

Joint meeting of the:

Needham Planning Board
Needham Select Board
Needham Finance Committee

Wednesday, November 18, 2020 8:00 a.m.

Virtual Meeting using Zoom

Meeting ID: **858 8819 8340** (Instructions for accessing below)

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1. Presentation by Greenman-Pedersen, Inc. of a Traffic Impact Study. Said study prepared for a proposed rezoning and redevelopment of the Muzi Motors and Channel 5 properties on Highland Avenue and Gould Street in Needham, MA.



TECHNICAL MEMORANDUM

REF: NEX-2020218.00

DATE: November 13, 2020

TO: Department of Planning and Community Development

c/o Ms. Lee Newman 500 Dedham Avenue Needham, MA 02492

FROM: Ms. Rebecca L. Brown, P.E., Senior Project Manager

Mr. Douglas Halpert, P.E., Project Engineer

RE: Traffic Impact Study

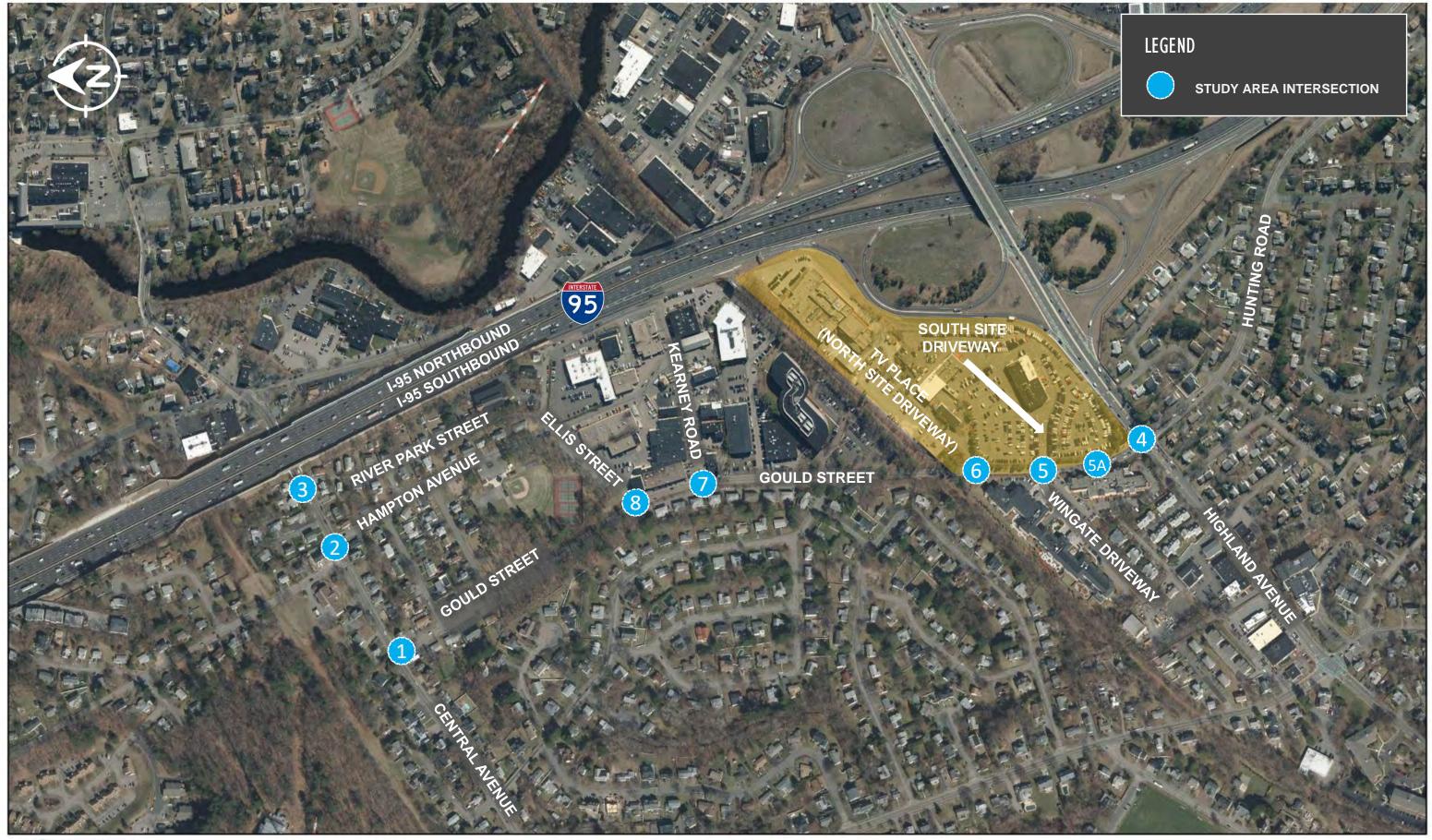
Muzi Motors Redevelopment

Gould Street & Highland Avenue - Needham, Massachusetts

INTRODUCTION

Greenman-Pedersen, Inc. (GPI) has prepared this *Traffic Impact Study* (TIS) for a proposed rezoning and redevelopment of the Muzi Motors and Channel 5 properties on Highland Avenue and Gould Street in Needham, Massachusetts. The site is located on the northeast corner of the Highland Avenue / Gould Street intersection and is currently accessed via a right-in/right-out only driveway on Highland Avenue and two full-access/egress driveways on Gould Street. The property is currently zoned Industrial 1, and the Town of Needham Department of Planning and Community Development is currently evaluating the impacts associated with rezoning this property to Highway Commercial 1. This TIS examines the traffic impacts associated with one potential build-out of the site under the proposed zoning, which would provide a floor area ratio (FAR) of 1.35 and a total of ±866,350 square feet (SF) of development, consisting of approximately ±368,200 SF of corporate headquarter space, ±368,200 SF of research and development (R&D) space, and ±129,950 SF of ancillary retail space. In addition, this TIS identifies the transportation infrastructure improvements that would be required to accommodate the additional traffic generated by such a redevelopment.

The site is bounded by Interstate 95 (Yankee Division Highway) to the east, Highland Avenue to the south, Gould Street to the west, and commercial/office space to the north. The site location in relation to the surrounding roadways is shown on the map on Figure 1.



EXISTING CONDITIONS

Study Area

Evaluation of the traffic impacts associated with the proposed project requires an evaluation of existing and projected traffic volumes on the adjacent streets, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets and nearby intersections. In preparing the TIA for the proposed site, the following intersections have been analyzed and evaluated based on conversations with the Town of Needham Department of Planning and Community Development:

- Central Avenue / Gould Street
- Central Avenue / Hampton Avenue
- Central Avenue / River Park Street
- Highland Avenue / Gould Street / Hunting Road
- Gould Street / Wingate Needham Driveway / Muzi Motors Driveway (South Site Driveway)
- Gould Street / TV Place (North Site Driveway)
- Gould Street / Kearney Road
- Gould Street / Ellis Street

Central Avenue / Gould Street

Gould Street intersects Central Avenue from the south to create a three-way "T-shaped", unsignalized intersection. The Central Avenue eastbound and westbound approaches consist of a single general-purpose lane with directional traffic separated by a striped double-yellow centerline. The Gould Street northbound approach consists of a single general-purpose lane with directional traffic separated by a striped double-yellow centerline. The Central Avenue eastbound and westbound approaches operate under free-flow conditions while the Gould Street northbound approach operates under STOP sign control. Sidewalks are provided along both sides of all approaches with crosswalks provided across the Central Avenue westbound approach and the Gould Street northbound approach. No bicycle accommodations are provided at this intersection.

Central Avenue / Hampton Avenue

Hampton Avenue intersects Central Avenue from the south to create a three-way "T-shaped", unsignalized intersection. The Central Avenue eastbound and westbound approaches consist of a single general-purpose lane with directional traffic separated by a striped double-yellow centerline. The Hampton Avenue northbound approach consists of a single general-purpose lane with directional traffic not separated. The Central Avenue eastbound and westbound approaches operate under free-flow conditions while the Hampton Avenue northbound approach operates under STOP sign control. Sidewalks are provided along both sides of all approaches; however, no crosswalks are provided. No bicycle accommodations are provided at this intersection.

Central Avenue / River Park Street

River Park Street intersects Central Avenue from the south to create a three-way "T-shaped", unsignalized intersection. The Central Avenue eastbound and westbound approaches consist of a single general-purpose lane with directional traffic separated by a striped double-yellow centerline. The River Park Street northbound approach consists of a single general-purpose lane with directional traffic not separated. The Central Avenue eastbound and westbound approaches operate under free-flow conditions while the River Park Street northbound approach operates under STOP sign control. Sidewalks are provided along both sides of Central Avenue. No crosswalks or bicycle accommodations are provided at this intersection.



Highland Avenue / Gould Street / Hunting Road

Gould Street and Hunting Road intersect Highland Avenue from the north and south respectively to create a four-way, signalized intersection. The Highland Avenue eastbound and westbound approaches consist of an exclusive left-turn lane, an exclusive through lane, and a shared through/right-turn lane with directional travel separated by a raised concrete median. The Hunting Road northbound approach consists of a shared left-turn/through lane and an exclusive right-turn lane with directional travel separated by a striped double-yellow centerline. Heavy vehicle restriction signage is posted for Hunting Road. The Gould Street southbound approach consists of an exclusive left-turn lane and a shared left/through/right-turn lane with directional travel separated by a striped double-yellow centerline.

Sidewalks are provided along both sides of all approaches and crosswalks are provided on all approaches except the westbound approach. Bicycle detection with supplemental signage is provided at the Highland Avenue eastbound and westbound approaches.

Gould Street / Wingate Driveway / Site South Driveway

The Wingate Residences driveway and the Project site's southerly driveway (existing Muzi Ford driveway) intersect Gould Street from the east and west respectively to create a four-way, unsignalized intersection. The Wingate driveway eastbound approach consists of a single general-purpose lane with directional travel not separated. The site southerly driveway westbound approach consists of a shared left-turn/through lane and an exclusive right-turn lane with directional travel separated by a striped single-yellow centerline. The Gould Street northbound and southbound approaches consist of a single general-purpose lane with directional travel separated by a striped double-yellow centerline. The Gould Street northbound and southbound approaches operate under free-flowing conditions while the Wingate driveway eastbound approach and the site southerly driveway westbound approach are assumed to operate under STOP control though no signage or pavement markings are provided. Sidewalks are provided along the westerly side of Gould Street and along the northerly side of the Wingate driveway. No crosswalks or bicycle accommodations are provided at this intersection.

Gould Street / TV Place (Site North Driveway)

TV Place (the Project site's northerly driveway) intersects Gould Street from the east to create a three-way "Y-shaped", unsignalized intersection. The TV Place westbound approach consists of a single general-purpose lane with directional travel not separated. The Gould Street northbound and southbound approaches consist of a single general-purpose lane with directional travel separated by a striped double-yellow centerline. The Gould Street northbound and southbound approaches operate under free-flowing conditions while the TV Place westbound approach is assumed to operate under STOP control though no signage or pavement markings are provided. A sidewalk is provided along the westerly side of Gould Street. No crosswalks or bicycle accommodations are provided at this intersection.

Gould Street / Kearney Road

Kearney Road intersects Gould Street from the east to create a three-way "T-shaped", unsignalized intersection. The Kearney Road westbound approach consists of a single general-purpose lane with directional travel not separated. The Gould Street northbound and southbound approaches consist of a single general-purpose lane with directional travel separated by a striped double-yellow centerline. The Gould Street northbound and southbound approaches operate under free-flowing conditions while the Kearney Road westbound approach is assumed to operate under STOP control though no signage or pavement markings are provided. A sidewalk is provided along the westerly side of Gould Street. No crosswalks or bicycle accommodations are provided at this intersection.



Gould Street / Ellis Street / Driveway

The driveway at 99-151 Gould Street and Ellis Street intersect Gould Street from the west and east respectively to create a four-way, unsignalized intersection. The driveway eastbound approach consists of a single general-purpose lane with directional travel not separated. The Ellis Street approach consists of a single general-purpose lane with directional travel separated by a striped single-yellow centerline. The Gould Street northbound and southbound approaches consist of a single general-purpose lane with directional travel separated by a striped double-yellow centerline. The Gould Street northbound and southbound approaches operate under free-flowing conditions while the driveway eastbound approach and the Ellis Street westbound approach are assumed to operate under STOP control though no signage or pavement markings are provided. A sidewalk is provided along the westerly side of Gould Street. No crosswalks or bicycle accommodations are provided at this intersection.

Public Transportation

The Massachusetts Bay Transportation Authority (MBTA) provides public transportation services within the Greater Boston Metropolitan Area, which includes the Town of Needham. The Needham Heights train station is a stop for the MBTA's Needham Commuter Line located approximately 0.8 miles southwest of the proposed site location. The line provides service from South Station in Boston to Needham Heights. The average travel time between South Station / Needham Heights is 40-45 minutes. On a typical weekday, this service runs between 6:05 AM and 10:47 AM for inbound travel, and between 6:47 AM and midnight for outbound travel. On a typical Saturday, this service runs between 8:05 AM and 12:05 AM (Sunday) for inbound travel, and between 7:10 AM and 11:25 PM for outbound travel. No additional service is provided on Sundays.

The fare for the commuter line ranges from \$2.40 to \$13.25 for adults while seniors and persons with disabilities pay 50% off the regular fare. The range in fare prices is based by zone with the Needham Commuter Line residing between Zone 1A – Zone 2. Children 11 years of age and under ride for free.

The MBTA also provides public transportation services within the vicinity of the project through one of its bus lines. The Bus Line 59 connecting Watertown Square and Needham Junction passes through Highland Avenue and Central to the south and north of the proposed site location, respectively. On a typical weekday, this service runs from 6:20 AM to 8:22 PM, with the average travel time from one end to another of 35 minutes. The fare for MBTA buses ranges from \$1.70 with CharlieCard to \$2.00 for cash-on-board for adults while seniors, persons with disabilities, and students pay \$0.85 per ride. Children 11 years of age and under ride for free. The closest stop to the site is located at Highland Avenue / Avery Square or at Central Avenue / Gould Street.

The Bus Line 59 also provides service to the Newton Heights train station which is approximately 2.5 miles from the Project site and on the MBTA Subway – Green Line D (Riverside). This line provides service from Government Center in Boston to Riverside in Newton. Because the Green Line D partially runs along the roadway with vehicles, the average travel time between Government Center / Riverside is variable. However, the MBTA notes that peak hour headways are 6 minutes and range from 8-11 minutes on off-peak hours. On a typical weekday and Saturday, this service runs between 4:56 AM and 12:49 AM. On a typical Sunday, this service runs between 5:25 AM and 12:49 AM.

The 128 Business Council provides shuttle service throughout the Town of Needham – Needham Shuttle Bus Route. The 128 Business Council provides service to numerous destinations in Needham, including Needham Street, Second Avenue, First Avenue, A Street, B Street, and Kendrick Street which are all located on the easterly side of Interstate 95. Weekday service operates from 7:30 AM to 5:50 PM. This service is offered when requested ahead of time and is available for persons with disabilities. The 128 Business Council is operating fare free until contract-free methods of fare payment is possible.



All public transportation information is provided in the Appendix.

Traffic Volumes

Due to the COVID-19 pandemic, current traffic volumes are lower than typical conditions, and therefore, MassDOT has a restriction on collecting new traffic count data. MassDOT has issued a directive, *Guidance of Traffic Count Data* dated April 2020 that allows for the use of counts collected as long ago as 2015, with application of appropriate adjustments to grow traffic volumes to current year conditions. Therefore, GPI researched previous studies in the area to obtain traffic counts data for the study area intersections.

A Traffic Impact Study¹ was previously prepared by BETA Group, Inc. in 2015 for the rezoning of property along Gould Street and Reservoir Street (herein referred to as *BETA 2015 TIS*). As part of the *BETA 2015 TIS*, manual turning movement counts (TMCs) were collected at the study area intersections in June, October, and December 2015 during the weekday AM peak period (7:00 to 9:00 AM) and weekday PM peak period (4:00 to 6:00 PM) peak periods, and were seasonally adjusted to reflect average-month conditions in accordance with MassDOT guidelines for traffic analysis. The 2015 seasonally adjusted traffic volumes from this study were used to estimate existing traffic-volume conditions at the majority of the study area intersections.

It should be noted that at the time that the traffic volumes were collected in 2015, a widening project was under construction along Route 128 (I-95) (MassDOT Project # 603711), which included reconstruction of the Exit 19 highway ramps. During this time, a significant volume of traffic was being detoured onto Hunting Road to travel to/from I-95. TMCs were collected at the Highland Avenue / Gould Street / Hunting Road intersection in February 2019 during the weekday AM and PM peak periods as part of the *Route 128 Adda-Lane Post Construction Study*². The volumes collected at this intersection in February 2019 were compared to those collected at the same intersection in 2015 as part of the *BETA 2015 TIS* and were found to be 14 to 15 percent lower in 2019 as compared to 2015. The majority of this reduction was experienced on the Highland Avenue westbound left-turn and Hunting Road northbound right-turn movements and is likely due a redistribution of traffic onto I-95 following completion of the Route 128 / I-95 roadway widening project. As the 2019 counts represent the most-recently collected traffic volumes and were collected after the construction along I-95 was completed, the February 2019 volumes were used to estimate existing traffic volume conditions at the Highland Avenue / Gould Street / Hunting Road intersection.

Annual Adjustment

The MassDOT directive, *Guidance of Traffic Count Data* provides specific annual adjustment factors to apply for each year of count data based on historic traffic growth trends along various classifications of roadways across the Commonwealth of Massachusetts. However, more local data is available to assess traffic growth specific to the study area. As described above, a comparison of the traffic volumes collected at the Highland Avenue / Gould Street / Hunting Road intersection in 2015 versus 2019 indicates that traffic volumes in the area have decreased by 14 to 15 percent since 2015.

In addition, supplemental Automatic Traffic Recorder (ATR) counts were collected at the Central Avenue / Gould Street and Gould Street / Ellis Street intersections in 2019. A comparison of these 2019 counts to the counts collected at the same locations as part of the *BETA 2015 TIS* indicate traffic volumes at the Central Avenue / Gould Street intersection have decreased by 13 to 14 percent. While volumes at the

² Route 128 Add-a-Lane Post Construction Study, Project File No. 603711, Contract #77875; prepared by McMahon Associates; November 25, 2019.



¹ Traffic Impact Study: Gould Street – Industrial 1 and Reservoir Street – Industrial Districts, Needham, Massachusetts, Contract No. 16GEN0110D; prepared by BETA Group, Inc.; December 2015.

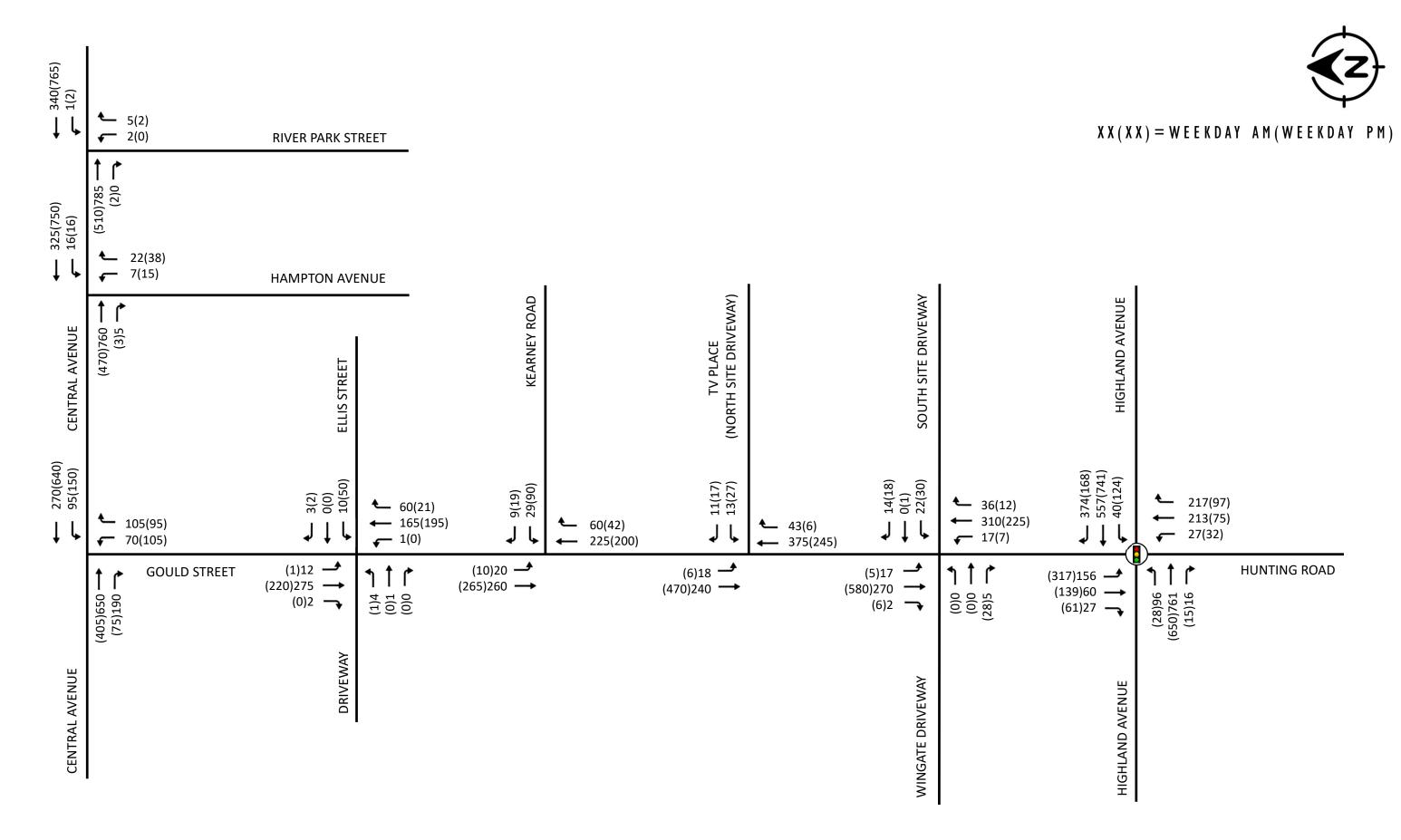
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Gould Street / Ellis Street intersection increased by 8 percent from 2015 to 2019 during the weekday PM peak hour, the volumes at this location decreased by 3 percent during the weekday AM peak hour.

As the comparison of 2015 to 2019 traffic volumes indicates traffic volumes have been decreasing in this area since 2015, the unadjusted 2015 traffic volumes were utilized to represent 2020 Existing traffic volume conditions in order to provide a conservative (worse case) analysis condition. The February 2019 traffic volumes from the *Route 128 Add-a-Lane Post Construction Study* were utilized to represent 2020 Existing traffic volumes at the Highland Avenue / Gould Street / Hunting Road intersection as these represent the most recently collected traffic volumes.

The traffic volume data and comparison calculations described above are provided in the Appendix. The resulting 2020 Existing traffic-flow networks for the weekday AM and PM peak hours are shown graphically on Figure 2.







Collisions

GPI reviewed collision history data from the Needham Police Department and MassDOT for the most recent five-year period available on file (2015-2019), plus the available data through October 21, 2020. Table 1 provides a summary of the collision patterns within the study area.

In addition to the collision summary, crash occurrence also should be compared to the volume of traffic through a particular intersection or on a particular classification of roadway to determine any significance. Accordingly, the crash rate was calculated for the study area intersections and compared with the statewide and district-wide averages. An intersection crash rate is a measure of the frequency of collisions compared to the volume of traffic through an intersection and is presented in crashes per million entering vehicles (c/mev). For signalized intersections, the statewide average is 0.78 c/mev and the district-wide (District 6) average is 0.71 c/mev. For unsignalized intersections, the statewide and district-wide average is 0.52 c/mev. A comparison of the calculated crash rate to these averages can be used to establish the significance of collision occurrence and whether or not potential safety problems exist. All crash rate worksheets are provided in the Appendix.

The intersection of Highland Avenue / Gould Street / Hunting Road experienced an average of nine collisions per year and a crash above the state and district-wide averages over the five-year analysis period. However, it should be noted that construction of roadway improvements was underway as part of the Route 128 Add-A-Lane project for the majority of the analysis time period and may have impacted the occurrence of collisions at this location.

The remaining study area intersections all experienced fewer than three collisions per year and crash rates lower than the state and district-wide averages, indicating a particular safety issue does not exist.



TABLE 1 Collision Summary

	Nui	mber of Col	lisions		Seve	rity ^a				Colli	sion T	ype ^b			Percent During		
Location	Total	Average per Year	Crash Rate ^c	PD	PI	F	NR	SS	RE	СМ	НО	FO	sv	U	Commuter Peak ^d	Wet/Icy Conditions ^e	
Central Avenue at Gould Street	14	2.8	0.47	11	2		1		2	12					43%	14%	
Central Avenue at Hampton Avenue	1	0.2	0.04		1				1						0%	0%	
Central Avenue at River Park Street	3	0.6	0.12	3					2			1			0%	67%	
Highland Avenue / Gould Street / Hunting Road	46	9.2	0.93	37	7		2	15	16	7		3	3	2	32%	22%	
Gould Street / Wingate Driveway / Muzi Motors Driveway	2	0.4	0.11		1		1	-	1		1				50%	0%	
Gould Street / TV Place																	
Gould Street / Kearney Road	1	0.2	0.08	1									1		0%	0%	
Gould Street / Ellis Street / Driveway	2	0.4	0.20	2						2					0%	50%	

Source: MassDOT (2015-October 2020).



^a PD = property damage only; PI = personal injury; F = fatality, NR = not reported.

b SS = sideswipe; RE = rear end; CM = cross movement/angle; HO = head-on; FO = fixed object; SV = single vehicle; U = unknown.

^c Measured in crashes per million entering vehicles for intersections and in crashes per million vehicle miles traveled for roadway segments.

^d Percent of vehicle incidents that occurred during the weekday AM (7:00 AM - 9:00 AM) and weekday PM (4:00 PM - 6:00 PM) commuter peak periods.

^eRepresents the percentage of only "known" collisions occurring during inclement weather conditions.

FUTURE CONDITIONS

To estimate the impact of site-generated traffic within the study area, existing traffic volumes were projected to the year 2030, representing a ten-year design horizon. The proposed redevelopment is expected to be completed and fully operational well within this time frame. Traffic volumes on the roadway network at that time will include existing traffic and new traffic due to normal traffic growth. Consideration of these factors resulted in the development of 2030 No-Build traffic volumes, which assume that the proposed redevelopment is not built. The incremental impacts of the proposed project may then be determined by adding site-generated traffic volumes (Build conditions) and making comparisons to the No-Build conditions.

Traffic Growth

To develop the 2030 No-Build forecast volumes, two components of traffic growth were considered. First, an annual growth percentage was determined. Based on correspondence with the Town of Needham Department of Planning and Community Development, a 1.0 percent compounded annual growth was assumed, which is consistent with other recent studies done in the area.

Second, any planned or approved specific developments in the area that would generate a significant volume of traffic on study area roadways within the next five years were considered. There were no significant projects identified and all smaller developments were considered to be included within the background annual growth rate.

Planned Roadway Improvements

MassDOT issued a noticed to proceed in July 2020 for the Reconstruction of Highland Avenue, Needham Street, & Charles River Bridge (Project #606635), which includes roadway improvements at the Highland Avenue / Gould Street / Hunting Road intersection. This project includes upgrading the traffic control signal equipment, optimizing signal timing, constructing new crosswalks with pedestrian signals, installation of bicycle lanes in both directions along Highland Avenue, and implementation of bicycle detection at the signal. While the number and utilization of the travel lanes on all approaches to the intersection will remain consistent with the existing geometry of the intersection, the lane widths will be reduced to 11 feet to accommodate the bicycle lanes.

While these improvements are focused on traffic safety and multi-modal accommodations rather than increasing intersection capacity, the work will provide some minor improvements in traffic operations. Since, the construction of these improvements is anticipated to be completed within a three-year period (prior to any planned opening of a new development on the Muzi/Channel5 site), GPI has prepared a sensitivity analysis of the 2023 traffic conditions with the MassDOT improvements in place to evaluate the operational impacts these improvements would have on the intersection. For the purposes of analysis, the 2023 Opening Year for the MassDOT Improvements utilized the latest MassDOT timing plans compared to the 2020 Existing conditions. This analysis condition was analyzed for the Highland Avenue / Gould Street / Hunting Road intersection as it is the only study area intersection directly affected by the listed improvements. As these improvements are anticipated to be completed well within the ten-year design horizon with time for travel patterns to normalize post-construction, these improvements were included in the analysis of 2030 No-Build conditions.



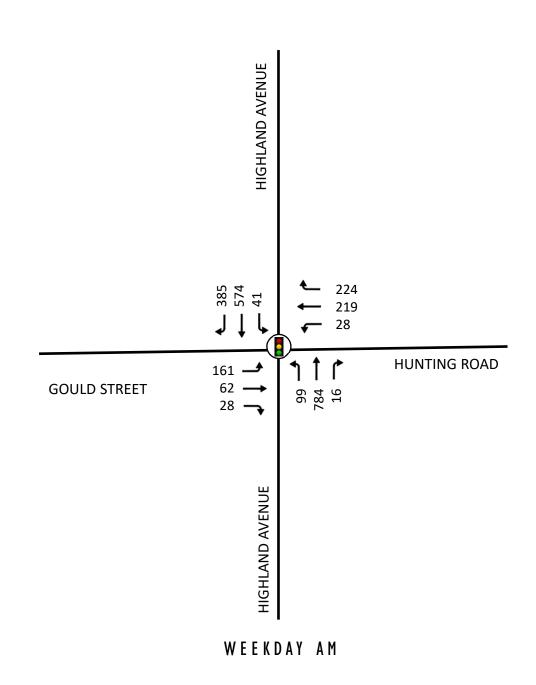
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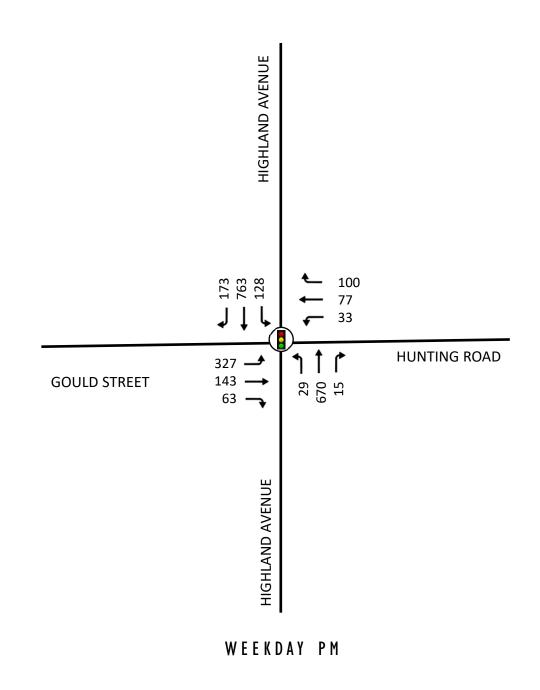
Opening Year and No-Build Conditions

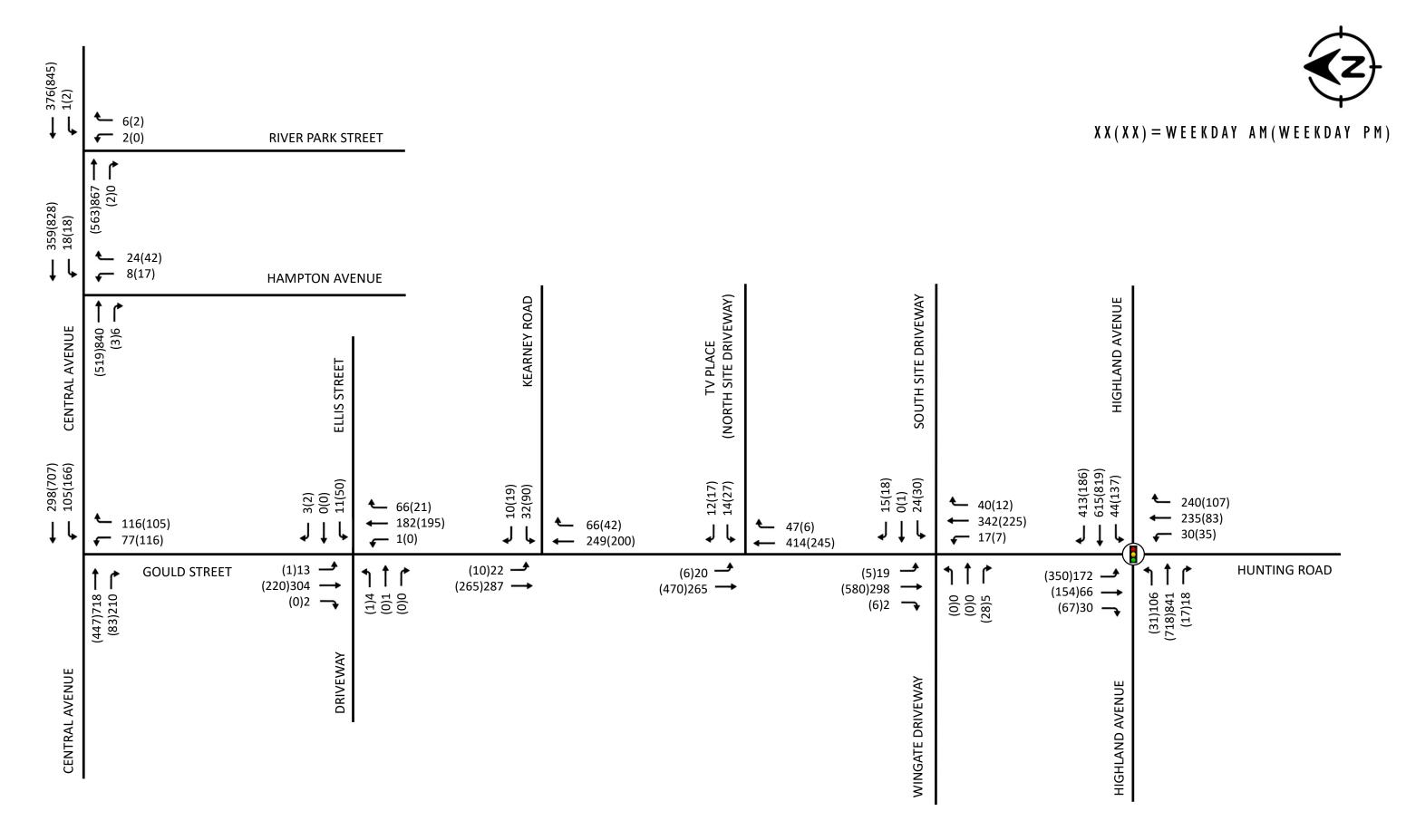
The 2023 Opening Year and 2030 No-Build peak-hour traffic volumes were accordingly developed by applying a 1.0 percent compounded annual traffic growth rate (3.0 percent over three years and 10.5 percent over ten years) to the 2020 Existing traffic volumes. The 2023 Opening Year traffic volumes are shown graphically on Figure 3 for the weekday AM and weekday PM peak hours. The 2030 No-Build traffic volumes are shown graphically on Figure 4 for the weekday AM and weekday PM peak hours.













Trip Generation

This TIS examines the traffic impacts associated with one potential redevelopment scenario for the site that would consist of approximately 368,200 SF of corporate headquarters space, 368,200 SF of R&D space, and 129,950 SF of ancillary retail space. To estimate the volume of traffic to be generated by the proposed redevelopment, trip-generation rates published by the ITE *Trip Generation Manual* were utilized for Land Use Code (LUC) 714 (Corporate Headquarters), LUC 760 (Research & Development Center), and LUC 820 (Shopping Center), respectively. All trip-generation data are provided in the Appendix.

Existing Trips

Not all of the vehicle trips expected to be generated by the proposed redevelopment represent *new* trips on the study area roadway system. There are existing uses on the site that are currently generating traffic and would be removed as part of the redevelopment. GPI estimate the trips generated by the existing uses on the site based on the TMCs collected at the site driveways.

Internal Capture

Studies have shown that for developments of mixed-use or multi-use sites, it is realistic to assume that there will be some multi-use trips within the site itself. The proposed retail on site is anticipated to consist of a mix of service and retail space that will serve as ancillary uses to the proposed corporate office and R&D space. Therefore, a reduction in the overall trips experienced at the site driveways can be anticipated as a result of multi-use trips that include stops at more than one use on the site. Based on information published in the ITE *Trip Generation Handbook*, it is estimated that multi-use trips account for 24 to 29 percent of the trips generated by the site. The Multi-Use Development Trip Generation and Internal Capture Worksheets are provided in the Appendix.

Pass-by Trips

In addition, studies have shown that for retail developments, a substantial portion of the site-generated vehicle trips are already present in the adjacent passing stream of traffic or are diverted from another route to the proposed site. For example, some vehicles which are already on the roadways may decide to visit the site on their way to another destination. Based on information published in the ITE *Trip Generation Handbook*, the average *pass-by* trip percentage is 34 percent during the weekday PM peak hour and 26 percent during the Saturday midday peak hour for LUC 820 (Shopping Center).

Transit Trips

As described in the *Public Transportation* section of this TIS, both bus and commuter rail services are available in close proximity to the site. Therefore, it is reasonable to expect a reduction in the total number of trips generated by the proposed redevelopment due to the use of public transportation, particularly for employees of the corporate headquarters and R&D space. Based on U.S. Census information, approximately 11.7 percent of residents within the Town of Needham use public transportation to travel to work. In order to provide a conservative (worse case) analysis condition, no credit was applied for the use of public transportation when evaluating the potential traffic impacts associated with the proposed redevelopment. However, GPI encourages the developer and the Town to consider provision of a bus stop at or near the site, as well as other Transportation Demand Management (TDM) measures to reduce the number of single-occupant vehicle trips generated by the development.

Walking and Bicycling Trips

The site is also located in close proximity to multiple residential neighborhoods, as well as other commercial uses that may generate walking and bicycling trips. MassDOT is in the process of constructing bicycle



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accommodations along Highland Avenue and sidewalks are provided along Gould Street and Highland Avenue in the area to provide walking and biking to the site. Based on U.S. Census information, approximately 3.5 percent of Needham residents walk or bike to get to work. Therefore, it is reasonable to expect a reduction in the number of trips generated by the redevelopment due to walking and biking. In order to provide a conservative (worse case) analysis condition, no credit has been applied for walking and biking trips. However, GPI recommends that the developer and the Town consider implementing a TDM program that includes measures to encourage walking and biking to the site.

The detailed site-generated trip calculations are included in the Appendix and the results are summarized in Table 2. As shown in Table 2, the proposed redevelopment is expected to generate 620 *additional new* vehicle trips (625 entering and -5 exiting) during the weekday AM peak hour, and 869 *additional new* vehicle trips (126 entering and 743 exiting) during the weekday PM peak hour. It should be noted that the volume of *pass-by* traffic does not reduce the total volume of traffic generated by the redevelopment and the external trips will still be realized as turning movements at the site driveways.



TABLE 2
Trip Generation Summary

		Total	Trips		External Trips									
Time Period / Direction	Corporate Office Trips ^a	R&D Trips ^b	Retail Trips ^c	Total Trips ^d	Total External Trips ^e	Existing Trips ^f	Pass-by Trips ^g	New Primary Trips ^h						
Weekday Daily	2,730	3,972	7,184	13,886	10,402		1,414	8,988 ⁱ						
Weekday AM Peak Hour: Enter Exit Total	458 <u>35</u> 493	271 <u>56</u> 327	135 <u>82</u> 217	864 <u>173</u> 1,037	766 <u>75</u> 841	126 <u>65</u> 191	15 <u>15</u> 30	625 <u>-5</u> 620						
Weekday PM Peak Hour: Enter Exit Total	49 <u>440</u> 489	63 <u>333</u> 396	317 <u>343</u> 660	429 <u>1,116</u> 1,545	239 <u>926</u> 1,165	33 <u>103</u> 136	80 <u>80</u> 160	126 <u>743</u> 869						

^a ITE LUC 714 (Corporate Headquarters Building) for 368,200 SF.



^b ITE LUC 760 (Research & Development Center) for 368,200 SF.

^cITE LUC 820 (Shopping Center) for 129,500 SF.

^d Sum of Corporate Office, R&D, and Retail Trips.

^e Reduction of 25% during the Weekday Daily and Weekday PM and 24% during the Weekday AM peak hours based on ITE *Trip Generation Handbook*.

^fBased on counts collected at site driveways.

⁹ 34 percent of retail trips during the Weekday PM peak hour and 26 percent of retail trips during all other time periods.

^h External Trips minus Existing Trips and Pass-by Trips

¹ No credit applied for trips generated by the existing uses on site as no daily TMCs collected.

Trip Generation Comparison – Residential Component

The Town of Needham also requested that GPI prepare a trip generation estimate for an alternative development build-out that consists of approximately 226 residential apartment units, ±259,130 SF of corporate office space, ±259,130 SF of R&D space, and ±91,460 SF of ancillary retail space. GPI utilized ITE trip rates for LUC 221 (Multi-Family Housing (Mid-Rise)), LUC 714 (Corporate Headquarters Building), LUC 760 (Research & Development Center), and LUC 820 (Shopping Center). Similar adjustments were applied for internal capture and pass-by trips were applied to the residential alternative build-out as to the non-residential build-out described above. The detailed trip generation calculation worksheets are included in the Appendix and the resulting trip generation is summarized in Table 3. As shown in Table 3, the proposed residential alternative build-out is anticipated to generate 129 to 292 fewer external vehicle trips than the proposed office/R&D build-out.



TABLE 3
Trip Generation Comparison – Residential Build-Out

		Alternative 1 ^a no Residential			Alternative 2 ^b units Residen		Net Difference ^c						
Time Period / Direction	Total Trips	Pass-By Trips	New Primary Trips	Total Trips	Pass-By Trips	New Primary Trips	Total Trips	Pass-By Trips	New Primary Trips				
Weekday Daily	10,402	1,414	8,988	8,064	988	7,066	-2,338	-416	-1,922				
Weekday AM Peak Hour: Enter Exit Total	766 <u>75</u> 841	15 <u>15</u> 30	751 <u>60</u> 811	597 <u>115</u> 712	15 <u>15</u> 30	582 100 682	-169 <u>40</u> -129	0 <u>0</u> 0	-169 <u>40</u> -129				
Weekday PM Peak Hour: Enter <u>Exit</u> Total	239 <u>926</u> 1,165	80 <u>80</u> 160	159 <u>846</u> 1,005	200 <u>673</u> 873	56 <u>56</u> 112	144 <u>617</u> 761	-39 <u>-253</u> -292	-24 <u>-24</u> -48	-15 - <u>229</u> -244				

^a Total External Trips from Table 2.



b ITE LUC 221 (Multi-Family Housing (Mid-Rise)) for 226 units, LUC 714 (Corporate Headquarters Building) for 259,130 SF, LUC 760 (Research & Development Center) for 259,130 SF, and LUC 820 (Shopping Center) for 91,460 SF with reductions applied for internal capture.

^b Alternative 2 trips minus Alternative 1 trips.

Trip Distribution

Having estimated project-generated vehicle trips, the next step is to determine the distribution of project traffic and assign these trips to the local roadway network. The directional distribution of site traffic is dependent on expected travel routes to and from the site and existing travel patterns. In addition, GPI prepared a Journey-to-Work model using U.S. Census data on the place of residency for employees working in the surrounding area in Needham to estimate the trip distribution for the proposed corporate headquarters and R&D space. GPI also developed a gravity based on building density within a 10-mile radius of the site to estimate the distribution of trips generated by the proposed retail uses. The detailed trip distribution models are included in the Appendix and all resulted in similar trip distribution patterns. Table 4 summarizes the resulting trip distribution percentages through the study area intersections.

TABLE 4
Trip Distribution Summary

Roadway	To/From Direction	Trip Distribution Percentage							
Highland Avenue	East	40%							
	West	10%							
Central Avenue	East	15%							
	West	15%							
Hunting Road	South	20%							
Total	100%								

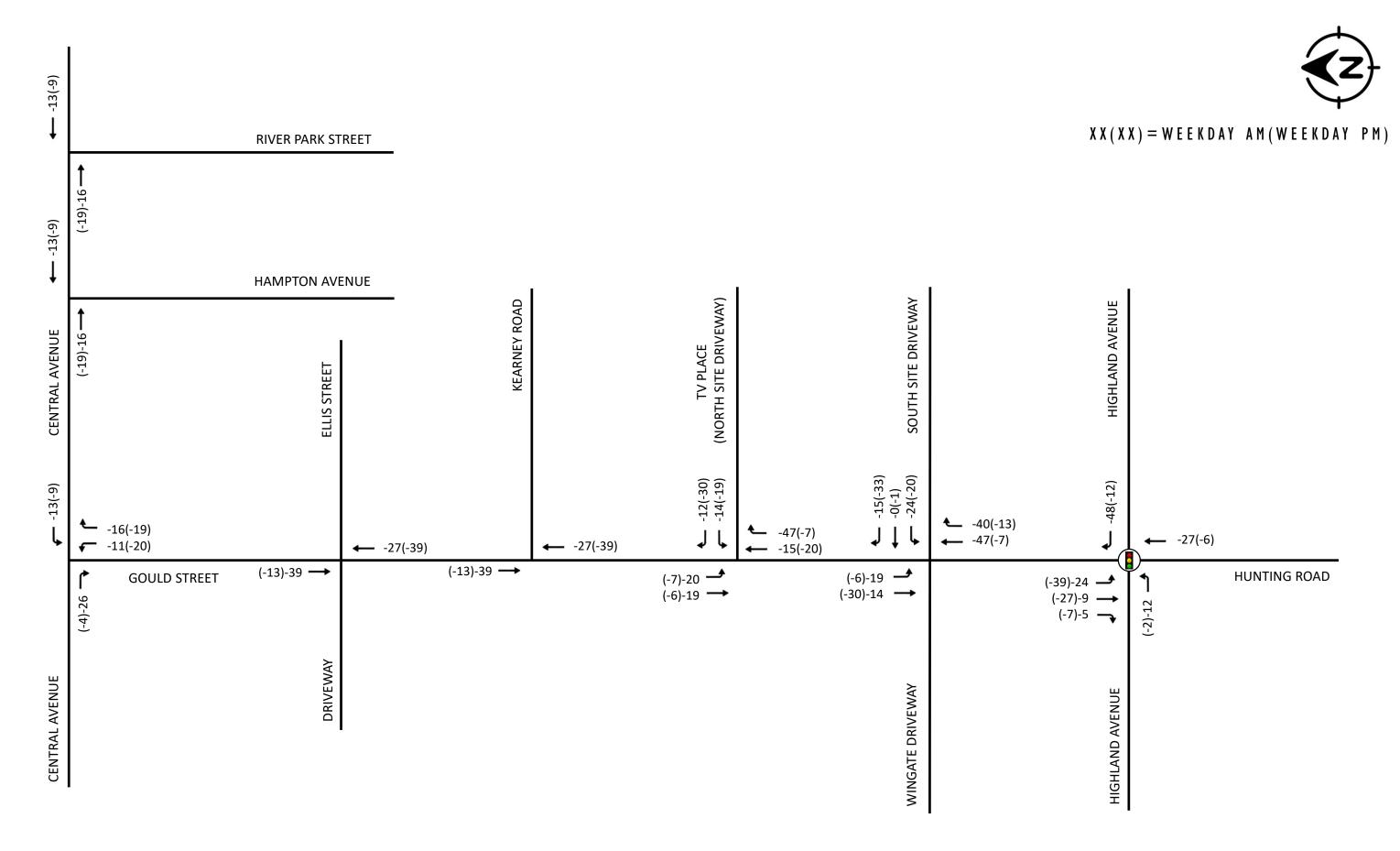
Removal of Existing Trips

As previously noted, there are existing uses on the site, including the Muzi Motors and Channel 5, which are currently generating traffic. These uses would be removed from the site as part of the redevelopment. Therefore, the trips generated by these uses will be removed from the existing roadway network as part of the redevelopment. GPI estimate the Removal of Existing Trips based on the TMCs collected at the existing driveways in 2015 and balancing through the adjacent intersections. The resulting Removal of Existing Trips traffic-flow network is graphically shown in Figure 5.

