:03
	2:01	2:08	See note.	2:26	2:33
	2:31	2:38	See note.	2:56	3:03
	3:01	3:08	See note.	3:26	3:33
	3:31	3:38	See note.	3:56	4:03
	4:01	4:08	See note.	4:26	4:33
4:31	4:38	See note.	4:56	5:03	
5:01	5:08	See note.	5:26	5:33	
5:31	5:38	5:48	5:56	6:03	
6:01	6:08	6:18	6:26	6:33	
6:31	6:38	6:48	6:56	7:03	
7:01	7:08	7:18	7:26	7:33	
7:31	7:38	7:48	7:56	8:03	
8:01	8:08	8:18	8:26	8:33	
8:31	8:38	8:48	8:56	9:03	
9:01	9:08	9:18	9:26	9:33	
10:01	10:08	10:18	10:26	10:33	

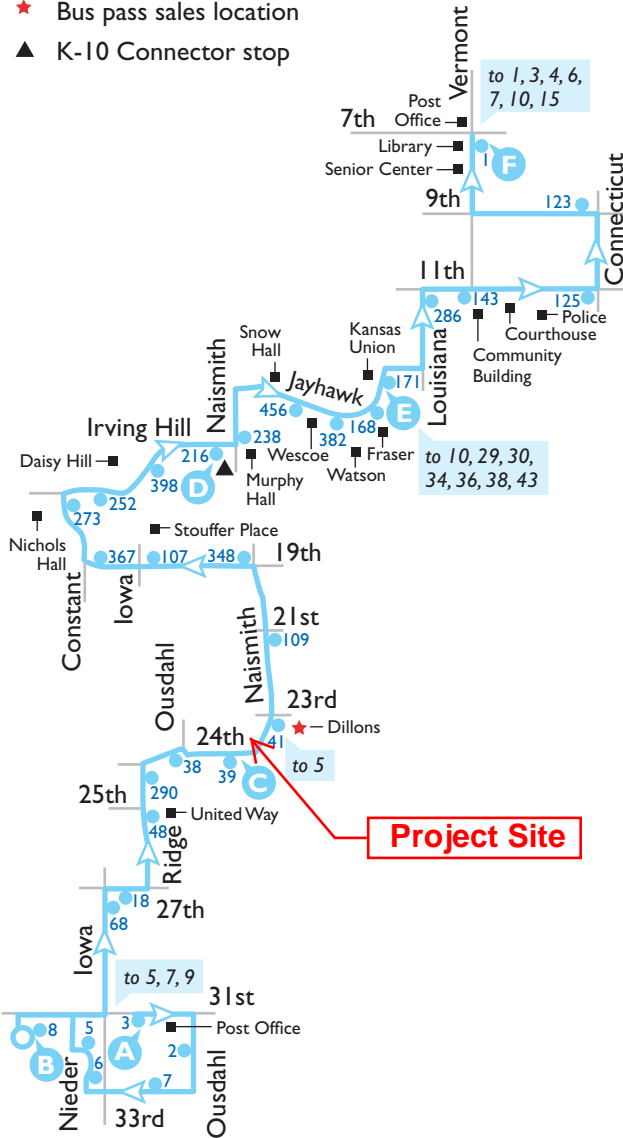
B Saturdays, Class Breaks, Summer Semester

	F 7th & Vermont	G Kansas Union	H Engel & Irving Hill	I 24th & Naismith	A 31st & Iowa
AM	6:31	6:38	6:48	6:56	7:03
	7:01	7:08	7:18	7:26	7:33
	7:31	7:38	7:48	7:56	8:03
	8:01	8:08	8:18	8:26	8:33
	8:31	8:38	8:48	8:56	9:03
	9:01	9:08	9:18	9:26	9:33
	9:31	9:38	9:48	9:56	10:03
	10:01	10:08	10:18	10:26	10:33
	10:31	10:38	10:48	10:56	11:03
	11:01	11:08	11:18	11:26	11:33
PM	11:31	11:38	11:48	11:56	12:03
	12:01	12:08	12:18	12:26	12:33
	12:31	12:38	12:48	12:56	1:03
	1:01	1:08	1:18	1:26	1:33
	1:31	1:38	1:48	1:56	2:03
	2:01	2:08	2:18	2:26	2:33
	2:31	2:38	2:48	2:56	3:03
	3:01	3:08	3:18	3:26	3:33
	3:31	3:38	3:48	3:56	4:03
	4:01	4:08	4:18	4:26	4:33
5:01	5:08	5:18	5:26	5:33	
5:31	5:38	5:48	5:56	6:03	
6:31	6:38	6:48	6:56	7:03	
7:01	7:08	7:18	7:26	7:33	