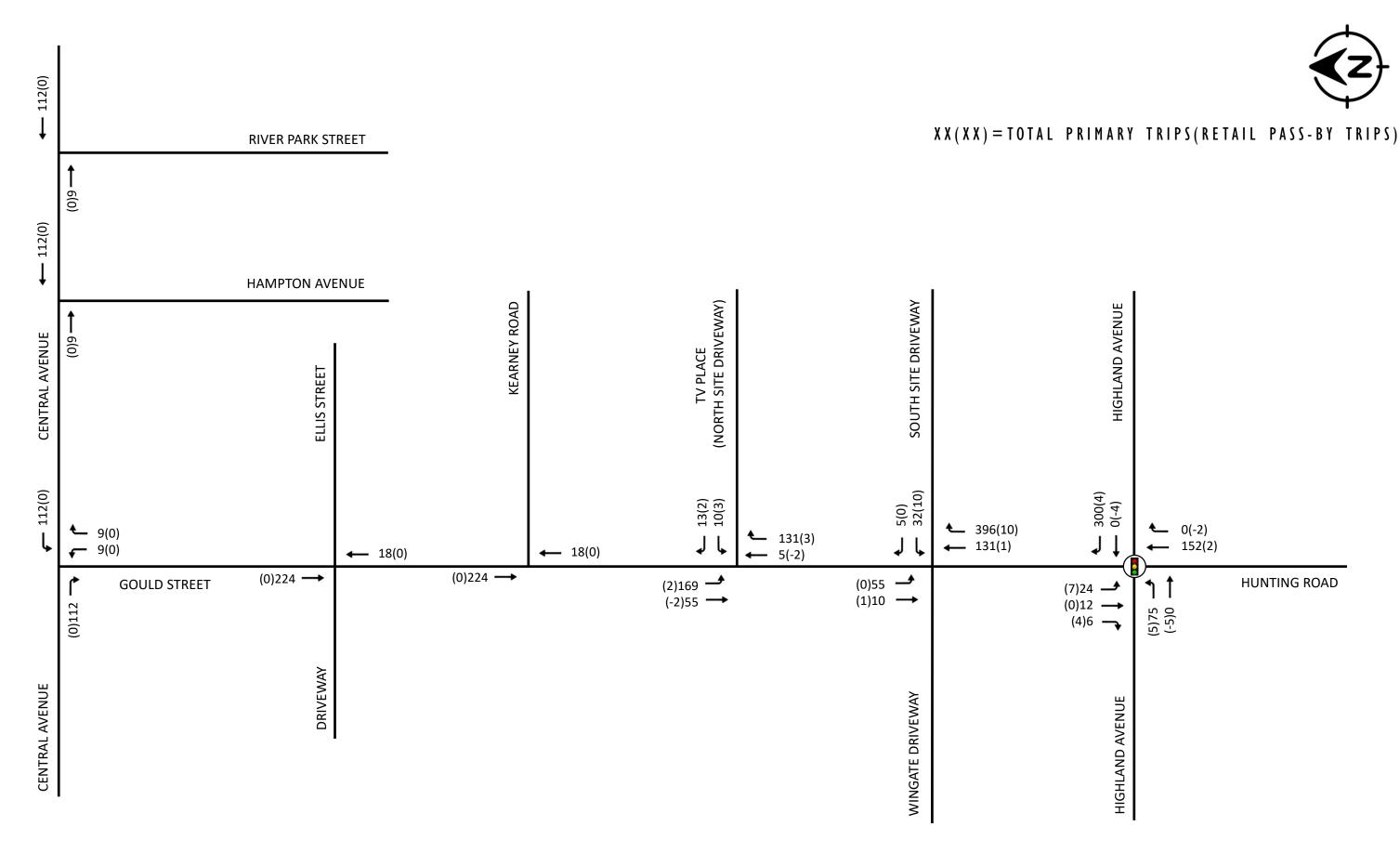
Build Traffic Volumes

Based on the traffic generation and distribution estimates for this project, the traffic volumes associated with the proposed redevelopment were assigned to the roadway network. The site-generated traffic networks are shown on Figures 6 and 7 for the weekday AM and PM peak hours, respectively. The 2030 Build peak-hour traffic-volume networks were then development by adding the site-generated traffic volumes to 2030 No-Build traffic volumes and removing the trips generated by the existing uses on site. The 2030 Build weekday AM and PM peak hour traffic volumes are illustrated on Figure 8. The 2030 Build With Mitigation weekday AM and PM peak hour traffic volumes are illustrated on Figure 9.













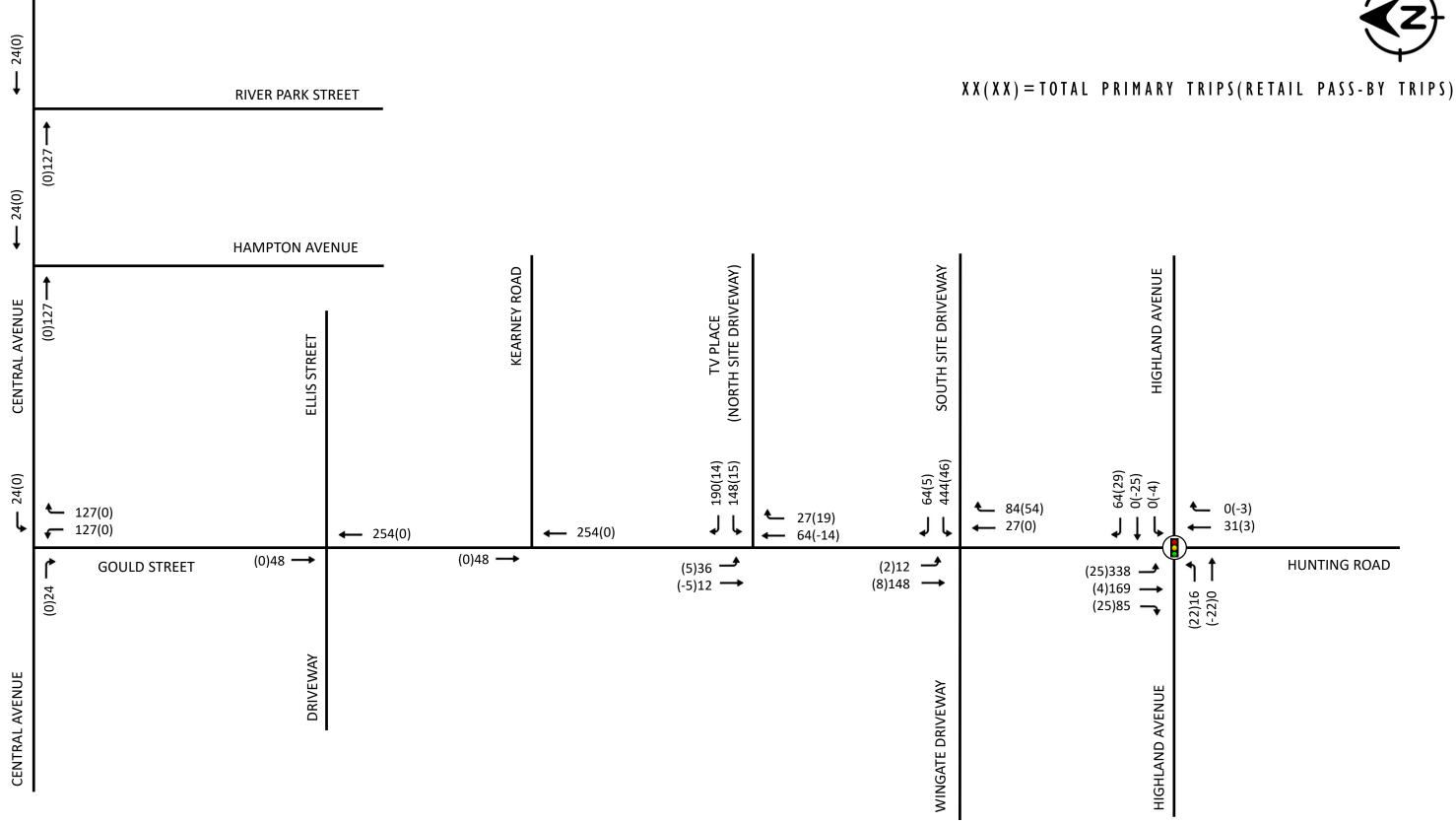
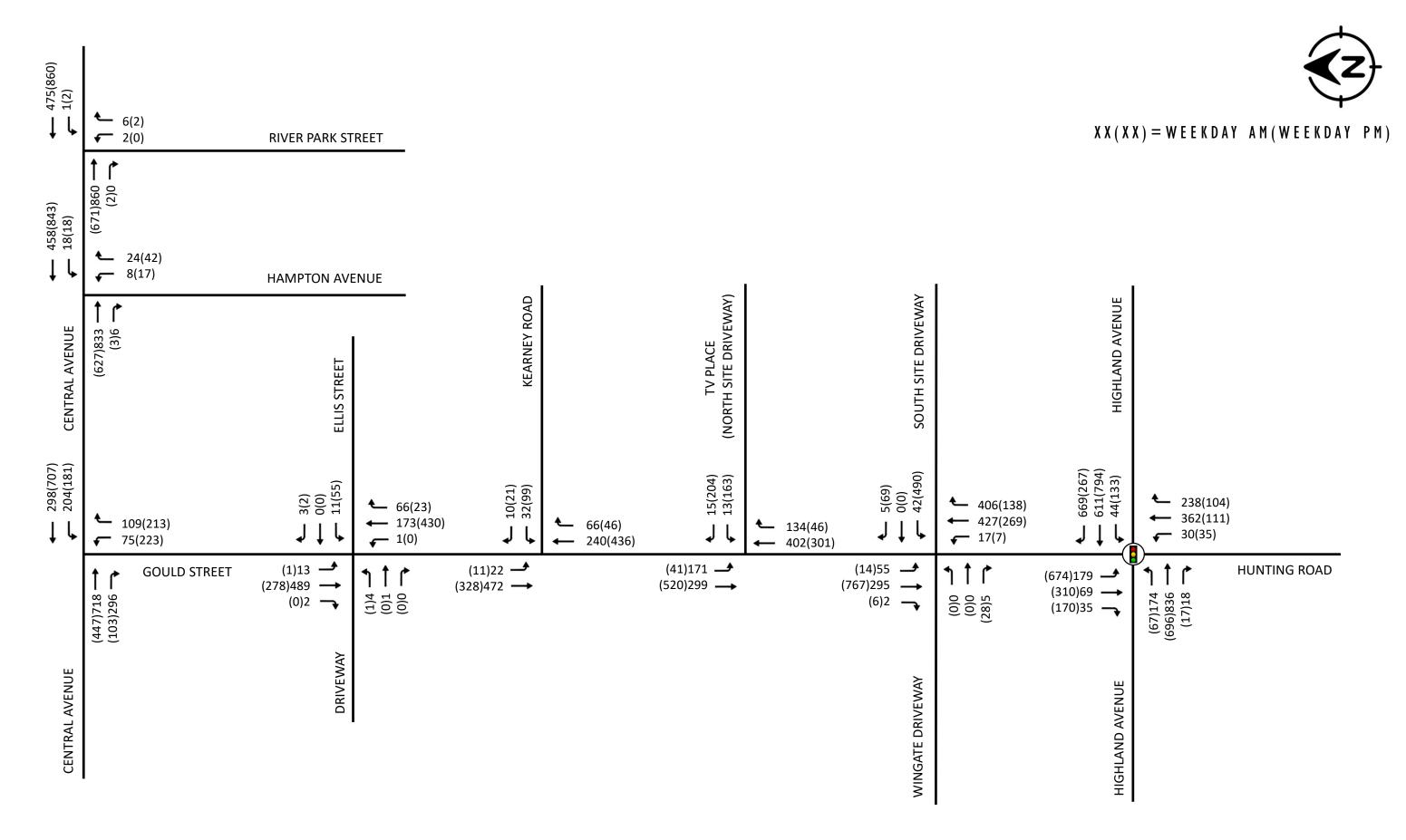




FIGURE 7 SITE-GENERATED VEHICLE TRIPS WEEKDAY PM PEAK HOUR





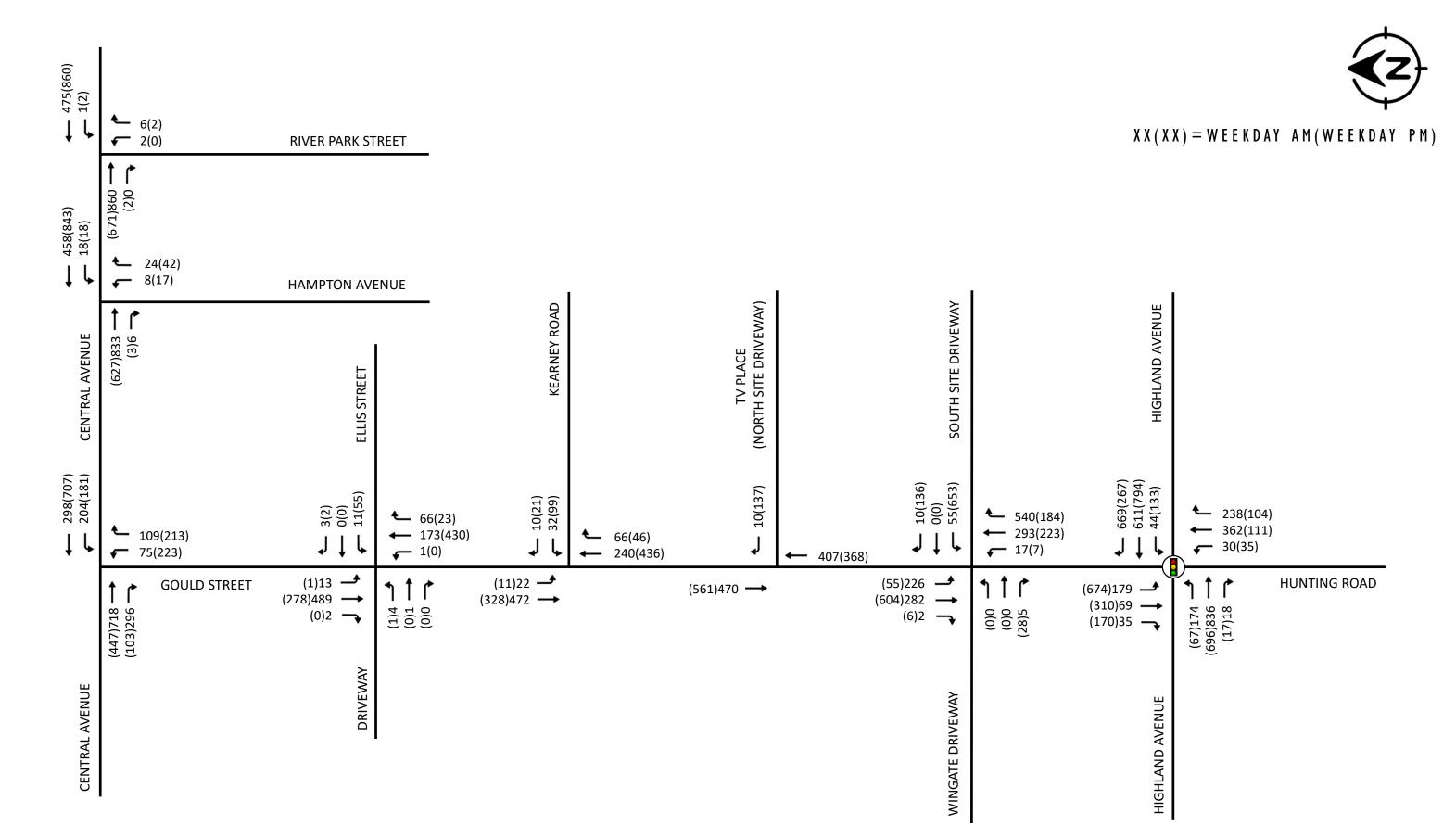




FIGURE 9

CAPACITY AND QUEUE ANALYSIS

Capacity and queue analyses were conducted at all study area locations under 2020 Existing, 2030 No-Build, and 2030 Build traffic-volume conditions. The impact of site-generated traffic can be measured by comparing 2030 No-Build conditions to 2030 Build conditions.

An additional sensitivity analysis was performed for the Highland Avenue / Gould Street / Hunting Road intersection to evaluate the operations in the 2023 Opening Year for the MassDOT Improvements compared to the 2020 Existing conditions to assess what impact these improvements would have on the intersection.

Methodology

The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM)³ and is described in the Appendix. The TIAS utilizes the HCM 2000 methodology at the signalized intersections due to the fact that *HCM 2010 methodology does not support exclusive ped or hold phases*. HCM 6 methodology was used at all unsignalized intersections as it represents the most recently approved analysis methodology.

For signalized intersections, the maximum back of queue during a typical (average) signal cycle and a 95th percentile signal cycle were calculated for each lane group during the peak periods studied. The back of queue is the length of a backup of vehicles from the stop line of a signalized intersection to the last vehicle in the queue that is required to stop, regardless of the signal indication. The length of this queue depends on a number of factors including signal timing, vehicle arrival patterns, and the saturation flow rate. For unsignalized intersections, the 95th percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). In this case, the queue length is a function of the capacity of the movement and the movement's degree of saturation.

Analysis Results

The results of the level-of-service (LOS) and queue analyses are shown in Table 5 and are discussed below. Capacity and queue analyses were conducted at the study area intersections utilizing *Synchro* software.⁴ The capacity and queue analysis worksheets for all conditions are provided in the Appendix.

Central Avenue / Gould Street

Traffic exiting Gould Street onto Central Avenue currently experiences long delays and queues that will be exacerbated as traffic volumes continue to grow in the area. This movement currently operates well over capacity, with a V/C ratio of 2.54 during the weekday PM peak hour.

Limited right-of-way exists to widen either Central Avenue or Gould Street to provide additional capacity. In addition, utilities, stone walls, and homes are located close to the roadway, further limiting the ability for widening. Since the potential developer of the Muzi/Channel 5 property would not have the power to acquire right-of-way, the following options could potentially be implemented to mitigate the project impacts, however, operations under the 2030 Build will still be worse than the 2030 No Build.

⁴ Synchro plus SimTraffic 10; Trafficware LLC.; Sugar Land, TX; 2017.



³ Highway Capacity Manual 2000, Transportation Research Board; Washington, D.C.; 2000.

- The traffic volumes through this intersection currently exceed the warranting conditions for installation of a traffic signal. Therefore, regardless of the Muzi/Channel 5 site redevelopment, the Town may wish to consider installation of a fully-actuated traffic-control signal at this intersection to reduce existing delay and mitigate the impacts of the proposed redevelopment. It is anticipated that the installation of traffic signal equipment at the intersection may require approximately 695 SF for signal easements from adjacent properties, approximately 250 SF for sidewalk easements, the relocation of a utility pole at the southeast corner of the intersection. The size of any easements or acquisition will be determined as part of the final design. With the potential redevelopment of the site, this may present an opportunity to work with the site developer to share the costs of construction.
- In addition, GPI recommends minor roadway widening and restriping along Central Avenue to provide an 11-foot westbound left-turn lane, an 11-foot westbound through lane, and a 12-foot eastbound shared through/right-turn lane, with 5.5-foot sidewalks in either direction. Construction of these improvements will eliminate the existing 5-foot bicycle accommodating shoulders. However, any further widening to maintain the shoulders would require the acquisition of right-of-way and potential complete property takings that would be outside of the developer's capacity to construct.

With implementation of the improvements described above, all movements at this intersection will operate at acceptable levels of service (LOS D or better) during the weekday PM peak hour. Although traffic exiting Gould Street will continue to operate at LOS F during the weekday AM peak hour, the V/C ratio will be reduced below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. In addition, the volume of traffic on this movement is low during the weekday AM peak hour.

Additional widening to provide dedicated turning lanes on Gould Street or Central Avenue eastbound is required to further reduce the delay on this approach in the morning. This widening would necessitate acquisition of additional right-of-way, as well as significant relocation of utilities near the intersection. Therefore, the Town should consider developing a Town-funded project to implement additional turning lanes as a means of increasing capacity at this location to accommodate existing traffic volumes and future development in the surrounding area. The Town can request a fair-share contribution toward the design and/or construction of these improvements from the developer, proportional to the percentage increase in trips generated by the project through the intersection. The proposed conceptual improvements are illustrated in Figure 10.

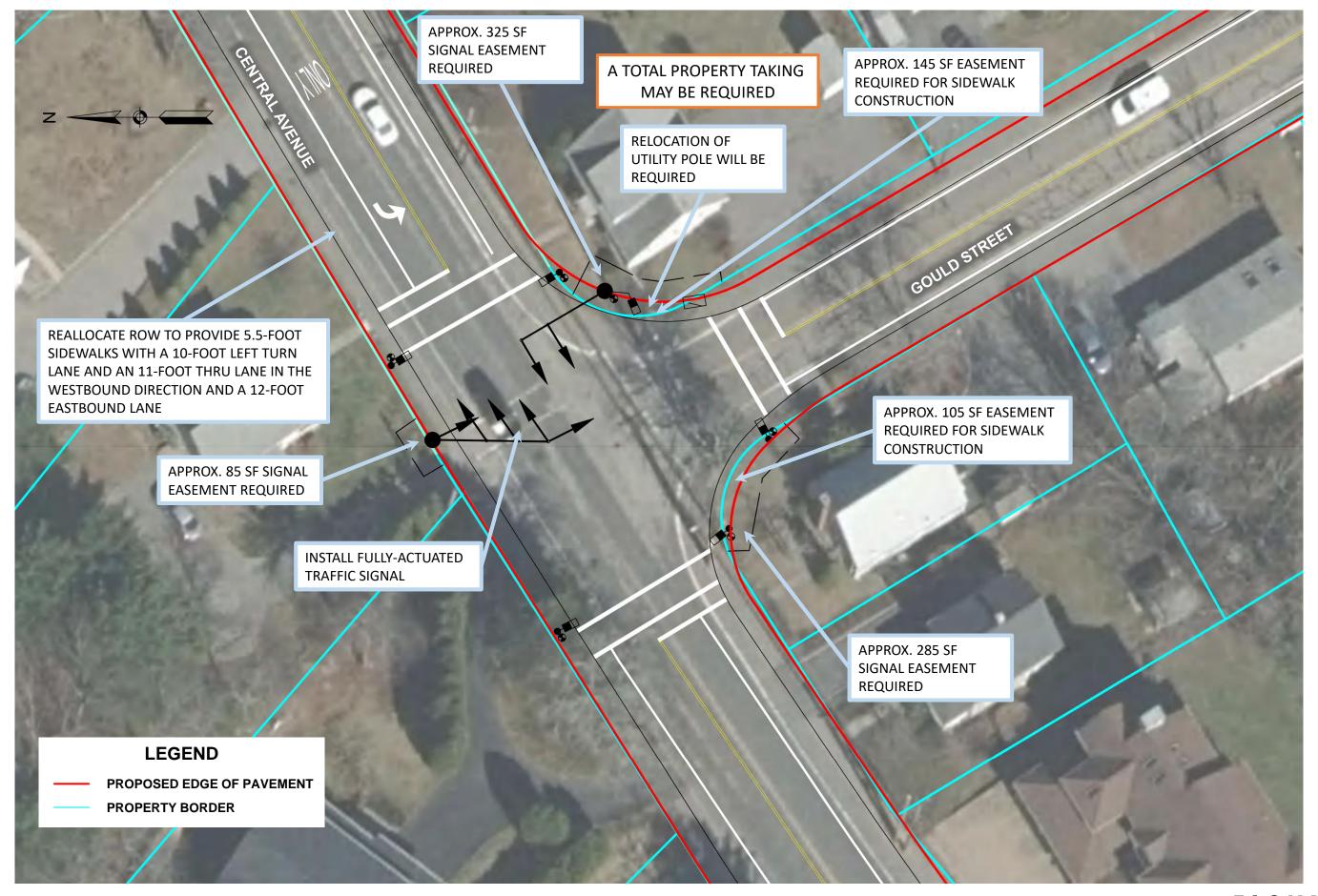
Central Avenue / Hampton Avenue

All movements at the Central Avenue / Hampton Avenue intersection are anticipated to operate at acceptable levels of service (LOS D or better) under all analysis scenarios. In addition, all volume-to-capacity (V/C) ratios will be less than 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes, and queues are not expected to exceed two vehicles on any given approach. The additional traffic generated by the proposed redevelopment is not expected to increase delay on any given movement by more than 5 seconds per vehicle or increase queues by more than one vehicle.

Central Avenue / River Park Street

All movements at the Central Avenue / River Park Street intersection are anticipated to operate at acceptable levels of service (LOS C or better) under all analysis scenarios. In addition, all volume-to-capacity (V/C) ratios will be less than 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes, and queues are not expected to exceed one vehicle on any given approach. The additional traffic generated by the proposed redevelopment is not expected to increase delay on any given movement by more than one second per vehicle and will not measurably impact the queues on any approach.







Highland Avenue / Gould Street / Hunting Road

All movements at the Highland Avenue / Gould Street / Hunting Road intersection currently operate under capacity (V/C less than 1.00) and at LOS E or better. A roadway improvement project is underway by MassDOT to enhance intersection safety and pedestrian and bicycle accommodations, and optimize the operation of the intersection. While this project is not expected to significantly increase the capacity of the intersection as no additional lanes are being added, the project will reallocate the green time at the traffic signal to optimize the intersection operations. As shown in the analysis of the 2023 with MassDOT Improvements conditions, the proposed improvements will result in slight decreases in the overall intersection delay and decreases in delay on individual movements of up to 21 seconds. MassDOT's project will also improve the level-of-service to LOS D or better for nearly all movements.

All movements at this intersection are anticipated to operate under capacity (V/C less than 1.00) and at LOS E or better under 2030 No-Build conditions. Although the MassDOT improvements have been included in the analysis of the 2020 No-Build condition, the 2030 No-Build conditions do not reflect any improvement in operations from the MassDOT improvements as the 1 percent background growth will utilize the limited additional capacity created by the signal timing optimization.

With the additional traffic generated by the proposed redevelopment, the overall intersection will operate over capacity at LOS F with several movements operating at LOS E or F. To mitigate the impacts of the proposed redevelopment, GPI recommends widening of Highland Avenue to provide a dedicated right-turn lane from Highland Avenue westbound onto Gould Street, which would be channelized and signalized as part of the intersection. Construction of this lane would go beyond the improvements currently proposed by MassDOT and will require the removal of the existing garden on the northeast corner of the intersection. This would require analysis of the weaving condition between the I-95 SB Off-Ramp and the channelized right-turn to ensure proper spacing exists between the intersections to provide an efficient and safe weaving condition. In addition, GPI recommends widening the Gould Street southbound approach to provide two dedicated left-turn lanes, a through lane, and a dedicated right-turn lane. Note that all widening along Gould Street and Highland Avenue would occur along the site-side of the roadway, which will likely require a significant donation of property from the developer and may impact the square footage of the areas used for trip generation.

As described in the following section of the TIS, installation of a traffic control signal is recommended at the Gould Street / Wingate Driveway / South Site Driveway intersection to facilitate traffic exiting the site. In order to manage queues and traffic flows between the intersections, GPI recommends implementing a coordinated signal system between these two intersections.

With implementation of the improvements described above, the operations of the Highland Avenue / Gould Street / Hunting Road intersection will be restored to nearly No-Build conditions during the weekday AM peak hour and better than No-Build conditions during the weekday PM peak hour. All movements will operate below capacity at LOS E or better.

Gould Street / Wingate Driveway / South Site Driveway

All movements at the Gould Street / Wingate Driveway / South Site Driveway intersection currently operate at acceptable levels of service (LOS D or better), with queues not exceeding two vehicles. With the additional traffic generated by the proposed redevelopment, traffic exiting the South Site Driveway is expected to operate at LOS F with a V/C ratio well over 1.00 and long queues, particularly during the weekday PM peak hour. GPI evaluated two options to mitigate the impacts of the proposed redevelopment at this location. Under both alternatives, the volume of traffic through the intersection is anticipated to exceed the warranting conditions for installation of a traffic control signal based on Warrant 1 – Eight Hour Volume Warrant, Warrant 2 – Four Hour Volume Warrant, and Warrant 3 – Peak Hour. Detail signal warrant analysis worksheets are provided in the Appendix. Therefore, GPI recommends installation of a fully-



actuated traffic control signal at this intersection at mitigation for the proposed redevelopment. Due to the proximity of this intersection to the existing signalized intersection of Highland Avenue / Gould Street / Hunting Road, GPI recommends implementation of a coordinated signal system. Additional improvements as part of each mitigation alternative are described below.

Alternative 1 consists of maintaining two full-access/egress driveways to the site at approximately the same locations as exist today. As part of this alternative, the South Site Driveway would be widened to provide an exclusive left-turn lane and a shared left/through/right-turn lane. Gould Street northbound would be widened to provide a shared left-turn/through lane and a dedicated right-turn lane entering the site. Gould Street southbound would also be widened to provide two general purpose travel lanes. The inside lane would transition of a left-turn lane at the Highland Avenue / Gould Street / Hunting Road intersection. With implementation of this alternative, all movements at the Gould Street / Wingate Driveway / South Site Driveway intersection would operate at acceptable levels of service (LOS D or better). GPI evaluated an option to maintain a single through lane on Gould Street southbound with Alternative 1. However, the queues on Gould Street southbound would extend over 650 feet, which would block traffic exiting the North Site Driveway and create additional back-ups into the site. With two southbound travel lanes, the queue on Gould Street will remain less than 250 feet, which is less than the distance between the two site driveways. It is anticipated that the installation of traffic signal equipment at the Highland Avenue / Gould Street / Hunting Road intersection and the need for roadway widening to provide additional turn lanes and sidewalk construction will require the acquisition of approximately 13,050 SF of the Muzi Motors property, which would reduce the total square footage available to be developed. In addition, a 725 SF signal easement will be required for the location of new traffic signal equipment on the site. The proposed conceptual improvements for Alternative 1 are illustrated in Figure 11.

Alternative 2 consists of consolidating the driveways into a single, signalized driveway at approximately the location of the Gould Street / Wingate Driveway / South Site Driveway intersection. A right-out-only movement would be maintained at northerly end of the site. As part of this alternative, the South Site Driveway would be widened to provide an exclusive left-turn lane and a shared left/through/right-turn lane. Gould Street northbound would be widened to provide a shared left-turn/through lane and a dedicated channelized right-turn lane entering the site. Gould Street southbound would also be widened to provide an exclusive left-turn lane and a shared through/right-turn lane. With implementation of this alternative, all movements at the Gould Street / Wingate Driveway / South Site Driveway intersection would operate at acceptable levels of service (LOS D or better). It is anticipated that the installation of traffic signal equipment at the Highland Avenue / Gould Street / Hunting Road intersection and the need for roadway widening to provide additional turn lanes and sidewalk construction will require the acquisition of approximately 9,250 SF of the Muzi Motors property, which would reduce the total square footage available to be developed. In addition, a 665 SF signal easement will be required for the location of new traffic signal equipment on the site. The proposed conceptual improvements for Alternative 2 are illustrated in Figure 12.

Gould Street / TV Place (North Site Driveway)

All movements at the Gould Street / TV Place (North Site Driveway) intersection currently operate at LOS C or better with queues not exceeding one vehicle. With the additional traffic generated by the proposed redevelopment, traffic exiting TV Place (North Site Driveway) is expected to operate at LOS F with long queues and delays, and V/C ratios exceeding 1.00, indicating there will be inadequate capacity to accommodate the anticipated traffic volumes generated by the proposed redevelopment. GPI evaluated two options to mitigate the impacts of the proposed redevelopment at this location.

Alternative 1 consists of maintaining full access and egress that the North Site Driveway while widening the driveway to provide separate left- and right-turn lanes, and widening Gould Street to provide dedicated left- and right-turn lanes entering the site. With this alternative, the North Site Driveway will still operate at LOS E during the weekday PM peak hour. However, the V/C ratio will be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes, and queues will be reduced to five



vehicles. All other movements through the intersection will operate at LOS B or better will implementation of this alternative. It is anticipated that the need for roadway widening will require the acquisition of approximately 3,750 SF of the Muzi Motors property which would reduce the total square footage available to be developed. The proposed conceptual improvements for Alternative 1 are illustrated in Figure 11.

Alternative 2 consists of consolidating the site driveways to force all left-turn movements to occur a single signalized access point at the Gould Street / Wingate Driveway / South Site Driveway intersection. With this alternative, a right-out-only driveway would be provided at the northerly end of the site to alleviate some congestion at the Gould Street / Wingate Driveway / South Site Driveway intersection and allow a second means of egress. With this alternative, all movements at the Gould Street / North Site Driveway intersection would operate at LOS B or better with queues not exceeding two vehicles. It is not anticipated that property acquisition will be required at this intersection as part of Alternative 2. The proposed conceptual improvements for Alternative 2 are illustrated in Figure 12.

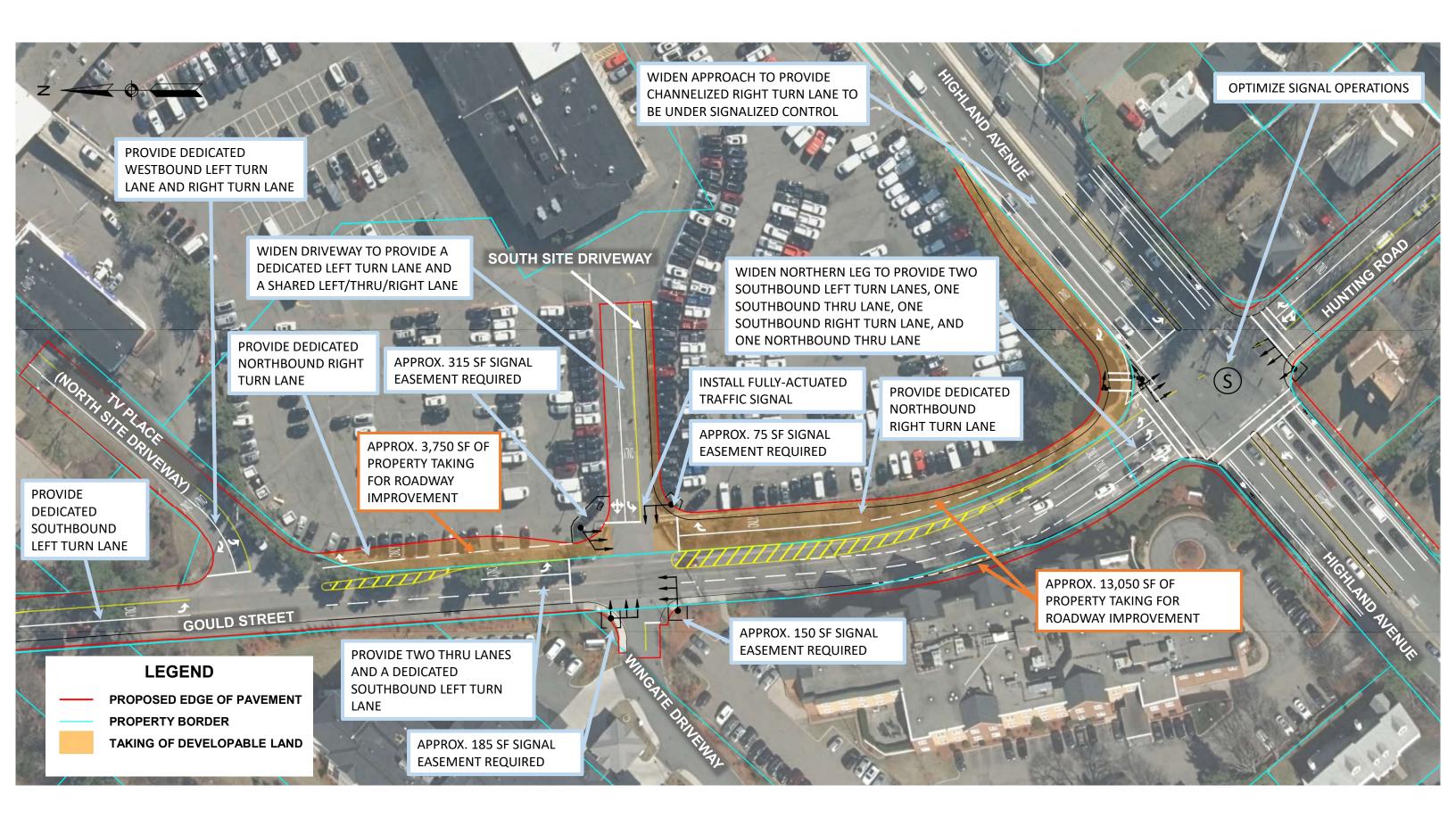
Gould Street / Kearney Road

All movements at the Gould Street / Kearney Road intersection are anticipated to operate at acceptable levels of service (LOS D or better) under all analysis scenarios. In addition, all volume-to-capacity (V/C) ratios will be less than 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes, and queues are not expected to exceed two vehicles on any given approach. The additional traffic generated by the proposed redevelopment is not expected to increase delay on any given movement by more than ten seconds per vehicle or increase queues on any given approach by more than one vehicle.

Gould Street / Ellis Street

All movements at the Gould Street / Kearney Road intersection are anticipated to operate at acceptable levels of service (LOS C or better) under all analysis scenarios. In addition, all volume-to-capacity (V/C) ratios will be less than 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes, and queues are not expected to exceed one vehicle on any given approach. The additional traffic generated by the proposed redevelopment is not expected to increase delay on any given movement by more than eight seconds per vehicle and will not measurably impact the queues on any approach.





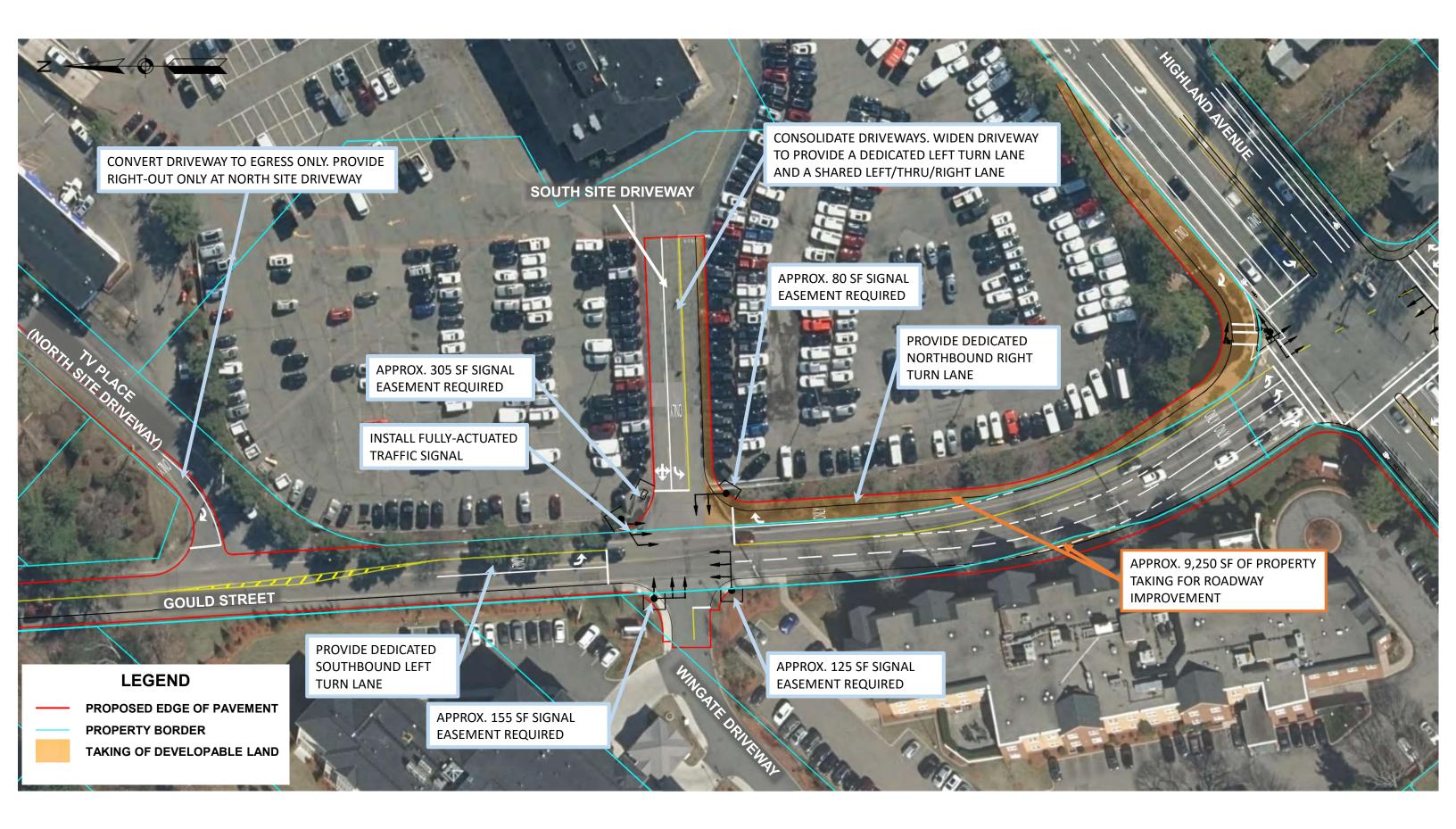


TABLE 5
Intersection Capacity Analysis Summary

			Existing			2030	No-Build			2030	Build		203	0 Build	Mitigate	d Alt 1	2030 Build Mitigated Alt 2			
Intersection/Peak Hour/Lane Group	V/C a	Del. b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Central Avenue at Gould Street																				
Weekday AM: Central Avenue EB approach Central Avenue WB approach Central Avenue WB left Central Avenue WB through Gould Street NB approach Overall Intersection	- 0.15 - - 1.02	- 10.8 - - - 110.7	- B - - F	/<25 - - /240 -	- 0.17 - - 1.12	11.5 - - 151.7	- B - - F -	/<25 - - /258 -	0.36 - - 1.85	- 14.2 - - 484.0	- B - - F	/40 - - /403 -	0.97 - 0.92 0.23 0.86 0.95	36.4 65.7 2.6 73.6 38.0	D - E A E D	517/867 - 78/215 36/56 78/208 /	Same as Alternative 1			
Weekday PM: Central Avenue EB approach Central Avenue WB approach Central Avenue WB left Central Avenue WB through Gould Street NB approach Overall Intersection	- 0.18 - - 2.54 -	- 9.5 - - 769.9 -	- A - - F -	- /<25 - - /728 -	- 0.18 - - 1.94 -	9.4 - - 509.1	- A - - F -	- /<25 - - /480 -	- 0.20 - - >2.00 -	- 9.6 - - >999.9 -	- A - - F -	- /<25 - - />999 -	0.83 - 0.66 0.77 0.83 0.85	29.6 - 18.8 16.7 34.8 24.9	C B B C C	261/422 - 48/132 287/475 195/375 /	Same as Alternative 1			
Central Avenue at Hampton Avenue																				
Weekday AM: Central Avenue WB approach Hampton Avenue NB approach	0.02 0.13	9.5 18.6	A C	/<25 /<25	0.03 0.13	10.0 21.0	A C	/<25 /<25	0.03 0.14	9.9 22.0	A C	/<25 /<25	N/A				N/A			
Weekday PM: Central Avenue WB approach Hampton Avenue NB approach	0.02 0.25	8.5 19.9	A C	/<25 /25	0.02 0.23	8.7 21.9	A C	/<25 /<25	0.02 0.28	9.2 26.6	A D	/<25 /28	N/A				N/A			
Central Avenue at River Park Street																				
Weekday AM: Central Avenue WB approach River Park Street NB approach	0.00 0.04	9.5 18.4	A C	/<25 /<25	0.00 0.04	9.9 20.2	A C	/<25 /<25	0.00 0.04	9.9 20.9	A C	/<25 /<25	N/A				N/A			
Weekday PM: Central Avenue WB approach River Park Street NB approach	0.00 0.02	8.5 11.8	A B	/<25 /<25	0.00 0.00	8.7 12.3	A B	/<25 /<25	0.00 0.01	9.2 13.8	A B	/<25 /<25	N/A				N/A			

^a Volume-to-capacity ratio.



b Average control delay in seconds per vehicle.

CI evel of service

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TABLE 5 (continued)
Intersection Capacity Analysis Summary

		2020	Existing		2023 With MassDOT Improvements					2030	No-Build			203	0 Build		203	30 Build	Mitigate	ed Alt 1	2030 Build Mitigated Alt 2			
Intersection/Peak Hour/Lane Group	V/C a	Del. b	LOS c	Queue d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Highland Avenue at Gould Street / H	ghland Avenue at Gould Street / Hunting Road																							
Weekday AM:																								
Highland Avenue EB left	0.73	65.4	Е	75/183	0.69	56.3	Е	70/216	0.76	65.7	Е	80/233	1.43	288.9	F	206/400	0.89	71.8	Е	107/227	0.89	71.8	Е	107/227
Highland Avenue EB through/right	0.69	32.9	С	272/354	0.67	28.5	С	247/406	0.70	29.3	С	280/448	0.61	26.1	С	286/448	0.74	26.6	С	256/396	0.74	26.6	С	256/396
Highland Avenue WB left	0.38	51.9	D	30/71	0.36	47.0	D	29/80	0.39	49.0	D	33/84	0.42	56.1	Е	38/83	0.73	71.1	Е	27/63	0.73	71.1	E	27/63
Highland Avenue WB through/right	0.84	40.8	D	314/396	0.83	35.8	D	291/456	0.86	37.6	D	333/507	0.91	41.0	D	466/738	-	-	-	-	-	-	-	-
Highland Avenue WB through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.70	31.1	С	184/291	0.70	31.1	С	184/291
Highland Avenue WB right	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.94	50.1	D	161/627	0.97	57.9	Е	172/638
Hunting Road NB left/through	0.78	54.0	D	193/354	0.76	48.6	D	170/433	0.86	61.5	Е	197/476	1.44	269.7	F	469/757	0.96	66.3	Е	240/425	0.96	66.3	Е	240/425
Hunting Road NB right	0.30	30.7	С	49/125	0.33	31.0	С	32/96	0.40	33.7	С	46/115	0.48	41.5	D	70/126	0.31	25.4	С	<25/58	0.31	25.4	С	<25/58
Gould Street SB left	0.43	39.6	Ď	92/172	0.65	48.3	Ď	91/192	0.68	51.5	Ď	103/205	0.74	63.4	Ē	127/214	0.67	49.8	Ď	55/112	0.67	49.4	Ď	56/114
Gould Street SB left/through/right	0.38	39.1	D	85/164	0.59	45.5	D	84/183	0.62	48.1	D	95/195	0.68	57.6	F	117/204	-	-	-	-	-	-	-	-
Gould Street SB through	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.46	45.5	D	41/95	0.46	45.1	D	41/96
Gould Street SB right	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	0.02	27.4	Ċ	<25/<25	0.02	27.4	Ċ	<25/<25
Overall Intersection	0.74	39.7	D	/	0.80	36.4	D	/	0.85	39.4	D	/	1.08	79.7	F	/	1.00	41.6	Ď	/	1.02	43.2	Ď	/
Weekday PM:																								
Highland Avenue EB left	0.62	73.5	F	<25/57	0.50	52.8	D	<25/64	0.53	57.4	Е	27/67	0.74	81.6	F	60/132	0.70	57.4	F	41/96	0.70	57.4	Е	41/96
Highland Avenue EB through/right	0.65	36.2	D	247/333	0.68	32.9	Č	246/395	0.72	35.6	D	285/434	0.66	36.4	D	285/418	0.84	37.7	D	222/366	0.84	37.7	D	222/366
Highland Avenue WB left	0.70	59.8	F	109/175	0.65	50.0	Ď	100/190	0.70	55.0	D	116/205	0.74	65.7	F	118/200	0.76	53.7	ח	80/167	0.76	53.7	D	80/167
Highland Avenue WB through/right	0.81	35.1	D _	377/450	0.79	30.9	C	343/570	0.85	35.0	D	404/653	0.92	46.5	D _	472/708	0.70	-	-	-	0.70	-	-	-
Highland Avenue WB through	0.01	-	-	-	0.73	-	-	3 - 3/3/0	0.00	-	-	-0-7033	0.32	-0.5	-	-12/100	0.86	36.2	D	248/400	0.86	36.2	D	248/400
Highland Avenue WB right	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	_	0.17	9.4	Δ	<25/<25	0.19	9.4	Δ	<25/<25
Hunting Road NB left/through	0.72	64.2	F	96/184	0.59	47.9	D	86/168	0.63	52.0	D	99/178	0.75	66.1	F	130/216	0.77	53.7	D	88/180	0.13	53.7	D	88/180
Hunting Road NB right	0.72	33.9	_	<25/41	0.08	31.6	C	<25/26	0.03	33.5	C	<25/32	0.73	37.9	D _	<25/31	0.77	27.3	C	<25/<25	0.77	27.3	C	<25/<25
Gould Street SB left	0.61	33.9 37.6	D	210/327	0.08	49.8	D	211/415	0.12	53.8	D	245/466	1.60	329.1	F	798/>999	0.89	44.3	D	141/357	0.89	43.6	D	194/349
Gould Street SB left/through/right	0.57	36.5	D	198/311	0.79	49.0 47.2	D	200/391	0.82	50.9	D	232/445	1.57	317.0	F	780/>999	0.09	 .3	-	-	0.09	-1 5.0	-	134/343
Gould Street SB through	0.57	30.3	D	190/311	0.76	41.2	D	200/391	0.79	50.9	D	232/443	1.57	317.0	Г		0.75	40.8	-	- 126/348	0.75	39.4	- D	163/313
Gould Street SB trilough Gould Street SB right	_	-	-	-	_	-	-	-	_	-	-	-	_	-	-	-	0.73	36.2	ם	<25/42	0.73	35.8	D	<25/39
Overall Intersection	0.77	38.8	-	- /	0.82	37.2	-	- /	0.87	40.8	-	-	- 1.15	- 140.9	-	- /	1	36.∠ 38.1	ם	<25/42 /	0.10 0.94	35.6 37.8	ם	<25/39 /
Overall litter section	0.77	30.0	U	/	0.02	31.2	U	/	0.07	40.0	U	/	1.15	140.9	Г	/	0.94	30.1	U	/	0.94	31.0	U	/

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TABLE 5 (continued)
Intersection Capacity Analysis Summary

		2020	Existing			2030	No-Build			2030) Build		20:	30 Build	Mitigate	ed Alt 1	20	30 Build	Mitigated	l Alt 2
Intersection/Peak Hour/Lane Group	V/C a	Del. b	LOS ^c	Queue ^d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Gould Street at Wingate Driveway / Site	South Dr	iveway																		
Weekday AM:																				
Wingate Driveway EB	0.01	10.1	В	/<25	0.01	10.1	В	/<25	0.01	10.0	В	/<25	0.00	43.9	D	<25/<25	0.00	43.9	D	<25/<25
Site Driveway WB left/through	0.08	17.9	С	/<25	0.09	18.6	С	/<25	0.30	38.2	E	/30	-	-	-	-	-	-	-	-
Site Driveway WB right	0.02	10.4	В	/<25	0.03	10.6	В	/<25	0.01	13.1	В	/<25	-	-	-	-	-	-	-	-
Site Driveway WB left	-	-	-	-	-	-	-	-	-	-	-	-	0.30	43.0	D	<25/41	0.30	41.1	D	<25/50
Site Driveway WB left/through/right	-	-	-	-	-	-	-	-	-	-	-	-	0.02	40.5	D	<25/<25	0.02	39.0	D	<25/<25
Gould Street NB approach	0.02	8.0	Α	/<25	0.02	8.0	Α	/<25	0.02	8.0	Α	/<25	-	-	-	-	-	-	-	-
Gould Street NB left/through	-	-	-	-	-	-	-	-	-	-	-	-	0.34	3.0	Α	49/117	0.25	3.1	Α	33/74
Gould Street NB right	-	-	-	-	-	-	-	-	-	-	-	-	0.28	3.9	Α	<25/<25	0.37	6.3	Α	<25/28
Gould Street SB approach	0.02	8.1	Α	/<25	0.02	8.2	Α	/<25	0.08	10.2	В	/<25	0.17	3.0	Α	<25/56	-	-	-	-
Gould Street SB left	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.332	4.8	Α	25/99
Gould Street SB through/right	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22	3.8	Α	29/101
Overall Intersection	-	-	-	-	-	-	-	-	-	-	-	-	0.34	4.9	Α	/	0.36	6.5	Α	/
Weekday PM:																				
Wingate Driveway EB	0.08	13.7	В	/<25	0.07	13.8	В	/<25	0.08	15.7	С	/<25	0.02	41.6	D	<25/<25	0.02	41.6	D	<25/<25
Site Driveway WB left/through	0.21	26.6	D	/<25	0.19	27.4	D	/<25	>2.00	>999.9	F	/>999	_	_	-	-	-	_	-	-
Site Driveway WB right	0.03	9.7	Α	/<25	0.03	9.9	Α	/<25	0.11	11.0	В	/<25	-	-	-	-	-	-	-	_
Site Driveway WB left	-	-	-	-	_	-	-	-	-	-	-	-	0.72	36.1	D	167/232	0.85	41.9	D	234/404
Site Driveway WB left/through/right	-	-	-	-	_	-	-	-	-	-	-	-	0.68	34.4	С	150/214	0.77	35.1	D	201/331
Gould Street NB approach	0.01	9.0	Α	/<25	0.01	9.1	Α	/<25	0.01	9.6	Α	/<25	-	-	-	-	-	-	-	-
Gould Street NB left/through	-	-	-	-	_	-	-	-	-	-	-	-	0.31	11.3	В	77/179	0.28	13.8	В	77/114
Gould Street NB right	-	-	-	_	_	-	-	-	-	-	-	-	0.09	9.1	Α	<25/<25	0.13	18.0	В	<25/<25
Gould Street SB approach	0.00	7.8	Α	/<25	0.01	7.8	Α	/<25	0.01	8.3	Α	/<25	0.48	13.9	В	161/255	-	-	-	-
Gould Street SB left	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.12	13.1	В	<25/44
Gould Street SB through/right	-	-	-	-	-	_	-	-	-	-	-	-	-	-	-	-	0.73	23.8	С	324/481
Overall Intersection	-	-	-	-	-	-	-	-	-	-	-	-	0.53	20.2	С	/	0.74	28.1	С	/

^a Volume-to-capacity ratio.

^b Average control delay in seconds per vehicle.

^c Level of service.

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

TABLE 5 (continued)
Intersection Capacity Analysis Summary

		2020	Existing			2030	No-Build			2030	Build		203	0 Build I	Mitigate	d Alt 1	203	0 Build M	itigated	Alt 2
Intersection/Peak Hour/Lane Group	V/C a	Del. b	LOS ^c	Queue d	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue	V/C	Del.	LOS	Queue
Gould Street at TV Place																				
Weekday AM:																				
TV Place WB approach	0.08	13.3	В	/<25	0.07	14.0	В	/<25	0.12	20.8	С	/<25	-	-	-	-	-	-	-	-
TV Place WB left	-	-	-	-	-	-	-	-	-	-	-	-	0.08	26.2	D	/<25	-	-	-	-
TV Place WB right	0.02	- 8.2		- /<25	0.02	- 8.4		- /<25	0.19	- 9.4	_	- / -25	0.03	10.9 9.4	В	/<25 /<25	0.02	10.9	В -	/<25
Gould Street SB approach	0.02	8.2	Α	/<25	0.02	8.4	Α	/<25	0.19	9.4	Α	/<25	0.19	9.4	Α	/<25	-	-	-	-
Weekday PM:																				
TV Place WB approach	0.15	16.8	С	/<25	0.13	15.1	С	/<25	1.02	82.3	F	/315	-	-	-	-	-	-	-	-
TV Place WB left	-	-	-	-	-	-	-	-	-	-	-	-	0.66	41.2	Ε	/108	-	-	-	-
TV Place WB right	-	-	-	-	-	-	-	-	-	-	-	-	0.31	12.2	В	/33	0.23	12.1	В	/<25
Gould Street SB approach	0.01	7.9	Α	/<25	0.01	7.9	Α	/<25	0.04	8.1	Α	/<25	0.04	8.1	Α	/<25	-	-	-	-
Gould Street at Kearney Road																				
Weekday AM:																				
Kearney Road WB approach	0.11	13.9	В	/<25	0.10	14.0	В	/<25	0.13	16.7	С	/<25		1	N/A			N.	/Δ	
Gould Street SB approach	0.02	7.9	Α	/<25	0.02	8.0	Α	/<25	0.02	8.0	Α	/<25		•	N/ /\			IN,	^	
Weekday PM:																				
Kearney Road WB approach	0.30	16.5	С	/33	0.27	15.0	С	/28	0.38	22.0	D	/45			1/4				/ A	
Gould Street SB approach	0.01	7.8	Α	/<25	0.01	7.8	Α	/<25	0.01	8.5	Α	/<25		Γ	N/A			N.	'A	
Gould Street at Ellis Street																				
Weekday AM:																				
Driveway EB approach	0.02	14.7	В	/<25	0.01	14.4	В	/<25	0.02	17.6	С	/<25								
Ellis Street WB approach	0.05	13.8	В	/<25	0.04	13.6	В	/<25	0.05	16.3	С	/<25		1	N/A			N.	/Δ	
Gould Street NB approach	0.00	8.0	Α	/<25	0.00	8.0	Α	/<25	0.00	8.6	Α	/<25			N/ /\			I N		
Gould Street SB approach	0.01	7.8	Α	/<25	0.01	7.8	Α	/<25	0.01	7.8	Α	/<25								
Weekday PM:																				
Driveway EB approach	0.01	13.7	В	/<25	0.00	12.7	В	/<25	0.00	16.8	С	/<25								
Ellis Street WB approach	0.16	15.0	С	/<25	0.13	13.7	В	/<25	0.22	19.3	С	/<25			N/A			N.	/Δ	
Gould Street NB approach	0.00	0.0	Α	/<25	0.00	0.0	Α	/<25	0.00	0.0	Α	/<25		'	N/ /*\			IN,	^	
Gould Street SB approach	0.00	7.8	Α	/<25	0.00	7.8	Α	/<25	0.00	8.3	Α	/<25								
Gould Street SB approach		7.8	Α	/<25	0.00	7.8		/<25	0.00	8.3		/<25								

^a Volume-to-capacity ratio.



b Average control delay in seconds per vehicle.

CI evel of service

^d Average/95th percentile queue length in feet per lane (assuming 25 feet per vehicle).

CONCLUSIONS

Existing and future conditions in the study area have been described, analyzed, and evaluated with respect to traffic operations and the impact of the proposed redevelopment. Conclusions of this effort are presented below.

- The existing site currently contains Muzi Motors and Channel 5. Access to the site is currently provided via a right-in/right-out driveway on Highland Avenue and two full-access/egress driveways on Gould Street. As part of the redevelopment, the existing uses on site would be razed to construct approximately 368,200 SF of corporate headquarters space, 368,200 SF of R&D space, and 129,950 SF of retail space. The right-in/right-out driveway on Highland Avenue would be closed as part of the redevelopment, and the two driveways on Gould Street would be maintained in some fashion or possibly combined to form a new signalized intersection.
- The proposed redevelopment is expected to generate 620 additional new vehicle trips (625 entering and -5 exiting) during the weekday AM peak hour, and 869 additional new vehicle trips (126 entering and 743 exiting) during the weekday PM peak hour.
- The Town of Needham also requested that GPI prepare a trip generation estimate for an alternative development build-out that consists of approximately 226 residential apartment units, ±259,130 SF of corporate office space, ±259,130 SF of R&D space, and ±91,460 SF of ancillary retail space. The proposed residential alternative build-out is anticipated to generate 129 to 292 fewer external vehicle trips than the proposed office/R&D build-out.
- While no credit was applied for public transit, walking, or biking trips to/from the site, GPI recommends that the developer implement a comprehensive Transportation Demand Management (TDM) program to encourage the use of public transit, walking and biking, and reduce single-occupancy vehicle trips to the site.
- Central Avenue / Gould Street Traffic exiting Gould Street onto Central Avenue currently experiences long delays and queues that will be exacerbated as traffic volumes continue to grow in the area. This movement currently operates well over capacity, with a V/C ratio of 2.54 during the weekday PM peak hour. Limited right-of-way exists to widen either Central Avenue or Gould Street to provide additional capacity. In addition, utilities, stone walls, and homes are located close to the roadway, further limiting the ability for widening. Since the potential developer of the Muzi/Channel 5 property would not have the power to acquire right-of-way, the following options could potentially be implemented to mitigate the project impacts, however, operations under the 2030 Build will still be worse than the 2030 No Build.
 - The traffic volumes through this intersection currently exceed the warranting conditions for installation of a traffic signal. Therefore, regardless of the Muzi/Channel 5 site redevelopment, the Town may wish to consider installation of a fully-actuated traffic-control signal at this intersection to reduce existing delay and mitigate the impacts of the proposed redevelopment. The installation of traffic signal equipment at the intersection may require signal easements from adjacent properties. It is anticipated that the installation of traffic signal equipment at the intersection may require approximately 695 SF for signal easements from adjacent properties, approximately 250 SF for sidewalk easements, the relocation of a utility pole at the southeast corner of the intersection. The size of any easements or acquisition will be determined as part of the final design. With the potential redevelopment of the site, this may present an opportunity to work with the site developer to share the costs of construction.



o In addition, GPI recommends minor roadway widening and restriping along Central Avenue to provide an 11-foot westbound left-turn lane, an 11-foot westbound through lane, and a 12-foot eastbound shared through/right-turn lane, with 5.5-foot sidewalks in either direction. Construction of these improvements will eliminate the existing 5-foot bicycle accommodating shoulders. However, any further widening to maintain the shoulders would require the acquisition of right-of-way and potential complete property takings that would be outside of the developer's capacity to construct.

With implementation of the improvements described above, all movements at this intersection will operate at acceptable levels of service (LOS D or better) during the weekday PM peak hour. Although traffic exiting Gould Street will continue to operate at LOS F during the weekday AM peak hour, the V/C ratio will be reduced below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. In addition, the volume of traffic on this movement is low during the weekday AM peak hour.

Additional widening to provide dedicated turning lanes on Gould Street or Central Avenue eastbound is required to further reduce the delay on this approach in the morning. This widening would necessitate acquisition of additional right-of-way, as well as significant relocation of utilities near the intersection. Therefore, the Town should consider developing a Town-funded project to implement additional turning lanes as a means of increasing capacity at this location to accommodate existing traffic volumes and future development in the surrounding area. The Town can request a fair-share contribution toward the design and/or construction of these improvements from the developer, proportional to the percentage increase in trips generated by the project through the intersection.

• Highland Avenue / Gould Street / Hunting Road – All movements at the Highland Avenue / Gould Street / Hunting Road intersection currently operate under capacity (V/C less than 1.00) and at LOS E or better. A roadway improvement project is underway by MassDOT to enhance intersection safety and pedestrian and bicycle accommodations, and optimize the operation of the intersection. While this project is not expected to significantly increase the capacity of the intersection as no additional lanes are being added, the project will reallocate the green time at the traffic signal to optimize the intersection operations. As shown in the analysis of the 2023 with MassDOT Improvements conditions, the proposed improvements will result in slight decreases in the overall intersection delay and decreases in delay on individual movements of up to 21 seconds. MassDOT's project will also improve the level-of-service to LOS D or better for nearly all movements.

All movements at this intersection are anticipated to operate under capacity (V/C less than 1.00) and at LOS E or better under 2030 No-Build conditions. Although the MassDOT improvements have been included in the analysis of the 2020 No-Build condition, the 2030 No-Build conditions do not reflect any improvement in operations from the MassDOT improvements as the 1 percent background growth will utilize the limited additional capacity created by the signal timing optimization. With the additional traffic generated by the proposed redevelopment, the overall intersection will operate over capacity at LOS F with several movements operating at LOS E or F. To mitigate the impacts of the proposed redevelopment, GPI recommends widening of Highland Avenue to provide a dedicated right-turn lane from Highland Avenue westbound onto Gould Street, which would be channelized and signalized as part of the intersection. This would require analysis of the weaving condition between the I-95 SB Off-Ramp and the channelized right-turn to ensure proper spacing exists between the intersections to provide an efficient and safe weaving condition. In addition, GPI recommends widening the Gould Street southbound approach to provide two dedicated left-turn lanes, a through lane, and a dedicated right-turn lane. Note that all widening along Gould Street and Highland Avenue would occur along the site-side of the roadway, which will likely require a significant donation of property from the developer and may impact the square



footage of the areas used for trip generation. In order to manage queues and traffic flows between this intersection and the South Site Driveway, GPI recommends implementing a coordinated signal system between these two intersections. With implementation of the improvements described above, the operations of the Highland Avenue / Gould Street / Hunting Road intersection will be restored to nearly No-Build conditions during the weekday AM peak hour and better than No-Build conditions during the weekday PM peak hour. All movements will operate below capacity at LOS E or better.

• Gould Street / Site Driveway Intersections — Under the existing geometric configuration of the two site driveways, traffic exiting both site driveways is expected to operate over capacity at LOS F with long delays and queues, particularly during the weekday PM peak hour. GPI evaluated the impacts of implementing two alternative mitigation scenarios to reduce the delay and queues at the site driveways. Alternative 1 involves maintaining both full-access/egress driveways and providing enhancements at both driveways to improve traffic operations. Alternative 2 consists of consolidating the driveways into a single, signalized driveway at approximately the location of the South Site Driveway and providing a right-out-only driveway at the northerly end of the site. With either of these alternatives, the traffic volumes through the Gould Street / Wingate Driveway / South Site Driveway intersection would exceed the warranting conditions for installation of a traffic signal. Therefore, GPI recommends installation of a fully-actuated traffic-control signal, which would operate as part of a coordinated signal system with the existing signal at Highland Avenue / Gould Street / Hunting Road. The geometric enhancements included as part of each alternative are described below.

Alternative 1 (Maintain Two Driveways):

- Gould Street / Wingate Driveway / South Site Driveway
 - Widen South Site Driveway to provide exclusive left-turn lane and shared left/through/right-lane;
 - Widen Gould Street northbound to provide a shared left-turn/through lane and an exclusive right-turn lane;
 - Widen Gould Street southbound to provide two general purpose travel lanes; and
 - ➤ It is anticipated that the installation of traffic signal equipment at the Highland Avenue / Gould Street / Hunting Road intersection and the need for roadway widening to provide additional turn lanes and sidewalk construction will require the acquisition of approximately 13,050 SF of the Muzi Motors property which inter would reduce the total square footage available to be developed.
 - ➤ A 725 SF signal easement will be required on the site for the placement of traffic signal equipment.
- Gould Street / TV Place (North Site Driveway)
 - Widen North Site Driveway to provide exclusive left-turn lane and exclusive right-turn lane:
 - Widen Gould Street northbound to provide a through lane and an exclusive rightturn lane;
 - Widen Gould Street southbound to provide an exclusive left-turn lane and a through lane; and
 - ➤ It is anticipated that the need for roadway widening will require the acquisition of approximately 3,750 SF of the Muzi Motors property which inter would reduce the total square footage available to be developed.



Alternative 2 (Consolidate Driveways):

- Gould Street / Wingate Driveway / South Site Driveway
 - Widen South Site Driveway to provide exclusive left-turn lane and shared left/through/right-lane;
 - Widen Gould Street northbound to provide a shared left-turn/through lane and an exclusive channelized right-turn lane;
 - Widen Gould Street southbound to provide an exclusive left-turn lane and a shared through/right-turn lane; and
 - ➤ It is anticipated that the installation of traffic signal equipment at the Highland Avenue / Gould Street / Hunting Road intersection and the need for roadway widening to provide additional turn lanes and sidewalk construction will require the acquisition of approximately 9,250 SF of the Muzi Motors property which inter would reduce the total square footage available to be developed.
 - A 665 SF signal easement will be required on the site for the placement of traffic signal equipment.
- Gould Street / TV Place (North Site Driveway)
 - Reconstruct the North Site Driveway to a right-out-only driveway with a single channelized lane to enforce the turn restriction; and
 - It is not anticipated that property acquisition will be required at this intersection as part of Alternative 2.

With implementation of either Alternative 1 or 2, all movements at the Gould Street / Wingate Driveway / South Site Driveway will operate at acceptable levels of service (LOS D or better) during the weekday AM and PM peak hours. While all movements at the Gould Street / North Site Driveway intersection will operate at LOS B or better under Alternative 2 (Consolidated Driveways), traffic exiting the North Site Driveway will operate at LOS E during the weekday PM peak hour under Alternative 1 (Maintain Two Driveways). In addition, less than 250 feet of vehicle stacking separates the two intersections and queues on Gould Street southbound may occasionally extend from the signalized intersection of Gould Street / Wingate Driveway / South Site Driveway beyond the North Site Driveway, resulting in additional difficulty and delay exiting this driveway. Therefore, GPI recommends consolidation of the two driveways into a single, signalized location as described by Alternative 2.

• All movements at the remaining study area intersections are anticipated to operate at acceptable levels of service (LOS D or better) with queues not exceeding two vehicles under all analysis conditions. The additional traffic generated by the proposed redevelopment is not anticipated to increase delay on any movement through any of these intersections by more than ten seconds per vehicle or increase queues by more than one vehicle. This level of traffic impact does not warrant any project-specific mitigation.



- APPENDIX

- Public Transportation Information
 - Traffic Count Data
 - Crash Rate Worksheets
 - Trip Generation Calculations
- Trip Generation Comparison Residential Build-Out
 - Trip Distribution Calculations
 - Signal Warrant Analysis Worksheets
 - Capacity Analysis Methodology
 - Capacity and Queue Analysis Worksheets

TRAFFIC I	MPACT STUDY
Muzi Motors Redevelopment – Needham	, Massachusetts
PUBLIC TRANSPORTATION INFO	PRMATION

NEEDHAM LINE

Monday to Friday

Monday to Friday

Summer 2020 schedule, effective June 22, 2020

	day to i riday																
Inbo	und to Boston				Al	VI							PM				
ZONE	STATION	TRAIN#	600	7602	7606	608	610	612	614	616	618	7620	7622	7624	626	628	630
	Bikes Allowed		<i>6</i> %	₫6	<i>6</i> %	ф	<i>6</i> %	<i>6</i> %	<i>6</i> %	<i>6</i> %	<i>₫</i> ₽	€6	€	€6	€6	<i>₫</i> ₽	<i>₫</i> ₺
2	Needham Heights	b	6:05	7:00	7:53	8:45	10:05	11:05	12:50	2:50	3:55	5:08	5:58	6:47	7:50	8:37	10:02
2	Needham Center	8	6:09	7:04	7:57	8:49	10:09	11:09	12:54	2:54	3:59	f 5:12	6:02	6:51	7:54	8:41	10:06
2	Needham Junction	8	6:14	7:09	8:02	8:54	10:13	11:13	12:58	2:58	4:03	-	6:06	6:55	7:58	8:45	10:10
2	Hersey	8	6:17	7:12	8:05	8:57	10:16	11:16	1:01	3:01	-	-	-	6:58	8:03	8:48	10:13
1	West Roxbury	b	6:23	7:18	8:11	9:03	10:21	11:21	1:06	3:06	4:09	5:24	6:14	7:07	8:08	8:53	10:23
1	Highland	8	6:26	7:21	8:14	9:06	10:23	11:23	1:08	3:08	-	5:26	-	7:09	8:10	8:55	10:25
1	Bellevue	b	6:30	7:25	8:17	9:10	10:25	11:25	1:10	3:10	-	5:28	-	7:11	8:12	8:57	10:27
1	Roslindale Village	8	6:33	7:28	8:20	9:13	10:28	11:28	1:13	3:13	-	5:31	-	7:14	8:15	9:00	10:30
1A	Forest Hills	8	6:36	7:31	8:24	9:16	10:31	11:31	1:16	3:16	-	5:34	-	7:19	8:18	9:03	10:33
1A	Ruggles	8	L 6:41	L 7:36	L 8:29	L 9:21	L 10:36	L 11:36	L 1:21	-	-	-	-	-	L 8:23	L 9:08	L 10:38
1A	Back Bay	8	L 6:45	L 7:40	L 8:33	L 9:25	L 10:40	L 11:40	L 1:25	L 3:24	L 4:25	L 5:48	L 6:31	L 7:27	L 8:27	L 9:12	L 10:42
1A	South Station	8	6:50	7:45	8:39	9:30	10:45	11:45	1:30	3:29	4:30	5:53	6:36	7:32	8:32	9:17	10:47

Trains in purple box indicate peak period trains.

Keep in Mind:

This schedule will be effective from June 22, 2020 and will replace the schedule of October 21, 2019

Presidents' Day and 4th of July operate on a **Saturday service schedule.**

New Year's Day, Memorial Day, Labor Day, Thanksgiving Day, and Christmas Day operate on a **Sunday service schedule**.

For all other holiday schedules, please check MBTA.com/holidays or call 617-222-3200.

For the latest information regarding weekend disruptions, visit MBTA.com/weekend.

For additional service to Ruggles Station, refer to the Providence and Franklin Line schedules for particular trains.

Times in purple with "f" indicate a flag stop:

Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.



Times in blue indicate an early departure (L stop): The train may leave ahead of schedule at these stops.



Bikes: Bicycles are allowed on trains with the bicycle symbol shown below the train number.



High level platform and bridge plate available. Visit mbta.com/accessibility for more information.

Out	bound from Boston				AM							F	PM				
ZONE	STATION	TRAIN#	7601	7603	605	607	609	611	613	615	7617	7619	623	625	627	629	631
	Bikes Allowed		66	646	<i>6</i> %	640	<i>6</i> %	<i>5</i> %	₫	<i>6</i> %	₫\$	₫	€	<i>6</i> %	56	<i>6</i> %	<i>6</i> %
1A	South Station	8	6:47	7:42	9:05	9:53	11:50	1:52	3:00	4:05	4:53	5:42	6:36	7:30	8:50	9:50	11:20
1A	Back Bay	8	6:52	7:47	9:10	9:58	11:55	1:57	3:05	4:10	4:58	5:47	6:41	7:35	8:55	9:55	11:25
1A	Ruggles	8	-	-	-	10:02	11:59	2:01	3:09	4:14	5:02	5:51	6:45	7:39	8:59	9:59	11:29
1A	Forest Hills	8	6:59	-	9:18	10:08	12:05	2:07	3:15	4:20	5:08	5:57	6:51	7:45	9:05	10:05	11:35
1	Roslindale Village	8	7:02	-	9:21	10:11	12:08	2:10	3:18	4:25	5:13	6:02	6:56	7:48	9:08	10:08	11:38
1	Bellevue	8	7:05	-	9:24	10:14	12:11	2:13	3:21	4:28	5:16	6:06	6:59	7:51	9:11	10:11	11:41
1	Highland	8	7:07	-	9:26	10:16	12:13	2:15	3:23	4:30	5:18	6:08	7:01	7:53	9:13	10:13	11:43
1	West Roxbury	8	7:09	8:01	9:29	10:18	12:15	2:17	3:25	4:32	5:20	6:10	7:03	7:55	9:15	10:15	11:45
2	Hersey	8	7:19	-	9:34	10:25	12:20	2:22	3:30	4:37	5:26	6:16	7:08	8:00	9:20	10:20	11:50
2	Needham Junction	8	7:22	8:17	9:36	10:28	12:23	2:25	3:34	4:41	5:30	6:20	7:12	8:03	9:23	10:23	11:53
2	Needham Center	8	7:25	L 8:20	9:39	10:31	12:26	2:28	3:37	4:44	5:33	6:23	7:15	8:06	9:26	10:26	11:56
2	Needham Heights	8	7:31	8:24	9:43	10:35	12:30	2:33	3:42	4:49	5:38	6:29	7:20	8:10	9:30	10:30	12:00

Trains in purple box indicate peak period trains.

Saturday (NO SERVICE ON SUNDAY)

Inbo	ound to Boston		A	M				PM			
ZONI	E STATION TRAI	N #	1602	1604	1606	1608	1610	1612	1614	1616	1618
	Bikes Allowed		40	646	€6	€	<i>6</i> %	40	<i>6</i> %	<i>6</i> %	<i>₫</i> ₺
2	Needham Heights	8	8:05	10:05	12:05	2:05	4:05	6:05	8:05	10:05	11:40
2	Needham Center	8	8:10	10:10	12:10	2:10	4:10	6:10	8:10	10:10	-
2	Needham Junction	8	8:13	10:13	12:13	2:13	4:13	6:13	8:13	10:13	-
2	Hersey	8	8:16	10:16	12:16	2:16	4:16	6:16	8:16	10:16	-
1	West Roxbury	8	8:21	10:21	12:21	2:21	4:21	6:21	8:21	10:21	-
1	Highland	8	8:23	10:23	12:23	2:23	4:23	6:23	8:23	10:23	-
1	Bellevue	8	8:25	10:25	12:25	2:25	4:25	6:25	8:25	10:25	-
1	Roslindale Village	8	8:27	10:27	12:27	2:27	4:27	6:27	8:27	10:27	-
1A	Forest Hills	8	8:31	10:31	12:31	2:31	4:31	6:31	8:31	10:31	-
1A	Ruggles	8	L 8:35	L 10:35	L 12:35	L 2:35	L 4:35	L 6:35	L 8:35	L 10:35	-
1A	Back Bay	8	L 8:39	L 10:39	L 12:39	L 2:39	L 4:39	L 6:39	L 8:39	L 10:39	L 12:00
1A	South Station	8	8:44	10:44	12:44	2:44	4:44	6:44	8:44	10:44	12:05

Saturday (NO SERVICE ON SUNDAY)

Outbound from Boston			AM				F	PM		
ZONE STATION TRA	IN#	1601	1603	1605	1607	1609	1611	1613	1615	1617
Bikes Allowed		<i>6</i> %	646	<i>6</i> %	<i>6</i> %	646	<i>6</i> %	646	<i>6</i> %	<i>6</i> %
1A South Station	8	7:10	9:10	11:10	1:10	3:10	5:10	7:10	9:10	10:45
1A Back Bay	8	7:15	9:15	11:15	1:15	3:15	5:15	7:15	9:15	10:50
1A Ruggles	8	7:18	9:18	11:18	1:18	3:18	5:18	7:18	9:18	10:54
1A Forest Hills	8	7:24	9:24	11:24	1:24	3:24	5:24	7:24	9:24	11:00
1 Roslindale Village	8	7:28	9:28	11:28	1:28	3:28	5:28	7:28	9:28	11:03
1 Bellevue	8	7:30	9:30	11:30	1:30	3:30	5:30	7:30	9:30	11:06
1 Highland	8	7:33	9:33	11:33	1:33	3:33	5:33	7:33	9:33	11:08
1 West Roxbury	b	7:35	9:35	11:35	1:35	3:35	5:35	7:35	9:35	11:10
2 Hersey	8	7:39	9:39	11:39	1:39	3:39	5:39	7:39	9:39	11:15
2 Needham Junction	b	7:42	9:42	11:42	1:42	3:42	5:42	7:42	9:42	11:18
2 Needham Center	b	7:46	9:46	11:46	1:46	3:46	5:46	7:46	9:46	11:21
2 Needham Heights	8	7:50	9:50	11:50	1:50	3:50	5:50	7:50	9:50	11:25

mbta.com/ridesafer



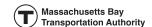
Buy tickets with mTicket



Wash hands before and after riding



Socially distance whenever possible















Connecting Newton Highlands Green Line station to the Needham Crossing area

Temporary Schedule Effective Date: 06-08-2020

Seating limited for physical distancing.

Follow protocols below to request an assigned seat.

This shuttle operates Monday-Friday only.

All times are approximate. **Arrive 5+ minutes early**.

For an accessible (lift-equipped) bus, contact us 24+ hours in advance.

AM

BUS NUMBER	001
DEPART CORNER OF LINCOLN & WALNUT Newton Highlands Pickup Location	see below
ARRIVE 320 NEEDHAM ST The Bulfinch Companies	see below
ARRIVE 152 SECOND AVE Atrius Health	see below
ARRIVE 254 SECOND AVE 254 Second Ave	see below
ARRIVE 75 SECOND AVE The Bulfinch Companies	see below
ARRIVE 50 CABOT ST Direct Federal Credit Union	see below
ARRIVE 200 FIRST AVE Homewood Suites	see below
ARRIVE 250 FIRST AVE The Bulfinch Companies	see below

https://128bc.org/schedules/needham/

BUS NUMBER	001
ARRIVE 189 B ST NBC Universal	see below
ARRIVE 89 A ST MCPF-Needham, LLC	see below
ARRIVE 110 A ST Intex	see below
ARRIVE 63 KENDRICK ST Charles River Place	see below
ARRIVE 117 KENDRICK ST The Bulfinch Companies	see below
ARRIVE 140 KENDRICK ST Boston Properties	see below

https://128bc.org/schedules/needham/



Connecting Newton Highlands Green Line station to the Needham Crossing area

Temporary Schedule Effective Date: 06-08-2020

Seating limited for physical distancing.

Follow protocols below to request an assigned seat.

This shuttle operates Monday-Friday only.

All times are approximate. Arrive 5+ minutes early.

For an accessible (lift-equipped) bus, contact us 24+ hours in advance.

PM

BUS NUMBER	001
DEPART 63 KENDRICK ST Charles River Place	see below
DEPART 117 KENDRICK ST The Bulfinch Companies	see below
DEPART 140 KENDRICK ST Boston Properties	see below
DEPART 89 A ST MCPF-Needham, LLC	see below
DEPART 189 B ST NBC Universal	see below
DEPART 110 A ST Intex	see below
DEPART 250 FIRST AVE The Bulfinch Companies	see below
DEPART 200 FIRST AVE Homewood Suites	see below

https://128bc.org/schedules/needham/

BUS NUMBER	001
DEPART 50 CABOT ST Direct Federal Credit Union	see below
DEPART 75 SECOND AVE The Bulfinch Companies	see below
DEPART 152 SECOND AVE Atrius Health	see below
DEPART 254 SECOND AVE 254 Second Ave	see below
DEPART 320 NEEDHAM ST The Bulfinch Companies	see below
ARRIVE NEWTON HIGHLANDS	see below

A.M. Departures

from Newton Highlands

7:30 AM last drop-off no later than 8:00 AM

8:50 AM last drop-off no later than 9:25 AM

Exact arrival times depend upon the stops needed by that day's riders.

No advance reservation needed for A.M. travel. The Shuttle Driver will assign you a seat immediately prior to departure from Newton Highlands.

P.M. Pickups

returning to Newton Highlands

trip begins 4:00 PM arrives at Alewife by approximately 4:30 PM

trip begins 5:15 PM arrives at Alewife by approximately 5:50 PM

Each afternoon/evening, shuttles will only stop at those sites for which riders have requested a pickup.

You can request pickup at one of these times between 5:00 AM EST and 12:00 PM (noon) EST.

In order to submit your request, fill out the form below. (This form is also available **here**.)

After you submit your request, you will receive an email from the 128BC team confirming your pickup time.

<u>Download this temporary schedule and all Safe Shuttle Rider Protocols applicable to the Needham Shuttle (also listed below).</u>

Request P.M. Pickup

Each afternoon/evening, 128 Business Council shuttles on multi-stop routes will only stop at those pickup sites for which riders have requested a pickup. Evening pickup requests can only be made for the current day between 5:00 A.M. EST and 12:00 P.M. EST. You do not need to use this form for A.M. travel.

How does the seat request process work?

What if I need to change my reservation?

Note: You cannot reserve more than one seat for a single evening. If you submit this request form multiple times in the same day, we will honor the last request submitted.

Shuttle Route (required)

Each shuttle is limited to eight riders to provide for safe physical distancing on board. If requests exceed this capacity, we will assign seats based on the order in which requests were received and may need to contact you about an alternate pickup time.

We need your contact information to follow up with you about your pickup request.

Rider Name (required)

Email (required)

Mobile Phone Number

Member Company

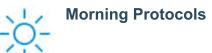
SUBMIT

COVID-19 Protocols



General Protocols

- All 128BC/The Grid services will be fare-free until further notice. We are working on developing contact-free methods of fare payment that will be safe for our riders and operators.
- If telework is an option, consider staying home. We can work with your employer to develop an office-wide telework plan, as well as other health & safety protocols.
- If you are ill, <u>definitely</u> stay home. Your Driver <u>cannot</u> assign a seat on the shuttle to anyone clearly displaying COVID-19 symptoms, including repeated coughing, difficulty breathing, blue lips or face, repeated shaking, or vomiting. You can find a complete list of symptoms associated with COVID-19 <u>here</u>.
- Wear a mask to protect those around you, including our drivers and other shuttle riders. You must wear a mask even if you feel healthy, as those with COVID-19 may experience little to no symptoms while still shedding infectious respiratory droplets.
- Make sure your mask fits properly. Your mask should fit snugly over the bridge of your nose and extend down under your chin, covering your mouth and nose completely. (What does a properly fitting mask look like?)
- Do not let your mask hang below your nose, and do not wear it around your neck. If you need to remove your mask, take it off completely and place it into a clean bag or container, isolated from other items. Improper use of a mask creates risk for cross-contamination.
- **Do not eat or drink in the waiting area or on the shuttle**, as this would require you to remove or compromise your mask.
- Wash your hands frequently throughout the day. Hand sanitizer is also available inside the entrance of each shuttle.



- Needham Shuttle riders do <u>not</u> need to request a ride in the morning. A seat will be assigned to you before you board the shuttle.
- Head to the shuttle stop located on Walnut Street after you arrive at Newton Highlands.

 The boarding area is curbside in front of a small park.
- Find the bright green 6-foot distance sidewalk decals. Feel feel to move around as needed to avoid foot traffic on Walnut Street, but return to one of these decals when you see your shuttle approaching.
- **Do not try to board early.** Your driver needs to exit the shuttle and assign each rider a seat prior to inviting each rider to board.
- Remain standing on your green sidewalk decal as you check in with the driver. The driver will ask for your destination and initials in order to create each trip's seat assignment list.
- When invited by the Driver, go straight to your assigned seat. If you are heading to the *last* stop, you will be asked to board first and assigned a seat at the back of the bus. If you are heading to the *first* stop, you will be asked to board last and assigned a seat at the front of the bus. (What does the seating layout look like?)
- Do not stand up until it's your turn to exit. We are working hard to maximize the space between riders and minimize riders having to pass one another in close quarters. Do your part by staying in your assigned seat and exercising patience when exiting the vehicle. (Need help visualizing these boarding patterns?)
- Let the riders in front of you exit the bus first when the shuttle pulls into your stop. The rider in the highest numbered seat (closest to the front) should exit first.
- Allow more than 6 feet of space in the aisle when following others off the vehicle. (How far is 6 feet?)

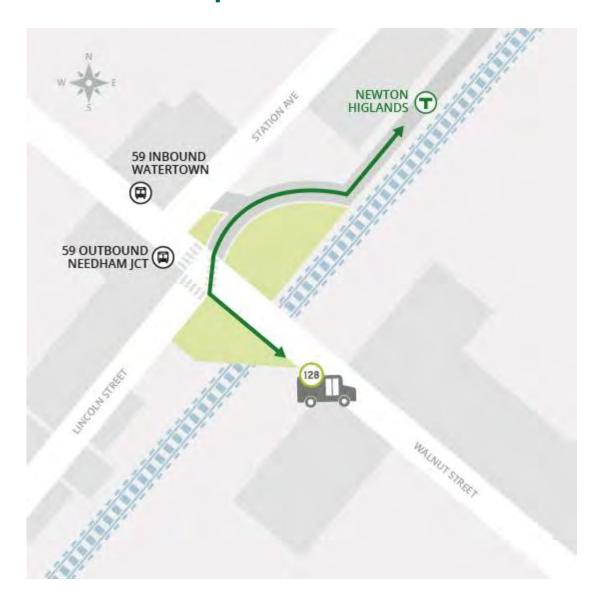


Do not forget to request a seat by 12:00 PM EST. Each afternoon/evening, shuttles will

- only stop at those sites for which riders have requested a pickup. **Afternoon/evening pickup requests** for the current day's pickups can be made beginning at 5:00 AM EST.
- Arrive at least 5 minutes early to the shuttle waiting area. Give yourself plenty of time so that you don't have to rush.
- Maintain <u>at least</u> a 6-foot distance from other waiting riders. For reference, six feet is a little more than the length of a bicycle and a little less than the length of a full-size bed. We can also work with your employer to demarcate 6-foot waiting areas as part of <u>creating a</u> worksite health & safety plan.
- Do not approach the bus until the driver opens the door. Once the driver opens the door, approach the bus one at a time, and exercise patience to avoid crowding other riders.
- Go immediately to the lowest-numbered available seat, as far to the back of the shuttle as possible. This will ensure that seats further forward are available to riders at later stops, eliminating the need for riders to pass one another in close quarters.
- **Do not stand up until it's your turn to exit.** We are working hard to maximize the space between riders and minimize riders having to pass one another in close quarters. Do your part by staying in your seat and exercising patience when exiting the vehicle.
- Let the riders in front of you exit the bus first when the shuttle pulls into the station. The rider in the highest numbered seat (closest to the front) should exit first.
- Allow more than 6 feet of space in the aisle when following others off the vehicle.

Learn more about all of our Safe Shuttle protocols.

Station Pickup Location

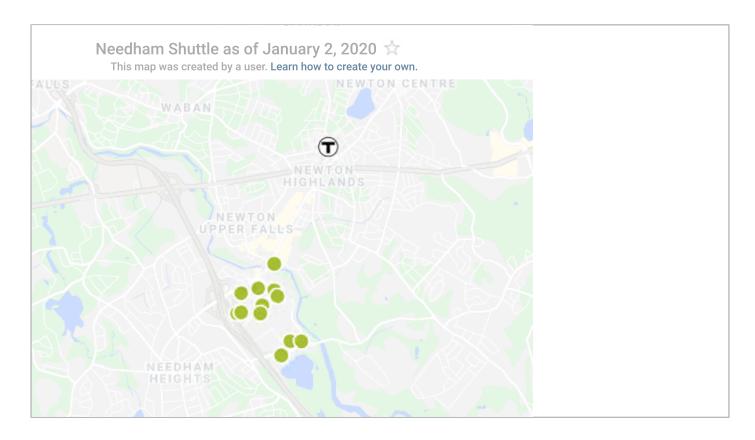




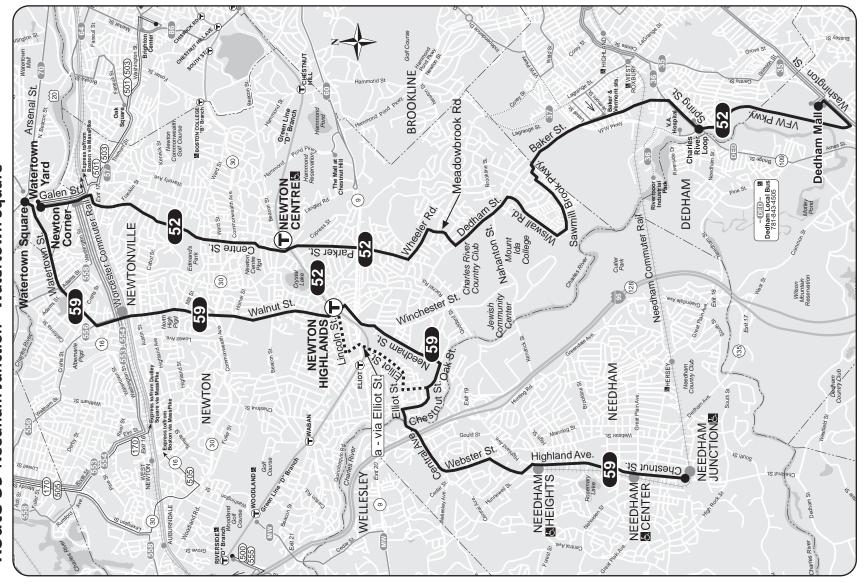
01:23

Service Area Map

All of the stops currently served by **Needham Shuttle** are shown in green below. Click on any stop icon for address, member company, and route information.