South Iowa to KU to Downtown Northbound

- A** Timing point
- Bus stop
- # Bus stop number
- ★ Bus pass sales location
- ▲ K-10 Connector stop



NORTHBOUND

A Fall & Spring Semesters Classes in Session (Mon – Fri)

	A	B	C	D	E	F
	31st & Iowa	West 31st St	24th & Naismith	Irving Hill & Naismith	Kansas Union	7th & Vermont
AM	6:03	6:13	6:22	6:31	6:41	6:52
	6:33	6:43	6:52	7:01	7:11	7:22
	7:03	7:13	7:22	7:31	7:41	7:52
	7:33	7:43	7:52	8:01	8:11	8:22
	8:03	8:13	8:22	8:31	8:41	8:52
	8:33	8:43	8:52	9:01	9:11	9:22
	9:03	9:13	9:22	9:31	9:41	9:52
	9:33	9:43	9:52	10:01	10:11	10:22
	10:03	10:13	10:22	10:31	10:41	10:52
	10:33	10:43	10:52	11:01	11:11	11:22
PM	11:03	11:13	11:22	11:31	11:41	11:52
	11:33	11:43	11:52	12:01	12:11	12:22
	12:03	12:13	12:22	12:31	12:41	12:52
	12:33	12:43	12:52	1:01	1:11	1:22
	1:03	1:13	1:22	1:31	1:41	1:52
	1:33	1:43	1:52	2:01	2:11	2:22
	2:03	2:13	2:22	2:31	2:41	2:52
	2:33	2:43	2:52	3:01	3:11	3:22
	3:03	3:13	3:22	3:31	3:41	3:52
	3:33	3:43	3:52	4:01	4:11	4:22
	4:03	4:13	4:22	4:31	4:41	4:52
	4:33	4:43	4:52	5:01	5:11	5:22
	5:03	5:13	5:22	5:31	5:41	5:52
	5:33	5:43	5:52	6:01	6:11	6:22
	6:03	6:13	6:22	6:31	6:41	6:52
	6:33	6:43	6:52	7:01	7:11	7:22
	7:03	7:13	7:22	7:31	7:41	7:52
	7:33	7:43	7:52	8:01	8:11	8:22
	8:03	8:13	8:22	8:31	8:41	8:52
	8:33	8:43	8:52	9:01	9:11	9:22
9:03	9:13	9:22	9:31	9:41	9:52	
9:33	9:43	9:52	10:01	10:11	10:22	