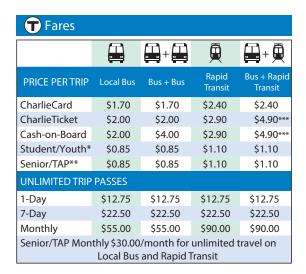


Needham Junction - Watertown Square - Watertown Yard **Dedham Mall 5**9 **52** Route Route



Effective August 30, 2020 52 Dedham Mall - Watertown Yard **59** Needham Junction-Watertown Square Serving • Newton Centre • Oak Hill • Newton Corner • Jewish Community Center • BC Law School Needham Center Needham Heights Newton Highlands Newtonville • Green Line • Needham Commuter Rail • Worcester Commuter Rail Massachusetts Bay
Transportation Authority massDO1 Information 617-222-3200 • 1-800-392-6100 (TTY) 617-222-5146 • www.mbta.com

52		Wee	kday				59		Wee	kday			59		Satu	rday			59		Su	nday		
	Inbound			Outbo	ound			Inbound			Outbound			Inbound			Outbound			Inbound		1	Outbound	
	_v/Arrive Arrive Charles Newton River Center	Arrive Watertown Yard	Leave Watertown Yard	Arrive Newton Center	Arrive Charles River		Leave Needham Junction	Arrive Newton Highlands	Arrive Watertown Square	Leave Watertown Square	Arrive Newton Highlands	Arrive Needham Junction	Leave Needham Junction	Arrive Newton Highlands	Arrive Watertown Square	Leave Watertown Square	Arrive Newton Highlands	Arrive Needham Junction	Leave Needham Junction	Arrive Newton Highlands	Arrive Watertowr Square	Leave Watertown Square	Arrive Newton Highlands	Arrive Needham Junction
	6:15A 6:34A 6:45 7:08 7:45 8:12	6:45A 7:22 8:29	7:00A 8:40	7:11A 8:54	7:38A 9:14	9:22A	6:20A 6:50 a7:20	6:38A 7:09 7:41	6:55A 7:30 8:02	6:05A 6:35 7:05	6:18A 6:48 7:25	6:37A 7:07 7:44	7:05A 8:35 10:05	7:23A 8:55 10:28	7:36A 9:10 10:45	6:20A 7:50 9:20	6:35A 8:05 9:35	6:49A 8:22 9:56	7:50A 9:20 10:50	8:07A 9:39 11:09	8:20A 9:53 11:23	7:05A 8:35 10:05	7:17A 8:47 10:18	7:33A 9:05 10:38
)P)	2:36P 3:01P 4:04 4:28 5:54 6:16	3:18P 4:41 6:28	s 2:57P 4:48 6:35	3:11P 5:04 6:44	3:35P 5:30 7:06	3:45P 5:40 	7:55 a 8:25 9:00 9:35 10:10 10:55 11:45	8:17 8:51 9:19 9:54 10:29 11:14 12:04P	8:39 9:10 9:36 10:11 10:46 11:31 12:21P	7:35 8:10 8:45 9:25 10:05 10:55 11:45	7:55 8:30 9:04 9:44 10:22 11:12 12:02P	8:15 8:50 9:24 10:04 10:42 11:33 12:23P	11:36 1:10P 2:40 4:10 5:40 7:05	12:01P 1:35P 3:02 4:31 6:01 7:25	12:18P 1:50P 3:17 4:46 6:15 7:39	10:50 12:22P 1:55 3:25 4:55 6:25	11:05 12:37P 2:10 3:40 5:10 6:40	11:30 1:02P 2:31 3:59 5:29 6:57	12:20P 1:50 3:20 4:50 6:20	12:40P 2:08 3:39 5:09 6:39	12:56P 2:24 3:56 5:25 6:55	11:35 1:05P 2:35 4:05 5:35	11:48 1:18P 2:48 4:18 5:49	12:08 1:38P 3:08 4:38 6:09
							12:35P 1:25 2:15 3:10 4:00 4:50 5:25 6:05 6:40 7:15	12:54 1:44 2:34 3:33 4:22 5:13 5:48 6:58 7:31	1:11 2:01 2:51 3:56 4:44 5:33 6:08 6:46 7:16	12:35P 1:25 2:10 3:00 3:50 a 4:30 5:05 a 5:45 6:25	12:52 1:42 2:27 3:20 4:10 4:50 5:28 6:08 6:42	1:13 2:03 2:52 3:45 4:35 5:14 5:53 6:32 7:05	7.00	7.20	7.55	0.20	VIII	0.01	長 All b	uses are	accessil	ole to pers	sons with c	lisabilities
	s - Does NO	T run duri	ing schoo	ol vacatio	on		7:50	8:07	8:22	7:00	7:16	7:39										+ 🖨		+ 🛱 s + Rapid
																			Fare		cal Bus B		Transit	Transit
									a - Via E	Elliot St									CharlieCi CharlieTi			\$1.70 \$2.00		\$2.40 \$4.90
									a - via L	_IIIOt Ot.									Cash-on-l	Board \$	2.00	\$4.00	\$2.90	\$4.90
																			Student/\ Senior/TA		0.85 0.85	\$0.85 \$0.85		\$1.10 \$1.10
	No Roi Satu	ute 52 ırday (า														VALID PASSES: (\$30.00/mo.); boat passes. FREE FARES: C Access Charlie * Requires S to student	LinkPass (\$90 **Senior/TAF nildren 11 and Card holders r tudent Charli	0.00/mo.); Loc 2 LinkPass (\$30 d under ride freide free and if eCard or Youth ticipating mid	ee when accome using a guide, to CharlieCard. Sand explain a guide, to CharlieCard. Sand le schools and	panied by an adu the guide rides fr student CharlieCa high schools. Yo ton metro area.	n LinkPass er rail, and It; Blind se. rds are available uth CharlieCards
		Rou	ıte 52						Rou	te 59									www.mbt ** Requires S	a.com/youthp	ass for details arlieCard, avai		re cardholders, s	
		Dedhai Jaterto	m Mal						edham	Junction Junction									11/26	Fall 9/7/20: Su 5/20, 12/25	2020 & Wi Inday; 10/12 5/20, & 1/1/	inter 2021 H 2/20 & 11/11 '21: Sun; 1/18	lolidays /20: Weekda 3/21 & 2/15/2	y 1: Sat



VALID PASSES: LinkPass (\$84.50/mo.); Student /Youth LinkPass* (\$30/mo.); Senior/TAP LinkPass* (\$30/mo.); and express bus, commuter rail, and boat

FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free: if using a guide, the guide rides free

- * Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit www.mbta.com/youthpass for details.
- ** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.
- *** For Silver Line SL4 or SL5 pay \$2.75. Also see "transfers."

If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations.

SCHEDULES

Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay and Downtown Crossing (Orange Line Level) or see station personnel. Schedules also available at the Transportation Building (10 Park Plaza), 45 High St, and online at mbta.com.

For real-time subway and bus tracking, download the Transit app on any smartphone.



Rapid Transit

Effective August 30, 2020













massDOT Massachusetts Bay
Transportation Authority

Information 617-222-3200 • 1-800-392-6100 (TTY) 617-222-5146 • www.mbta.com

Rapid		We	ekday			Saturday		Sunday				
Transit Line	First Trip	Peak	Off Peak	Last Trip	First Trip	Arriving Every	Last Trip	First Trip	Arriving Every	Last Trip		
Red Line Alewife Braintree	5:24 AM 5:08 AM	9 mins	12-16 mins	12:20 AM 12:17 AM	5:24 AM 5:09 AM	12-16 mins	12:20 AM 12:17 AM	6:08AM 6:00AM	12-16 mins	12:20 AM 12:17 AM		
Alewife	5:16 AM	9	12-16	w 12:27 AM	5:16 AM	12-16	w 12:27 AM	6:00AM	12-16	w 12:27 AM		
Ashmont	5:16 AM	mins	mins	w 12:30 AM	5:16 AM	mins	w 12:30 AM	6:00AM	mins	w 12:30 AM		
"M" Ashmont	5:17 AM	5	8-12 Day	w 1:05 AM	5:15 AM	8-12 Day	w 1:05 AM	6:03AM	8-12 Day	w 1:05 AM		
Mattapan	5:05 AM	mins	26 Late	12:53 AM	5:05 AM	26 Early/Late	12:53 AM	5:51AM	26 Early/Late	12:53 AM		
Blue Line Wonderland Orient Heights Bowdoin	5:13 AM 5:14 AM 5:30 AM	5 mins	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:25 AM 5:13 AM 5:29 AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:58AM 6:03AM 6:21AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM		
Orange Line Oak Grove Forest Hills	5:16 AM 5:16 AM	6 mins	9-11 mins			9-11 mins	w 12:30 AM w 12:28 AM	6:00AM 6:00AM	9-11 mins	w 12:30 AM w 12:28 AM		
Green Line* B Boston College Park Street	5:01 AM	5-6	7-9	12:10 AM	4:45 AM ²	7-8	12:09 AM	5:20AM ²	9	12:10 AM		
	5:45 AM	mins	mins	w 12:52 AM	5:40 AM	mins	w 12:52 AM	6:12AM	mins	w 12:52 AM		
C Cleveland Circle	4:57 AM ¹	6-8	9-11	12:07 AM	4:50 AM ²	9-10	12:10 AM	5:30AM ²	10	12:10 AM		
North Station	5:48 AM	mins	mins	w 12:46 AM	5:30 AM	mins	w 12:46 AM	6:06AM	mins	w 12:46 AM		
D Riverside	4:56 AM	6	8-11	12:05 AM	4:55 AM	8-9	12:02 AM	5:25AM	11-12	12:05 AM		
Government Ctr.	5:45 AM	mins	mins	w 12:49 AM	5:38 AM	mins	w 12:49 AM	6:10AM	mins	w 12:49 AM		
E Lechmere * Heath Street	5:00 AM ⁴	6-7	8-10	12:30 AM	5:01 AM	10	12:30 AM	5:35AM	12	12:30 AM		
	5:45 AM	mins	mins	12:47 AM ³	5:39 AM	mins	12:47 AM ³	6:15AM	mins	12:47 AM ³		
Silver Line SL1 Logan Airport South Station	5:38 AM 5:40 AM	7-12 mins	10-12 mins	f 1:03 AM w 1:02 AM	5:48 AM 5:45 AM	10-12 mins	1:15 AM w 12:59 AM	5:50AM 6:12AM	10-12 mins	f 1:12 AM w 1:00 AM		
SL2 Design Center	6:07 AM	6	14-16	12:37 AM	6:03 AM	14-16	12:35 AM	6:51AM	14-16	12:51 AM		
South Station	5:44 AM	mins	mins	12:50 AM	5:47 AM	mins	12:45 AM	6:35AM	mins	12:36 AM		
SL3 Chelsea Station	4:55 AM	6-11	8-13	f 1:05 AM	5:30 AM	8-13	1:22 AM	6:26AM	8-13	f 1:25 AM		
South Station	4:20 AM	mins	mins	w 12:35 AM	4:56 AM	mins	w 12:55 AM	5:53AM	mins	w 12:55 AM		
SL4 Nubian Station	5:20 AM	6-11	6-11	12:20 AM	5:23 AM	13-20	12:20 AM	6:02AM	13-20	12:20 AM		
South Station	5:38 AM	mins	mins	12:37 AM	5:40 AM	mins	12:40 AM	6:20AM	mins	12:40 AM		
SL5 Nubian Station	5:15 AM	11-14	13-20	12:51 AM	5:19 AM	6-11	12:43 AM	6:00AM	6-11	12:25 AM		
Downtown Xing	5:32 AM	mins	mins	w 1:07 AM	5:34 AM	mins	w 1:00 AM	6:16AM	mins	w 12:47 AM		

Peak Service: Weekdays 7 AM - 9 AM, 4 PM - 6:30 PM

Green Line Notes:

New and ongoing infrastucture projects may result in diversions on some branches at various times.

See GL service changes at mbta.com/GLwork View service alerts at mbta.com/alerts

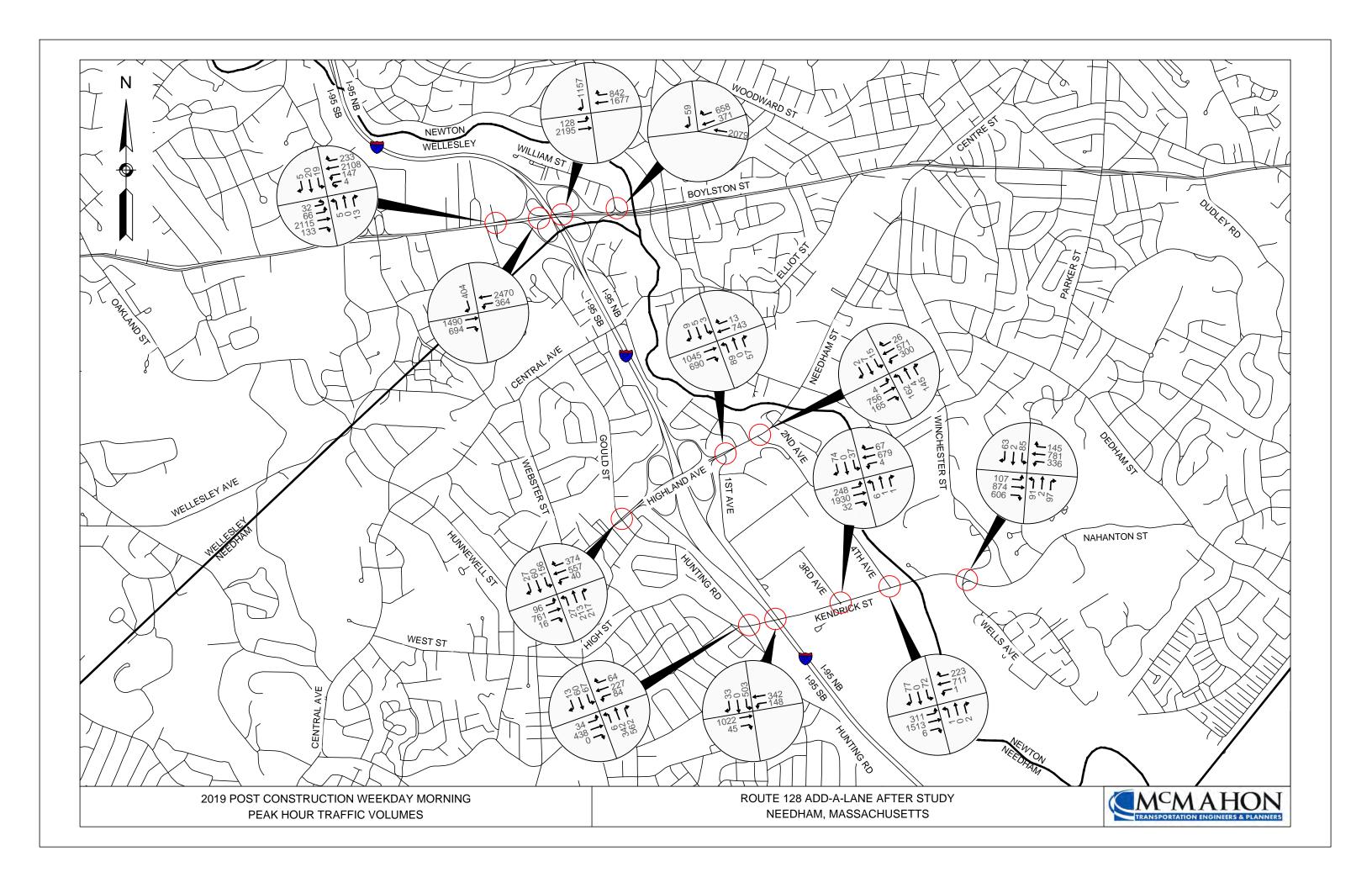
* E trains start/end at North Station for Green Line Extension work – shuttles provided between North Station and Lechmere.

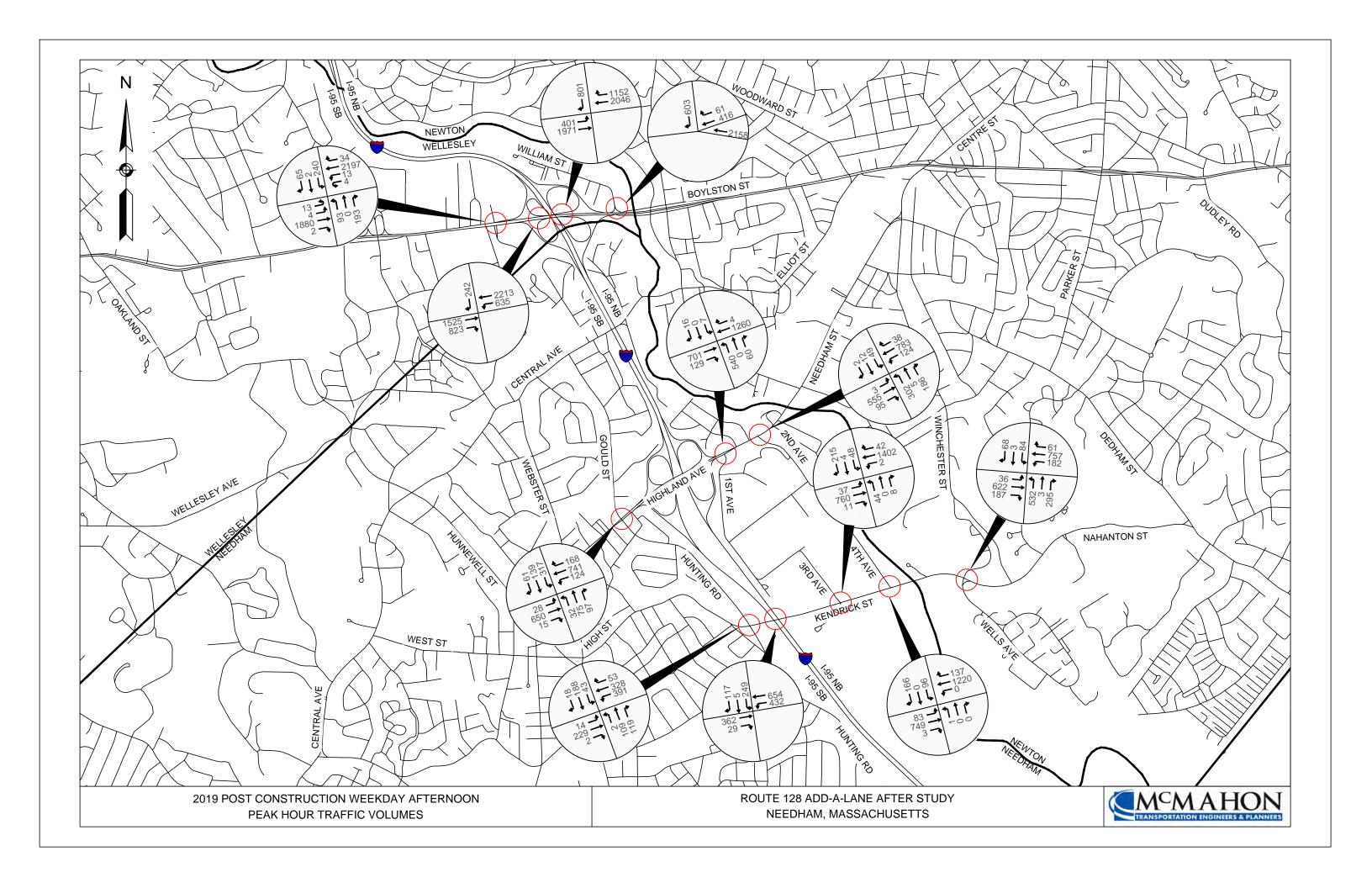
More: mbta.com/GLEwork

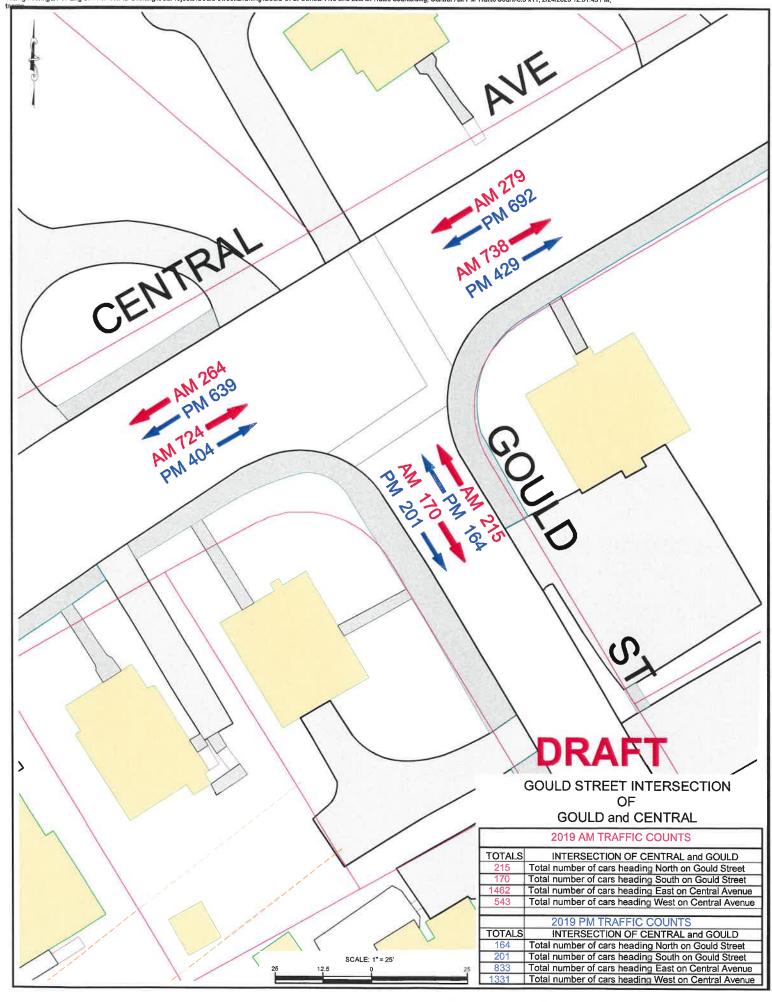
- 1 The first two C train AM northbound trips run through to Lechmere Station on weekdays.
- 2 The first B and second C train AM northbound trips run through to Lechmere Station on weekends.
- 3 On weekdays the 12:27 AM trip (weekends the 12:32 AM trip) from Heath St is the last connecting train to other lines downtown. The 12:37AM and 12:47AM trips (weekends the 12:47AM trip) from Heath St. runs in service to Lechmere with no guaranteed connections.
- 4 Early morning service from Lechmere to Riverside departs Lechmere at 5:00 AM.
- f After exiting Ted Williams Tunnel bus will only service World Trade Center and South Station stops.
- w Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.

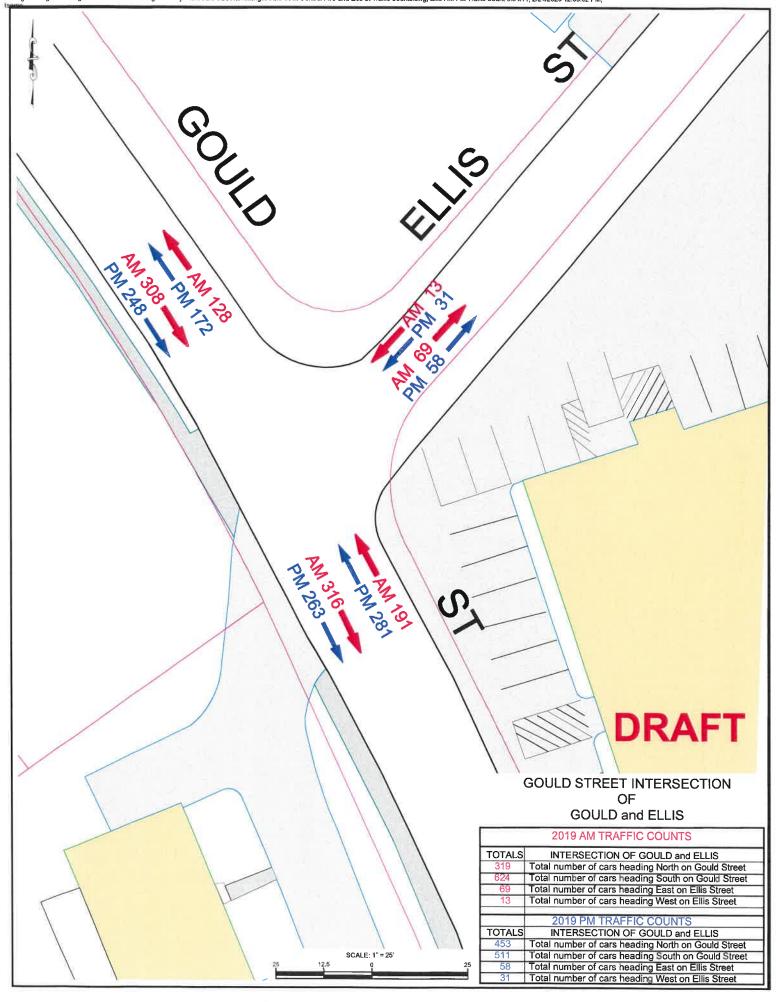
Fall 2020 & Winter 2021 Holidays 9/7/20: Sunday; 10/12/20 & 11/11/20: Weekday 11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

TRAFFIC IMPACT STUDY
Muzi Motors Redevelopment – Needham, Massachusetts
TRAFFIC-COUNT DATA









	TRAFFIC IMPACT STUDY
Muzi Motor	rs Redevelopment – Needham, Massachusetts
	CRASH RATE WORKSHEETS



INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020								
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNALIZED :										
		~ IN7	TERSECTION	I DATA ~										
MAJOR STREET :	Central Aven	ue												
MINOR STREET(S):	Gould Street													
INTERSECTION DIAGRAM (Label Approaches)	North		DEAK HOUS	Gould Street										
APPROACH :	1	2	PEAK HOUF	R VOLUMES 4	5	Total Peak								
DIRECTION:	EB	WB	NB	SB		Hourly Approach Volume								
PEAK HOURLY VOLUMES (AM/PM) :	480	790	200			1,470								
"K" FACTOR:	0.090	INTERS	ECTION ADT APPROACH		16,333									
TOTAL # OF CRASHES :	14	# OF YEARS :	5	AVERA CRASHES A	2.80									
CRASH RATE CALCU	ILATION :	0.47	RATE =	(A * 1,0	000,000) * 365)									
Comments : K-value ba		DOT default v 8.00 - Muzi M		elopment - Ne	eedham, MA									

MassDOT Crash Data Central Avenue / Gould Street

Г																					1		
						Driver							Traffic	Vehicle		Vehicle				Vehicle			
	Day of	Crach	Crach	Crash	Number	Contributing	Driver Distracted By	Light	Manner of	Road Surface	Total	Total Non-	Control	Actions Prior	Vehicle Configuration	Travel Directions	Weather	Hit and	School Bus	Sequence of	Street		Near
Crash Date	Day of Week	Crash Severity	Crash Status	Time	of Vehicles	Circumstances (All Drivers)	-	_	Collision	Condition	Fatalities	Fatal Injuries	Device Type	to Crash (All Vehicles)	_		Conditions	Run	Related	Events (All Vehicles)	Number	Roadway	Intersection Roadway
						(car zaracia)	(,	.,,,,	((as a construct,	(V1:(Collision		,	
														V1: Travelling			Snow/			with motor			
														straight ahead / V2: Slowing	car) / V2:(Light truck(van, mini-		Sleet, hail (freezing		No,	vehicle in traffic) V2:(Collision with			
		Not				D1: (Unknown)							No	_	van, pickup,	V1: W / V2:		No hit	school bus not	motor vehicle in		CENTRAL AV	
02/05/2015	Thursday	Reported	Closed	7:29 AM	2	/ D2: (Unknown)		Daylight	Rear-end	Snow	0		controls	traffic		Not Reported		and run	involved	traffic)		/ GOULD ST	
																				(2 !!! .			
		Property				D1: (No									V1:(Passenger					V1:(Collision with motor			
		damage				improper driving)	D1: External								car) / V2:(Light				No,	vehicle in traffic)			
		only				/ D2: (Failed to	distraction							_	truck(van, mini-				school	V2:(Collision with			
		(none				yield right of	(outside the								van, pickup,	,		No hit	bus not	motor vehicle in		CENTRAL	
06/20/2015	Saturday	injured)	Closed	8:59 AM	2	way),(Distracted)	vehicle)	Daylight	Angle	Dry	0	0	Stop signs	right	sport utility))	V1: N / V2: E	Clear	and run	involved	traffic) V1:(Collision	152	AVE	
						D1: (No														with motor			
						improper driving)								V1: Travelling	V1:(Passenger				No,	vehicle in traffic)			
						/ D2: (Failed to								straight ahead					school	V2:(Collision with			
00/02/2015	Thursday	Non-fatal	Classed	1.2F DN4		yield right of		Davlicht	Analo	Dest		2			V2:(Passenger	V4. F / V2. N		No hit	bus not	motor vehicle in traffic)	152	CENTRAL AVENUE	
09/03/2015	Thursday	injury	Closed	1:35 PM	2	way)		Daylight	Angle	Dry	0	3	Stop signs	iert	car)	V1: E / V2: N	Clear	and run	involved	V1:(Collision	152	AVENUE	
		Property																		with motor			
		damage				D1: (Failed to									V1:(Passenger				No,	vehicle in traffic)			
		only				yield right of								V1: Turning left				No bit	school	V2:(Collision with		CENTRAL	
05/11/2017	Thursday	(none injured)	Closed	10:42 AM	2	way) / D2: (No improper driving)		Daylight	Angle	Dry	0	0	Stop signs	/ V2: Travelling straight ahead		V1: W / V2: E		No hit and run	bus not involved	motor vehicle in traffic)		AVE / GOULD ST	
55, ==, = 5	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, , , ,			_	1 1 1 1		17 0	0 -	,		-			,	,				V1:(Collision			
		Property												V1: Slowing or						with motor			
		damage only				D1: (No improper driving)									V1:(Passenger car) /				No, school	vehicle in traffic) V2:(Collision with		CENTRAL	
		(none				/ D2: (No								•		V1: W / V2:		No hit	bus not	motor vehicle in		AVE / GOULD	
05/11/2017	Thursday	injured)	Closed	12:59 PM	2	improper driving)		Daylight	Rear-end	Dry	0	0	Stop signs	straight ahead	_	W	Clear	and run	involved	traffic)		ST	
																				(5 111 .			
		Property				D1: (Disregarded traffic signs,														V1:(Collision with motor			
		damage				signals, road								V1: Turning	V1:(Passenger				No,	vehicle in traffic)			
		only				markings) / D2:									car) /				school	V2:(Collision with			
		(none				(No improper		5 11 1 .					. .		V2:(Passenger				bus not	motor vehicle in		CENTRAL	
05/26/2017	Friday	injured)	Closed	4:44 PM	2	driving)		Daylight	Angle	Wet	0	0	Stop signs	straight ahead	car)	V1: N / V2: E	Clear	and run	involved	traffic) V1:(Collision	152	AVE	
																				with motor			
						D1: (Failed to									V1:(Passenger				No,	vehicle in traffic)			
						yield right of								V1: Turning left					school	V2:(Collision with		CENTRAL	
05/27/2017		Non-fatal injury	Closed	12:16 PM		way) / D2: (No improper driving)		Daylight	Angle	Dry	0	1	Ston signs	/ V2: Travelling straight ahead		V1: W / V2:		No hit and run	bus not involved	motor vehicle in traffic)		AVE / GOULD ST	
03/2//2017	Jacarday	injury	Cioseu	12.10 F IVI		improper univing)		Dayngiit	, trigic	DI Y			arob aigila	on aight aireau	carj	1.4	Cicai	ana run	involved	V1:(Collision	1	31	
		Property													V1:(Passenger					with motor			
		damage													car) / V2:(Light				No,	vehicle in traffic)		0511=5.1	
																		No hit	_	· ·			
09/25/2017	Monday	injured)	Closed	12:36 PM	2	improper driving)		Daylight	Angle	Dry	0	0	Stop signs	straight ahead		V1: N / V2: E		and run	involved	traffic)		ST GOOLD	
09/25/2017	Mondav	damage only (none	Closed	12:36 PM	2	D1: (Inattention) / D2: (No improper driving)		Daylight	Angle	Dry	0	0		V1: Turning left / V2: Travelling	car) / V2:(Light truck(van, mini- van, pickup,	V1: N / V2: F		No hit and run	school bus not	with motor vehicle in traffic) V2:(Collision with motor vehicle in		CENTRAL AVE / GOULD ST	

MassDOT Crash Data Central Avenue / Gould Street

Crash Date	Day of Week	Crash Severity	Crash Status	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	Light Conditions	Manner of Collision	Road Surface Condition	Total Fatalities	Total Non- Fatal Injuries	Traffic Control Device Type	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Hit and Run	School Bus Related	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway
12/06/2017	Wednesday	Property damage only (none injured)	Closed	4:58 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving)		Dark - lighted roadway	Angle	Dry	0	0	Stop signs	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: S	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVE / GOULD ST	
07/11/2018	Wednesday	Property damage only (none injured)	Open	4:16 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way),(Inattention)		Daylight	Angle	Dry	0	0	Stop signs	straight ahead / V2: Turning	V1:(Passenger car) / V2:(Passenger car)	V1: W / V2: N	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVE / GOULD ST	
07/24/2018	Tuesday	Property damage only (none injured)	Open	4:15 PM	2	D1: (No improper driving) / D2: (Failed to yield right of way)		Daylight	Angle	Dry	0	0	Stop signs	/ V2: Turning	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: N	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVE / GOULD ST	
09/05/2018	Wednesday	Property damage only (none injured)	Open	5:21 PM	2	D1: (Unknown) / D2: (Failed to yield right of way)		Daylight	Angle	Dry	0	0	Stop signs	straight ahead / V2: Travelling	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: N	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVE	GOULD ST
06/07/2019	Friday	Property damage only (none injured)	Open	10:25 AM	2	D1: (No improper driving) / D2: (Failed to yield right of way)		Daylight	Angle		0	0	Stop signs	straight ahead / V2: Turning	V1:(Passenger car) / V2:(Unknown heavy truck, cannot classify)	V1: N / V2: W	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVENUE / GOULD STREET	
07/15/2019		Property damage only (none	Open	12:45 PM	2	D1: (No improper driving) / D2: (Inattention)				Dry	0	0			V1:(Passenger car) / V2:(Light truck(van, mini- van, pickup,	V1: E / V2: N	Clear	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		GOULD ST / CENTRAL AVE	



CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNA	LIZED :	
		~ IN]	TERSECTION	I DATA ~		
MAJOR STREET :	Central Aven	ue				
MINOR STREET(S):	Hampton Ave	enue				
INTERSECTION DIAGRAM (Label Approaches)	North		PEAK HOUF	Hampton Avenue	ntral Avenue	
APPROACH:	1	2	3	4	5	Total Peak Hourly
DIRECTION:	EB	WB	NB	SB		Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	473	766	53			1,292
"K" FACTOR:	0.090	INTERS	ECTION ADT APPROACH		AL DAILY	14,356
TOTAL # OF CRASHES :	1	# OF YEARS :	5	CRASHES	GE # OF PER YEAR (\(\):	0.20
CRASH RATE CALCU	ILATION :	0.04	RATE =	(A * 1,i	000,000) * 365)	
Comments : K-value ba		DOT default v 8.00 - Muzi M		elopment - Ne	eedham, MA	



CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNA	LIZED :	
		~ IN 7	TERSECTION	I DATA ~		
MAJOR STREET :	Central Aven	nue				
MINOR STREET(S):	River Park R	oad				
INTERSECTION DIAGRAM (Label Approaches)	North			River Park Road	ntral Avenue	
		ı	PEAK HOUR	VOLUMES	1	T. (-I DI
APPROACH:	1	2	3	4	5	Total Peak Hourly
DIRECTION:	EB	WB	NB	SB		Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	512	767	2			1,281
"K" FACTOR:	0.090	INTERSI	ECTION ADT APPROACH		AL DAILY	14,233
OTAL # OF CRASHES :	3	# OF YEARS :	5	CRASHES	GE#OF PERYEAR(.):	0.60
CRASH RATE CALCU	ILATION :	0.12	RATE =	<u>(A * 1,0</u> (V	000,000) * 365)	
Comments : K-value ba			ralue lotors Redeve	elopment - Ne	eedham. MA	

MassDOT Crash Data Central Avenue / Hampton Avenue Central Avenue / River Park Street

Crash Date	Day of Week	Crash Severity	Crash Status	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	_	Manner of Collision	Road Surface Condition	Total Fatalities	Total Non Fatal Injuries	Traffic Control Device Type	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Hit and Run	School Bus Related	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway
Central Avenu	ue / Hampto	n Avenue	1		1		•	•	T			T		•					-	T .			•
05/30/2019	Thursday	Non-fatal injury		9:13 AM		D1: (Followed too closely) / D2: (No improper driving)		Daylight	Rear-end		0	2	No controls	V1: Travelling straight ahead / V2: Slowing	sport utility)) /	V1: W / V2: W		No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)	110	_	HAMPTON AVE
O1/26/2015	Monday	Property damage only (none	Closed	9:50 AM		D1: (Followed too closely) / D2: (No improper driving)		Daylight	Rear-end	Dry	0	0	No controls	_	car) / V2:(Passenger car)	V1: N / V2: N	,,,	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		CENTRAL AVE / RIVER PARK ST	
08/04/2015	Tuesday	1	Closed	7:04 PM		D1: (No improper driving) / D2: (No improper driving) / D3: (No improper driving)		Other	Rear-end	Wet	0		No controls	V1: Travelling straight ahead / V2: Travelling	V3:(Light truck(van, mini- van, pickup,		crosswinds	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic) V3:(Collision with motor vehicle in traffic)	89	CENTRAL AVE	
04/04/2016	Monday	Property damage only (none injured)	Closed	1:12 PM	1	D1: (No improper driving)		Daylight	Single vehicle crash	Snow	0		No controls	V1: Travelling straight ahead		V1: W		No hit and run	No, school bus not involved	V1:(Collision with tree)	89	CENTRAL AVE	



CITY/TOWN : Needham	_			COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :		SIGNA	LIZED :	Х
		~ IN	ΓERSECTION	I DATA ~		
MAJOR STREET :	Highland Ave	enue				
MINOR STREET(S):	Gould Street					
	Hunting Roa	d				
INTERSECTION	North			Gould		
DIAGRAM		Highland A	venue	Hig	shland Avenue	e
(Label Approaches)						
				Hunting Road		
			PEAK HOUF	R VOLUMES		
APPROACH:	1	2	3	4	5	Total Peak Hourly
DIRECTION:	EB	WB	NB	SB		Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	693	1,033	204	517		2,447
"K" FACTOR:	0.090	INTERS	ECTION ADT APPROACH	` '	AL DAILY	27,189
TOTAL # OF CRASHES :	46	# OF YEARS :	5	CRASHES	GE # OF PER YEAR (.):	9.20
CRASH RATE CALCU	JLATION :	0.93	RATE =	<u>(A * 1,0</u>	000,000) * 365)	
Comments : K-value ba			ralue lotors Redeve	elopment - Ne	eedham, MA	

						Driver							Traffic	Vehicle		Vehicle				Vehicle			
Crash Date	Day of Week	Crash Severity	Crash Status	Crash Time	Number of Vehicles	Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	Light Conditions	Manner of Collision	Road Surface Condition	Total Fatalities	Total Non- Fatal Injuries	Control Device Type	Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Travel Directions (All Vehicles)	Weather Conditions	Hit and Run	School Bus Related	Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway
Crasii Date	week	Severity	Status	Time	verifices	(All Drivers)	(All Vellicles)	Conditions	Comsion	Condition	rataiities	ilijuries	туре	V1: Slowing or	(All Vellicles)	(All Verlicles)	Conditions	Kuii	Relateu	V1:(Collision	Number	Roauway	Roadway
														stopped in						with motor			
						D1: (Other								traffic / V2: Slowing or	V1:(Passenger car) /					vehicle in traffic) V2:(Collision with			
		Property				improper action)								stopped in	V2:(Passenger					motor vehicle in			
		damage				/ D2: (No								traffic / V3:	car) / V3:(Light				No,	traffic)			
		only				improper driving)		Dark -		Sand,			Traffic	Slowing or	truck(van, mini-				school	V3:(Collision with		HIGHLAND	
01/10/2015	Caturday	(none	Clasad	10:16 DN	,	/ D3: (No		lighted		mud, dirt,	0	0	control	stopped in	van, pickup,	V1: N / V2: N / V3: N	Cloar	No hit	bus not	motor vehicle in		AVE /	
01/10/2015	Saturday	injured)	Closed	10:16 PM	3	improper driving)		roadway	Rear-end	oil, gravel	U	0	signal	traffic V1: Slowing or	sport utility))	/ V3. IV	Clear	and run	involved	traffic) V1:(Collision		HUNTING RD	
		Property												stopped in	V1:(Passenger					with motor			
		damage				D1: (No								traffic / V2:	car) / V2:(Light				No,	vehicle in traffic)			
		only				improper driving)							Traffic	Slowing or	truck(van, mini-				school	V2:(Collision with		HIGHLAND	
02/16/2015	Mondou	(none	Classed	2.01 DN4	,	/ D2: (Followed		Douliaht	Door and	\A/-+	0		control	stopped in	van, pickup,	V1: S / V2:	Cloor	No hit	bus not	motor vehicle in		AVE / GOULD	
02/16/2015	Monday	injured)	ciosed	2:01 PM	2	too closely)		Daylight	Rear-end	wet	0	0	signal	traffic	sport utility))	Not Reported	Ciedi	and run	involved	traffic) V1:(Collision		ST	
		Property													V1:(Passenger					with other			
		damage				D1: (Followed								V1: Entering	car) / V2:(Light				No,	movable object)			
		only				too closely) / D2:								traffic lane /	truck(van, mini-				school	V2:(Collision with			
00/05/2015	Mada asday	(none	Classed	11.02 444	,	(No improper		Daylight	Door and	D	0	0	No	V2: Travelling straight ahead	van, pickup,	V1: W / V2:	Clear	No hit	bus not	other movable object)	FF7	HIGHLAND AVENUE	
08/05/2015	wednesday	injurea)	Closed	11:03 AM	2	driving) D1: (No		Daylight	Rear-end	Dry	0	0	controls	Straight aneau	sport utility))	VV	Clear	and run	involved	objecti	557	AVENUE	
						improper driving)									V1:(Passenger					V1:(Collision			
		Property				/ D2:									car) / V2:(Bus					with motor			
		damage				(Disregarded								_	(seats for 9-15				No,	vehicle in traffic)		GOULD	
		only (none				traffic signs, signals, road							Traffic control	straight ahead / V2: Travelling				No hit	school bus not	V2:(Collision with motor vehicle in		STREET / HIGHLAND	
08/18/2015	Tuesday	injured)	Closed	12:02 PM	2	markings)		Daylight	Angle	Dry	0	0	signal	straight ahead	_	V1: S / V2: W	Clear	and run	involved	traffic)		AVENUE	
00/ =0/ =0=0		, ,				5-7		1, 0	0 -	,						,				V1:(Collision			
		Property				D1: (No								V1: Slowing or						with motor			
		damage				improper driving)								stopped in	V1:(Passenger				No,	vehicle in traffic)			
		only (none				/ D2: (Distracted),(Inat							No	traffic / V2: Travelling	car) / V2:(Passenger			No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	
10/28/2015	Wednesday		Closed	1:15 PM	2	tention)		Daylight	Rear-end	Dry	0			straight ahead		V1: N / V2: N	Clear				589	AVE	
-, -, -	,	, ,		_		,		1, 0		,					,	,				V1:(Collision			
		Property																		with motor			
		damage				D1. (I Ind								V1: Travelling straight ahead	, ,				No,	vehicle in traffic)			
		only (none				D1: (Unknown) / D2: (No							No	/ V2: Travelling	1			No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	
10/28/2015	Wednesday	1,	Closed	5:22 PM	2	improper driving)		Dusk	Rear-end	Wet	0		controls	straight ahead	_	V1: N / V2: N	Rain/Other		involved	traffic)	501	AVE	
, , , , , ,		,,			_		D1: Other					-			, ·	, ,				V1:(Collision			
		Property				(Inattention),(Fol	•							V1: Travelling						with motor			
		damage				lowed too	(searching,	Dorle						straight ahead					No,	vehicle in traffic)			
		only (none					eating, personal	Dark - lighted					No		car) / V2:(Passenger			No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	
11/05/2015	Thursday	1,	Closed	6:00 PM	2		hygiene, etc.)	_	Rear-end	Dry	0		controls	traffic	car)	V1: E / V2: E	Clear	and run	involved	traffic)	580	AVE	
, ,, ,, ,,		<u> </u>				<u>. </u>	,,,,,,	,		<u> </u>		-			<u> </u>				1	V1:(Collision			
		Property												V1: Travelling						with motor			
		damage				D4. (11-1			Cide ' -					straight ahead					No,	vehicle in traffic)			
		only (none				D1: (Unknown) / D2: (No			Sideswipe , same				No		car) / V2:(Single unit truck (2-	V1: W / V2:		No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	
12/09/2015	Wednesday	,	Closed	8:41 AM	2	improper driving)		Daylight	direction	Dry	0	0	controls	traffic			Clear	and run	involved	traffic)	589	AVENUE	

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						Driver							Traffic	Vehicle		Vehicle				Vehicle			
					Number	Contributing	Driver		Manner	Road		Total Non-	Control	Actions Prior	Vehicle	Travel			School	Sequence of			Near
	Day of	Crash	Crash	Crash	of	Circumstances	Distracted By	Light	of	Surface	Total	Fatal	Device	to Crash	Configuration	Directions	Weather	Hit and	Bus	Events	Street		Intersection
Crash Date	Week	Severity	Status	Time	Vehicles	(All Drivers)	(All Vehicles)	Conditions	Collision	Condition	Fatalities	Injuries	Туре	(All Vehicles)	(All Vehicles)	(All Vehicles)	Conditions	Run	Related	(All Vehicles)	Number	Roadway	Roadway
																				V1:(Collision			
		Property				.								!!:	15				. .	with motor			
		damage only				D1: (No improper driving)								V1: Travelling straight ahead	V1:(Passenger				No, school	vehicle in traffic) V2:(Collision with			
		(none				/ D2: (Other							No		V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
01/11/2016	Monday	injured)	Closed	3:31 PM	2	improper action)		Daylight	Unknown	Drv	0	0	controls		car)	V1: E / V2: E	Clear	and run	involved	traffic)	557	AVENUE	
0-,,		, ,			_	D1: (Failure to		1, 0		,					,	,				,			
						keep in proper																	
						lane or running													No,	V1:(Collision			
						off		Dark -	Single										school	with			
		Not				road),(Inattentio		lighted	vehicle				No		V1:(Passenger			No hit	bus not	curb),(Collision		HIGHLAND	
01/27/2016	Wednesday	Reported	Closed	6:42 PM	1	n)		roadway	crash	Dry	0	0	controls	lanes	car)	V1: S	Clear	and run	involved	with guardrail)	557	AVE	
		Dun a nate.																		V1:(Collision			
		Property				D1: (No									V1:(Passenger				No	with motor vehicle in traffic)			
		damage only				improper driving)							Traffic	V1: Turning left					No, school	V2:(Collision with		HIGHLAND	
		(none				/ D2:							control		V2:(Passenger			No hit	bus not	motor vehicle in		AVE / GOULD	
04/05/2016	Tuesday		Closed	11:22 AM	2	(Inattention)		Daylight	Angle	Dry	0	0	signal	straight ahead	_	V1: S / V2: S	Clear	and run	involved	traffic)		ST	
0 1, 00, 2020	· ucouuy	,	0.0000			D1: (Swerving or		78		,			0	e a a graduation and a	,	, , , , , , ,			1	,			
						avoiding due to																	
						wind, slippery																	
						surface, vehicle,													No,				
						object, non-		Dark -	Single				Traffic						school				
		Non-fatal				motorist in		lighted	vehicle				control		V1:(Passenger			No hit	bus not	V1:(Collision		HIGHLAND	
07/13/2016	Wednesday	injury	Closed	9:09 PM	1	roadway, etc)		roadway	crash	Dry	0	1	signal	V1: Turning left	car)	V1: S	Clear	and run	involved	with utility pole)	580	AVE	
		Dranarti																		V1:(Collision with motor			
		Property damage				D1: (No								V1: Travelling	V1:/Dassenger				No,	vehicle in traffic)			
		only				improper driving)							Traffic	straight ahead					school	V2:(Collision with			
		(none				/ D2: (No							control		V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
08/24/2016	Wednesday	,	Closed	4:14 PM	2	improper driving)		Daylight	Rear-end	Dry	0	0	signal	_	car)	V1: N / V2: N	Clear	and run	involved	traffic)	589	AVE	
	•	Property								,													
		damage																	No,				
		only																	school				
		(none				D1: (No									V1:(Passenger			No hit	bus not			HIGHLAND	
09/24/2016	Saturday	injured)	Closed	1:58 PM	1	improper driving)		Unknown	Unknown	Dry	0	0	Unknown	V1: Unknown	car)	V1: E	Clear	and run	involved		557	AVE	
						D1. /Diamasandad														V4./Calliaian			
		Proporty				D1: (Disregarded traffic signs,									V1:(Passenger					V1:(Collision with motor			
		Property damage				signals, road									car) / V2:(Light				No,	vehicle in traffic)			
		only				markings) / D2:			Single				Traffic		truck(van, mini-				school	V2:(Collision with			
		(none				(No improper			vehicle				control	/ V2: Travelling				No hit	bus not	motor vehicle in		HIGHLAND	
10/23/2016	Sunday	injured)	Closed	3:34 PM	2	driving)		Daylight		Dry	0		signal	_		V1: E / V2: W	Clear	and run	involved	traffic)	589	AVE	
, , , , , ,	,	, ,				<u> </u>		, ,		, , , , , , , , , , , , , , , , , , ,		-	Ŭ		V1:(Light					,			
															truck(van, mini-								
															van, pickup,					V1:(Collision			
		Property													sport utility)) /					with motor			
		damage				D1: (No			L					l	V2:(Light				No,	vehicle in traffic)		l	
		only				improper driving)			Sideswipe				Traffic		truck(van, mini-				school	V2:(Collision with		HIGHLAND	
11/11/2016	Fai de	(none	Classi	1.40 55 6		/ D2: (No		Doudink!	, same	Dest			control		van, pickup,	V1: S / V2:	Class	No hit	bus not	motor vehicle in		AVE / GOULD	
11/11/2016	Friday	injured)	ciosed	1:49 PM	2	improper driving)		Daylight	direction	υry	0	0	signal	left	sport utility))	Not Reported	ciear	and run	involved	traffic)		ST	