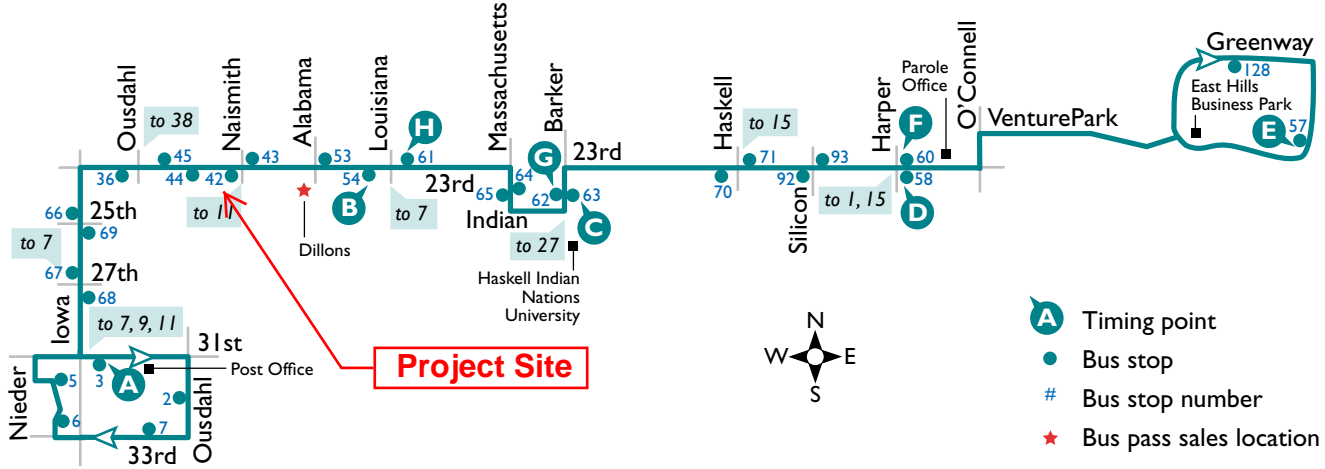
B Saturdays, Class Breaks, Summer Semester

	A	B	C	D	E	F
	31st & Iowa	West 31st St	24th & Naismith	Irving Hill & Naismith	Kansas Union	7th & Vermont
AM	7:03	7:13	7:22	7:31	7:41	7:52
	7:33	7:43	7:52	8:01	8:11	8:22
	8:03	8:13	8:22	8:31	8:41	8:52
	8:33	8:43	8:52	9:01	9:11	9:22
	9:03	9:13	9:22	9:31	9:41	9:52
	9:33	9:43	9:52	10:01	10:11	10:22
	10:03	10:13	10:22	10:31	10:41	10:52
	10:33	10:43	10:52	11:01	11:11	11:22
	11:03	11:13	11:22	11:31	11:41	11:52
	11:33	11:43	11:52	12:01	12:11	12:22
PM	12:03	12:13	12:22	12:31	12:41	12:52
	12:33	12:43	12:52	1:01	1:11	1:22
	1:03	1:13	1:22	1:31	1:41	1:52
	1:33	1:43	1:52	2:01	2:11	2:22
	2:03	2:13	2:22	2:31	2:41	2:52
	2:33	2:43	2:52	3:01	3:11	3:22
	3:03	3:13	3:22	3:31	3:41	3:52
	3:33	3:43	3:52	4:01	4:11	4:22
	4:03	4:13	4:22	4:31	4:41	4:52
	4:33	4:43	4:52	5:01	5:11	5:22
	5:33	5:43	5:52	6:01	6:11	6:22
	6:03	6:13	6:22	6:31	6:41	6:52
	6:33	6:43	6:52	7:01	7:11	7:22
	7:03	7:13	7:22	7:31	7:41	7:52

This route operates Monday–Saturday, except holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. It follows B Schedule on Saturdays, Class Breaks, and Summer Semester.



5 South Iowa to East Hills Business Park



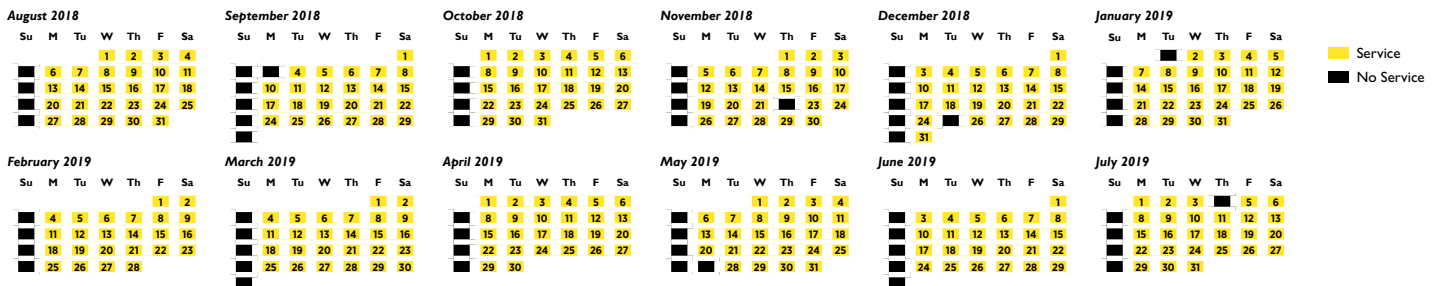
EASTBOUND

	A	B	C	D	E
	31st & Iowa	23rd & Louisiana	Haskell University	23rd & Harper	East Hills
AM	6:00	6:12	6:15	6:19	6:28
	6:30	6:42	6:45	6:49	6:58
	7:00	7:12	7:15	7:19	7:28
	7:30	7:42	7:45	7:49	7:58
	8:00	8:12	8:15	8:19	8:28
	8:30	8:42	8:45	8:49	8:58
	9:00	9:12	9:15	9:19	9:28
	9:30	9:42	9:45	9:49	9:58
	10:00	10:12	10:15	10:19	10:28
	10:30	10:42	10:45	10:49	10:58
PM	11:00	11:12	11:15	11:19	11:28
	11:30	11:42	11:45	11:49	11:58
	12:00	12:12	12:15	12:19	12:28
	12:30	12:42	12:45	12:49	12:58
	1:00	1:12	1:15	1:19	1:28
	1:30	1:42	1:45	1:49	1:58
	2:00	2:12	2:15	2:19	2:28
	2:30	2:42	2:45	2:49	2:58
	3:00	3:12	3:15	3:19	3:28
	3:30	3:42	3:45	3:49	3:58
PM	4:00	4:12	4:15	4:19	4:28
	4:30	4:42	4:45	4:49	4:58
	5:00	5:12	5:15	5:19	5:28
	5:30	5:42	5:45	5:49	5:58
	6:00	6:12	6:15	6:19	6:28
	6:30	6:42	6:45	6:49	6:58
	7:00	7:12	7:15	7:19	7:28
7:30	7:42	7:45	7:49	7:58	