																				I			
						Driver							Traffic	Vehicle		Vehicle				Vehicle			
	Day of	Crash	Crash	Crash	Number of	Contributing Circumstances	Driver Distracted By	Light	Manner of	Road Surface	Total	Total Non- Fatal	Control Device	Actions Prior to Crash	Vehicle Configuration	Travel Directions	Weather	Hit and	School Bus	Sequence of Events	Street		Near Intersection
Crash Date	Week	Severity	Status	Time	Vehicles	(All Drivers)	(All Vehicles)	Conditions	Collision	Condition	Fatalities	Injuries	Type	(All Vehicles)	(All Vehicles)	(All Vehicles)		Run	Related	(All Vehicles)	Number	Roadway	Roadway
		Property					,					•	71	,		,		-				,	,
		damage					D1: External												No,				
		only					distraction		Single vehicle				No	V1. Travallina	\/1./Dassangar			No hit	school	V1:(Collision with motor		HIGHLAND	
11/19/2016	Saturday	(none injured)	Closed	3:55 PM	1	D1: (No improper driving)	(outside the			Dry	0	0	No controls		V1:(Passenger car)	V1: W	Clear	No hit and run	bus not involved	vehicle in traffic)	589	AVE	
11/13/2010	Saturday	injurcuj	Closed	3.33 1 141		improper arrying)	vernerej	Daylight	Crusii	Diy	Ü		COTTET OIS	Straight anead	cary	V 1. VV	cicai	ana ran	IIIVOIVEG	vernere in traine,	303	7.00	
						D1: (No																	
						improper driving)),4 (6 H; ;			
						/ D2: (Failed to yield right of														V1:(Collision with motor			
						way),(Disregarde								V1: Travelling	V1:(Truck/traile				No,	vehicle in traffic)			
						d traffic signs,								_	r) /				school	V2:(Collision with			
		Non-fatal				signals, road									V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
11/30/2016	Wednesday	injury	Closed	12:46 PM	2	markings)		Daylight	Angle	Dry	0	1	Yield signs	traffic lane	car)	V1: W / V2: S	Cloudy	and run	involved	traffic)	501	AVENUE	
						D1: (Disregarded														V1:(Collision			
		Property				traffic signs,														with motor			
		damage				signals, road									V1:(Passenger				No,	vehicle in traffic)			
		only				markings) / D2:			Sideswipe				Traffic	Overtaking/	car) /				school	V2:(Collision with			
03/01/2017	Wodpocday	(none	Closed	1:31 PM	2	(No improper driving)		Daylight	, same direction	Dny	0	0	control signal	passing / V2: Turning right	V2:(Passenger car)	V1: N / V2: N	Clear	No hit and run	bus not involved	motor vehicle in traffic)	580	HIGHLAND AVE	HUNTING RD
03/01/2017	weunesuay	injureuj	Closed	1.31 FIVI		unving)		Dayligit	unection	ыу	0	U	Signai	Turring right	carj	V1. IV / V2. IV	Clear	and run	ilivolved	V1:(Collision	380	AVL	ND
		Property																		with motor			
		damage													V1:(Passenger				No,	vehicle in traffic)			
		only (none				D1: (Inattention) / D2: (No									car) / V2:(Passenger			No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	HIGHLAND
04/22/2017	Saturday	injured)	Closed	4:01 PM	2	improper driving)		Daylight	Rear-end	Dry	0	0	Stop signs	traffic lane	car)	V1: S / V2: S	Cloudy	and run	involved	traffic)	589	AVE	AVE
	· · ·	, ,				1		, ,		,							,			V1:(Collision			
															V1:(Passenger					with motor			
						D1: (Followed too closely) / D2:									car) / V2:(Light truck(van, mini-				No, school	vehicle in traffic) V2:(Collision with			
		Non-fatal				(No improper							No	/ V2: Travelling				No hit	bus not	motor vehicle in		HIGHLAND	
05/09/2017	Tuesday		Closed	5:26 PM	2	driving)		Daylight	Rear-end	Dry	0	1	controls	straight ahead	. , - /	V1: E / V2: E	Cloudy	and run	involved	traffic)	589	AVENUE	
																				V1:(Collision			
		Property												V4. T	V4 (Dansa and					with motor			
		damage only				D1: (Inattention)		Dark -						V1: Travelling straight ahead					No, school	vehicle in traffic) V2:(Collision with			
		(none				/ D2: (No		lighted							V2:(Passenger	V1: W / V2:		No hit	bus not	motor vehicle in		HIGHLAND	
10/03/2017	Tuesday	injured)	Closed	7:00 PM	2	improper driving)		_	Rear-end	Dry	0	0	Yield signs	straight ahead			Clear	and run	involved	traffic)	589	AVE	
		_																		V1:(Collision			
		Property damage				D1: (No	D1: Manually							V1: Travelling	V1·(Daccengor				No,	with motor vehicle in traffic)			
		only				improper driving)		Dark -					Traffic	straight ahead					school	V2:(Collision with			
		(none					electronic	lighted					control	/ V2: Travelling				No hit	bus not	motor vehicle in		HIGHLAND	
11/18/2017	Saturday	injured)	Closed	10:55 PM	2	(Inattention)	device	roadway	Angle	Wet	0	0	signal	straight ahead	car)	V1: W / V2: S	Rain	and run	involved	traffic)	589	AVE	GOULD ST
		Droport					D1: Other							V1: Slowing or	\/1:/Daccanac=					V1:(Collision			
		Property damage				D1: (Other	activity (searching,								V1:(Passenger car) / V2:(Light				No,	with motor vehicle in traffic)			
		only				improper action)		Dark -					Traffic		truck(van, mini-				school	V2:(Collision with			
		(none				/ D2: (No	personal	lighted					control	stopped in	van, pickup,			No hit	bus not	motor vehicle in		HIGHLAND	
11/22/2017	Wednesday	injured)	Closed	5:32 PM	2	improper driving)	hygiene, etc.)	roadway	Rear-end	Wet	0	0	signal	traffic	sport utility))	V1: S / V2: S	Rain	and run	involved	traffic)	557	AVE	

						I	1							I	ı		1			T			
						Driver							Traffic	Vehicle		Vehicle				Vehicle			
					Number	Contributing	Driver		Manner	Road		Total Non-	Control	Actions Prior	Vehicle	Travel			School	Sequence of			Near
	Day of	Crash	Crash	Crash	of		Distracted By	Light	of	Surface	Total	Fatal	Device	to Crash	Configuration	Directions	Weather	Hit and	Bus	Events	Street		Intersection
Crash Date	Week	Severity	Status	Time	Vehicles	(All Drivers)	(All Vehicles)	Conditions	Collision	Condition	Fatalities	Injuries	Туре	(All Vehicles)	(All Vehicles)	(All Vehicles)	Conditions	Run	Related	(All Vehicles)	Number	Roadway	Roadway
		Property				D1: (No									V1:(Light truck(van, mini-	_				V1:(Collision with motor			
		damage				improper driving)									van, pickup,				No,	vehicle in traffic)			
		only				/ D2: (Failed to			Sideswipe					_	sport utility)) /				school	V2:(Collision with			
		(none				yield right of			, same				No		V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
03/22/2018	Thursday	injured)	Open	4:40 PM	2	way)		Daylight	direction	Wet	0	0	controls	right	car)	V1: S / V2: S	Cloudy	and run	involved	traffic)	589	AVE	
																				V1:(Collision			
		Property					D4 5 1							V1: Slowing or	V4 / D					with motor			
		damage				D1: /No	D1: External						Traffic	stopped in traffic / V2:	V1:(Passenger				No,	vehicle in traffic)			
		only (none				D1: (No improper driving)	distraction						Traffic control	Travelling	car) / V2:(Passenger			No hit	school bus not	V2:(Collision with motor vehicle in		HIGHLAND	
05/04/2018	Friday	injured)	Open	6:00 PM	2	/ D2: (Distracted)		Daylight	Rear-end	Drv	0	0	signal		car)	V1: E / V2: E	Clear	and run	involved	traffic)	589	AVE	
00/01/2020	,	,	-			D1: (No	,			,			8	e a a grant a a a a a a a a a a a a a a a a a a		, , , , , , , , , , , ,				,	1		
						improper driving)														V1:(Collision			
						/ D2:														with motor			
						(Disregarded								_	V1:(Passenger				No,	vehicle in traffic)			
		N Cabal				traffic signs,							Traffic	_				N1 - 1-11	school	V2:(Collision with	l l	LUCIU AND	
06/27/2018		Non-fatal	Open	7:23 AM	2	signals, road markings)		Daylight	Angle	Dny	0		control signal	_	V2:(Passenger car)	V1: S / V2: W	Cloar	No hit and run	bus not involved	motor vehicle in traffic)	580	HIGHLAND AVE	
00/2//2018	weunesuay	iiijuiy	Ореп	7.25 AIVI		markings)		Daylight	Aligie	Dry	U	1	Sigilai	straight aheau	V1:(Light	V1. 3 / V2. VV	Cleal	and run	ilivoiveu	traffic)	360	AVE	
															truck(van, mini-	.							
														V1: Slowing or	van, pickup,					V1:(Collision			
														stopped in	sport utility)) /					with motor			
														traffic / V2:	V2:(Light				No,	vehicle in traffic)			
						D1: (Unknown)							Traffic	Slowing or	truck(van, mini	-			school	V2:(Collision with	ı İ	HUNTING RD	
07/42/2040	e data.	Non-fatal	0	E EO DA 4	_	/ D2: (No		Durali	D	Б.		4	control	stopped in	van, pickup,	V4. N. / V2. N	Class	No hit	bus not	motor vehicle in		/ HIGHLAND	
07/13/2018	Friday	injury	Open	5:59 PM	2	improper driving)		Dusk	Rear-end	Dry	0	1	signal	traffic	sport utility))	V1: N / V2: N	Clear	and run	involved	traffic) V1:(Collision		AVE	
		Property																		with overhead			
		damage																	No,	sign			
		only						Dark -	Single				Traffic		V1:(Single-unit				school	support),(Collisio			
		(none						lighted	vehicle				control	V1: Travelling	truck (3-or-			No hit	bus not	n with highway		HIGHLAND	
07/17/2018	Tuesday	injured)	Open	2:03 AM	1	D1: (Inattention)		roadway	crash	Dry	0	0	signal	straight ahead	more axles))	V1: N	Clear	and run	involved	traffic sign post)	589	AVE	
						D1: (Failure to														V1:(Collision			
		Property				keep in proper								V1: Travelling straight ahead	V1:/Passanger				No	with motor vehicle in traffic)			
		damage only				lane or running off road) / D2:			Sideswipe				Traffic	_	car) /				No, school	V2:(Collision with		HIGHLAND	
		(none				(No improper			, same				control		V2:(Passenger			Yes, hit	bus not	motor vehicle in		AVE / GOULD	
07/26/2018	Thursday	1 '	Open	8:20 AM	2	driving)		Daylight	direction	Dry	0		signal		car)	V1: E / V2: E	Cloudy	and run	involved	traffic)		ST	
	,												-							V1:(Collision			
		Property												V1: Slowing or						with motor			
		damage				D1: (No		<u>.</u>							V1:(Passenger				No,	vehicle in traffic)			
		only				improper driving) / D2:		Dark -					Traffic		car) /			No bir	school	V2:(Collision with		IIICIII AND	
08/15/2018	Wodnosday	(none	Onon	9:00 PM	2	(Inattention)		lighted roadway	Rear-end	Dny	0		control signal	_	V2:(Passenger car)	V1: N / V2: N	Clear	No hit and run	bus not involved	motor vehicle in traffic)	596	HIGHLAND AVE	
00/13/2018	vveunesuay	Property	Open	9.00 PIVI		(mattention)		i Jauway	near-end	ыу	U	U	sigilal	ou aigni anedu	cai j	VI.IN / VZ.IN	Cleai	anu run	involved	traine)	390	AVL	
		damage																	No,				
		only							Sideswipe				Traffic						school	V1:(Collision		HIGHLAND	
		(none				D1: (No			, same				control		V1:(Passenger			No hit	bus not	with motor		AVE / GOULD	
12/12/2018	Wednesday	injured)	Open	12:11 PM	1	improper driving)		Daylight	direction	Dry	0	0	signal	V1: Turning left	t car)	V1: S	Clear	and run	involved	vehicle in traffic)		ST	

Crash Date	Day of Week	Crash Severity	Crash Status	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	Light Conditions	Manner of Collision	Road Surface Condition	Total Fatalities	Total Non- Fatal Injuries	Traffic Control Device Type	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Hit and Run	School Bus Related	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway	Near Intersection Roadway
02/05/2040	Tundo	Property damage only (none	0	7.24.554	4	D1: (No		lighted	Sideswipe , same		0	0	Traffic control	_	V1:(Passenger		Class	No hit	No, school bus not	V1:(Collision with motor	500	HIGHLAND	
02/05/2019	Tuesday	Property damage only (none	Open	7:21 PM	1	improper driving) D1: (Unknown)			Sideswipe , same		0	0	signal Traffic control	V1: Turning left	car) V1:(Light truck(van, minivan, pickup, sport utility)) / V2:(Passenger		Clear	and run	No, school bus not	vehicle in traffic) V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in		AVE HIGHLAND AVE / GOULD	
03/23/2019		injured) Non-fatal injury		11:04 AM 4:49 AM	2	/ D2: (Unknown) D1: (Unknown) / D2: (Unknown)		Dark - lighted		Dry Wet	0	1	signal Traffic control signal	Travelling	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: S V1: W / V2: N	Clear	and run No hit and run	No, school bus not involved	traffic) V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		HIGHLAND AVE / GOULD ST	
07/31/2019	Wednesday		Open	4:35 PM	1	D1: (No improper driving)			Sideswipe , same direction	Wet	0	0	Traffic control signal		V1:(Passenger car)	V1: W	Clear	Yes, hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V1:(Collision		HUNTING RD / HIGHLAND AVE	
08/03/2019	Saturday	Property damage only (none injured)	Open	2:55 PM	2	D1: (No improper driving) / D2: (Unknown)		Daylight	Angle	Dry	0	0	Traffic control signal	V1: Turning left / V2: Turning right	V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: N	Clear	No hit and run	No, school bus not involved	with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		GOULD ST / HIGHLAND AVE	
12/09/2019	Monday	Property damage only (none		11:10 AM		D1: (Failure to keep in proper lane or running off road) / D2: (No improper driving)			Sideswipe , same direction		0	0	Traffic control signal	V1: Turning left / V2: Turning	V1:(Passenger car) / V2:(Passenger car)	V1: E / V2: E	Rain/	No hit and run	No, school bus not involved	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		HIGHLAND AVE / HUNTING RD	

					l		1																
						Driver							Traffic	Vehicle		Vehicle				Vehicle			
	Daniel	Cuanh	Cuash	Curch	Number	Contributing	Driver	l'abt	Manner	Road		Total Non-	Control	Actions Prior	Vehicle	Travel	14/ t	1112	School	Sequence of	Chunat		Near
Crash Date	Day of Week	Crash Severity	Crash Status		of Vehicles	(All Drivers)	Distracted By (All Vehicles)	Light Conditions	of Collision	Surface Condition	Total Fatalities	Fatal Injuries	Device Type	to Crash (All Vehicles)	(All Vehicles)	Directions (All Vehicles)	Weather Conditions	Hit and Run	Bus Related	Events (All Vehicles)	Street Number	Roadway	Intersection Roadway
Grasii Bate	- Treek	Sevency	Status		Vermenes	(7.11.21.10.13)	(7 till Verilleles)	Contactions	Combion	Conuncion	ratantics	juii es	.,,,,	(7 till 4 cillidica)	(7 till 7 cillicios)	(7 till 4 cilliones)	Conuncions	11411	Helatea	V1:(Collision	- Trumber	Roddinay	nouumuy
																				with motor			
						D1: (Failed to			Sideswipe					_	V1:(Passenger car) /				No,	vehicle in traffic) V2:(Collision with			
		Non-fatal				yield right of way) / D2: (No			, same				Not	right / V2: Travelling	V2:(Tractor/	V1: W / V2:		No hit	school bus not	motor vehicle in		HIGHLAND	
06/12/2015	Friday	injury	Closed	11:00 AM	2	improper driving)		Daylight	.	Dry	0	2	reported	straight ahead	semi-trailer)	W	Clear	and run	involved	traffic)	500	AVENUE	
						D1: (Failure to														V1:(Collision			
		Property				keep in proper) /1 . Ch i	V41./Danaanaan				l _{NI} -	with motor			
		damage only				lane or running off road) / D2:			Sideswipe					V1: Changing lanes / V2:	V1:(Passenger car) /				No, school	vehicle in traffic) V2:(Collision with			
		(none				(No improper			, same				No	Travelling	V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
09/07/2016	Wednesday	injured)	Closed	11:04 AM	2	driving)		Daylight	direction	Dry	0	0	controls	straight ahead	car)	V1: S / V2: S	Clear	and run	involved	traffic)	500	AVE	
		Property																					
		damage only							Single										No, school	V1:(Collision with impact			
		(none							vehicle				No	V1: Travelling	V1:(Passenger			No hit	bus not	attenuator/ crash		HIGHLAND	
11/08/2016	Tuesday	l'	Closed	4:12 PM	1	D1: (Glare)				Dry	0		controls	-	car)	V1: W	Clear	and run	involved	cushion)		AVE	
						D1: (Failure to														V4./Calliaia.a			
		Property				keep in proper lane or running														V1:(Collision with motor			
		damage				off								V1: Changing	V1:(Passenger				No,	vehicle in traffic)			
		only				road),(Inattentio		Dark -	Sideswipe					lanes / V2:	car) /				school	V2:(Collision with			
		(none				n) / D2: (No		lighted	, same				No .	_	V2:(Passenger			No hit	bus not	motor vehicle in		HIGHLAND	
01/03/2017	Tuesday	injured)	Closed	5:30 PM	2	improper driving)		roadway	direction	Wet	0	0	controls	straight ahead	car)	V1: S / V2: S	Rain	and run	involved	traffic) V1:(Collision	500	AVE	
		Property																		with other			
		damage				D1: (Followed								V1: Travelling	V1:(Passenger				No,	movable object)			
		only				too closely) / D2:								straight ahead					school	V2:(Collision with			
06/27/2017	Turadau	(none	Classed	0.14 4 4 4	_	(No improper		Douliaht	Door and	D.m.	0	0	No	_	V2:(Passenger	V1. C / V2. C	Claudy	No hit	bus not	other movable object)	F00	HIGHLAND	
06/27/2017	Tuesday	injured)	Closed	9:14 AM	2	driving)		Daylight	Rear-end	Dry	0	0	controls	straight ahead	car)	V1: S / V2: S	Cloudy	and run	involved	object)	500	AVE	
						D1: (No														V1:(Collision			
		Property				improper driving)														with motor			
		damage				/ D2: (Failure to									V1:(Passenger				No,	vehicle in traffic)			
		only				keep in proper			Sideswipe					V1: Turning left				N1 - 1-21	school	V2:(Collision with		LUCIU AND	
12/07/2017	Thursday	(none injured)	Closed	7:29 PM	2	lane or running off road)		lighted roadway	, same direction	Dry	0		control signal	/ V2: Turning left	V2:(Passenger car)	V1: S / V2: S	Clear	No hit and run	bus not involved	motor vehicle in traffic)	500	HIGHLAND AVE	
12/07/2017	Thursday	injurcuj	Closed	7.23 1 101			D1: Other	Todaway	ancetion	ыу		U	Jigilai	iere	cury	V1.5 / V2.5	Cicui	una run	IIIVOIVEG	V1:(Collision	300	7.00	
		Property				improper driving)								V1: Slowing or						with motor			
		damage				I'	(searching,								V1:(Passenger				No,	vehicle in traffic)			
		only				(Inattention),(Fol	_								car) /	/			school	V2:(Collision with			
03/09/2019	Saturday	(none injured)	Open	4:23 PM	2		personal hygiene, etc.)	Daylight	Rear-end	Dry	0	0	Yield signs	Travelling straight ahead	V2:(Passenger car)	V1: W / V2: W	Clear	No hit and run	bus not involved	motor vehicle in traffic)	500	HIGHLAND AVE	
03/03/2019	Jacarday	injureuj	Open	7.23 F IVI		ciosciy)	וויין פוני.)	Dayngiit	ricai Ella	DI Y		0	riciu sigils	oti digiit diledu	V1:(Light		Cicai	ana run	involved	V1:(Collision	300	/ \ V L	
		Property													truck(van, mini-	-				with motor			
		damage													van, pickup,				No,	vehicle in traffic)			
		only				D4. (Uml			Sideswipe				Traffic		sport utility)) /	V4. W. 1.V2		Na bii	school	V2:(Collision with		LUCIU AND	
09/04/2019	Wednesday	(none	Onon	5:18 PM	2	D1: (Unknown) / D2: (Unknown)		Daylight	, same direction	Dry	0		control signal	/ V2: Travelling straight ahead	V2:(Passenger	V1: W / V2: W	Cloudy	No hit and run	bus not involved	motor vehicle in traffic)	500	HIGHLAND AVE	
09/04/2019	vveunesday	(Injured)	open	D.TQ LIA		/ DZ. (Ulikilowil)		Dayligiit	un ecciófi	Dry	U	U	əiği idi	oti aigiit allead	cai j	٧٧	cloudy	anu rufi	iiivoived	u ai iic)	500	AVL	



CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNA	LIZED :	
			TERSECTION	I DATA ~		
MAJOR STREET :	Gould Street					
MINOR STREET(S):	Muzi Motors	Driveway				
	Wingate Driv	eway				
INTERSECTION DIAGRAM	North	Wingate D	riveway	Mı	ızi Motors Dri	veway
(Label Approaches)				Gould Street		
			PEAK HOUR	VOLUMES		
APPROACH:	1	2	3	4	5	Total Peak Hourly
DIRECTION:	EB	WB	NB	SB		Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	28	49	244	591		912
"K" FACTOR:	0.090	INTERSE	ECTION ADT APPROACH		AL DAILY	10,133
TOTAL # OF CRASHES :	2	# OF YEARS :	5	CRASHES	GE # OF PER YEAR (.):	0.40
CRASH RATE CALCU	ILATION :	0.11	RATE =	(A * 1,0	000,000) * 365)	
Comments : K-value ba		DOT default v 8.00 - Muzi M		elopment - Ne	eedham, MA	



CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNA	LIZED :	
			TERSECTION			
MAJOR STREET :	Gould Street					
MINOR STREET(S):	Kearney Roa	d				
INTERSECTION DIAGRAM (Label Approaches)	North			Gould Street	arney Road	
			PEAK HOUF	R VOLUMES		Total Peak
APPROACH:	1	2	3	4	5	Hourly
DIRECTION:	EB	WB	NB	SB		Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :		109	242	275		626
"K" FACTOR:	0.090	INTERSE	ECTION ADT APPROACH		AL DAILY	6,956
TOTAL # OF CRASHES :	1	# OF YEARS :	5	CRASHES	GE # OF PER YEAR (.):	0.20
CRASH RATE CALCU	ILATION :	0.08	RATE =	(A * 1,0	000,000) * 365)	
Comments : K-value ba				elopment - Ne	eedham, MA	



CITY/TOWN : Needham				COUNT DA	TE: <u>2015 g</u>	rown to 2020
DISTRICT: 6	UNSIGN	ALIZED :	Х	SIGNA	LIZED :	
			TERSECTION	I DATA ~		111111111111111111111111111111111111111
MAJOR STREET :	Gould Street					_
MINOR STREET(S):	Ellis Street					
	Driveway					
						_
INTERSECTION	North					
DIAGRAM	1401111	Drivewa	у	Elli	s Street	
(Label Approaches)						
				street		
				Gould Street		
APPROACH :	1	2	PEAK HOUF	4 VOLUMES	5	Total Peak
DIRECTION :	EB	WB	NB	SB		Hourly Approach
PEAK HOURLY	1	52	216	221		Volume 490
VOLUMES (AM/PM) :					N DAILY	430
"K" FACTOR:	0.090	INTERS	ECTION ADT APPROACH		AL DAILT	5,444
TOTAL # OF CRASHES :	2	# OF YEARS :	5	CRASHES	GE # OF PER YEAR (\(\):	0.40
CRASH RATE CALCU	JLATION :	0.20	RATE =	<u>(A * 1,</u> (000,000) * 365)	
Comments : K-value ba						
Project Title & Date:	NEX-202021	8.00 - Muzi N	lotors Redeve	elopment - Ne	eedham, MA	

MassDOT Crash Data Gould Street / Wingate Driveway / Muzi Motors Driveway Gould Street / Kearney Road Gould Street / Ellis Street / Driveway

											-	s Street / D										
Crash Date	Day of Week	Crash Severity	Crash Status	Crash Time	Number of Vehicles		Driver Distracted By (All Vehicles)		Manner of Collision	Road Surface Condition	Total Fatalities	Total Non- Fatal Injuries	Traffic Control Device Type	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Hit and Run	School Bus Related	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway
Gould Steet	/ Wingate Dr	iveway / M	uzi Moto	ors Drivewa	у		<u> </u>	ı											1			
04/07/2018	Saturday	Unknown	Open	12:17 PM	2	D1: (No improper driving) / D2: (Unknown)		Daylight	Head-on	Drv	0	0	No controls		V1:(Passenger car) / V2:(Passenger car)	V1: N / V2: S	Clear/ Cloudy	No hit	No, school bus not involved	V1:(Collision with unknown movable object) V2:(Collision with motor vehicle in traffic)	235	GOULD ST
09/04/2018		Non-fatal		8:49 AM	7	D1: (No improper driving) / D2: (No improper driving)			Rear-end		0	1	No	V1: Travelling straight ahead	V1:(Passenger car) / V2:(Light truck(van, minivan, pickup, sport utility))		,	No hit	No, school bus not	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		GOULD ST
No collisions Gould Steet	at Gould Str	eet / TV Pla		0.43 AIVI	<u> </u>	jimproper unving)		Daylight	incar cha	риу		1 1	CONTROLS	iraine .	sport utility)	V1. W / V2. W	Cicui	una run	involveu	<u>iranic</u>	233	0001231
Sound Steet	, rearries re	Property damage				D1: (Operating vehicle in erratic, reckless, careless, negligent or			Single					_		V1: S / V2:			No,	V1:(Collision		

I															1 = 1(1 0.00080							
		Property				reckless,								V1: Travelling	car) /							
		damage				careless,									V2:(Passenger	V1: S / V2:			No,			
		only				negligent or			Single							Not Reported			school	V1:(Collision		
		(none				aggressive			vehicle				No					No hit	bus not	with parked		
2/05/2019	Monday	1,	Onon	2.02 DM	2			Daylight		Draw		0					Cloudy			motor vehicle)	110	GOULD ST
3/05/2018	Monday	injured)	Open	2:03 PM	3	manner)		Daylight	crash	Dry	0	U	controls	reported	car)	Reported	Cloudy	and run	iiivoiveu	motor venicie)	110	GOOLD 3
	/ EU: 6: .	/ D ·																				
ould Steet /	Ellis Street ,	/ Driveway	ı		1	1	1	_	1			1		1	1	1	1	1		T T		
																				V1:(Collision		
		Property				D1: (No														with motor		
		_				· ·								V1. Travalling	V1./Dassanger				No	vehicle in traffic)		
		damage				improper driving)								V1: Travelling					No,			
		only				/ D2: (Failed to								straight ahead					school	V2:(Collision with		
		(none				yield right of							No		V2:(Passenger	V1: N / V2:		No hit	bus not	motor vehicle in		
2/05/2016	Friday	injured)	Closed	12:14 PM	2	way)		Daylight	Angle	Snow	0	0	controls	straight ahead	car)	W	Snow	and run	involved	traffic)	99	GOULD S
																				V1:(Collision		
		Droporty																		with motor		
		Property													V4 /D							
		damage													V1:(Passenger					vehicle in traffic)		
		only													car) /				school	V2:(Collision with		
		(none				D1: (Unknown)									V2:(Passenger			No hit	bus not	motor vehicle in		
					2	/ D2: (Unknown)		Daylight	Angle					Turning right	car)	V1: N / V2: E		and run	involved	traffic)	99	GOULD S

TRAFFIC IMPACT STUDY
Muzi Motors Redevelopment - Needham, Massachusetts
TRIP-GENERATION CALCULATIONS

Size	Units	Land Use
866,342	SF	-
	Units	LUC 221
368,195	SF	LUC 714
368,195	SF	LUC 760
129,951	SF	LUC 820

		Pa	ass-By Rate	es	
	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL
Weekday Daily	0%	0%	0%	26%	-
Weekday AM	0%	0%	0%	26%	-
Weekday PM	0%	0%	0%	34%	-
Saturday Daily	0%	0%	0%	26%	-
Saturday Midday	0%	0%	0%	26%	-

		Total Trips					External Trips						Pass-By Trips				New Primary Trips			
	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL
Weekday Daily Entering		1,365	1,986	3,592	6,943	0	956	1,390	2,855	5,201	0	0	0	707	707	0	956	1,390	2,148	4,494
<u>Exiting</u>		<u>1,365</u>	<u>1,986</u>	<u>3,592</u>	<u>6,943</u>	<u>0</u>	<u>1,065</u>	<u>1,549</u>	<u>2,587</u>	<u>5,201</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>707</u>	<u>707</u>	<u>0</u>	<u>1,065</u>	<u>1,549</u>	<u>1,880</u>	<u>4,494</u>
Total	0	2,730	3,972	7,184	13,886	0	2,021	2,939	5,442	10,402	0	0	0	1,414	1,414	0	2,021	2,939	4,028	8,988
Weekday AM Peak Hour Entering		458	271	135	864	0	432	256	78	766	0	0	0	15	15	0	432	256	63	751
<u>Exiting</u>		<u>35</u> 493	<u>56</u>	<u>82</u>	<u>173</u>	<u>0</u>	<u>13</u>	<u>21</u>	<u>41</u>	<u>75</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>15</u>	<u>15</u>	<u>0</u>	<u>13</u>	<u>21</u> 277	<u>26</u>	<u>60</u>
Total	0	493	327	217	1,037	0	445	277	119	841	0	0	0	30	30	0	445	277	89	811
Weekday PM Peak Hour Entering		49	63	317	429	0	34	43	162	239	0	0	0	80	80	0	34	43	82	159
<u>Exiting</u>		<u>440</u>	<u>333</u>	<u>343</u>	<u>1,116</u>	<u>0</u>	<u>352</u>	<u>266</u>	<u>308</u>	<u>926</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>80</u>	<u>80</u>	<u>0</u>	<u>352</u>	<u>266</u>	<u>228</u>	<u>846</u>
Total	0	489	396	660	1,545	0	386	309	470	1,165	0	0	0	160	160	0	386	309	310	1,005
Saturday Daily Entering		331	286	5,242	5,859	0	258	223	5,106	5,587	0	0	0	1,328	1,328	0	258	223	3,778	4,259
<u>Exiting</u>		<u>331</u> 662	<u>286</u>	<u>5,242</u>	<u>5,859</u>	<u>0</u>	<u>258</u>	<u>223</u>	<u>5,106</u>	<u>5,587</u>	<u>0</u>	<u>0</u>	<u>O</u>	<u>1,328</u>	<u>1,328</u>	<u>0</u>	<u>258</u>	<u>223</u>	<u>3,778</u>	<u>4,259</u>
Total	0	662	572	10,484	11,718	0	516	446	10,212	11,174	0	0	0	2,656	2,656	0	516	446	7,556	8,518
Saturday Midday Peak Hour Entering		16	44	396	456	0	10	27	383	420	0	0	0	94	94	0	10	27	289	326
<u>Exiting</u>		<u>21</u>	<u>44</u>	<u>365</u>	<u>430</u>	<u>0</u>	<u>17</u>	<u>35</u>	<u>342</u>	<u>394</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>94</u>	<u>94</u>	<u>0</u>	<u>17</u>	<u>35</u>	<u>248</u>	<u>300</u>
Total	0	37	88	761	886	0	27	62	725	814	0	0	0	188	188	0	27	62	537	626

Land Use Code (LUC) 714 - Corporate Headquarters Building General Urban/Suburban

Average Vehicle Trips Ends vs:

1000 Sq. Feet Gross Floor Area

Independent Variable (X): 368.195

AVERAGE WEEKDAY DAILY

$$T = 6.16 * (X) + 462.50$$

$$T = 6.16 * 368.195 + 462.50$$

$$T = 2730.58$$

T = 2,730 vehicle trips

with 50% (1,365 vpd) entering and 14% (1,365 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

$$Ln T = 0.88 Ln (X) + 1.00$$

$$Ln T = 0.88$$
 $Ln(368.195) + 1.00$

$$Ln T = 6.20$$

$$T = 492.54$$

WEEKDAY EVENING PEAK HOUR OF GENERATOR

$$Ln T = 0.95 Ln (X) + 0.58$$

Ln T =
$$0.95$$
 Ln(368.195) + 0.58

$$Ln T = 6.19$$

$$T = 489.40$$

$$T = 489$$
 vehicle trips

vph) entering and 90% (440 vph) exiting.

SATURDAY DAILY

ITE LUC 710 Weekday Daily Trip Rate

ITE LUC 714 Saturday Daily Trip Rate
ITE LUC 714 Weekday Daily Trip Rate

$$\frac{2.21}{9.74}$$
 = $\frac{(Y)}{7.95}$ = 1.80

$$T = Y * 368.195$$

$$T = 662.75$$

$$T = 662$$
 vehicle trips

(same distribution split as ITE LUC 710 during the Saturday Daily)

$$T = 0.10 * (X)$$

$$T = 0.10$$
 * 368.195

$$T = 36.82$$

$$T = 37$$
 vehicle trips

Land Use Code (LUC) 760 - Research and Development Center General Urban/Suburban

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area

Independent Variable (X): 368.195

AVERAGE WEEKDAY DAILY

```
T = 10.23 * (X) + 204.68

T = 10.23 * 368.195 + 204.68

T = 3971.31

T = 3,972 vehicle trips

with 50% ( 1,986 vpd) entering and 50% ( 1,986 vpd) exiting.
```

WEEKDAY MORNING PEAK HOUR OF GENERATOR

```
\begin{array}{lll} \text{Ln T} = & 0.88 \text{ Ln (X)} + 0.59 \\ \text{Ln T} = & 0.88 & \text{Ln (368.195} & ) + 0.59 \\ \text{Ln T} = & 5.79 & \\ & \text{T} = & 326.88 \\ & \text{T} = & 327 & \text{vehicle trips} \\ & & \text{with 83\% (} & 271 & \text{vph) entering and 17\% (} & 56 & \text{vph) exiting.} \end{array}
```

WEEKDAY EVENING PEAK HOUR OF GENERATOR

SATURDAY DAILY

```
T = 1.25 * (X) + 112.04
T = 1.25 * 368.195 + 112.04
T = 572.28
T = 572 	 vehicle trips
with 50\% ( 286 	 vpd) entering and 50% ( 286 	 vpd) exiting.
```

```
T = 0.24 * (X)
T = 0.24 * 368.195
T = 88.37
T = 88 \qquad \text{vehicle trips}
\text{with 50\% (} 44 \qquad \text{vph) entering and \% (} 44 \qquad \text{vph) exiting.}
(same \ distribution \ split \ as \ ITE \ LUC \ 760 \ during \ the \ Saturday \ Daily)}
```

Land Use Code (LUC) 820 - Shopping Center

General Urban/Suburban

Average Vehicle Trips Ends vs: 1000 Sq. Ft. Gross Floor Area Independent Variable (X): 129.951

AVERAGE WEEKDAY DAILY

```
\label{eq:local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_
```

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

```
\begin{array}{lll} \text{Ln T} = & 0.74 \text{ Ln (X)} + 2.89 \\ \text{Ln T} = & 0.74 & \text{Ln (129.951)} + 2.89 \\ \text{Ln T} = & 6.49 & \\ & \text{T} = & 659.64 \\ & \text{T} = & 660 & \text{vehicle trips} \\ & & \text{with 48\% (} & 317 & \text{vph) entering and 52\% (} & 343 & \text{vph) exiting.} \end{array}
```

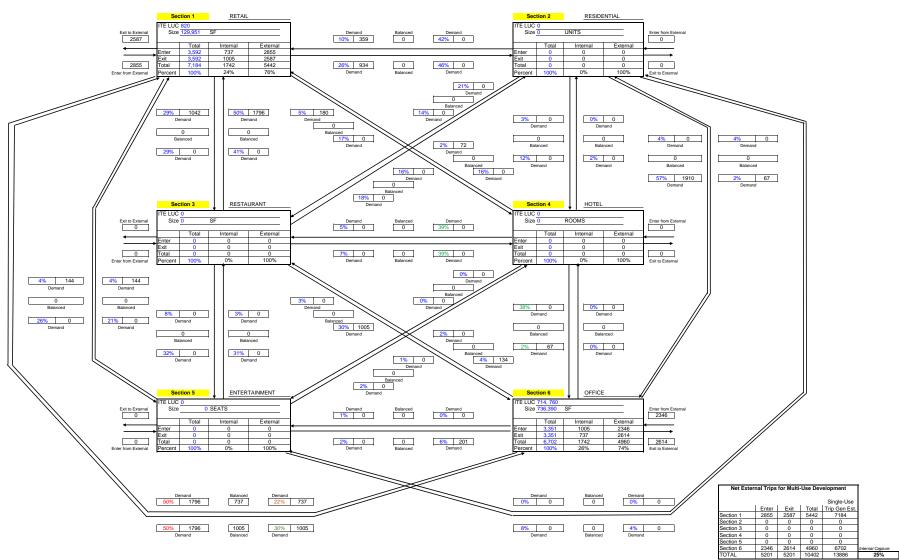
SATURDAY DAILY

```
\begin{array}{lll} \text{Ln T} = & 0.62 \text{ Ln (X)} + 6.24 \\ \text{Ln T} = & 0.62 & \text{Ln (129.951)} + 6.24 \\ \text{Ln T} = & 9.26 \\ & \text{T} = & 10484.34 \\ & \text{T} = & 10,484 & \text{vehicle trips} \\ & & \text{with 50\% (} & 5,242 & \text{vpd) entering and 50\% (} & 5,242 & \text{vpd) exiting.} \end{array}
```

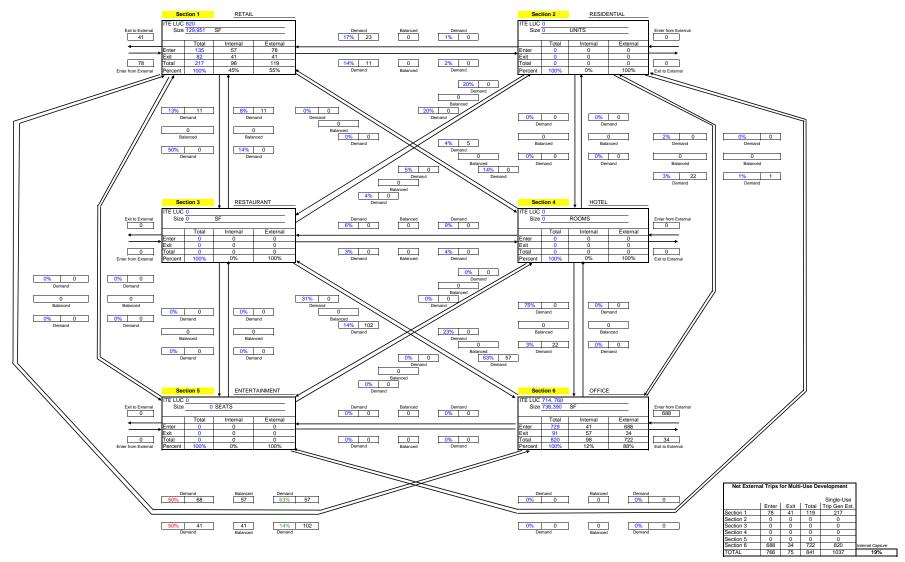
Analyst: Douglas Halpert, P.E.

Date: September 22, 2020

Time Period: Weekday Daily

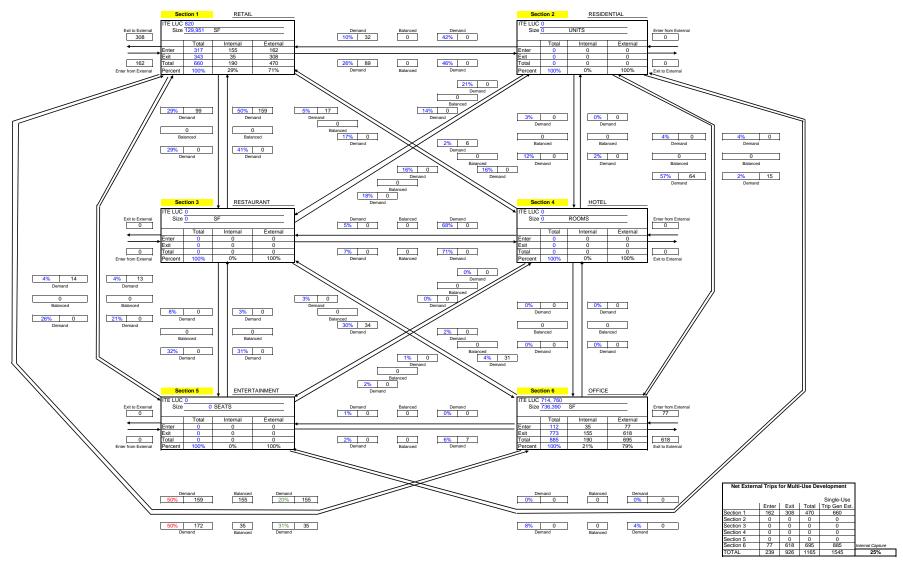


MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY



MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY

Name of Dvlpt: Muzi Ford Traffic Study - Needham, MA
Time Period: Weekday PM



Trip Generation Comparison Summary - Residential Alternative Build-Out

Trip Generation Comparison	Julilliai	y - Residential Al	ternative bund-o	ut
			Total External Trip	S
			Alternative 2	
		Alternative 1	(226 units	
		(no Residential)	Residential)	Net Difference
Weekday Daily	Entering	5,201	4,032	-1,169
	<u>Exiting</u>	<u>5,201</u>	<u>4,032</u>	<u>-1,169</u>
	Total	10,402	8,064	-2,338
Weekday AM Peak Hour	Entering	766	597	-169
	<u>Exiting</u>	<u>75</u>	<u>115</u>	<u>40</u>
	Total	841	712	-129
Weekday PM Peak Hour	Entering	239	200	-39
	<u>Exiting</u>	<u>926</u>	<u>673</u>	<u>-253</u>
	Total	1,165	873	-292
Saturday Daily	Entering	5,587	4,614	-973
	Exiting	<u>5,587</u>	<u>4,614</u>	<u>-973</u>
	Total	11,174	9,228	-1,946
Saturday Midday Peak Hour	Entering	420	329	-91
	<u>Exiting</u>	<u>394</u>	<u>312</u>	<u>-82</u>
	Total	814	641	-173

Size	Units	Land Use
866,342	SF	-
226	Units	LUC 221
259,132	SF	LUC 714
259,132	SF	LUC 760
91,458	SF	LUC 820

		Pa	ass-By Rate	es	
	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL
Weekday Daily	0%	0%	0%	26%	-
Weekday AM	0%	0%	0%	26%	-
Weekday PM	0%	0%	0%	34%	-
Saturday Daily	0%	0%	0%	26%	-
Saturday Midday	0%	0%	0%	26%	-

			Total Trips	i			E	Pass-By Trips					New Primary Trips							
	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL	LUC 221	LUC 714	LUC 760	LUC 820	TOTAL
Weekday Daily Entering	615	1,029	1,428	2,829	5,901	307	710	985	2,030	4,032	0	0	0	499	499	307	710	985	1,531	3,533
<u>Exiting</u>	<u>615</u>	<u>1,029</u>	<u>1,428</u>	<u>2,829</u>	<u>5,901</u>	<u>332</u>	<u>792</u>	<u>1,099</u>	<u>1,809</u>	4,032	<u>0</u>	<u>0</u>	<u>0</u>	<u>499</u>	<u>499</u>	<u>332</u>	<u>792</u>	<u>1,099</u>	<u>1,310</u>	<u>3,533</u>
Total	1,230	2,058	2,856	5,658	11,802	639	1,502	2,084	3,839	8,064	0	0	0	998	998	639	1,502	2,084	2,841	7,066
Weekday AM Peak Hour Entering	20	337	199	123	679	20	312	185	80	597	0	0	0	15	15	20	312	185	65	582
<u>Exiting</u>	<u>56</u>	<u>25</u> 362	<u>41</u>	<u>75</u>	<u>197</u>	<u>54</u>	<u>9</u>	<u>15</u>	<u>37</u>	<u>115</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>15</u>	<u>15</u>	<u>54</u>	<u>9</u>	<u>15</u>	<u>22</u>	<u>100</u>
Total	76	362	240	198	876	74	321	200	117	712	0	0	0	30	30	74	321	200	87	682
Weekday PM Peak Hour Entering	59	35	45	244	383	30	23	30	117	200	0	0	0	56	56	30	23	30	61	144
<u>Exiting</u>	<u>38</u> 97	<u>316</u> 351	<u>237</u> 282	<u>265</u>	<u>856</u>	<u>20</u>	<u>251</u>	<u>189</u>	<u>213</u>	<u>673</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>56</u>	<u>56</u>	<u>20</u>	<u>251</u>	<u>189</u> 219	<u>157</u>	<u>617</u>
Total	97	351	282	509	1,239	50	274	219	330	873	0	0	0	112	112	50	274	219	218	761
Saturday Daily Entering	555	233	218	4,216	5,222	367	176	165	3,906	4,614	0	0	0	1,019	1,019	367	176	165	2,887	3,595
<u>Exiting</u>	<u>555</u>	<u>233</u>	<u>218</u>	<u>4,216</u>	5,222	<u>333</u>	<u>179</u>	<u>168</u>	3,934	<u>4,614</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1,019</u>	<u>1,019</u>	<u>333</u>	<u>179</u>	<u>168</u>	<u>2,915</u>	<u>3,595</u>
Total	1,110	466	436	8,432	10,444	700	355	333	7,840	9,228	0	0	0	2,038	2,038	700	355	333	5,802	7,190
Saturday Midday Peak Hour Entering	50	11	31	300	392	31	7	18	273	329	0	0	0	67	67	31	7	18	206	262
<u>Exiting</u>	<u>52</u>	<u>15</u>	<u>31</u>	<u>277</u>	<u>375</u>	<u>33</u>	<u>12</u>	<u>25</u>	<u>242</u>	<u>312</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>67</u>	<u>67</u>	<u>33</u>	<u>12</u>	<u>25</u>	<u>175</u>	<u>245</u>
Total	102	26	62	577	767	64	19	43	515	641	0	0	0	134	134	64	19	43	381	507

Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise) General Urban/Suburban

Average Vehicle Trips Ends vs: Dwelling Units

Independent Variable (X): 226

AVERAGE WEEKDAY DAILY

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

SATURDAY DAILY

```
T = 0.42 * (X) + 6.73
T = 0.42 * 226 + 6.73
T = 101.65
T = 102 	 vehicle trips 	 vpd) entering and 51% ( 52 vpd) exiting.
```

Land Use Code (LUC) 714 - Corporate Headquarters Building General Urban/Suburban

Average Vehicle Trips Ends vs:

1000 Sq. Feet Gross Floor Area

Independent Variable (X): 259.132

AVERAGE WEEKDAY DAILY

$$T = 6.16 * (X) + 462.50$$

 $T = 6.16 * 259.132 + 462.50$
 $T = 2058.75$

T = 2.058vehicle trips

> with 50% (1,029 vpd) entering and 14% (1,029 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

$$Ln T = 0.88 Ln (X) + 1.00$$

$$Ln T = 0.88$$
 $Ln(259.132) + 1.00$

Ln
$$T = 5.89$$

$$T = 361.57$$

 $T = 362$ vehicle trips

WEEKDAY EVENING PEAK HOUR OF GENERATOR

$$Ln T = 0.95 Ln (X) + 0.58$$

Ln T =
$$0.95$$
 Ln(259.132) + 0.58

$$Ln T = 5.86$$

$$T = 350.54$$

$$T = 351$$
 vehicle trips

SATURDAY DAILY

ITE LUC 710 Weekday Daily Trip Rate

ITE LUC 714 Saturday Daily Trip Rate ITE LUC 714 Weekday Daily Trip Rate

$$\frac{2.21}{9.74}$$
 = $\frac{(Y)}{7.95}$ = 1.80

$$T = Y * 259.132$$

$$T = 466.44$$

$$T = 466$$
 vehicle trips

(same distribution split as ITE LUC 710 during the Saturday Daily)

$$T = 0.10 * (X)$$

$$T = 0.10$$
 * 259.132

$$T = 25.91$$

$$T = 26$$
 vehicle trips

Land Use Code (LUC) 760 - Research and Development Center General Urban/Suburban

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area

Independent Variable (X): 259.132

AVERAGE WEEKDAY DAILY

T = 10.23 * (X) + 204.68 T = 10.23 * 259.132 + 204.68 T = 2855.60 T = 2,856 vehicle trips with 50% (1,428 vpd) entering and 50% (1,428 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF GENERATOR

 $\begin{array}{lll} Ln \ T = & 0.88 \ Ln \ (X) + 0.59 \\ Ln \ T = & 0.88 & Ln \ (259.132 \) + 0.59 \\ Ln \ T = & 5.48 \\ T = & 239.96 \\ T = & 240 & vehicle trips \\ & & with 83\% \ (& 199 & vph) \ entering \ and \ 17\% \ (& 41 & vph) \ exiting. \end{array}$

WEEKDAY EVENING PEAK HOUR OF GENERATOR

SATURDAY DAILY

T = 1.25 * (X) + 112.04 T = 1.25 * 259.132 + 112.04 T = 435.96 T = 436 vehicle trips with 50% (218 vpd) entering and 50% (218 vpd) exiting.