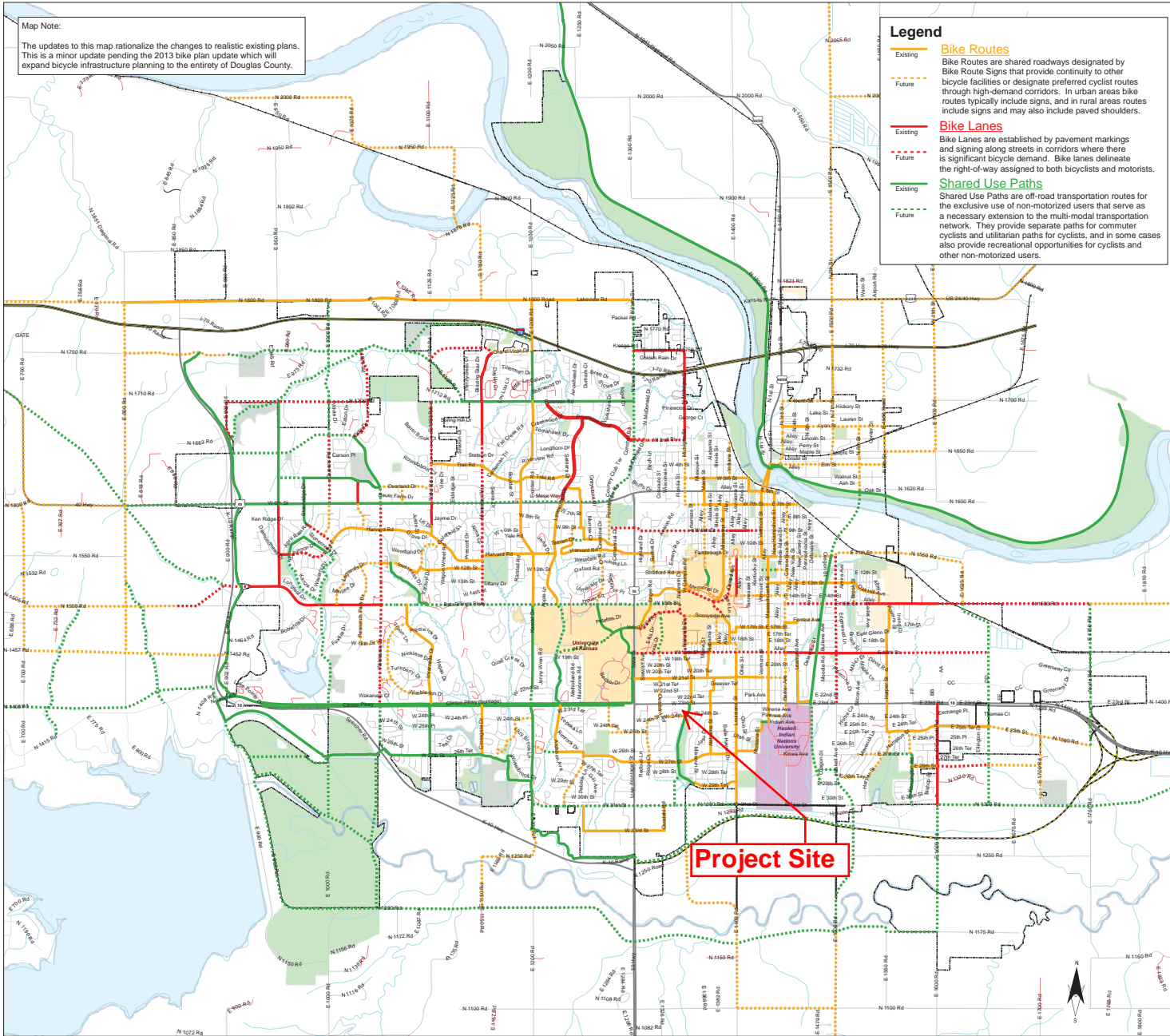
WESTBOUND

	E	F	G	H	A
	East Hills	23rd & Harper	Haskell University	23rd & Louisiana	31st & Iowa
AM	6:04	6:12	6:18	6:21	6:30
	6:34	6:42	6:48	6:51	7:00
	7:04	7:12	7:18	7:21	7:30
	7:34	7:42	7:48	7:51	8:00
	8:04	8:12	8:18	8:21	8:30
	8:34	8:42	8:48	8:51	9:00
	9:04	9:12	9:18	9:21	9:30
	9:34	9:42	9:48	9:51	10:00
	10:04	10:12	10:18	10:21	10:30
	10:34	10:42	10:48	10:51	11:00
PM	11:04	11:12	11:18	11:21	11:30
	11:34	11:42	11:48	11:51	12:00
	12:04	12:12	12:18	12:21	12:30
	12:34	12:42	12:48	12:51	1:00
	1:04	1:12	1:18	1:21	1:30
	1:34	1:42	1:48	1:51	2:00
	2:04	2:12	2:18	2:21	2:30
	2:34	2:42	2:48	2:51	3:00
	3:04	3:12	3:18	3:21	3:30
	3:34	3:42	3:48	3:51	4:00
PM	4:04	4:12	4:18	4:21	4:30
	4:34	4:42	4:48	4:51	5:00
	5:04	5:12	5:18	5:21	5:30
	5:34	5:42	5:48	5:51	6:00
	6:04	6:12	6:18	6:21	6:30
	6:34	6:42	6:48	6:51	7:00
	7:04	7:12	7:18	7:21	7:30
7:34	7:42	7:48	7:51	8:00	

This route operates Monday–Saturday, except holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.