SATURDAY PEAK HOUR OF GENERATOR

T = 0.24 * (X) T = 0.24 * 259.132 T = 62.19 T = 62 vehicle trips with 50% (31 vph) entering and % (31 vph) exiting. (same distribution split as ITE LUC 760 during the Saturday Daily)

Land Use Code (LUC) 820 - Shopping Center

General Urban/Suburban

Average Vehicle Trips Ends vs: 1000 Sq. Ft. Gross Floor Area

Independent Variable (X): 91.458

AVERAGE WEEKDAY DAILY

```
\begin{array}{lll} Ln(T) = 0.68 \ Ln\ (X) + 5.57 \\ Ln(T) = 0.68 & Ln\ (91.458\ ) + 5.57 \\ Ln(T) = 8.64 & \\ T = 5657.84 & \\ T = 5,658 & \text{vehicle trips} \\ & \text{with } 50\%\ (2,829\ \text{vph}) \ \text{entering and } 50\%\ (2,829\ \text{vph}) \ \text{exiting.} \end{array}
```

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

```
\begin{split} T &= 0.50 * (X) + 151.78 \\ T &= 0.50 & * ( 91.458  ) + 151.78 \\ T &= 197.51 \\ T &= 198 & \text{vehicle trips} \\ & \text{with } 62\% \ ( 123  & \text{vph) entering and } 38\% \ ( 75  & \text{vph) exiting.} \end{split}
```

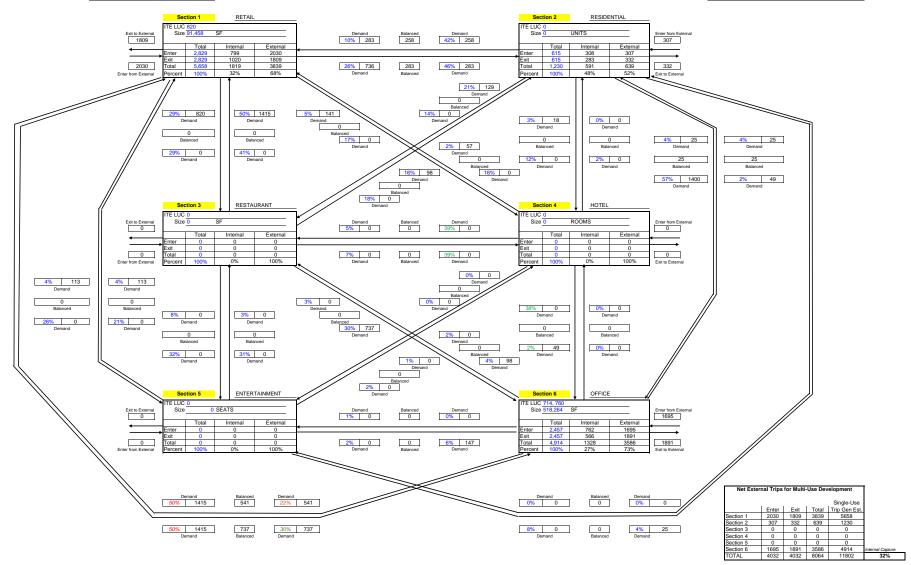
WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

```
\begin{array}{lll} \text{Ln T} = & 0.74 \text{ Ln (X)} + 2.89 \\ \text{Ln T} = & 0.74 & \text{Ln (91.458)} + 2.89 \\ \text{Ln T} = & 6.23 & \\ & T = & 508.65 \\ & T = & 509 & \text{vehicle trips} \\ & & \text{with } & 48\% & ( & 244 & \text{vph) entering and } & 52\% & ( & 265 & \text{vph) exiting.} \end{array}
```

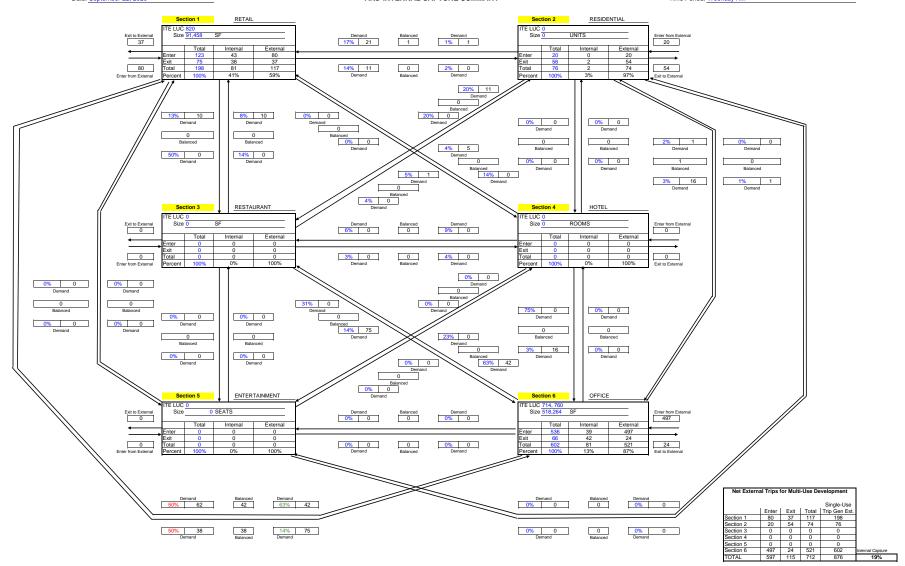
SATURDAY DAILY

```
\begin{array}{lll} Ln \ T = & 0.62 \ Ln \ (X) + 6.24 \\ Ln \ T = & 0.62 & Ln \ (91.458 & ) + 6.24 \\ Ln \ T = & 9.04 & \\ T = & 8432.47 \\ T = & 8,432 & vehicle trips \\ & & with 50\% \ ( & 4,216 & vpd) \ entering \ and 50\% \ ( & 4,216 \ vpd) \ exiting. \end{array}
```

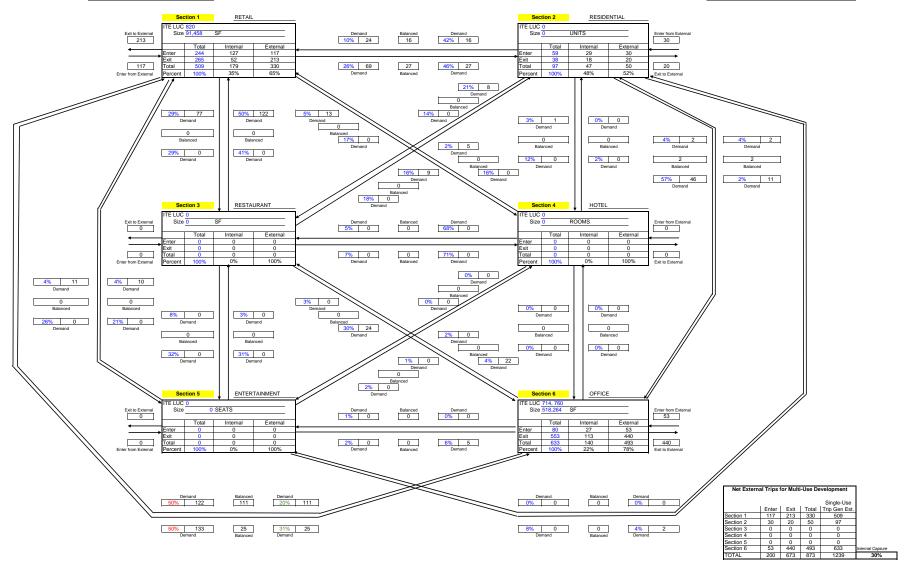
```
\begin{array}{lll} \text{Ln T} = & 0.79 \text{ Ln (X)} + 2.79 \\ \text{Ln T} = & 0.79 & \text{Ln (91.458} & ) + 2.79 \\ \text{Ln T} = & 6.36 & \\ & \text{T} = & 576.83 \\ & \text{T} = & 577 & \text{vehicle trips} \\ & & \text{with 52\% (} & 300 & \text{vpd) entering and 48\% (} & 277 & \text{vpd) exiting.} \end{array}
```



MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY



MULTI-USE DEVELOPMENT TRIP GENERATION AND INTERNAL CAPTURE SUMMARY



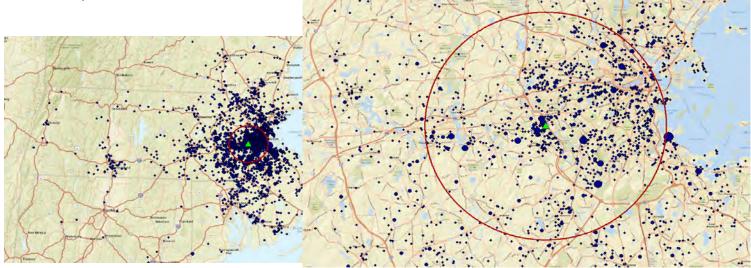
TRAFFIC IMPACT STUDY
Muzi Motors Redevelopment - Needham, Massachusetts
TRIP-DISTRIBUTION CALCULATIONS

	Existing Travel Patterns (Entering/Exiting Gould St)			BETA Gould Industrial Distribution				Building Density Model	Journey to Work (Office)		
		AM		PM	AM PM		AM/PM	AM/PM	Use in TIAS ⁺⁺		
Direction	Trips	% Distribution	Trips	% Distribution	Trips	% Distribution	Trips	% Distribution	% Distribution	% Distribution	% Distribution
Highland E	530	38%	485	40%	636	32%	580	33%	48%	54%	40%
Central E	200	14%	245	20%	280	14%	339	19%	14%	9%	15%
Central W	260	19%	180	15%	360	18%	260	15%	15%	15%	15%
Highland W	123	9%	89	7%	233	12%	151	9%	2%	2%	10%
Hunting S	273	20%	214	18%	492	25%	416	24%	22%	21%	20%
Total	1386	100%	1213	100%	2001	100%	1746	100%	100%	100%	100%

Work to Home Data

(Depicts home Locations of people who work within selection area)

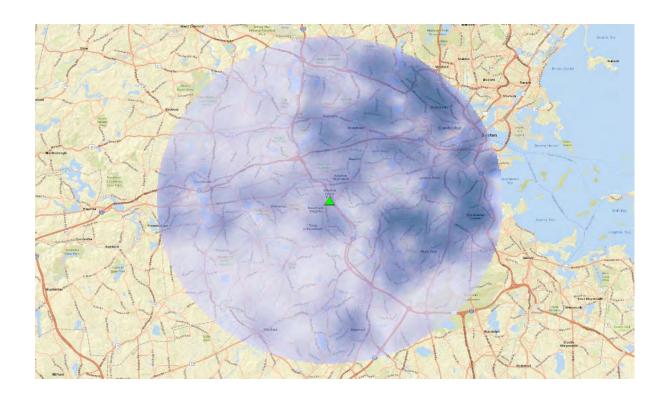
	# of Morkovs	Davaantaaa
	# of Workers	Percentage
I-95 N	1446	51%
I -95 S	937	33%
Central E	98	3%
Central W	136	5%
Highland E	29	1%
Highland V	43	2%
Hunting S	122	4%
Total	2811	100%



Structures

(Depicts structures located within a 10 mile buffer of the site)

	# of Struct Pe	ercentage
I-95 N	181265	52%
I -95 S	71236	20%
Central E	29578	8%
Central W	15355	4%
Highland E	7084	2%
Highland W	5360	2%
Hunting S	40054	11%
Total	349932	100%



TRAFFIC IMPACT STUDY
Muzi Motors Redevelopment - Needham, Massachusetts
CLONIAL VALADO ANIT ANIAL VOIC VALODICOLIETTO
SIGNAL WARRANT ANALYSIS WORKSHEETS

Raw Counts

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
6:00	0	343	67	42	111	0	25	0	40	0	0	0
7:00	0	711	139	87	229	0	45	0	71	0	0	0
8:00	0	650	190	93	272	0	72	0	104	0	0	0
9:00	0	539	105	66	174	0	42	0	66	0	0	0
10:00	0	480	94	59	155	0	47	0	75	0	0	0
11:00	0	458	89	56	147	0	71	0	65	0	0	0
12:00	0	475	90	176	752	0	71	0	65	0	0	0
13:00	0	461	88	171	730	0	74	0	68	0	0	0
14:00	0	477	91	177	754	0	71	0	65	0	0	0
15:00	0	583	111	216	923	0	68	0	62	0	0	0
16:00	0	369	77	197	614	0	135	0	122	0	0	0
17:00	0	405	77	150	641	0	105	0	96	0	0	0
18:00	0	407	77	151	643	0	90	0	82	0	0	0
19:00	0	345	66	128	546	0	63	0	58	0	0	0

From Raw 2015 TMCs in BETA Study
Ratio applied to AM Peak Hour counts on Highland Avenue
Ratio applied to PM Peak Hour counts on Highland Avenue

Highland Avenue Counts*

<u>EB</u>	<u>WB</u>	TOTAL
432	336	768
895	600	1,495
872	612	1,484
679	556	1,235
604	632	1,236
576	619	1,195
603	623	1,226
585	648	1,233
605	616	1,221
740	591	1,331
649	740	1,389
514	916	1,430
516	781	1,297
438	549	987

^{*}Based on MassDOT Count Station 6697 for 3/8/2017

Seasonally Adjusted Volumes

<u>Time</u>	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	<u>SB LT</u>	<u>SB TH</u>	SB RT
7:00	0	711	139	87	229	0	45	0	71	0	0	0
8:00	0	650	190	93	272	0	72	0	104	0	0	0
9:00	0	539	105	66	174	0	42	0	66	0	0	0
10:00	0	480	94	59	155	0	47	0	75	0	0	0
11:00	0	458	89	56	147	0	71	0	65	0	0	0
12:00	0	475	90	176	752	0	71	0	65	0	0	0
13:00	0	461	88	171	730	0	74	0	68	0	0	0
14:00	0	477	91	177	754	0	71	0	65	0	0	0
15:00	0	583	111	216	923	0	68	0	62	0	0	0
16:00	0	369	77	197	614	0	135	0	122	0	0	0
17:00	0	405	77	150	641	0	105	0	96	0	0	0
18:00	0	407	77	151	643	0	90	0	82	0	0	0
19:00	0	345	66	128	546	0	63	0	58	0	0	0

Historic Growth Rate Volumes

									_			
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	785	153	96	253	0	50	0	78	0	0	0
8:00	0	718	210	103	300	0	79	0	115	0	0	0
9:00	0	595	116	73	192	0	46	0	73	0	0	0
10:00	0	530	104	65	171	0	52	0	83	0	0	0
11:00	0	506	98	62	162	0	78	0	72	0	0	0
12:00	0	524	99	194	830	0	78	0	72	0	0	0
13:00	0	509	97	189	806	0	82	0	75	0	0	0
14:00	0	527	100	195	832	0	78	0	72	0	0	0
15:00	0	644	123	238	1,019	0	75	0	68	0	0	0
16:00	0	407	85	217	678	0	149	0	135	0	0	0
17:00	0	447	85	166	708	0	116	0	106	0	0	0
18:00	0	449	85	167	710	0	99	0	91	0	0	0
19:00	0	381	73	141	603	0	70	0	64	0	0	0

No-Build Adjusted Volumes

					,						
EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
0	785	153	96	253	0	50	0	78	0	0	0
0	718	210	103	300	0	79	0	115	0	0	0
0	595	116	73	192	0	46	0	73	0	0	0
0	530	104	65	171	0	52	0	83	0	0	0
0	506	98	62	162	0	78	0	72	0	0	0
0	524	99	194	830	0	78	0	72	0	0	0
0	509	97	189	806	0	82	0	75	0	0	0
0	527	100	195	832	0	78	0	72	0	0	0
0	644	123	238	1,019	0	75	0	68	0	0	0
0	407	85	217	678	0	149	0	135	0	0	0
0	447	85	166	708	0	116	0	106	0	0	0
0	449	85	167	710	0	99	0	91	0	0	0
0	381	73	141	603	0	70	0	64	0	0	0
	0 0 0 0 0 0 0 0	0 785 0 718 0 595 0 530 0 506 0 524 0 509 0 527 0 644 0 407 0 447	0 785 153 0 718 210 0 595 116 0 530 104 0 506 98 0 524 99 0 509 97 0 527 100 0 644 123 0 407 85 0 447 85 0 449 85	0 785 153 96 0 718 210 103 0 595 116 73 0 530 104 65 0 506 98 62 0 524 99 194 0 509 97 189 0 527 100 195 0 644 123 238 0 407 85 217 0 447 85 166 0 449 85 167	0 785 153 96 253 0 718 210 103 300 0 595 116 73 192 0 530 104 65 171 0 506 98 62 162 0 524 99 194 830 0 509 97 189 806 0 527 100 195 832 0 644 123 238 1,019 0 407 85 217 678 0 447 85 166 708 0 449 85 167 710	0 785 153 96 253 0 0 718 210 103 300 0 0 595 116 73 192 0 0 530 104 65 171 0 0 506 98 62 162 0 0 524 99 194 830 0 0 509 97 189 806 0 0 527 100 195 832 0 0 644 123 238 1,019 0 0 407 85 217 678 0 0 447 85 166 708 0 0 449 85 167 710 0	0 785 153 96 253 0 50 0 718 210 103 300 0 79 0 595 116 73 192 0 46 0 530 104 65 171 0 52 0 506 98 62 162 0 78 0 524 99 194 830 0 78 0 509 97 189 806 0 82 0 527 100 195 832 0 78 0 644 123 238 1,019 0 75 0 407 85 217 678 0 149 0 447 85 166 708 0 116 0 449 85 167 710 0 99	0 785 153 96 253 0 50 0 0 718 210 103 300 0 79 0 0 595 116 73 192 0 46 0 0 530 104 65 171 0 52 0 0 506 98 62 162 0 78 0 0 524 99 194 830 0 78 0 0 509 97 189 806 0 82 0 0 527 100 195 832 0 78 0 0 644 123 238 1,019 0 75 0 0 407 85 217 678 0 149 0 0 447 85 166 708 0 116 0 0 449 85	0 785 153 96 253 0 50 0 78 0 718 210 103 300 0 79 0 115 0 595 116 73 192 0 46 0 73 0 530 104 65 171 0 52 0 83 0 506 98 62 162 0 78 0 72 0 524 99 194 830 0 78 0 72 0 509 97 189 806 0 82 0 75 0 527 100 195 832 0 78 0 72 0 644 123 238 1,019 0 75 0 68 0 407 85 217 678 0 149 0 135 0 447 <td>0 785 153 96 253 0 50 0 78 0 0 718 210 103 300 0 79 0 115 0 0 595 116 73 192 0 46 0 73 0 0 530 104 65 171 0 52 0 83 0 0 506 98 62 162 0 78 0 72 0 0 524 99 194 830 0 78 0 72 0 0 524 99 194 830 0 78 0 72 0 0 527 100 195 832 0 78 0 72 0 0 644 123 238 1,019 0 75 0 68 0 0 407 85</td> <td>0 785 153 96 253 0 50 0 78 0 0 0 718 210 103 300 0 79 0 115 0 0 0 595 116 73 192 0 46 0 73 0 0 0 530 104 65 171 0 52 0 83 0 0 0 506 98 62 162 0 78 0 72 0 0 0 524 99 194 830 0 78 0 72 0 0 0 509 97 189 806 0 82 0 75 0 0 0 527 100 195 832 0 78 0 72 0 0 0 644 123 238 1,019 0 7</td>	0 785 153 96 253 0 50 0 78 0 0 718 210 103 300 0 79 0 115 0 0 595 116 73 192 0 46 0 73 0 0 530 104 65 171 0 52 0 83 0 0 506 98 62 162 0 78 0 72 0 0 524 99 194 830 0 78 0 72 0 0 524 99 194 830 0 78 0 72 0 0 527 100 195 832 0 78 0 72 0 0 644 123 238 1,019 0 75 0 68 0 0 407 85	0 785 153 96 253 0 50 0 78 0 0 0 718 210 103 300 0 79 0 115 0 0 0 595 116 73 192 0 46 0 73 0 0 0 530 104 65 171 0 52 0 83 0 0 0 506 98 62 162 0 78 0 72 0 0 0 524 99 194 830 0 78 0 72 0 0 0 509 97 189 806 0 82 0 75 0 0 0 527 100 195 832 0 78 0 72 0 0 0 644 123 238 1,019 0 7

Retail Site Generated Volumes

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	2	2	0	0	3	0	3	0	0	0
8:00	0	0	9	9	0	0	4	0	4	0	0	0
9:00	0	0	6	6	0	0	9	0	9	0	0	0
10:00	0	0	9	9	0	0	15	0	15	0	0	0
11:00	0	0	13	13	0	0	25	0	25	0	0	0
12:00	0	0	14	14	0	0	34	0	34	0	0	0
13:00	0	0	12	12	0	0	34	0	34	0	0	0
14:00	0	0	12	12	0	0	33	0	33	0	0	0
15:00	0	0	11	11	0	0	33	0	33	0	0	0
16:00	0	0	12	12	0	0	34	0	34	0	0	0
17:00	0	0	12	12	0	0	34	0	34	0	0	0
18:00	0	0	10	10	0	0	31	0	31	0	0	0
19:00	0	0	7	7	0	0	25	0	25	0	0	0

% of Peak Hour Volumes

VOIG	11103
Enter	Exit
1.4	0.9
2.6	1.5
4.7	2.5
7.1	4.1
9.7	6.8
10.6	9.4
9.2	9.5
8.9	9.2
8.5	9.0
8.9	9.4
9.2	9.4
7.6	8.5
5.3	6.9

Office / R&D Site Generated Volumes

			O	00 / 11	~D O.	O O O	o. a.o.					
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	17	17	0	0	7	0	7	0	0	0
8:00	0	0	103	103	0	0	9	0	9	0	0	0
9:00	0	0	8	8	0	0	16	0	16	0	0	0
10:00	0	0	7	7	0	0	21	0	21	0	0	0
11:00	0	0	8	8	0	0	37	0	37	0	0	0
12:00	0	0	13	13	0	0	38	0	38	0	0	0
13:00	0	0	12	12	0	0	24	0	24	0	0	0
14:00	0	0	11	11	0	0	24	0	24	0	0	0
15:00	0	0	10	10	0	0	31	0	31	0	0	0
16:00	0	0	7	7	0	0	55	0	55	0	0	0
17:00	0	0	12	12	0	0	93	0	93	0	0	0
18:00	0	0	2	2	0	0	10	0	10	0	0	0
19:00	0	0	1	1	0	0	8	0	8	0	0	0

% of Peak Hour Volumes

Enter	Exit
13.1	1.9
14.4	3.5
6.4	4.3
5.4	5.9
6.2	10.3
10.2	10.4
9.0	6.7
8.2	6.5
7.4	8.5
5.5	15.2
4.2	15.6
1.7	2.9
0.9	2.2

Build Adjusted Volumes

					,		v Olali	.00				
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	785	172	115	253	0	60	0	88	0	0	0
8:00	0	718	322	215	300	0	92	0	128	0	0	0
9:00	0	595	130	87	192	0	71	0	98	0	0	0
10:00	0	530	120	81	171	0	88	0	119	0	0	0
11:00	0	506	119	83	162	0	140	0	134	0	0	0
12:00	0	524	126	221	830	0	150	0	144	0	0	0
13:00	0	509	121	213	806	0	140	0	133	0	0	0
14:00	0	527	123	218	832	0	135	0	129	0	0	0
15:00	0	644	144	259	1,019	0	139	0	132	0	0	0
16:00	0	407	104	236	678	0	238	0	224	0	0	0
17:00	0	447	109	190	708	0	243	0	233	0	0	0
18:00	0	449	97	179	710	0	140	0	132	0	0	0
19:00	0	381	81	149	603	0	103	0	97	0	0	0

Traffic Control Signal Warrant Analyses

Central Avenue at Gould Street

Intersection:

(Based on MUTCD-2009 Edition)

Pop. <10,000)? <mark>(Y/N</mark>)	N	(Count Date:	10/21/201	5	Ana	lysis Date:	10/04/20			<u>_</u>
Speed (in mp	oh):	35 mph	An	alysis Year:	2030 Build	d		Analyst:	RLB			
	Is Major?*	#Lanes*	Adjustn	nent Factor:	1		Raw counts	'		•		
	(Y/N)	(one way)	_			_	-					
EB	Υ	1	Ma	ajor Lanes:	1	Enter the h	nigher number	of lanes for	the major st	reet approa	ch	
WB	Υ	1	Mii	nor Lanes:	1	Enter the n	umber of lane	s for the min	or street app	proach you v	want to analy	/ze
NB	N	1										
SB	N	1	*Note: If inter	rsection is a "	T" intersectio	n, leave cells	blank for the no	n-existent app	oroach			
			-									
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	785	172	115	253	0	60	0	88	0	0	0
8:00	0	718	322	215	300	0	92	0	128	0	0	0
9:00	0	595	130	87	192	0	71	0	98	0	0	0
10:00	0	530	120	81	171	0	88	0	119	0	0	0
11:00	0	506	119	83	162	0	140	0	134	0	0	0
12:00	0	524	126	221	830	0	150	0	144	0	0	0
13:00	0	509	121	213	806	0	140	0	133	0	0	0
14:00	0	527	123	218	832	0	135	0	129	0	0	0
15:00	0	644	144	259	1,019	0	139	0	132	0	0	0
16:00	0	407	104	236	678	0	238	0	224	0	0	0
17:00	0	447	109	190	708	0	243	0	233	0	0	0
18:00	0	449	97	179	710	0	140	0	132	0	0	0
19:00	0	381	81	149	603	0	103	0	97	0	0	0

Time	Σ EB	ΣWB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	957	368	148	0	1325	148	148	N	Υ	Υ	Υ	Υ
8:00	1039	515	220	0	1554	220	220	Υ	Υ	Υ	Υ	Υ
9:00	725	279	169	0	1004	169	169	Υ	Υ	Υ	Υ	N
10:00	650	252	207	0	902	207	207	Υ	Υ	Υ	Υ	N
11:00	625	245	274	0	870	274	274	Υ	Υ	Υ	Υ	Υ
12:00	651	1052	294	0	1702	294	294	Υ	Υ	Υ	Υ	Υ
13:00	630	1019	273	0	1649	273	273	Υ	Υ	Υ	Υ	Υ
14:00	650	1051	264	0	1701	264	264	Υ	Υ	Υ	Υ	Υ
15:00	787	1278	272	0	2066	272	272	Υ	Υ	Υ	Υ	Υ
16:00	511	914	462	0	1426	462	462	Υ	Υ	Υ	Υ	Υ
17:00	556	897	476	0	1453	476	476	Υ	Υ	Υ	Υ	Υ
18:00	546	889	272	0	1435	272	272	Υ	Υ	Υ	Υ	Υ
19:00	462	752	200	0	1214	200	200	Υ	Υ	Υ	Υ	Υ
							-	12 of 8	13 of 8	13 of 8	13 of 4	11 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Met

Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Met

Warrant 1: Combination of Warrants 1A and 1B is Met

Warrant 2: Four-Hour Warrant is Met Warrant 3: One-Hour Warrant is Met

Raw Counts

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
6:00	0	0	0	0	0	0	0	158	0	0	113	0
7:00	0	0	0	0	0	0	0	236	0	0	181	0
8:00	0	0	0	0	0	0	0	305	0	0	218	0
9:00	0	0	0	0	0	0	0	254	0	0	181	0
10:00	0	0	0	0	0	0	0	254	0	0	182	0
11:00	0	0	0	0	0	0	0	246	0	0	176	0
12:00	0	0	0	0	0	0	0	206	0	0	291	0
13:00	0	0	0	0	0	0	0	207	0	0	293	0
14:00	0	0	0	0	0	0	0	205	0	0	290	0
15:00	0	0	0	0	0	0	0	223	0	0	316	0
16:00	0	0	0	0	0	0	0	233	0	0	330	0
17:00	0	0	0	0	0	0	0	233	0	0	356	0
18:00	0	0	0	0	0	0	0	218	0	0	308	0
19:00	0	0	0	0	0	0	0	166	0	0	234	0

From Raw 2015 TMCs in BETA Study Ratio applied to AM Peak Hour counts on Highland Avenue Ratio applied to PM Peak Hour counts on Highland Avenue

Highland Avenue Counts*

<u>EB</u>	<u>WB</u>	TOTAL
432	336	768
895	600	1,495
872	612	1,484
679	556	1,235
604	632	1,236
576	619	1,195
603	623	1,226
585	648	1,233
605	616	1,221
740	591	1,331
649	740	1,389
514	916	1,430
516	781	1,297
438	549	987

^{*}Based on MassDOT Count Station 6697 for 3/8/2017

Seasonal Adjustment to Average Month Conditions (Percentage) = 0.0%

Seasonally Adjusted Volumes

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	0	0	0	0	236	0	0	181	0
8:00	0	0	0	0	0	0	0	305	0	0	218	0
9:00	0	0	0	0	0	0	0	254	0	0	181	0
10:00	0	0	0	0	0	0	0	254	0	0	182	0
11:00	0	0	0	0	0	0	0	246	0	0	176	0
12:00	0	0	0	0	0	0	0	206	0	0	291	0
13:00	0	0	0	0	0	0	0	207	0	0	293	0
14:00	0	0	0	0	0	0	0	205	0	0	290	0
15:00	0	0	0	0	0	0	0	223	0	0	316	0
16:00	0	0	0	0	0	0	0	233	0	0	330	0
17:00	0	0	0	0	0	0	0	233	0	0	356	0
18:00	0	0	0	0	0	0	0	218	0	0	308	0
19:00	0	0	0	0	0	0	0	166	0	0	234	0

Historic Growth Rate Volumes

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	0	0	0	0	261	0	0	200	0
8:00	0	0	0	0	0	0	0	337	0	0	241	0
9:00	0	0	0	0	0	0	0	280	0	0	200	0
10:00	0	0	0	0	0	0	0	280	0	0	201	0
11:00	0	0	0	0	0	0	0	272	0	0	194	0
12:00	0	0	0	0	0	0	0	227	0	0	321	0
13:00	0	0	0	0	0	0	0	229	0	0	323	0
14:00	0	0	0	0	0	0	0	226	0	0	320	0
15:00	0	0	0	0	0	0	0	246	0	0	349	0
16:00	0	0	0	0	0	0	0	257	0	0	364	0
17:00	0	0	0	0	0	0	0	257	0	0	393	0
18:00	0	0	0	0	0	0	0	241	0	0	340	0
19:00	0	0	0	0	0	0	0	183	0	0	258	0

No-Build Adjusted Volumes

Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	0	0	0	0	261	0	0	200	0
8:00	0	0	0	0	0	0	0	337	0	0	241	0
9:00	0	0	0	0	0	0	0	280	0	0	200	0
10:00	0	0	0	0	0	0	0	280	0	0	201	0
11:00	0	0	0	0	0	0	0	272	0	0	194	0
12:00	0	0	0	0	0	0	0	227	0	0	321	0
13:00	0	0	0	0	0	0	0	229	0	0	323	0
14:00	0	0	0	0	0	0	0	226	0	0	320	0
15:00	0	0	0	0	0	0	0	246	0	0	349	0
16:00	0	0	0	0	0	0	0	257	0	0	364	0
17:00	0	0	0	0	0	0	0	257	0	0	393	0
18:00	0	0	0	0	0	0	0	241	0	0	340	0
19:00	0	0	0	0	0	0	0	183	0	0	258	0

Retail Site Generated Volumes

<u>Time</u> 7:00	EB LT 0	EB TH	EB RT	WB LT	WB TH	1						
7:00	0	_		TTD LI	VVD III	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
		0	0	16	0	2	0	2	15	1	5	0
8:00	0	0	0	24	0	2	0	12	44	4	5	0
9:00	0	0	0	44	0	6	0	7	50	4	13	0
10:00	0	0	0	72	0	10	0	11	76	6	21	0
11:00	0	0	0	120	0	16	0	15	103	8	35	0
12:00	0	0	0	166	0	22	0	16	113	9	48	0
13:00	0	0	0	168	0	22	0	14	98	8	49	0
14:00	0	0	0	162	0	22	0	14	95	8	47	0
15:00	0	0	0	159	0	21	0	13	91	7	46	0
16:00	0	0	0	166	0	22	0	14	95	8	48	0
17:00	0	0	0	166	0	22	0	14	98	8	48	0
18:00	0	0	0	150	0	20	0	12	81	7	43	0
19:00	0	0	0	122	0	16	0	8	56	5	35	0

% of Peak Hour Volumes

Enter 1.4	Exit 0.9
2.6	1.5
4.7	2.5
7.1	4.1
9.7	6.8
10.6	9.4
9.2	9.5
8.9	9.2
8.5	9.0
8.9	9.4
9.2	9.4
7.6	8.5
5.3	6.9

Office / R&D Site Generated Volumes

			• • • • • • • • • • • • • • • • • • • •	00 /	·- ··	· · · · ·	0.000					
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	34	0	4	0	20	140	11	10	0
8:00	0	0	0	18	0	3	0	120	362	51	6	0
9:00	0	0	0	76	0	10	0	10	68	6	22	0
10:00	0	0	0	104	0	14	0	8	58	5	30	0
11:00	0	0	0	182	0	24	0	9	66	5	53	0
12:00	0	0	0	184	0	24	0	16	109	9	53	0
13:00	0	0	0	118	0	16	0	14	96	8	34	0
14:00	0	0	0	115	0	15	0	12	87	7	33	0
15:00	0	0	0	150	0	20	0	11	79	6	43	0
16:00	0	0	0	268	0	36	0	8	59	5	78	0
17:00	0	0	0	324	0	47	0	13	40	6	108	0
18:00	0	0	0	51	0	7	0	3	18	1	15	0
19:00	0	0	0	39	0	5	0	1	10	1	11	0

% of Peak Hour Volumes

Enter	Exit
13.1	1.9
14.4	3.5
6.4	4.3
5.4	5.9
6.2	10.3
10.2	10.4
9.0	6.7
8.2	6.5
7.4	8.5
5.5	15.2
4.2	15.6
1.7	2.9
0.9	2.2

Build Adjusted Volumes

				Dи	iia Aaj	ustea	voluli	ies				
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
7:00	0	0	0	50	0	6	0	283	155	12	215	0
8:00	0	0	0	42	0	5	0	469	406	55	252	0
9:00	0	0	0	120	0	16	0	297	118	10	235	0
10:00	0	0	0	176	0	24	0	299	134	11	252	0
11:00	0	0	0	302	0	40	0	296	169	13	282	0
12:00	0	0	0	350	0	46	0	259	222	18	422	0
13:00	0	0	0	286	0	38	0	257	194	16	406	0
14:00	0	0	0	277	0	37	0	252	182	15	400	0
15:00	0	0	0	309	0	41	0	270	170	13	438	0
16:00	0	0	0	434	0	58	0	279	154	13	490	0
17:00	0	0	0	490	0	69	0	284	138	14	549	0
18:00	0	0	0	201	0	27	0	256	99	8	398	0
19:00	0	0	0	161	0	21	0	192	66	6	304	0

Traffic Control Signal Warrant Analyses

(Based on MUTCD-2009 Edition)

Intersection:		Gould Stre	et at South	Site Drive	way												
Pop. <10,000? (Y/N)		N		Count Date:													
Speed (in mp	oh):	35 mph	Ana	alysis Year:	2030 Build			Analyst:	RLB								
	Is Major?*	#Lanes*	Adjustm	nent Factor:	1		Raw counts										
	(Y/N)	(one way)				•											
EB	N	1	Ma	jor Lanes:		Enter the higher number of lanes for the major street approach											
WB	N	2	Mir	nor Lanes:	2	Enter the number of lanes for the minor street approach you want to analyze											
NB	Υ	2															
SB	Υ	*Note: If intersection is a "T" intersection, leave cells blank for the non-existent approach															
Time	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT					
7:00	0	0	0	50	0	6	0	283	155	12	215	0					
8:00	0	0	0	42	0	5	0	469	406	55	252	0					
9:00	0	0	0	120	0	16	0	297	118	10	235	0					
10:00	0	0	0	176	0	24	0	299	134	11	252	0					
11:00	0	0	0	302	0	40	0	296	169	13	282	0					
12:00	0	0	0	350	0	46	0	259	222	18	422	0					
13:00	0	0	0	286	0	38	0	257	194	16	406	0					
14:00	0	0	0	277	0	37	0	252	182	15	400	0					
15:00	0	0	0	309	0	41	0	270	170	13	438	0					
16:00	0	0	0	434	0	58	0	279	154	13	490	0					
17:00	0	0	0	490	0	69	0	284	138	14	549	0					
18:00	0	0	0	201	0	27	0	256	99	8	398	0					
19:00	0	0	0	161	0	21	0	192	66	6	304	0					

Time	Σ EB	ΣWB	Σ NB	Σ SB	Σ Major	Σ Minor	Σ Max Minor	W1 A	W1 B	W1combo	W2	W3
7:00	0	56	438	227	664	56	56	N	N	N	N	N
8:00	0	47	875	307	1181	47	47	N	N	N	N	N
9:00	0	136	415	245	660	136	136	N	N	N	N	N
10:00	0	200	433	263	696	200	200	Υ	N	N	N	N
11:00	0	342	465	295	760	342	342	Υ	N	Υ	Υ	N
12:00	0	396	481	440	922	396	396	Υ	Υ	Υ	Υ	N
13:00	0	324	451	422	873	324	324	Υ	N	Υ	Υ	N
14:00	0	314	434	415	849	314	314	Υ	N	Υ	Υ	N
15:00	0	350	440	451	891	350	350	Υ	N	Υ	Υ	N
16:00	0	492	433	503	937	492	492	Υ	Υ	Υ	Υ	Υ
17:00	0	559	422	563	985	559	559	Υ	Υ	Υ	Υ	Υ
18:00	0	228	355	406	761	228	228	Υ	N	Υ	N	N
19:00	0	182	258	310	569	182	182	N	N	N	N	N
								9 of 8	3 of 8	8 of 8	7 of 4	2 of 1

Warrant Analyses

Warrant 1: Condition A Minimum Vehicular Volume Warrant is Met

Warrant 1: Condition B Interruption of Continuous Traffic Warrant is Not Met

Warrant 1: Combination of Warrants 1A and 1B is Met

Warrant 2: Four-Hour Warrant is Met Warrant 3: One-Hour Warrant is Met

TRAFFIC IMPACT STUDY
Muzi Motors Redevelopment – Needham, Massachusetts
CAPACITY ANALYSIS METHODOLOGY

CAPACITY ANALYSIS METHODOLOGY

A primary result of capacity analysis is the assignment of levels of service to traffic facilities under various traffic flow conditions. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual* (HCM).⁵ The concept of level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst. Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year. A description of the operating condition under each level of service is provided below:

- LOS A describes conditions with little to no delay to motorists.
- LOS B represents a desirable level with relatively low delay to motorists.
- LOS C describes conditions with average delays to motorists.
- LOS D describes operations where the influence of congestion becomes more noticeable. Delays
 are still within an acceptable range.
- LOS E represents operating conditions with high delay values. This level is considered by many agencies to be the limit of acceptable delay.
- LOS F is considered to be unacceptable to most drivers with high delay values that often occur, when arrival flow rates exceed the capacity of the intersection.

Unsignalized Intersections

Levels of service for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control (STOP, YIELD, or all-way STOP control). The definition of level of service for unsignalized intersections is a function of average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The level-of-service criteria for unsignalized intersections are shown in Table A-1.

Signalized Intersections

Levels of service for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on average *control* delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Table A-1 summarizes the relationship between level of service and average control delay.

⁵ Highway Capacity Manual 2000, Transportation Research Board; Washington, D.C.; 2000.

TABLE A-1 Level-of-Service Criteria for Intersections

Level of Service	Unsignalized Intersection Criteria Average Control Delay (Seconds per Vehicle)	Signalized Intersection Criteria Average Control Delay (Seconds per Vehicle)
A	≤10	≤10
В	>10 and ≤15	>10 and ≤20
С	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50	>80

Source Highway Capacity Manual 2000, Transportation Research Board; Washington, D.C.; 2000. Pages 10-16 and 17-2.

For signalized intersections, this delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to the entire intersection. For unsignalized intersections, this delay criterion may be applied in assigning level-of-service designations to individual lane groups or to individual intersection approaches.