T2040 Bikeway System Map



Lawrence-Douglas County Metropolitan Planning Organization

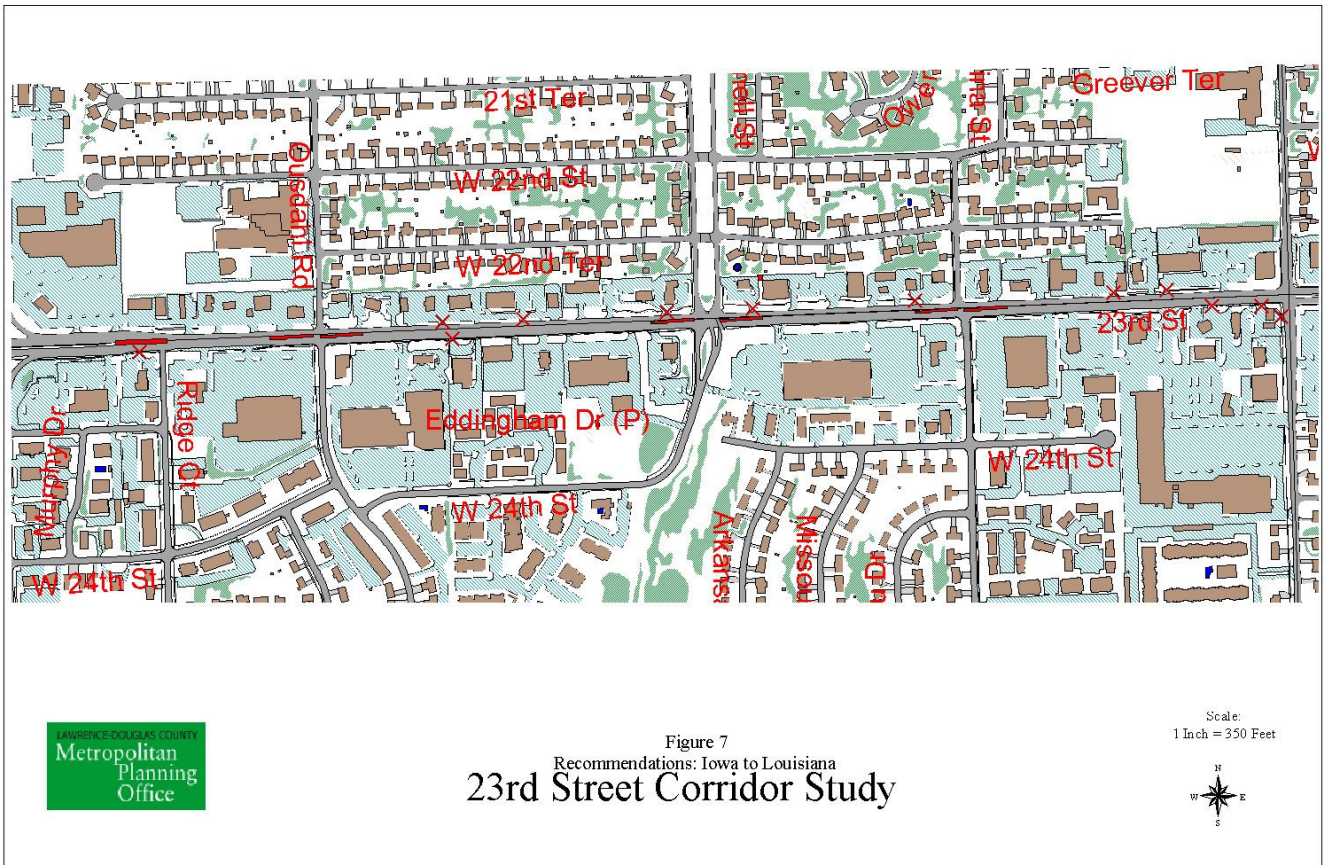
Drafted by David R. Guntert

Map Notes:

It is understood that future roadways are projections only. Development plans that extend roads designated to have bicycle facilities should also continue those bicycle facilities. All developments that seek changes in the designated bicycle facilities shown on this map are subject to review by the Bicycle Advisory Committee, which shall make its recommendations to the Lawrence City Commission, Douglas County Commission, and the Lawrence-Douglas County MPO. The MPO by approval of this map is establishing a regional plan for bikeway development that is made a part of the Metropolitan Transportation Plan.

Approved by the Lawrence-Douglas County Metropolitan Planning Organization on April 16, 2009. Minor network updates last made on March 21, 2013. T2040 Metropolitan Transportation Plan Approved on March 21, 2013.

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