	TRAFFIC IMPACT STUDY
	Muzi Motors Redevelopment - Needham, Massachusetts
CAPACITY A	ND QUEUE ANALYSIS WORKSHEETS

	-	•	•	←	1	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ર્ન	W	
Traffic Volume (vph)	650	190	95	270	70	105
Future Volume (vph)	650	190	95	270	70	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.970				0.919	
Flt Protected				0.987	0.980	
Satd. Flow (prot)	1807	0	0	1802	1652	0
Flt Permitted				0.987	0.980	
Satd. Flow (perm)	1807	0	0	1802	1652	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)		2	2		2	2
Peak Hour Factor	0.93	0.93	0.89	0.89	0.76	0.76
Heavy Vehicles (%)	2%	2%	7%	3%	3%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other		•		•	•

Intersection						
Int Delay, s/veh	17.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	LDIN	VVDL	4	¥	ווטוו
Traffic Vol, veh/h	650	190	95	270	7 0	105
Future Vol, veh/h	650	190	95	270	70	105
Conflicting Peds, #/hr	030	2	2	0	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	riee -	None	riee -	None	310p -	None
Storage Length	-	None	-	None -	0	Mone
		-	-			-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	89	89	76	76
Heavy Vehicles, %	2	2	7	3	3	4
Mvmt Flow	699	204	107	303	92	138
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	905	0	1322	805
Stage 1	-	-	-	-	803	-
Stage 2			_		519	_
Critical Hdwy			4.17	_	6.43	6.24
	-	-	4.17	-		
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.263	-	3.527	3.336
Pot Cap-1 Maneuver	-	-	731	-	172	379
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	595	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	730	-	141	378
Mov Cap-2 Maneuver	-	-	-	-	141	-
Stage 1	_	_	_	_	438	_
Stage 2					489	
Slaye Z	-	-	-	-	407	-
Annroach	ΓD		WD		MD	
Approach	EB		WB		NB	
HCM Control Delay, s	0		2.8		110.7	
HCM LOS					F	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		226	_	_	730	_
HCM Lane V/C Ratio		1.019	_	_	0.146	_
HCM Control Delay (s)		110.7	_	_	10.8	0
HCM Lane LOS		F	_	_	В	A
HCM 95th %tile Q(veh)		9.6	-		0.5	
HOW FULL FORME (VEII)		7.0	-	-	0.5	-

	-	•	•	←	1	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,			र्स	W	
Traffic Volume (vph)	760	5	16	325	. 7	22
Future Volume (vph)	760	5	16	325	7	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999				0.899	
Flt Protected				0.998	0.988	
Satd. Flow (prot)	1859	0	0	1810	1688	0
Flt Permitted				0.998	0.988	
Satd. Flow (perm)	1859	0	0	1810	1688	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	549			284	522	
Travel Time (s)	12.5			6.5	17.8	
Confl. Peds. (#/hr)		3	2		3	2
Peak Hour Factor	0.93	0.93	0.89	0.89	0.73	0.73
Heavy Vehicles (%)	2%	20%	0%	5%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

2020 Existing AM.synSynchro 10 ReportGreenman-Pedersen, Inc.Page 3

Intersection						
Int Delay, s/veh	0.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		LDIX	WDL	4	¥	NDIX
Traffic Vol, veh/h	760	5	16	325	'T' 7	22
Future Vol, veh/h	760	5	16	325	7	22
Conflicting Peds, #/hr	700	3	2	323	3	22
Sign Control	Free	ہ Free	Free	Free	Stop	Stop
RT Channelized	riee -	None	riee -	None		
					-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, 7		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	89	89	73	73
Heavy Vehicles, %	2	20	0	5	0	0
Mvmt Flow	817	5	18	365	10	30
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	825	0	1227	825
Stage 1	-	-	-	-	823	-
Stage 2	_	_		_	404	_
Critical Hdwy	-	-	4.1		6.4	6.2
	-	-	4.1	-		
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	814	-	199	376
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	679	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	_	-	812	_	192	374
Mov Cap-2 Maneuver	_	_	_	_	192	_
Stage 1	_	_	_	_	434	_
Stage 2	_	_		_	658	_
Stage 2	_	_	_	_	030	_
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		18.6	
HCM LOS	U		0.4		18.0 C	
HOW LUS					C	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	304	-	-	812	-
HCM Lane V/C Ratio		0.131	-	-	0.022	-
HCM Control Delay (s)		18.6	-	-	9.5	0
HCM Lane LOS		С	_	_	Α	Ä
HCM 95th %tile Q(veh)		0.4	_	_	0.1	-
HOW /JULY /JULIC Q(VEH)		0.4	-	-	0.1	_

	-	•	•	•	4	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			र्स	W	
Traffic Volume (vph)	785	0	1	340	2	5
Future Volume (vph)	785	0	1	340	2	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.899	
Flt Protected					0.988	
Satd. Flow (prot)	1863	0	0	1827	1467	0
Flt Permitted					0.988	
Satd. Flow (perm)	1863	0	0	1827	1467	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.93	0.93	0.91	0.91	0.58	0.58
Heavy Vehicles (%)	2%	0%	0%	4%	0%	20%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Area Type: Control Type: Unsignalized Other

Intersection						
Int Delay, s/veh	0.2					
•	EBT	EDD	WDI	WDT	MDI	NBR
Movement		EBR	WBL	WBT	NBL	NRK
Lane Configurations	}	0		्रदी	¥	-
Traffic Vol, veh/h	785	0	1	340	2	5
Future Vol, veh/h	785	0	1	340	2	5
Conflicting Peds, #/hr	0	0	1	0	0	1
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	93	93	91	91	58	58
Heavy Vehicles, %	2	0	0	4	0	20
Mvmt Flow	844	0	1	374	3	9
IVIVIIILI IOW	044	U		3/4	J	7
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	845	0	1221	846
Stage 1	_	-	-	_	845	-
Stage 2	_	_	_		376	-
Critical Hdwy	_	_	4.1	_	6.4	6.4
Critical Hdwy Stg 1			7.1		5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
	-	-		-		
Follow-up Hdwy	-	-	2.2	-	3.5	3.48
Pot Cap-1 Maneuver	-	-	800	-	200	337
Stage 1	-	-	-	-	425	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	799	-	199	336
Mov Cap-2 Maneuver	-	_	-	-	199	-
Stage 1	_	_	_	_	425	_
Stage 2	_	_	_	_	698	_
Jiaye 2	-	-	-	-	070	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		18.4	
	U		U		18.4 C	
HCM LOS					C	
NAME OF THE PARTY		NIDI 4		EDD.	WD	WOT
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		281	-	-	799	-
HCM Lane V/C Ratio		0.043	-	-	0.001	-
HCM Control Delay (s)		18.4	-	-	9.5	0
HCM Lane LOS		С	-	-	Α	Α
HCM 95th %tile Q(veh)		0.1	_	_	0	-
_(-	

4: Hunting Road/Gould Street & Highland Avenue

	۶	→	•	•	←	•	•	†	/	>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	↑ ↑		ሻ	∱ }			ર્ન	7	ሻ	4	
Traffic Volume (vph)	96	761	16	40	557	374	27	213	217	156	60	27
Future Volume (vph)	96	761	16	40	557	374	27	213	217	156	60	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	10	10	11	11
Storage Length (ft)	200		250	250		0	0		100	100		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.940				0.850		0.967	
Flt Protected	0.950			0.950				0.994		0.950	0.986	
Satd. Flow (prot)	1636	3411	0	1668	3222	0	0	1810	1492	1510	1620	0
Flt Permitted	0.950			0.950				0.994		0.950	0.000	
Satd. Flow (perm)	1636	3411	0	1668	3222	0	0	1810	1492	1510	0	0
Right Turn on Red			Yes			Yes			Yes		_	Yes
Satd. Flow (RTOR)		1			115				158		8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.88	0.88	0.88	0.89	0.89	0.89
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Shared Lane Traffic (%)	Б.,			Б	NIA		C !!!			22%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2		8	8	5 8	7	4	
Permitted Phases	1	,		5	2		8	8	5 8	7	4	
Detector Phase Switch Phase	ı	6		5	Z		ŏ	Ö	2.6	1	4	
	4.0	10.0		4.0	20.0		4.0	6.0		4.0	6.0	
Minimum Initial (s) Minimum Split (s)	4.0 9.0	10.0 15.0		6.0 11.0	20.0 25.0		6.0 11.0	11.0		6.0 11.0	11.0	
* · · · · · · · · · · · · · · · · · · ·	9.0 15.0	39.0		31.0	55.0 55.0		27.0	27.0		29.0	29.0	
Total Split (s) Total Split (%)	9.9%	25.8%		20.5%	36.4%		17.9%	17.9%		19.2%	19.2%	
Maximum Green (s)	10.0	34.0		26.0	50.476		22.0	22.0		24.0	24.0	
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	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		1.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag			3.0		3.0	3.0	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)	NOTIC	171111		INOTIC	171111		INUITO	INOTIC		INOTIC	INOTIC	
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												

Intersection Summary

Area Type: Cycle Length: 151

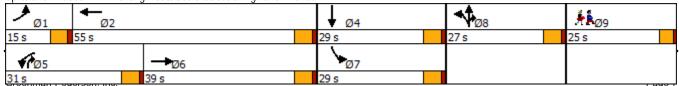
Actuated Cycle Length: 114.7

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue

Other



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	17%
Maximum Green (s)	21.0
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	2.0
Vehicle Extension (s) Recall Mode	2.0 None
Walk Time (s)	6.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	0
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Intersection Summary	

2020 Existing AM.syn
Greenman-Pedersen, Inc.
Synchro 10 Report
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2020 Existing Timing Plan: Weekday AM

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	_	-	*		- 1	-	•	*
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	103	835	42	980	273	247	136	136
v/c Ratio	0.72	0.69	0.38	0.85	0.78	0.44	0.43	0.39
Control Delay	80.1	34.9	62.4	38.7	62.0	14.9	45.9	42.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.1	34.9	62.4	38.7	62.0	14.9	45.9	42.2
Queue Length 50th (ft)	75	272	30	314	193	49	92	85
Queue Length 95th (ft)	#183	354	71	396	#354	125	172	164
Internal Link Dist (ft)		1272		1244	601			383
Turn Bay Length (ft)	200		250			100	100	
Base Capacity (vph)	143	1210	379	1474	348	776	317	346
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	0.72	0.69	0.11	0.66	0.78	0.32	0.43	0.39
Intersection Summary								

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ î≽		ሻ	↑Љ 557			र्स	7	ሻ	4	
Traffic Volume (vph)	96	761	16	40		374	27	213	217	156	60	27
Future Volume (vph)	96	761	16	40	557	374	27	213	217	156	60	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	10	10	11	11
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.94			1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (prot)	1636	3411		1668	3221			1810	1492	1510	1619	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.00	
Satd. Flow (perm)	1636	3411		1668	3221			1810	1492	1510	0	
Peak-hour factor, PHF	0.93	0.93	0.93	0.95	0.95	0.95	0.88	0.88	0.88	0.89	0.89	0.89
Adj. Flow (vph)	103	818	17	42	586	394	31	242	247	175	67	30
RTOR Reduction (vph)	0	1	0	0	76	0	0	0	110	0	6	0
Lane Group Flow (vph)	103	834	0	42	904	0	0	273	137	136	130	0
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2		8	8	5 8	7	4	
Permitted Phases												
Actuated Green, G (s)	10.0	40.7		7.7	38.4			22.1	34.8	24.1	24.1	
Effective Green, g (s)	10.0	40.7		7.7	38.4			22.1	34.8	24.1	24.1	
Actuated g/C Ratio	0.09	0.36		0.07	0.34			0.19	0.30	0.21	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	142	1211		112	1079			349	453	317	340	,
v/s Ratio Prot	c0.06	0.24		0.03	c0.28			c0.15	0.09	c0.09	0.08	
v/s Ratio Perm												
v/c Ratio	0.73	0.69		0.38	0.84			0.78	0.30	0.43	0.38	
Uniform Delay, d1	51.0	31.5		51.1	35.2			44.0	30.6	39.3	38.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.4	1.3		0.8	5.5			10.1	0.1	0.3	0.3	
Delay (s)	65.4	32.9		51.9	40.8			54.0	30.7	39.6	39.1	
Level of Service	Ε	С		D	D			D	С	D	D	
Approach Delay (s)		36.4			41.2			43.0			39.4	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.7	Н	CM 2000 L	evel of Ser	rvice		D			
HCM 2000 Volume to Capacity ra	atio		0.74									
Actuated Cycle Length (s)			114.6	Sı	ım of lost t	ime (s)			24.0			
Intersection Capacity Utilization			68.8%	IC	U Level of	Service			С			
A !- D! - / !- \			1 [
Analysis Period (min) c Critical Lane Group			15									

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4	7		4			4	
Traffic Volume (vph)	0	0	5	22	0	14	17	310	36	17	270	2
Future Volume (vph)	0	0	5	22	0	14	17	310	36	17	270	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.987			0.999	
Flt Protected					0.950			0.998			0.997	
Satd. Flow (prot)	0	1611	0	0	1770	1583	0	1835	0	0	1855	0
Flt Permitted					0.950			0.998			0.997	
Satd. Flow (perm)	0	1611	0	0	1770	1583	0	1835	0	0	1855	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

Intersection												
Int Delay, s/veh	1.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			र्स	7		4			4	
Traffic Vol, veh/h	0	0	5	22	0	14	17	310	36	17	270	2
Future Vol., veh/h	0	0	5	22	0	14	17	310	36	17	270	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized			None		·-	None .	-	-	None	-	_	None
Storage Length	-	-	-	_	-	0	-	-	-	-	_	-
Veh in Median Storage,	# -	0	-	_	0	_	-	0	-	-	0	-
Grade, %	-	0	-	_	0	_	-	0	-	-	0	-
Peak Hour Factor	63	63	63	90	90	90	90	90	90	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	24	0	16	19	344	40	20	325	2
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	776	788	326	772	769	364	327	0	0	384	0	0
Stage 1	366	366	-	402	402	-	-	-	-	-	-	-
Stage 2	410	422	_	370	367	_	_	_	_	_	_	_
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	_	_	4.12	_	_
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	_	_	2.218	_	_
Pot Cap-1 Maneuver	315	323	715	317	332	681	1233	_	_	1174	_	_
Stage 1	653	623		625	600	-	-	_	_	-	_	_
Stage 2	619	588	_	650	622	_	_	_	_	_	_	_
Platoon blocked, %	0.,	000		000	022			_	-		_	-
Mov Cap-1 Maneuver	298	310	715	304	318	681	1233	-	-	1174	_	-
Mov Cap-2 Maneuver	298	310	-	304	318	-	-	-	-	-	_	-
Stage 1	640	610	_	613	588	_	_	-	-	_	_	_
Stage 2	593	576	_	629	609	_	_	_	-	_	_	_
	3.3	3.3		32,	557							
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.1			15			0.4			0.5		
HCM LOS	В			C			0.1			0.0		
TIONI E00	Б			J								
Minor Lane/Major Mvmt		NBL	NBT	MRD	ERI n1	WBLn1	M/RI n2	SBL	SBT	SBR		
			וטוו	NUN					301	JUIN		
Capacity (veh/h) HCM Lane V/C Ratio		1233 0.015	-	-	715 0.011	304 0.08	681 0.023	1174 0.017	-	-		
			0	-	10.1	17.9	10.4	8.1	0	-		
HCM Lang LOS		8		-						-		
HCM Lane LOS		A	А	-	В	C 0.3	B 0.1	A	A	-		
HCM 95th %tile Q(veh)		0	-	-	0	0.3	0.1	0.1	-	-		

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		f)			ર્ન
Traffic Volume (vph)	13	11	375	43	18	240
Future Volume (vph)	13	11	375	43	18	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.939		0.986			
Flt Protected	0.973					0.996
Satd. Flow (prot)	1736	0	1837	0	0	1841
Flt Permitted	0.973					0.996
Satd. Flow (perm)	1736	0	1837	0	0	1841
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.60	0.60	0.95	0.95	0.91	0.91
Heavy Vehicles (%)	0%	0%	2%	2%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					

Intersection						
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥	TI DIX	1	NOIL	ODL	4
Traffic Vol, veh/h	13	11	375	43	18	240
Future Vol, veh/h	13	11	375	43	18	240
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
Grade, %	0		0	-	-	0
Peak Hour Factor	60	60	95	95	91	91
Heavy Vehicles, %	0	00	2	2	0	3
3	22	18	395	45	20	264
Mvmt Flow	22	10	393	45	20	204
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	722	418	0	0	440	0
Stage 1	418	-	-	-	-	-
Stage 2	304	-	-	_	-	-
Critical Hdwy	6.4	6.2	_	_	4.1	-
Critical Hdwy Stg 1	5.4	_	-		_	-
Critical Hdwy Stg 2	5.4	_	_	_	_	_
Follow-up Hdwy	3.5	3.3	_	_	2.2	_
Pot Cap-1 Maneuver	397	639	_	_	1131	_
Stage 1	669	-	_	_	-	_
Stage 2	753	_			_	_
Platoon blocked, %	755	_			_	
Mov Cap-1 Maneuver	389	639	-	-	1131	-
Mov Cap-1 Maneuver	389 389	039	-	-	1131	-
		-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	737	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	13.3		0		0.6	
HCM LOS	В					
Minor Long/Maior M.		NDT	א טטט י	MDI ∽1	CDI	CDT
Minor Lane/Major Mvmt		NBT	NRK /	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	474	1131	-
HCM Lane V/C Ratio		-	-	0.084	0.017	-
HCM Control Delay (s)		-	-	13.3	8.2	0
HCM Lane LOS		-	-	В	Α	Α
HCM 95th %tile Q(veh)		-	-	0.3	0.1	-

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	**		ĵ»			ર્ન
Traffic Volume (vph)	2 9	9	225	60	20	260
Future Volume (vph)	29	9	225	60	20	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.969		0.971			
Flt Protected	0.963					0.996
Satd. Flow (prot)	1600	0	1805	0	0	1808
Flt Permitted	0.963					0.996
Satd. Flow (perm)	1600	0	1805	0	0	1808
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Peak Hour Factor	0.79	0.79	0.90	0.90	0.80	0.80
Heavy Vehicles (%)	14%	0%	2%	3%	0%	5%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
	OIL					

Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	₩.	WDIX		NDIX	JDL	<u>3₽1</u>
Traffic Vol, veh/h	T 29	9	1 225	60	20	€ 1 260
Future Vol, veh/h	29 29		225	60	20	260
		9				
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, a		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	90	90	80	80
Heavy Vehicles, %	14	0	2	3	0	5
Mvmt Flow	37	11	250	67	25	325
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	659	284	0	0	317	0
Stage 1	284	204	-	U	317	-
			-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	6.54	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	410	760	-	-	1255	-
Stage 1	737	-	-	-	-	-
Stage 2	669	_	_	_	_	_
Platoon blocked, %	007		_	_		_
Mov Cap-1 Maneuver	400	760		_	1255	
	400	700	-	-	1200	-
Mov Cap-2 Maneuver		-	-	-	-	-
Stage 1	737	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	13.9		0		0.6	
HCM LOS	В					
	_					
Minor Long/M-! M.		NDT	MDD i	MDI 1	CDI	CDT
Minor Lane/Major Mvmt		NBT	MRK /	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	451	1255	-
HCM Lane V/C Ratio		-	-	0.107	0.02	-
HCM Control Delay (s)		-	-	13.9	7.9	0
HCM Lane LOS		-	-	В	Α	Α
HCM 95th %tile Q(veh)		-	-	0.4	0.1	-

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	4	1	0	10	0	3	1	165	60	12	275	2
Future Volume (vph)	4	1	0	10	0	3	1	165	60	12	275	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.966			0.964			0.999	
Flt Protected		0.964			0.964						0.998	
Satd. Flow (prot)	0	1832	0	0	1646	0	0	1783	0	0	1825	0
Flt Permitted		0.964			0.964						0.998	
Satd. Flow (perm)	0	1832	0	0	1646	0	0	1783	0	0	1825	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	10		6			4	10		4			6
Peak Hour Factor	0.63	0.63	0.63	0.65	0.65	0.65	0.82	0.82	0.82	0.81	0.81	0.81
Heavy Vehicles (%)	0%	0%	0%	10%	2%	0%	2%	3%	2%	0%	4%	2%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Intersection												
Int Delay, s/veh	0.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	4	1	0	10	0	3	1	165	60	12	275	2
Future Vol, veh/h	4	1	0	10	0	3	1	165	60	12	275	2
Conflicting Peds, #/hr	10	0	6	0	0	4	10	0	4	0	0	6
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	- -	None	-	- -	None	-	-	None	-	-	None
Storage Length		_	-	_	_	-		_	-		_	-
Veh in Median Storage,	# _	0	_		0	_	_	0	_		0	
Grade, %	<i>II</i>	0	_	_	0	_	_	0	_	-	0	_
Peak Hour Factor	63	63	63	65	65	65	82	82	82	81	81	81
Heavy Vehicles, %	03	03	03	10	2	0	2	3	2	0	4	2
•			0			5						2
Mvmt Flow	6	2	U	15	0	5	1	201	73	15	340	2
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	633	661	357	622	626	252	Major1 352	0	0	278	0	0
Stage 1	381	381	-	244	244	232	332	U	U	270	U	U
Stage 2	252	280	-	378	382	-	-	-	-	-	-	-
						6.2	4 1 2	-	-	4.1	-	-
Critical Hdwy	7.1	6.5	6.2	7.2	6.52		4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.2	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.2	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.59	4.018	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	395	385	692	388	401	792	1207	-	-	1296	-	-
Stage 1	645	617	-	742	704	-	-	-	-	-	-	-
Stage 2	757	683	-	628	613	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	381	374	681	379	389	781	1196	-	-	1291	-	-
Mov Cap-2 Maneuver	381	374	-	379	389	-	-	-	-	-	-	-
Stage 1	638	602	-	738	700	-	-	-	-	-	-	-
Stage 2	745	680	-	614	598	-	-	-	-	-	-	-
Annroach	רח			MD			ND			CD		
Approach	EB			WB			NB			SB		
HCM Control Delay, s	14.7			13.8			0			0.3		
HCM LOS	В			В								
Minor Lane/Major Mvmt		NBL	NBT	NRD	EBLn1	WRI n1	SBL	SBT	SBR			
Capacity (veh/h)		1196	ND1	NDIX	380	430	1291	JD1	JUN			
				-	0.021	0.047	0.011	-	-			
HCM Captrol Doloy (c)		0.001	-					-	-			
HCM Control Delay (s)		8	0	-	14.7	13.8	7.8	0	-			
HCM Lane LOS		A	Α	-	В	В	A	Α	-			
HCM 95th %tile Q(veh)		0	-	-	0.1	0.1	0	-	-			

	-	•	•	←	1	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ર્ન	W	
Traffic Volume (vph)	405	75	150	640	105	95
Future Volume (vph)	405	75	150	640	105	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979				0.936	
Flt Protected				0.991	0.974	
Satd. Flow (prot)	1845	0	0	1849	1700	0
Flt Permitted				0.991	0.974	
Satd. Flow (perm)	1845	0	0	1849	1700	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)			6			6
Peak Hour Factor	0.90	0.90	0.82	0.82	0.61	0.61
Heavy Vehicles (%)	1%	0%	1%	2%	0%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	139.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		LDIX	WDL			NDIX
Traffic Vol, veh/h	Љ 405	75	150	4	₩ 105	95
	405 405	75 75		640		
Future Vol, veh/h			150	640	105	95 4
Conflicting Peds, #/hr	0	0	- 6	_ 0	0	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	82	82	61	61
Heavy Vehicles, %	1	0	1	2	0	4
Mvmt Flow	450	83	183	780	172	156
Major/Minor	Malar1		Malara		Minor1	
	Major1		Major2		Minor1	F0.4
Conflicting Flow All	0	0	539	0	1644	504
Stage 1	-	-	-	-	498	-
Stage 2	-	-	-	-	1146	-
Critical Hdwy	-	-	4.11	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	1034	-	~ 111	564
Stage 1	-	-	-	-	615	-
Stage 2	_	_	_	_	306	-
Platoon blocked, %	_	_		_		
Mov Cap-1 Maneuver	_	_	1028	_	~ 76	558
Mov Cap-2 Maneuver			1020	_	~ 76	-
	-	-	-			-
Stage 1	-	-	-	-	611	-
Stage 2	-	-	-	-	210	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.8	(\$ 769.9	
HCM LOS					F	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		129	-	-	1028	-
HCM Lane V/C Ratio		2.542	-	-	0.178	-
HCM Control Delay (s)	\$	\$ 769.9	-	-	9.3	0
HCM Lane LOS		F	_	_	Α	Α
HCM 95th %tile Q(veh)		29.1	-	-	0.6	-
Notes						
. Valuma avasada sana	oltu d	Dolovi	oveoode	2000	· · Com	nutation

^{~:} Volume exceeds capacity

^{\$:} Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

	-	•	•	•	4	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			ર્ન	W	
Traffic Volume (vph)	470	3	16	750	15	38
Future Volume (vph)	470	3	16	750	15	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999				0.903	
Flt Protected				0.999	0.986	
Satd. Flow (prot)	1861	0	0	1877	1656	0
Flt Permitted				0.999	0.986	
Satd. Flow (perm)	1861	0	0	1877	1656	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	549			284	522	
Travel Time (s)	12.5			6.5	17.8	
Confl. Peds. (#/hr)		2	1		2	1
Peak Hour Factor	0.96	0.96	0.87	0.87	0.66	0.66
Heavy Vehicles (%)	2%	0%	6%	1%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	1.2					
•		EDD	WDI	WDT	NDI	MDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	₽.	_		र्स	, A	
Traffic Vol, veh/h	470	3	16	750	15	38
Future Vol, veh/h	470	3	16	750	15	38
Conflicting Peds, #/hr	0	2	1	0	2	1
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	96	96	87	87	66	66
Heavy Vehicles, %	2	0	6	1	0	3
Mymt Flow	490	3	18	862	23	58
IVIVIIIL FIOW	490	3	10	002	23	30
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	495	0	1394	495
Stage 1	-	_	-	-	494	-
Stage 2		_		-	900	-
Critical Hdwy	_	_	4.16	_	6.4	6.23
Critical Hdwy Stg 1			1.10	_	5.4	0.20
Critical Hdwy Stg 2	_	_	_	_	5.4	_
Follow-up Hdwy	_	_	2.254		3.5	3.327
Pot Cap-1 Maneuver	-	-	1048		158	573
Pol Cap-1 ivianeuvei	-	-	1048	-		
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	400	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1046	-	152	571
Mov Cap-2 Maneuver	-	-	-	-	152	-
Stage 1	-	-	-	-	616	-
Stage 2	-	_	-	-	386	-
J						
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		19.9	
HCM LOS	Ü		0.2		C	
HOW LOO					J	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		321	-	-	1046	-
HCM Lane V/C Ratio		0.25	-	-	0.018	-
HCM Control Delay (s)		19.9	-	-	8.5	0
•						
HCM Lane LOS HCM 95th %tile Q(veh)		C 1	-	-	A 0.1	Α

	-	•	•	•	4	-
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ»			र्स	W	
Traffic Volume (vph)	510	2	2	765	0	2
Future Volume (vph)	510	2	2	765	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1863	0	0	1881	1644	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1881	1644	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.94	0.94	0.87	0.87	0.25	0.25
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

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Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	LDI	WDL	- VIDT	NDL NDL	NUN
Traffic Vol, veh/h	510	2	2	₹ 4 765	T	2
Future Vol, veh/h	510	2	2	765	0	2
Conflicting Peds, #/hr	0	0	1	700	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	riee -	None	riee -	None	310p -	None
Storage Length	-	NOHE	-	None -	0	None
Veh in Median Storage, #		-	-	0	0	-
· ·						
Grade, %	0	- 0.4	-	0	0	-
Peak Hour Factor	94	94	87	87	25	25
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	543	2	2	879	0	8
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	546	0	1428	546
Stage 1	_	-	_	_	545	-
Stage 2	_	_	_	_	883	_
Critical Hdwy		_	4.1	_	6.4	6.2
Critical Hdwy Stg 1		_	7.1	_	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
	-	-	1033			
Pot Cap-1 Maneuver	-	-	1033	-	150	541
Stage 1	-	-	-	-	585	-
Stage 2	-	-	-	-	408	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1032	-	149	540
Mov Cap-2 Maneuver	-	-	-	-	149	-
Stage 1	-	-	-	-	584	-
Stage 2	-	-	-	-	406	-
Ŭ						
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		11.8	
HCM LOS	U		U		В	
LICIVI LOS					ט	
Minor Lang/Major Muset		NDI n1	ГПТ	EDD	WDI	WDT
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		540	-	-	1032	-
HCM Lane V/C Ratio		0.015	-	-	0.002	-
HCM Control Delay (s)		11.8	-	-	8.5	0
HCM Lane LOS		В	-	-	Α	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

2020 Existing Timing Plan: Weekday PM

4: Hunting Road/Gould Street & Highland Avenue

	۶	→	•	•	+	4	1	†	/	/	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ ∱≽		7	∱ ∱≽			4 75	ř 97	ሻ	4	
Traffic Volume (vph)	28	650	15	124	741	168	32		97	317	139	61
Future Volume (vph)	28	650	15	124	741	168	32	75	97	317	139	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	10	10	11	11
Storage Length (ft)	200		250	250		0	0		100	100		0
Storage Lanes	1		1	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.972				0.850		0.964	
Flt Protected	0.950			0.950				0.985		0.950	0.989	
Satd. Flow (prot)	1685	3413	0	1685	3090	0	0	1797	1492	1585	1639	0
Flt Permitted	0.950			0.950				0.985		0.950	0.000	
Satd. Flow (perm)	1685	3413	0	1685	3090	0	0	1797	1492	1585	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			20				111		10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.95	0.95	0.95	0.88	0.88	0.88	0.87	0.87	0.87	0.89	0.89	0.89
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Shared Lane Traffic (%)										18%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2		8	8	5 8	7	4	
Permitted Phases												
Detector Phase	1	6		5	2		8	8	5 8	7	4	
Switch Phase												
Minimum Initial (s)	4.0	10.0		6.0	20.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	9.0	15.0		11.0	25.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	35.0		35.0	59.0		17.0	17.0		41.0	41.0	
Total Split (%)	7.2%	22.9%		22.9%	38.6%		11.1%	11.1%		26.8%	26.8%	
Maximum Green (s)	6.0	30.0		30.0	54.0		12.0	12.0		36.0	36.0	
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	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												

Intersection Summary

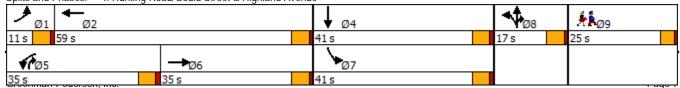
Area Type: Other

Cycle Length: 153

Actuated Cycle Length: 118.2

Natural Cycle: 105 Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Shared Lane Traffic (%)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	6.0
Minimum Split (s)	25.0
Total Split (s)	25.0
Total Split (%)	16%
Maximum Green (s)	21.0
Yellow Time (s)	3.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	2.0
	None
Walk Time (s)	6.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	0
Intersection Summary	

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	-		V			/		•
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	29	700	141	1033	123	111	292	289
v/c Ratio	0.37	0.67	0.69	0.80	0.70	0.24	0.60	0.57
Control Delay	71.0	39.9	68.6	35.7	75.2	7.5	43.0	40.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.0	39.9	68.6	35.7	75.2	7.5	43.0	40.2
Queue Length 50th (ft)	23	247	109	377	96	0	210	198
Queue Length 95th (ft)	57	333	175	450	#184	41	327	311
Internal Link Dist (ft)		1272		1244	601			383
Turn Bay Length (ft)	200		250			100	100	
Base Capacity (vph)	85	1039	430	1431	183	650	485	509
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	0.34	0.67	0.33	0.72	0.67	0.17	0.60	0.57
Intersection Summary								

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

	۶	→	•	•	←	•	1	†	/	/	+	✓
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	↑ ↑		7	∱ ∱			ર્ન	7	7	4	
Traffic Volume (vph)	28	650	15	124	741	168	32	75	97	317	139	61
Future Volume (vph)	28	650	15	124	741	168	32	75	97	317	139	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	10	10	11	11
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.97			1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (prot)	1685	3411		1685	3091			1797	1492	1585	1640	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.00	
Satd. Flow (perm)	1685	3411		1685	3091			1797	1492	1585	0	
Peak-hour factor, PHF	0.95	0.95	0.95	0.88	0.88	0.88	0.87	0.87	0.87	0.89	0.89	0.89
Adj. Flow (vph)	29	684	16	141	842	191	37	86	111	356	156	69
RTOR Reduction (vph)	0	1	0	0	12	0	0	0	83	0	7	0
Lane Group Flow (vph)	29	699	0	141	1021	0	0	123	28	292	282	0
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2		8	8	5 8	7	4	
Permitted Phases	0.4	00.0		440	10.1			44.5	00.0	0/0	010	
Actuated Green, G (s)	3.4	38.2		14.3	49.1			11.5	30.8	36.2	36.2	
Effective Green, g (s)	3.4	38.2		14.3	49.1			11.5	30.8	36.2	36.2	
Actuated g/C Ratio	0.03	0.32		0.12	0.41			0.10	0.26	0.30	0.30	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	200	2.0	2.0	
Lane Grp Cap (vph)	47	1084		200	1262			171	382	477	493	
v/s Ratio Prot	0.02	0.21		c0.08	c0.33			c0.07	0.02	c0.18	0.17	
v/s Ratio Perm	0.70	0.75		0.70	0.01			0.70	0.07	0 / 1	0.57	
v/c Ratio	0.62	0.65		0.70	0.81			0.72	0.07	0.61	0.57	
Uniform Delay, d1	57.8	35.2		50.9	31.4 1.00			52.8	33.9	36.0	35.5	
Progression Factor	1.00 15.7	1.00		1.00 8.9	3.7			1.00	1.00	1.00	1.00	
Incremental Delay, d2	73.5	1.0 36.2		59.8	3. <i>1</i> 35.1			11.4 64.2	0.0 33.9	1.6 37.6	1.0 36.5	
Delay (s) Level of Service	73.5 E	30.2 D		59.6 E	33.1 D			04.2 E	33.9 C	37.0 D	30.3 D	
Approach Delay (s)	L	37.7		L	38.1			49.8	C	D	37.0	
Approach LOS		37.7 D			36. I D			49.0 D			37.0 D	
		D			D			D			D	
Intersection Summary HCM 2000 Control Delay			38.8	Ш	CM 2000 L	oval of Car	nvico		D			
HCM 2000 Collifor Delay HCM 2000 Volume to Capacity ra	tio		38.8 0.77	П	JIVI ZUUU L	evel of Sel	IVICE		U			
Actuated Cycle Length (s)	แบ		120.2	Çı.	ım of lost t	ima (s)			24.0			
Intersection Capacity Utilization			65.8%		U Level of				24.0 C			
Analysis Period (min)			15	iC	O LCVCI UI	JUI AICE			C			
c Critical Lane Group			13									
c Chilical Lane Group												

	•	→	*	•	—	•	4	†	~	/	Ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4	7		4			4	
Traffic Volume (vph)	0	0	28	30	1	18	7	225	12	5	580	6
Future Volume (vph)	0	0	28	30	1	18	7	225	12	5	580	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.993			0.999	
Flt Protected					0.953			0.998				
Satd. Flow (prot)	0	1611	0	0	1775	1583	0	1846	0	0	1861	0
Flt Permitted					0.953			0.998				
Satd. Flow (perm)	0	1611	0	0	1775	1583	0	1846	0	0	1861	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.75	0.75	0.75	0.72	0.72	0.72	0.92	0.92	0.92	0.86	0.86	0.86
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			र्स	7		4			4	
Traffic Vol, veh/h	0	0	28	30	1	18	7	225	12	5	580	6
Future Vol, veh/h	0	0	28	30	1	18	7	225	12	5	580	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	- -	None	-	-	None	-	-	None
Storage Length	_	_	-	_	_	0	_	_	-	_	_	-
Veh in Median Storage,	# -	0	_	_	0	-	_	0	_	_	0	_
Grade, %	. "	0	_	_	0	_	_	0	_	_	0	
Peak Hour Factor	75	75	75	72	72	72	92	92	92	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mymt Flow	0	0	37	42	1	25	8	245	13	6	674	7
IVIVITIL FIUW	U	U	31	42	'	23	0	240	13	Ü	0/4	1
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	971	964	678	976	961	252	681	0	0	258	0	0
Stage 1	690	690	-	268	268	-	-	-	-		-	-
Stage 2	281	274	_	708	693	_	_	_	_	_		_
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	_	_	4.12	_	_
Critical Hdwy Stg 1	6.12	5.52	- 0.22	6.12	5.52	0.22	1.12		_	1.12	_	
Critical Hdwy Stg 2	6.12	5.52	_	6.12	5.52	_			_		_	
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218			2.218		
Pot Cap-1 Maneuver	232	255	452	230	256	787	912	_		1307		-
Stage 1	435	446	432	738	687	101	712	-	-	1307	-	-
Stage 2	726	683	-	426	445	-	-	-	-	-	-	-
Platoon blocked, %	120	003	-	420	440	-	-	-	-	-	-	-
· ·	221	251	452	208	252	787	912	-	-	1307	-	-
Mov Cap-1 Maneuver		251			252	/8/	912	-	-	1307	-	-
Mov Cap-2 Maneuver	221		-	208		-	-	-	-	-	-	-
Stage 1	431	443	-	731	680	-	-	-	-	-	-	-
Stage 2	694	676	-	388	442	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.7			20.4			0.3			0.1		
HCM LOS	13.7 B			20.4 C			0.3			0.1		
1.5101 2.05	D			J								
Minor Lane/Major Mvmt	t	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)		912	-	-	452	209	787	1307	-	-		
HCM Lane V/C Ratio		0.008	_	_	0.083	0.206	0.032	0.004	_	_		
HCM Control Delay (s)		9	0	_	13.7	26.6	9.7	7.8	0	_		
HCM Lane LOS		Á	Ā	_	В	D	A	A	Ā	_		
HCM 95th %tile Q(veh)		0	-	_	0.3	0.8	0.1	0	-	-		

	•	•	†	~	\	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		f)			ર્ન
Traffic Volume (vph)	27	17	245	6	6	470
Future Volume (vph)	27	17	245	6	6	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.947		0.997			
Flt Protected	0.970					0.999
Satd. Flow (prot)	1745	0	1894	0	0	1792
Flt Permitted	0.970					0.999
Satd. Flow (perm)	1745	0	1894	0	0	1792
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.81	0.81	0.75	0.75	0.73	0.73
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Other

Intersection						
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥	WDI	<u>₩</u>	INDIN	JDL	<u> </u>
Traffic Vol, veh/h	27	17	245	6	6	470
Future Vol, veh/h	27	17	245	6	6	470
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	Stop	•	riee -		riee -	
	-	None		None		None
Storage Length	0	-	-	-	-	0
Veh in Median Storage,		-	0	-	-	
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	75	75	73	73
Heavy Vehicles, %	0	0	0	0	0	6
Mvmt Flow	33	21	327	8	8	644
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	991	331	0	0	335	0
Stage 1	331	-	-	-	-	-
Stage 2	660	-	_	_	_	-
Critical Hdwy	6.4	6.2	_	_	4.1	_
Critical Hdwy Stg 1	5.4	-				
Critical Hdwy Stg 2	5.4	_			_	_
Follow-up Hdwy	3.5	3.3			2.2	
Pot Cap-1 Maneuver	275	715	_	_	1236	_
	732		-	-	1230	-
Stage 1		-	-	-	-	-
Stage 2	518	-	-	-	-	-
Platoon blocked, %	.=.		-	-		-
Mov Cap-1 Maneuver	272	715	-	-	1236	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	732	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	16.8		0		0.1	
HCM LOS	С		,			
200	ŭ					
Minor Lane/Major Mvmt		NBT	NDD I	WBLn1	SBL	SBT
		INDI				
Capacity (veh/h)		-	-	358	1236	-
HCM Lane V/C Ratio		-	-	0.152	0.007	-
HCM Control Delay (s)		-	-	16.8	7.9	0
HCM Lane LOS		-	-	C	A	Α
HCM 95th %tile Q(veh)		-	-	0.5	0	-

	•	•	†	~	>	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		₽			4
Traffic Volume (vph)	9 0	19	200	42	10	265
Future Volume (vph)	90	19	200	42	10	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.976		0.976			
Flt Protected	0.960					0.998
Satd. Flow (prot)	1766	0	1818	0	0	1896
Flt Permitted	0.960					0.998
Satd. Flow (perm)	1766	0	1818	0	0	1896
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Confl. Peds. (#/hr)	1	1		1	1	
Peak Hour Factor	0.80	0.80	0.90	0.90	0.66	0.66
Heavy Vehicles (%)	1%	0%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Other

Intersection						
Int Delay, s/veh	2.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
		WBK		INDR	SBL	
Lane Configurations	M	10	1	40	10	्रद्
Traffic Vol, veh/h	90	19	200	42	10	265
Future Vol, veh/h	90	19	200	42	10	265
Conflicting Peds, #/hr	1	1	0	1	1	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	80	80	90	90	66	66
Heavy Vehicles, %	1	0	2	2	0	0
Mvmt Flow	113	24	222	47	15	402
WIVIII I IOW	113	24	222	47	13	402
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	680	248	0	0	270	0
Stage 1	247	-	-	-	-	-
Stage 2	433	-	-	-	-	-
Critical Hdwy	6.41	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.41	_	-	-	_	-
Critical Hdwy Stg 2	5.41	_	_	_	_	_
Follow-up Hdwy	3.509	3.3	_	_	2.2	_
Pot Cap-1 Maneuver	418	796			1305	
Stage 1	796	770	-	-	1303	-
		-	-	-	-	-
Stage 2	656	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	411	794	-	-	1304	-
Mov Cap-2 Maneuver	411	-	-	-	-	-
Stage 1	795	-	-	-	-	-
Stage 2	646	-	-	-	-	-
-						
Approach	WB		NB		SB	
HCM Control Delay, s	16.5		0		0.3	
HCM LOS	10.5 C		U		0.5	
HOW LOS	C					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		_	-	449	1304	-
HCM Lane V/C Ratio		_	_	0.303	0.012	_
HCM Control Delay (s)		_	_	16.5	7.8	0
HCM Lane LOS		_	_	C	Α.	A
HCM 95th %tile Q(veh)		_	_	1.3	0	
HOW FOUT MINE Q(VEII)		-	-	1.3	U	-

	•	→	•	•	←	4	4	†	/	/	ļ	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	1	0	0	50	0	2	0	195	21	1	220	0
Future Volume (vph)	1	0	0	50	0	2	0	195	21	1	220	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.994			0.987				
Flt Protected		0.950			0.954							
Satd. Flow (prot)	0	1805	0	0	1802	0	0	1842	0	0	1827	0
Flt Permitted		0.950			0.954							
Satd. Flow (perm)	0	1805	0	0	1802	0	0	1842	0	0	1827	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Peak Hour Factor	0.25	0.25	0.25	0.76	0.76	0.76	0.83	0.83	0.83	0.66	0.66	0.66
Heavy Vehicles (%) Shared Lane Traffic (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Int Delay, s/Neh													
Movement	Intersection	4.1											
Lane Configurations	ını Delay, s/veh												
Traffic Vol, veh/h		EBL		EBR	WBL		WBR	NBL		NBR	SBL		SBR
Future Vol, veh/h Conflicting Peds, #hr Slop Slop Slop Slop Slop Slop Slop Slop	Lane Configurations		4			4			- 43→			4	
Conflicting Peds, #/hr		1	0	0	50	0		0	195	21	1	220	0
Sign Control Stop Stop													
RT Channelized - None			-					3		3	2	0	2
Storage Length		Stop	Stop	Stop	Stop	Stop	Stop	Free	Free		Free	Free	Free
Veh in Median Storage, # - 0 - - 0 - - 0 - - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 <td></td> <td>-</td> <td>-</td> <td>None</td> <td>-</td> <td>-</td> <td>None</td> <td>-</td> <td>-</td> <td>None</td> <td>-</td> <td>-</td> <td>None</td>		-	-	None	-	-	None	-	-	None	-	-	None
Grade, % - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -		-	-	-	-	-	-	-	-	-	-	-	-
Peak Hour Factor 25 25 25 25 76 76 76 83 83 83 66 66 66 Heavy Vehicles, % 0 </td <td></td> <td># -</td> <td>0</td> <td>-</td> <td>-</td> <td>0</td> <td>-</td> <td>-</td> <td>0</td> <td>-</td> <td>-</td> <td>0</td> <td>-</td>		# -	0	-	-	0	-	-	0	-	-	0	-
Heavy Vehicles, %		-	0	-	-	0	-	-	0	-	-	0	-
Mymf Flow 4 0 0 66 0 3 0 235 25 2 333 0 Major/Minor Minor1 Minor1 Major1 Major2 Conflicting Flow All 591 603 3339 591 591 253 336 0 0 263 0 0 Stage 1 340 340 - 251 251 251 -		25	25		76	76	76	83		83	66	66	66
Major/Minor Minor2 Minor1 Major1 Major2 Major2	Heavy Vehicles, %	0	0	0	0	0	0	0	2		0	4	0
Conflicting Flow All S91 603 339 S91 S91 253 336 0 0 263 0 0	Mvmt Flow	4	0	0	66	0	3	0	235	25	2	333	0
Conflicting Flow All 591 603 339 591 591 253 336 0 0 263 0 0 Stage 1 340 340 - 251 251													
Stage 1													
Stage 2 251 263 - 340 340 - - - - - -				339			253	336	0	0	263	0	0
Critical Hdwy 7.1 6.5 6.2 7.1 6.5 6.2 4.1 - 4.1 - - 4.1 - - 4.1 - - 4.1 - - 4.1 - - 4.1 - - 4.1 - - 4.1 - - 4.1 - - <t< td=""><td></td><td></td><td></td><td>-</td><td></td><td></td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></t<>				-			-	-	-	-	-	-	-
Critical Hdwy Stg 1 6.1 5.5 - 6.1 5.5 -		251		-	340	340	-	-	-	-	-	-	-
Critical Hdwy Stg 2 6.1 5.5 - 6.1 5.5 -	Critical Hdwy	7.1		6.2	7.1		6.2	4.1	-	-	4.1	-	-
Follow-up Hdwy 3.5 4 3.3 3.5 4 3.3 2.2 - 2.2 - 2.2 - Pot Cap-1 Maneuver 422 416 708 422 422 791 1235 - 13113 - Stage 1 679 643 - 758 703				-	6.1	5.5	-	-	-	-	-	-	-
Pot Cap-1 Maneuver			5.5	-	6.1	5.5	-	-	-	-	-	-	-
Stage 1 679 643 - 758 703 -			4	3.3					-	-		-	-
Stage 2 758 694 - 679 643 -	Pot Cap-1 Maneuver	422	416	708	422	422	791	1235	-	-	1313	-	-
Platoon blocked, %	Stage 1	679	643	-	758	703	-	-	-	-	-	-	-
Mov Cap-1 Maneuver 418 413 704 419 419 787 1231 - - 1309 - - Mov Cap-2 Maneuver 418 413 - 419 419 -	Stage 2	758	694	-	679	643	-	-	-	-	-	-	-
Mov Cap-2 Maneuver 418 413 - 419 419 - </td <td>Platoon blocked, %</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td></td> <td>-</td> <td>-</td>	Platoon blocked, %								-	-		-	-
Stage 1 677 640 - 756 701 -	Mov Cap-1 Maneuver	418	413	704	419		787	1231	-	-	1309	-	-
Stage 2 754 692 - 676 640 -		418	413	-	419		-	-	-	-	-	-	-
Approach EB WB NB SB HCM Control Delay, s HCM LOS 13.7 BB 15 C 0 0 Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR SBT SBR Capacity (veh/h) 1231 - 418 427 1309 - HCM Lane V/C Ratio - HCM Control Delay (s) - 0.01 0.16 0.001 - HCM 0.0		677	640	-	756	701	-	-	-	-	-	-	-
HCM Control Delay, s	Stage 2	754	692	-	676	640	-	-	-	-	-	-	-
HCM Control Delay, s 13.7 15 0 0	Annroach	ED			\M/D			MD			C D		
Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1231 - - 418 427 1309 - - HCM Lane V/C Ratio - - - 0.01 0.16 0.001 - - HCM Control Delay (s) 0 - - 13.7 15 7.8 0 - HCM Lane LOS A - - B C A A -													
Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1231 - - 418 427 1309 - - HCM Lane V/C Ratio - - - 0.01 0.16 0.001 - - HCM Control Delay (s) 0 - - 13.7 15 7.8 0 - HCM Lane LOS A - B C A A -	•							U			U		
Capacity (veh/h) 1231 418 427 1309 HCM Lane V/C Ratio 0.01 0.16 0.001 HCM Control Delay (s) 0 - 13.7 15 7.8 0 HCM Lane LOS A - B C A A -	HCIVI LUS	В			C								
Capacity (veh/h) 1231 418 427 1309 HCM Lane V/C Ratio 0.01 0.16 0.001 HCM Control Delay (s) 0 13.7 15 7.8 0 HCM Lane LOS A - B C A A -	Minor Lane/Major Mvmt		NBL	NBT	NBR	EBLn1 \	WBLn1	SBL	SBT	SBR			
HCM Lane V/C Ratio - - - 0.01 0.16 0.001 - - HCM Control Delay (s) 0 - - 13.7 15 7.8 0 - HCM Lane LOS A - - B C A A -			1231	-	-			1309	_	-			
HCM Control Delay (s) 0 13.7 15 7.8 0 - HCM Lane LOS A - B C A A -			_	-	-				_	-			
HCM Lane LOS A B C A A -			0	-	-				0	-			
				_	_					_			
	HCM 95th %tile Q(veh)		0	-	_	0	0.6	0	-	_			

	-	•	•	•	•	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			र्स	W	
Traffic Volume (vph)	718	210	105	298	77	116
Future Volume (vph)	718	210	105	298	77	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.969				0.919	
Flt Protected				0.987	0.980	
Satd. Flow (prot)	1805	0	0	1802	1652	0
Flt Permitted				0.987	0.980	
Satd. Flow (perm)	1805	0	0	1802	1652	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)		2	2		2	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	7%	3%	3%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					

Intersection						
Int Delay, s/veh	20					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
		EBR	WBL			NBK
Lane Configurations	}	010	105	4	77	11/
Traffic Vol, veh/h	718	210	105	298	//	116
Future Vol, veh/h	718	210	105	298	77	116
Conflicting Peds, #/hr	0	2	2	0	2	2
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	7	3	3	4
Mymt Flow	780	228	114	324	84	126
IVIVIIIL I IOW	700	220	114	324	04	120
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1010	0	1450	898
Stage 1	_	_		_	896	-
Stage 2	_	_	_	_	554	_
Critical Hdwy			4.17	_	6.43	6.24
Critical Hdwy Stg 1	_	_	4.17	_	5.43	0.24
	-	-		-		
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.263	-	3.527	3.336
Pot Cap-1 Maneuver	-	-	667	-	143	335
Stage 1	-	-	-	-	397	-
Stage 2	-	-	-	-	574	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	666	-	113	334
Mov Cap-2 Maneuver	-	_	-	_	113	-
Stage 1	_	_	_	_	396	_
Stage 2	_	_	_	_	453	_
Jiaye Z	-	-	-	-	400	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		3		151.7	
HCM LOS					F	
					•	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		188	-	-	666	-
HCM Lane V/C Ratio		1.116	-	-	0.171	-
HCM Control Delay (s)		151.7	_	_	11.5	0
HCM Lane LOS		F	_	_	В	Ā
HCM 95th %tile Q(veh)		10.3	_	_	0.6	-
1101V1 70111 701110 Q(VOII)		10.5	·		0.0	

	-	•	•	•	4	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ર્ન	W	
Traffic Volume (vph)	840	6	18	359	8	24
Future Volume (vph)	840	6	18	359	8	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999				0.900	
Flt Protected				0.998	0.987	
Satd. Flow (prot)	1858	0	0	1810	1688	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1858	0	0	1810	1688	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	549			284	522	
Travel Time (s)	12.5			6.5	17.8	
Confl. Peds. (#/hr)		3	2		3	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	20%	0%	5%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	0.7					
-		EDD	WDI	WDT	NDI	MDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	\$,	40	्रदी	¥	0.4
Traffic Vol, veh/h	840	6	18	359	8	24
Future Vol, veh/h	840	6	18	359	8	24
Conflicting Peds, #/hr	0	3	2	0	3	2
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	20	0	5	0	0
Mvmt Flow	913	7	20	390	9	26
WWITH FIOW	913	1	20	390	9	20
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	923	0	1353	922
Stage 1	-	-	-	_	920	-
Stage 2	_	_	_	_	433	_
Critical Hdwy	_	_	4.1	_	6.4	6.2
Critical Hdwy Stg 1			7.1		5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
	-	-	2.2	-		
Follow-up Hdwy	-	-		-	3.5	3.3
Pot Cap-1 Maneuver	-	-	748	-	167	330
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	658	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	746	-	160	328
Mov Cap-2 Maneuver	-	-	-	_	160	-
Stage 1	_	_	_	_	391	_
Stage 2	_	_	_	_	634	_
Juge 2					001	
Approach	EB		WB		NB	
Approach						
HCM Control Delay, s	0		0.5		21	
HCM LOS					С	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		260	_		746	-
HCM Lane V/C Ratio		0.134	_	_	0.026	_
HCM Control Delay (s)		21	-	-	10	0
			-	-		
HCM Lane LOS		С	-	-	Α	Α
HCM 95th %tile Q(veh)		0.5	-	-	0.1	-

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	î,			4	W	
Traffic Volume (vph)	867	0	1	376	2	6
Future Volume (vph)	867	0	1	376	2	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.895	
Flt Protected					0.989	
Satd. Flow (prot)	1863	0	0	1827	1455	0
Flt Permitted					0.989	
Satd. Flow (perm)	1863	0	0	1827	1455	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	4%	0%	20%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	4			4		
Traffic Vol, veh/h	867	0	1	376	¥ 2	6
Future Vol, veh/h	867	0	1	376	2	6
Conflicting Peds, #/hr	0	0	1	0	0	1
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	1100	None	-	None	- -	None
Storage Length	-	NONE	-	NONE -	0	INOITE
Veh in Median Storage, #	0		-	0	0	-
•						
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	4	0	20
Mvmt Flow	942	0	1	409	2	7
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	943	0	1354	944
Stage 1	U	U	743	U	943	744
	-	-	-	-	411	-
Stage 2	-	-	4.1	-		
Critical Hdwy	-	-	4.1	-	6.4	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.48
Pot Cap-1 Maneuver	-	-	736	-	167	294
Stage 1	-	-	-	-	382	-
Stage 2	_	-	-	_	674	-
Platoon blocked, %	_	-		-		
Mov Cap-1 Maneuver	_	_	735	_	166	293
Mov Cap-2 Maneuver	_	_	, 55	_	166	275
Stage 1	-	-	-	_	382	_
	-	-	-	-		-
Stage 2	-	-	-	-	673	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		20.2	
HCM LOS	ŭ		J		C	
TIOW LOO					J	
Minor Lanc/Major Mumi		MDI 51	EDT	EDD	WDI	WDT
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		246	-	-	735	-
HCM Lane V/C Ratio		0.035	-	-	0.001	-
HCM Control Delay (s)		20.2	-	-	9.9	0
HCM Lane LOS		С	-	-	Α	Α
HCM 95th %tile Q(veh)		0.1	-	-	0	-
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Timing Plan: Weekday AM

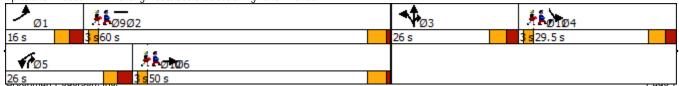
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ħβ		*	ħβ			ર્ન	7	7	4	
Traffic Volume (vph)	106	841	18	44	615	413	30	235	240	172	66	30
Future Volume (vph)	106	841	18	44	615	413	30	235	240	172	66	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	11	11	11	11
Storage Length (ft)	175		0	165		0	0		100	100		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.940				0.850		0.966	
Flt Protected	0.950			0.950				0.994		0.950	0.986	
Satd. Flow (prot)	1636	3411	0	1668	3222	0	0	1810	1546	1564	1619	0
Flt Permitted	0.950			0.950				0.994		0.950	0.986	
Satd. Flow (perm)	1636	3411	0	1668	3222	0	0	1810	1546	1564	1619	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			141				134		9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Shared Lane Traffic (%)										22%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Detector Phase	1	6		5	2		3	3	3 5	4	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)	12.0	15.0		12.0	15.0		12.0	12.0		12.0	12.0	
Total Split (s)	16.0	50.0		26.0	60.0		26.0	26.0		29.5	29.5	
Total Split (%)	11.6%	36.4%		18.9%	43.6%		18.9%	18.9%		21.5%	21.5%	
Maximum Green (s)	10.0	45.0		20.0	55.0		20.0	20.0		23.5	23.5	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Lead/Lag	Lead			Lead			Lead	Lead				
Lead-Lag Optimize?	Yes			Yes			Yes	Yes				
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	
Intersection Summary												

Intersection Summary

Area Type: Other Cycle Length: 137.5 Actuated Cycle Length: 111.1

Natural Cycle: 90 Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type	0	10	11
Protected Phases Permitted Phases	9	10	11
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	3.0 2%	3.0 2%	3.0 2%
Maximum Green (s)	2% 1.0	2% 1.0	2% 1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
Recall Mode	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
• •			·
Intersection Summary			

2030 No-Build Timing Plan: Weekday AM

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			▼			/		▼
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	115	934	48	1117	288	261	146	146
v/c Ratio	0.77	0.71	0.39	0.88	0.87	0.53	0.69	0.64
Control Delay	84.0	32.9	63.3	37.4	71.8	14.4	64.8	57.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.0	32.9	63.3	37.4	71.8	14.4	64.8	57.9
Queue Length 50th (ft)	80	280	33	333	197	46	103	95
Queue Length 95th (ft)	#233	448	84	507	#476	115	205	195
Internal Link Dist (ft)		1272		1244	601			383
Turn Bay Length (ft)	175		165			100	100	
Base Capacity (vph)	150	1473	306	1700	332	653	338	357
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	0.77	0.63	0.16	0.66	0.87	0.40	0.43	0.41
Intersection Summary								

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ î≽		7	ħβ			र्स	7	ሻ	4	
Traffic Volume (vph)	106	841	18	44	615	413	30	235	240	172	66	30
Future Volume (vph)	106	841	18	44	615	413	30	235	240	172	66	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.94			1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (prot)	1636	3410		1668	3221			1810	1546	1564	1619	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (perm)	1636	3410		1668	3221			1810	1546	1564	1619	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	115	914	20	48	668	449	33	255	261	187	72	33
RTOR Reduction (vph)	0	1	0	0	88	0	0	0	99	0	8	0
Lane Group Flow (vph)	115	933	0	48	1029	0	0	288	162	146	138	0
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	10.2	42.9		8.2	40.9			20.4	28.6	15.1	15.1	
Effective Green, g (s)	10.2	42.9		8.2	40.9			20.4	28.6	15.1	15.1	
Actuated g/C Ratio	0.09	0.39		0.07	0.37			0.19	0.26	0.14	0.14	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	152	1334		124	1201			336	403	215	223	
v/s Ratio Prot	c0.07	0.27		0.03	c0.32			c0.16	0.10	c0.09	0.09	
v/s Ratio Perm												
v/c Ratio	0.76	0.70		0.39	0.86			0.86	0.40	0.68	0.62	
Uniform Delay, d1	48.5	27.9		48.3	31.6			43.2	33.4	44.9	44.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	17.2	1.3		0.7	6.0			18.3	0.2	6.5	3.6	
Delay (s)	65.7	29.3		49.0	37.6			61.5	33.7	51.5	48.1	
Level of Service	Ε	С		D	D			Ε	С	D	D	
Approach Delay (s)		33.2			38.1			48.3			49.8	
Approach LOS		С			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			39.4	H	CM 2000 L	evel of Se	rvice		D			
HCM 2000 Volume to Capacity	ratio		0.85									
Actuated Cycle Length (s)			109.6	Su	ım of lost t	ime (s)			27.0			
Intersection Capacity Utilization			76.7%	IC	U Level of	Service			D			
Analysis Period (min)			15									
c Critical Lane Group												
v/s Ratio Perm v/c Ratio Uniform Delay, d1 Progression Factor Incremental Delay, d2 Delay (s) Level of Service Approach Delay (s) Approach LOS Intersection Summary HCM 2000 Control Delay HCM 2000 Volume to Capacity Actuated Cycle Length (s) Intersection Capacity Utilization Analysis Period (min)	0.76 48.5 1.00 17.2 65.7 E	0.70 27.9 1.00 1.3 29.3 C	0.85 109.6 76.7%	0.39 48.3 1.00 0.7 49.0 D	0.86 31.6 1.00 6.0 37.6 D 38.1 D	ime (s)	rvice	0.86 43.2 1.00 18.3 61.5 E 48.3	0.40 33.4 1.00 0.2 33.7 C	0.68 44.9 1.00 6.5 51.5	0.62 44.5 1.00 3.6 48.1 D	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4	7		4			4	
Traffic Volume (vph)	0	0	5	24	0	15	17	342	40	19	298	2
Future Volume (vph)	0	0	5	24	0	15	17	342	40	19	298	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.987			0.999	
Flt Protected					0.950			0.998			0.997	
Satd. Flow (prot)	0	1611	0	0	1770	1583	0	1835	0	0	1855	0
Flt Permitted					0.950			0.998			0.997	
Satd. Flow (perm)	0	1611	0	0	1770	1583	0	1835	0	0	1855	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			र्स	7		4			4	
Traffic Vol, veh/h	0	0	5	24	0	15	17	342	40	19	298	2
Future Vol, veh/h	0	0	5	24	0	15	17	342	40	19	298	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized			None			None	-	-	None	-	-	None
Storage Length	-	_	-	-	-	0	-	_	-	-	-	_
Veh in Median Storage,	# -	0	-	_	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	_
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	5	26	0	16	18	372	43	21	324	2
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	805	818	325	800	798	394	326	0	0	415	0	0
Stage 1	367	367	-	430	430	-	-	-	-	-	-	-
Stage 2	438	451	_	370	368	_		_	_	_	_	_
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	_	_	4.12	_	_
Critical Hdwy Stg 1	6.12	5.52	0.22	6.12	5.52	0.22	1.12	_	_	1.12	_	_
Critical Hdwy Stg 2	6.12	5.52	_	6.12	5.52	_	_	_	_	_	_	_
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	_	_	2.218	_	_
Pot Cap-1 Maneuver	301	311	716	303	319	655	1234	_	_	1144	_	_
Stage 1	653	622	-	603	583	-	1201	_	_		_	_
Stage 2	597	571	_	650	621	_	_		_	_		
Platoon blocked, %	371	371	-	000	UZI	-	-	_	-	-	_	-
Mov Cap-1 Maneuver	284	298	716	291	306	655	1234	_	_	1144	_	_
Mov Cap-1 Maneuver	284	298	710	291	306	-	1207	_	_		_	_
Stage 1	641	608	_	592	572	_	_	_		_	_	_
Stage 2	571	560	_	631	607	_	_	_	_	_	_	_
Jugo Z	371	300		001	507		-	·			·	
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.1			15.5			0.3			0.5		
HCM LOS	В			С			0.0			0.0		
200	D			J								
Minor Lane/Major Mvmt		NBL	NBT	NRR	FRI n1	WBLn1	WRI n2	SBL	SBT	SBR		
Capacity (veh/h)		1234	-	HOIL	716	291	655	1144	ODI	CDIN		
HCM Lane V/C Ratio		0.015	-	-	0.008	0.09	0.025	0.018	-	-		
HCM Control Delay (s)		0.013	0	-	10.1	18.6	10.6	8.2	0	-		
HCM Lane LOS		A	A	-	10.1 B	10.0 C	10.6 B	0.2 A	A	-		
HCM 95th %tile Q(veh)		0	Α -	-	0	0.3	0.1	0.1	Α -	-		
HOW FOUT WITH Q(VEN)		U	-	-	U	0.3	U. I	U. I	-	-		

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Lane Group	v WBL	WBR	• NBT	• NBR	SBL	SBT
Lane Configurations	W		î,			र्स
Traffic Volume (vph)	14	12	414	47	20	265
Future Volume (vph)	14	12	414	47	20	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.937		0.986			
Flt Protected	0.974					0.996
Satd. Flow (prot)	1734	0	1837	0	0	1841
Flt Permitted	0.974					0.996
Satd. Flow (perm)	1734	0	1837	0	0	1841
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	2%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Intersection						
Int Delay, s/veh	0.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		<u>₩</u>		UDL	4
Traffic Vol, veh/h	14	12	414	47	20	265
Future Vol, veh/h	14	12	414	47	20	265
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
Grade, %	0	_	0	_	_	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	0	3
Mymt Flow	15	13	450	51	22	288
WWW. LOW	13	13	700	51	~~	200
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	808	476	0	0	501	0
Stage 1	476	-	-	-	-	-
Stage 2	332	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	353	593	-	-	1074	-
Stage 1	629	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	345	593	-	-	1074	-
Mov Cap-2 Maneuver	345	-	-	-	-	_
Stage 1	629	_	_	_	_	_
Stage 2	713	_	_	_	_	_
Olago Z	, 13					
Approach	WB		NB		SB	
HCM Control Delay, s	14		0		0.6	
HCM LOS	B		U		0.0	
HOW LUS	D					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	428	1074	-
HCM Lane V/C Ratio		-	-	0.066	0.02	-
HCM Control Delay (s)		-	-	14	8.4	0
HCM Lane LOS		-	-	В	Α	Α
HCM 95th %tile Q(veh)		-	-	0.2	0.1	-

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	M		f)			ર્ન
Traffic Volume (vph)	32	10	249	66	22	287
Future Volume (vph)	32	10	249	66	22	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.968		0.972			
Flt Protected	0.963					0.996
Satd. Flow (prot)	1601	0	1807	0	0	1808
Flt Permitted	0.963					0.996
Satd. Flow (perm)	1601	0	1807	0	0	1808
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	2%	3%	0%	5%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Intersection						
Int Delay, s/veh	1.2					
•	WBL	WBR	NBT	NBR	SBL	SBT
Movement Lang Configurations		WDK		INDK	SBL	
Lane Configurations	¥	10	}	//	22	4
Traffic Vol, veh/h	32	10	249	66	22	287
Future Vol, veh/h	32	10	249	66	22	287
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, %	14	0	2	3	0	5
Mymt Flow	35	11	271	72	24	312
IVIVIIIL I IOW	33	11	2/1	12	24	312
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	667	307	0	0	343	0
Stage 1	307	-	-	-	-	-
Stage 2	360	_	_	_	_	_
Critical Hdwy	6.54	6.2			4.1	
Critical Hdwy Stg 1	5.54	-			7.1	
	5.54		-	-	-	-
Critical Hdwy Stg 2		-	-	-	-	-
Follow-up Hdwy	3.626	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	406	738	-	-	1227	-
Stage 1	720	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	396	738	-	-	1227	-
Mov Cap-2 Maneuver	396	-	-	-	-	-
Stage 1	720	_	_	_	_	_
Stage 2	664	_				_
Stage 2	004					
Approach	WB		NB		SB	
HCM Control Delay, s	14		0		0.6	
HCM LOS	В					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	445	1227	-
HCM Lane V/C Ratio		_	_	0.103	0.019	_
HCM Control Delay (s)		_	_	14	8	0
HCM Lane LOS		-	-	B	A	A
		-	-			
HCM 95th %tile Q(veh)		-	-	0.3	0.1	-

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	4	1	0	11	0	3	1	182	66	13	304	2
Future Volume (vph)	4	1	0	11	0	3	1	182	66	13	304	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.973			0.964			0.999	
Flt Protected		0.962			0.962						0.998	
Satd. Flow (prot)	0	1828	0	0	1647	0	0	1783	0	0	1824	0
Flt Permitted		0.962			0.962						0.998	
Satd. Flow (perm)	0	1828	0	0	1647	0	0	1783	0	0	1824	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	10		6			4	10		4			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	10%	2%	0%	2%	3%	2%	0%	4%	2%
Shared Lane Traffic (%) Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Intersection Int Delay, s/Neh 0.6														
Movement EBL EBT EBR WBL WBT WBR NBL NBT NBR SBL SBT SBR Lane Configurations Traffic Vol, veh/h 4														
Lane Configurations	Int Delay, s/veh	0.6												
Traffic Vol, veh/h	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Traffic Vol, veh/h	Lane Configurations		43-			43-			43-			43-		
Conflicting Peds, #/hr 10 Stop Stop Stop Stop Stop Stop Stop Stop Free Free	Traffic Vol, veh/h	4		0	11	0	3	1	182	66	13		2	
Sign Control Stop	4	1	0	11	0		1		66		304			
Sign Control Stop Free Free Free Free Free Free Free RT Channelized None None None - None		10	0		0	0				4		0		
RT Channelized	J .		Stop	Stop	Stop	Stop	Stop	Free		Free	Free	Free	Free	
Storage Length			-											
Veh in Median Storage, # - 0 - - 0 - - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - Page Page Page Page Page Page Page Page		_	_		_	_		_	_	-	_	_	-	
Grade, % - 0 - - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 92 82 92 92 82 82 92		# -	0	_	_	0	_	_	0	_	-	0	_	
Peak Hour Factor	•			_	_		_	_		_	_		_	
Heavy Vehicles, %	·	92		92	92		92	92		92	92		92	
Major/Minor Minor2 Minor1 Major1 Major2 Major4 0 0 0 0 0 0 0 0 0														
Major/Minor Minor2 Minor1 Major1 Major2	•													
Conflicting Flow All 617 645 347 606 610 248 342 0 0 274 0 0 Stage 1 369 369 - 240 240	IVIVIII I IOVV	7	ı	J	12	U	3	'	170	12	17	550	۷	
Conflicting Flow All 617 645 347 606 610 248 342 0 0 274 0 0 Stage 1 369 369 - 240 240	Major/Minor	Minor2			Minor1			Maior1			Maior2			
Stage 1 369 369 - 240 240 - - - - - - - - -			645			610			0			0	0	_
Stage 2 248 276 - 366 370 - - -	•								-	-		-	-	
Critical Hdwy 7.1 6.5 6.2 7.2 6.52 6.2 4.12 - 4.1 - - Critical Hdwy Stg 1 6.1 5.5 - 6.2 5.52 -	3						_	_	_	_	_	_	_	
Critical Hdwy Stg 1 6.1 5.5 - 6.2 5.52 - <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>4 12</td><td>_</td><td>_</td><td>41</td><td>_</td><td>_</td><td></td></th<>								4 12	_	_	41	_	_	
Critical Hdwy Stg 2 6.1 5.5 - 6.2 5.52 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -								1.12	_	_		_	_	
Follow-up Hdwy 3.5 4 3.3 3.59 4.018 3.3 2.218 - 2.2 Pot Cap-1 Maneuver 405 393 701 398 409 796 1217 - 1301 Stage 1 655 624 - 746 707							_		_	_		_	_	
Pot Cap-1 Maneuver							3 3	2 218	_	_	22	_	_	
Stage 1 655 624 - 746 707 -									_	_		_	_	
Stage 2 760 685 - 637 620 -							770	1217	_	_	-	_	_	
Platoon blocked, %	•						_		_	_	_		_	
Mov Cap-1 Maneuver 392 382 690 389 398 785 1205 - - 1296 - - Mov Cap-2 Maneuver 392 382 - 389 398 -		700	003		037	020								
Mov Cap-2 Maneuver 392 382 - 389 398 - </td <td></td> <td>392</td> <td>382</td> <td>690</td> <td>380</td> <td>308</td> <td>785</td> <td>1205</td> <td>_</td> <td>_</td> <td>1296</td> <td>_</td> <td>_</td> <td></td>		392	382	690	380	308	785	1205	_	_	1296	_	_	
Stage 1 648 610 - 742 703 -							700	1200	_	_	1270	-	_	
Stage 2 749 682 - 624 606 -							-	_	_	_	-	-	_	
Approach EB WB NB SB HCM Control Delay, s 14.4 13.6 0 0.3 HCM LOS B B B B B Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1205 - - 390 436 1296 - - - HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -							-	_	_	_	-	-	_	
HCM Control Delay, s 14.4 13.6 0 0.3 HCM LOS B B B 0 0.3 Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1205 - - 390 436 1296 - - HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -	Juge 2	177	002	-	024	000	-	_	-	-	-	-	_	
HCM Control Delay, s 14.4 13.6 0 0.3 HCM LOS B B B 0 0.3 Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1205 - - 390 436 1296 - - HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -	Approach	EB			WB			NB			SB			
Minor Lane/Major Mvmt NBL NBT NBR EBLn1 WBLn1 SBL SBT SBR Capacity (veh/h) 1205 - - 390 436 1296 - - HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -														_
Capacity (veh/h) 1205 390 436 1296 HCM Lane V/C Ratio 0.001 0.014 0.035 0.011 HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -											0.0			
Capacity (veh/h) 1205 390 436 1296 HCM Lane V/C Ratio 0.001 0.014 0.035 0.011 HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -														
HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -	Minor Lane/Major Mvmt			NBT	NBR				SBT	SBR				
HCM Lane V/C Ratio 0.001 - - 0.014 0.035 0.011 - - HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -	Capacity (veh/h)		1205	-	-	390	436	1296	-	-				
HCM Control Delay (s) 8 0 - 14.4 13.6 7.8 0 - HCM Lane LOS A A - B B A A -				-	-				-	-				
HCM Lane LOS A A - B B A A -	HCM Control Delay (s)		8	0	-				0	-				
				Α	-			Α	Α	_				
	HCM 95th %tile Q(veh)		0	-	-	0	0.1	0	-	-				

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			ર્ન	¥	
Traffic Volume (vph)	447	83	166	707	116	105
Future Volume (vph)	447	83	166	707	116	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.979				0.936	
Flt Protected				0.991	0.974	
Satd. Flow (prot)	1845	0	0	1849	1700	0
Flt Permitted				0.991	0.974	
Satd. Flow (perm)	1845	0	0	1849	1700	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)			6			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	2%	0%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					

Intersection						
Int Delay, s/veh	70.2					
· ·		EDD	Whi	WDT	NDI	NDD
Movement Lang Configurations	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	}	02	1//	4 707	11/	105
Traffic Vol, veh/h	447	83	166	707	116	105
Future Vol, veh/h	447	83	166	707	116	105
Conflicting Peds, #/hr	0	0	6	0	O Cton	6 Cton
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	- 4 0	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	1	2	0	4
Mvmt Flow	486	90	180	768	126	114
Major/Minor	Major1		Major2		Minor1	F 4 2
Conflicting Flow All	0	0	582	0	1665	543
Stage 1	-	-	-	-	537	-
Stage 2	-	-	-	-	1128	-
Critical Hdwy	-	-	4.11	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	997	-	~ 108	536
Stage 1	-	-	-	-	590	-
Stage 2	-	-	-	-	312	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	991	-	~ 73	530
Mov Cap-2 Maneuver	-	-	-	-	~ 73	-
Stage 1	-	-	-	-	586	-
Stage 2	-	-	-	-	213	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.8	Ç	\$ 509.1	
HCM LOS					F	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		124	-	-	991	-
HCM Lane V/C Ratio		1.937	-	-	0.182	-
HCM Control Delay (s)	;	\$ 509.1	-	-	9.4	0
HCM Lane LOS		F	-	-	Α	Α
HCM 95th %tile Q(veh)		19.2	-	-	0.7	-
Notes						
~: Volume exceeds capa	city \$	S: Delav	exceeds	300s	+: Con	nputation
		. 20.03				

^{~:} Volume exceeds capacity

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ર્ન	W	
Traffic Volume (vph)	519	3	18	828	17	42
Future Volume (vph)	519	3	18	828	17	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999				0.903	
Flt Protected				0.999	0.986	
Satd. Flow (prot)	1861	0	0	1877	1656	0
Flt Permitted				0.999	0.986	
Satd. Flow (perm)	1861	0	0	1877	1656	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	549			284	522	
Travel Time (s)	12.5			6.5	17.8	
Confl. Peds. (#/hr)		2	1		2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	6%	1%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	LDIN	VVDL	4	₩.	ועטוג
Traffic Vol, veh/h	519	3	18	828	'T' 17	42
Future Vol, veh/h	519	3	18	828	17	42
Conflicting Peds, #/hr	0	2	10	020	2	1
Sign Control						
RT Channelized	Free	Free	Free	Free	Stop	Stop
	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	6	1	0	3
Mvmt Flow	564	3	20	900	18	46
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	569	0	1510	569
Stage 1	U	U	507	-	568	-
	-	-	-	-	942	-
Stage 2	-	-	-	-		
Critical Hdwy	-	-	4.16	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.254	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	984	-	134	520
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	382	-
Platoon blocked, %	-	_		-		
Mov Cap-1 Maneuver	_	_	982	_	128	519
Mov Cap 1 Maneuver			702	_	128	517
Stage 1	-	-	-	_	570	-
	-	-	-			-
Stage 2	-	-	-	-	366	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		21.9	
HCM LOS					С	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
		276	LDI			
Capacity (veh/h)			-	-	982	-
HCM Lane V/C Ratio		0.232	-	-	0.02	-
HCM Control Delay (s)		21.9	-	-	8.7	0
HCM Lane LOS		С	-	-	Α	Α
HCM 95th %tile Q(veh)		0.9	-	-	0.1	-

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			4	14	
Traffic Volume (vph)	563	2	2	845	0	2
Future Volume (vph)	563	2	2	845	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1863	0	0	1881	1644	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1881	1644	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1	LDIX	WDL	4	¥	NDI
Traffic Vol, veh/h	563	2	2	845	0	2
Future Vol, veh/h	563	2	2	845	0	2
	000	0	1		0	1
Conflicting Peds, #/hr				0		
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, a		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	1	0	0
Mvmt Flow	612	2	2	918	0	2
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	615	0	1536	615
Stage 1	U	U	013	-	614	
	-	-		-		-
Stage 2	-	-	-	-	922	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	974	-	129	495
Stage 1	-	-	-	-	544	-
Stage 2	_	-	-	_	391	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	_	_	973	_	128	494
Mov Cap-2 Maneuver	_	_		_	128	-
Stage 1	-	-	-	-	543	-
Stage 2	-	-	-	-	389	-
Staye 2	-	-	-	-	აგგ	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		12.3	
HCM LOS					В	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		494	-	-	973	-
HCM Lane V/C Ratio		0.004	-	-	0.002	-
HCM Control Delay (s)		12.3	-	-	8.7	0
			-	-		
HCM Lane LOS		В	-	-	A	Α
HCM 95th %tile Q(veh)		0	-	-	0	-

	•	→	•	•	+	4	1	†	/	/		1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	∱ ∱		*	ተ ጮ 819			ર્ન	7	7	44	
Traffic Volume (vph)	31	718	17	137	819	186	35	83	107	350	154	67
Future Volume (vph)	31	718	17	137	819	186	35	83	107	350	154	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	11	11	11	11
Storage Length (ft)	175		0	165		0	0		100	100		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.972				0.850		0.964	
Flt Protected	0.950			0.950				0.985		0.950	0.989	
Satd. Flow (prot)	1685	3412	0	1685	3090	0	0	1796	1546	1641	1639	0
Flt Permitted	0.950			0.950				0.985		0.950	0.989	
Satd. Flow (perm)	1685	3412	0	1685	3090	0	0	1796	1546	1641	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			22				94		10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Shared Lane Traffic (%)										18%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Detector Phase	1	6		5	2		3	3	3 5	4	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)	12.0	15.0		12.0	15.0		12.0	12.0		12.0	12.0	
Total Split (s)	16.0	45.0		26.0	55.0		26.0	26.0		36.0	36.0	
Total Split (%)	11.5%	32.4%		18.7%	39.6%		18.7%	18.7%		25.9%	25.9%	
Maximum Green (s)	10.0	40.0		20.0	50.0		20.0	20.0		30.0	30.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Lead/Lag	Lead			Lead			Lead	Lead				
Lead-Lag Optimize?	Yes			Yes			Yes	Yes				
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 139
Actuated Cycle Length: 111.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type	0	10	11
Protected Phases Permitted Phases	9	10	11
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	3.0 2%	3.0 2%	3.0 2%
Maximum Green (s)	2% 1.0	2% 1.0	2% 1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
Recall Mode	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
• •			·
Intersection Summary			

2030 No-Build Timing Plan: Weekday PM

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Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	34	798	149	1092	128	116	312	308
v/c Ratio	0.30	0.78	0.69	0.84	0.62	0.26	0.81	0.79
Control Delay	64.5	43.4	67.7	38.3	64.9	7.0	60.9	57.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.5	43.4	67.7	38.3	64.9	7.0	60.9	57.1
Queue Length 50th (ft)	27	285	116	404	99	7	245	232
Queue Length 95th (ft)	67	434	205	#653	178	32	#466	#445
Internal Link Dist (ft)		1272		1244	601			383
Turn Bay Length (ft)	175		165			100	100	
Base Capacity (vph)	158	1296	316	1465	337	640	463	469
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	0.62	0.47	0.75	0.38	0.18	0.67	0.66
Intersection Summary								

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኘ 31	∱ }		ħ	↑Љ 819			र्दी 83	7	7	4	
Traffic Volume (vph)		718	17	137		186	35		107	350	154	67
Future Volume (vph)	31	718	17	137	819	186	35	83	107	350	154	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.97			1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (prot)	1685	3411		1685	3091			1797	1546	1641	1640	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (perm)	1685	3411		1685	3091			1797	1546	1641	1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	780	18	149	890	202	38	90	116	380	167	73
RTOR Reduction (vph)	0	1	0	0	13	0	0	0	71	0	8	0
Lane Group Flow (vph)	34	797	0	149	1079	0	0	128	45	312	300	0
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	4.3	36.5		14.3	46.5			12.8	27.1	26.1	26.1	
Effective Green, g (s)	4.3	36.5		14.3	46.5			12.8	27.1	26.1	26.1	
Actuated g/C Ratio	0.04	0.32		0.13	0.41			0.11	0.24	0.23	0.23	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	64	1104		213	1275			204	371	380	379	
v/s Ratio Prot	0.02	0.23		c0.09	c0.35			c0.07	0.03	c0.19	0.18	
v/s Ratio Perm	0.52	0.70		0.70	0.05			0.70	0.10	0.00	0.70	
v/c Ratio	0.53	0.72		0.70	0.85			0.63	0.12	0.82	0.79	
Uniform Delay, d1	53.2	33.6		47.1	29.9			47.7	33.5	41.1	40.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.2	2.0		7.8	5.2			4.3	0.1	12.7	10.1	
Delay (s) Level of Service	57.4 E	35.6 D		55.0	35.0 D			52.0	33.5 C	53.8 D	50.9	
Approach Delay (s)	E	36.5		D	37.4			D 43.2	C	D	D 52.3	
Approach LOS		30.5 D			37.4 D			43.2 D			52.3 D	
• •		D			D			D			D	
Intersection Summary			40.0	1.14	21.1.2022.1	1.60						
HCM 2000 Control Delay	ti o		40.8	H	JIVI 2000 L	evel of Se	vice		D			
HCM 2000 Volume to Capacity ra	llO		0.87	C.	un of lock t	!ma a /a\			27.0			
Actuated Cycle Length (s)			112.7		ım of lost t				27.0			
Intersection Capacity Utilization			74.8%	IC	U Level of	Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4	7		4			4	
Traffic Volume (vph)	0	0	28	33	1	20	7	249	13	6	641	6
Future Volume (vph)	0	0	28	33	1	20	7	249	13	6	641	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.994			0.999	
Flt Protected					0.954			0.999				
Satd. Flow (prot)	0	1611	0	0	1777	1583	0	1850	0	0	1861	0
Flt Permitted					0.954			0.999				
Satd. Flow (perm)	0	1611	0	0	1777	1583	0	1850	0	0	1861	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

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Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			ર્ન	7		4			4	
Traffic Vol., veh/h	0	0	28	33	1	20	7	249	13	6	641	6
Future Vol., veh/h	0	0	28	33	1	20	7	249	13	6	641	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	_	-	None	-	-	None
Storage Length	_	_	-	_	_	0	_	_	-	_	_	-
Veh in Median Storage,	# -	0	-	_	0	-	_	0	-	_	0	-
Grade, %	_	0	_	_	0	_	_	0	_	_	0	_
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	30	36	1	22	8	271	14	7	697	7
	3	3	00	00			3	_,.		•	3,,	•
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1021	1016	701	1024	1012	278	704	0	0	285	0	0
Stage 1	715	715	-	294	294	270	701	-	-	200	-	-
Stage 2	306	301	_	730	718	_	_	_	_	_	_	_
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	_	_	4.12	_	_
Critical Hdwy Stg 1	6.12	5.52	0.22	6.12	5.52	0.22	7.12	_	_	7.12	_	_
Critical Hdwy Stg 2	6.12	5.52	_	6.12	5.52			_	_		_	
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	_	_	2.218	_	_
Pot Cap-1 Maneuver	215	238	439	214	239	761	894	_	_	1277	_	_
Stage 1	422	434		714	670	701	074	_	_	12//	_	_
Stage 2	704	665		414	433		_	_	_	_	_	_
Platoon blocked, %	704	003		414	433							
Mov Cap-1 Maneuver	205	233	439	196	234	761	894	_	_	1277	_	_
Mov Cap-2 Maneuver	205	233	-	196	234	701	071	_	_	12//	_	
Stage 1	417	430	_	706	663			_	_	_	_	_
Stage 2	675	658		382	429	-	-	-		-		
Juge 2	073	000	-	302	74.7	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	13.8			20.9			0.2			0.1		
HCM LOS	В			C			0.2			0.1		
Minor Lane/Major Mvmt		NBL	NBT	NBR	FBI n1	WBLn1	WBI n2	SBL	SBT	SBR		
Capacity (veh/h)		894		-	439	197	761	1277				
HCM Lane V/C Ratio		0.009	-	-	0.069	0.188	0.029	0.005	-	-		
HCM Control Delay (s)		9.1	0	-	13.8	27.4	9.9	7.8	0	-		
HCM Lane LOS		9. I	A	-	13.0 B	27.4 D	9.9 A	7.0 A	A	-		
HCM 95th %tile Q(veh)		0	Α -	-	0.2	0.7	0.1	0	A	-		
HOW FOUT WITHE (VEII)		U	-	-	0.2	U. /	U. I	U	-	-		

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		f)			ર્ન
Traffic Volume (vph)	30	19	271	7	7	519
Future Volume (vph)	30	19	271	7	7	519
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.947		0.996			
Flt Protected	0.970					0.999
Satd. Flow (prot)	1745	0	1892	0	0	1792
Flt Permitted	0.970					0.999
Satd. Flow (perm)	1745	0	1892	0	0	1792
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
Aroa Typo:	Othor					

Intersection						
Int Delay, s/veh	0.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		₽.		UDL	4
Traffic Vol, veh/h	30	19	271	7	7	519
Future Vol, veh/h	30	19	271	7	7	519
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
Grade, %	0	_	0	_	_	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	6
Mvmt Flow	33	21	295	8	8	564
WIVIII I IOW	55	۷.	270	U	U	JU-1
NA ' (NA'						
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	879	299	0	0	303	0
Stage 1	299	-	-	-	-	-
Stage 2	580	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	321	745	-	-	1269	-
Stage 1	757	-	-	-	-	-
Stage 2	564	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	318	745	-	_	1269	-
Mov Cap-2 Maneuver	318	_	_	_	_	-
Stage 1	757	_	_	_	_	_
Stage 2	559	_		_	_	_
Jiago Z	337	_	_	_	_	_
Annragah	MD		NID.		CD	
Approach	WB		NB		SB	
HCM Control Delay, s	15.1		0		0.1	
HCM LOS	С					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	409	1269	-
HCM Lane V/C Ratio		_	_	0.13	0.006	_
HCM Control Delay (s)		_	_	15.1	7.9	0
HCM Lane LOS		_	_	C	Α	A
HCM 95th %tile Q(veh)		_		0.4	0	,,
HOW /JUL /OUIE Q(VEII)		-	-	0.4	U	-

	€	•	†	~	\	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		f)			र्स
Traffic Volume (vph)	99	21	221	46	11	293
Future Volume (vph)	99	21	221	46	11	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.976		0.977			
Flt Protected	0.960					0.998
Satd. Flow (prot)	1766	0	1820	0	0	1896
Flt Permitted	0.960					0.998
Satd. Flow (perm)	1766	0	1820	0	0	1896
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Confl. Peds. (#/hr)	1	1		1	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other		_		_	_

Intersection						
Int Delay, s/veh	2.7					
,		WDD	NDT	NDD	CDI	CDT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		₽			र्स
Traffic Vol, veh/h	99	21	221	46	11	293
Future Vol, veh/h	99	21	221	46	11	293
Conflicting Peds, #/hr	1	1	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-		0
Grade, %	0	_	0	_	_	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	2	2	0	0
3						
Mvmt Flow	108	23	240	50	12	318
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	609	267	0	0	291	0
Stage 1	266	-	-	-	-	-
Stage 2	343	-	-	-	_	-
Critical Hdwy	6.41	6.2	_	-	4.1	
Critical Hdwy Stg 1	5.41	-	_	_		_
Critical Hdwy Stg 2	5.41	_			_	
Follow-up Hdwy	3.509	3.3			2.2	
Pot Cap-1 Maneuver	460	3.3 777	-	-	1282	-
			-	-	1282	-
Stage 1	781	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	454	776	-	-	1281	-
Mov Cap-2 Maneuver	454	-	-	-	-	-
Stage 1	780	-	-	-	_	_
Stage 2	712	-	-	-	-	-
g -	_					
Approach	WB		NB		SB	
HCM Control Delay, s	15		0		0.3	
HCM LOS	C		0		0.5	
HOW LOS	C					
						0
Minor Lane/Major Mvmt		NBT		WBLn1	SBL	SBT
Capacity (veh/h)		-	-	490	1281	-
HCM Lane V/C Ratio		-	-	0.266	0.009	-
HCM Control Delay (s)		-	-	15	7.8	0
HCM Lane LOS		-	-	С	Α	Α
HCM 95th %tile Q(veh)		-	_	1.1	0	-
/ 5 / 5 (2 (7 5 1 1)					J	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	1	0	0	55	0	2	0	215	23	1	243	0
Future Volume (vph)	1	0	0	55	0	2	0	215	23	1	243	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996			0.987				
Flt Protected		0.950			0.954							
Satd. Flow (prot)	0	1805	0	0	1805	0	0	1842	0	0	1827	0
Flt Permitted		0.950			0.954							
Satd. Flow (perm)	0	1805	0	0	1805	0	0	1842	0	0	1827	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Vol, veh/h	1	0	0	55	0	2	0	215	23	1	243	0
Future Vol, veh/h	1	0	0	55	0	2	0	215	23	1	243	0
Conflicting Peds, #/hr	2	0	3	3	0	2	3	0	3	2	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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, %	0	0	0	0	0	0	0	2	0	0	4	0
Mvmt Flow	1	0	0	60	0	2	0	234	25	1	264	0
	•	_	-		,	_	-			•	.= .	,
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	519	531	270	519	519	252	267	0	0	262	0	0
Stage 1	269	269	-	250	250		-	-	-	-	-	-
Stage 2	250	262	_	269	269	_	_	-	_	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	_	_	4.1	_	_
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	_	_	-	_	_
Critical Hdwy Stg 2	6.1	5.5	_	6.1	5.5	_	_	_	_	_	_	_
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	_	_	2.2	_	_
Pot Cap-1 Maneuver	471	457	774	471	464	792	1308	_	_	1314	-	_
Stage 1	741	690	-	759	704		-	_	_			_
Stage 2	759	695	_	741	690	_	_	_	_	_		_
Platoon blocked, %	757	373		7 1 1	370			_	_		_	_
Mov Cap-1 Maneuver	467	454	770	468	461	788	1304	_	_	1310	_	_
Mov Cap 1 Maneuver	467	454	-	468	461	-	-	_	_	-	_	_
Stage 1	739	687	_	757	702	_	_	_	_	_	_	_
Stage 2	755	693		738	687	_	_	_	_	_	_	_
Jugo Z	700	373		750	507							
Approach	EB			WB			NB			SB		
HCM Control Delay, s	12.7			13.7			0			0		
HCM LOS	В			В			3			3		
	_											
Minor Lane/Major Mvmt		NBL	NBT	NBR	EBLn1	WBI n1	SBL	SBT	SBR			
Capacity (veh/h)		1304	-	, TOIL	467	475	1310		-			
HCM Lane V/C Ratio		1304	-	-	0.002	0.13	0.001	_	-			
HCM Control Delay (s)		0	-	-	12.7	13.7	7.8	0	-			
HCM Lane LOS		A	-	-	12.7 B	13.7 B	7.6 A	A	-			
HCM 95th %tile Q(veh)		0	-	-	0	0.4	0	A	-			
now your wille a(ven)		U	-	-	U	0.4	U	-	-			

	-	\rightarrow	•	←	4	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1>			ર્ન	W	
Traffic Volume (vph)	718	296	204	298	7 5	109
Future Volume (vph)	718	296	204	298	75	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.961				0.920	
Flt Protected				0.980	0.980	
Satd. Flow (prot)	1790	0	0	1780	1654	0
Flt Permitted				0.980	0.980	
Satd. Flow (perm)	1790	0	0	1780	1654	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)		2	2		2	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	7%	3%	3%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other				_	

Intersection						
Intersection Int Delay, s/veh	54.1					
•		EDD	\\/DI	WDT	NIDI	NIDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations		001	004	્રન	, A	400
Traffic Vol, veh/h	718	296	204	298	7 5	109
Future Vol, veh/h	718	296	204	298	75	109
Conflicting Peds, #/hr	_ 0	_ 2	_ 2	_ 0	2	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, a		-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	7	3	3	4
Mvmt Flow	780	322	222	324	82	118
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1104	0	1713	945
	U	U	1104	-	943	943
Stage 1	-	-	-	-		
Stage 2	-	-	-	-	770	-
Critical Hdwy	-	-	4.17	-	6.43	6.24
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.263	-	3.527	3.336
Pot Cap-1 Maneuver	-	-	614	-	99	315
Stage 1	-	-	-	-	377	-
Stage 2	-	-	-	-	455	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	_	-	613	-	~ 55	314
Mov Cap-2 Maneuver	_	_	_	_	~ 55	_
Stage 1	_	_	_	_	376	_
Stage 2	_				253	_
Stage 2					233	
Approach	EB		WB		NB	
HCM Control Delay, s	0		5.8		\$ 484	
HCM LOS					F	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
		108	LDI	LDK	613	WD1
Capacity (veh/h)			-			
HCM Cantral Pales (a)		1.852	-	-	0.362	-
HCM Control Delay (s)		\$ 484	-	-	14.2	0
HCM Lane LOS		F	-	-	В	Α
HCM 95th %tile Q(veh)		16.1	-	-	1.6	-
Notes						
		- D - I		000		

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

	-	•	•	•	4	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ર્ન	W	
Traffic Volume (vph)	833	6	18	458	8	24
Future Volume (vph)	833	6	18	458	8	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999				0.900	
Flt Protected				0.998	0.987	
Satd. Flow (prot)	1858	0	0	1809	1688	0
Flt Permitted				0.998	0.987	
Satd. Flow (perm)	1858	0	0	1809	1688	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	549			284	522	
Travel Time (s)	12.5			6.5	17.8	
Confl. Peds. (#/hr)		3	2		3	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	20%	0%	5%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	0.7					
•		בהה	MDI	MOT	ND	NDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)			ની	, A	
Traffic Vol, veh/h	833	6	18	458	8	24
Future Vol, veh/h	833	6	18	458	8	24
Conflicting Peds, #/hr	0	3	2	0	3	2
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	20	0	5	0	0
Mvmt Flow	905	7	20	498	9	26
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	915	0	1453	914
Stage 1	-	-	,10	-	912	-
Stage 2	_	_	_	_	541	_
Critical Hdwy	-	-	4.1	-		6.2
	-	-	4.1	-	6.4	
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	754	-	145	334
Stage 1	-	-	-	-	395	-
Stage 2	_	-	-	_	588	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	_	_	752	_	139	332
Mov Cap-2 Maneuver			702		139	-
Stage 1				_	394	
	-	-	-	-	564	-
Stage 2	-	-	-	-	304	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.4		22	
HCM LOS					С	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		246	-	-	752	-
HCM Lane V/C Ratio		0.141	-	-	0.026	-
HCM Control Delay (s)		22	-	-	9.9	0
HCM Lane LOS		С	_	_	Α	A
HCM 95th %tile Q(veh)		0.5	_	_	0.1	-
/ 0.11 / 0.110 (2(1011)		3.5			0.1	

	-	•	•	←	4	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ»			4	W	
Traffic Volume (vph)	860	0	1	475	2	6
Future Volume (vph)	860	0	1	475	2	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.895	
Flt Protected					0.989	
Satd. Flow (prot)	1863	0	0	1827	1455	0
Flt Permitted					0.989	
Satd. Flow (perm)	1863	0	0	1827	1455	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	4%	0%	20%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Area Type: Control Type: Unsignalized Other

Intersection						
Int Delay, s/veh	0.1					
,	EBT	EDD	WDI	WDT	MDI	NBR
Movement		EBR	WBL	WBT	NBL	NRK
Lane Configurations	}	0	4	्रदी	¥	,
Traffic Vol, veh/h	860	0	1	475	2	6
Future Vol, veh/h	860	0	1	475	2	6
Conflicting Peds, #/hr	0	0	1	0	0	1
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	0	0	4	0	20
Mymt Flow	935	0	1	516	2	7
IVIVIIIL I IOW	/33	U	,	310	2	,
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	936	0	1454	937
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	518	-
Critical Hdwy	_	_	4.1	_	6.4	6.4
Critical Hdwy Stg 1					5.4	-
Critical Hdwy Stg 2		_	_		5.4	_
Follow-up Hdwy	-	-	2.2	-	3.5	3.48
	-	-	740	-		3.40 297
Pot Cap-1 Maneuver	-	-	740	-	145	
Stage 1	-	-	-	-	385	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	739	-	145	296
Mov Cap-2 Maneuver	-	-	-	-	145	-
Stage 1	_	-	_		385	-
Stage 2	_	_	_	_	601	_
Olago 2					001	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		20.9	
HCM LOS	U		U		20.7 C	
HOW LOS					C	
		NDL	ED=	EDE	WD.	WDT
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		235	-	-	739	-
HCM Lane V/C Ratio		0.037	-	-	0.001	-
HCM Control Delay (s)		20.9	-	-	9.9	0
HCM Lane LOS		С	-	-	Α	Α
HCM 95th %tile Q(veh)		0.1	_	_	0	-
					_	

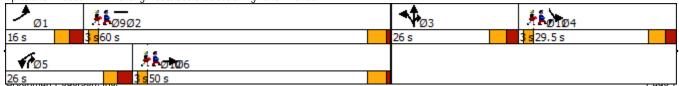
	•	→	•	•	+	4	1	†	/	-	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	↑Љ 836		*	∱ }			ર્ન	7	ň	4	
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	11	11	11	11
Storage Length (ft)	175		0	165		0	0		100	100		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.922				0.850		0.963	
Flt Protected	0.950			0.950				0.996		0.950	0.987	
Satd. Flow (prot)	1636	3411	0	1668	3172	0	0	1813	1546	1564	1617	0
Flt Permitted	0.950			0.950				0.996		0.950	0.987	
Satd. Flow (perm)	1636	3411	0	1668	3172	0	0	1813	1546	1564	1617	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			240				112		10	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Shared Lane Traffic (%)										21%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases				_	_		_	_				
Detector Phase	1	6		5	2		3	3	3 5	4	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)	12.0	15.0		12.0	15.0		12.0	12.0		12.0	12.0	
Total Split (s)	16.0	50.0		26.0	60.0		26.0	26.0		29.5	29.5	
Total Split (%)	11.6%	36.4%		18.9%	43.6%		18.9%	18.9%		21.5%	21.5%	
Maximum Green (s)	10.0	45.0		20.0	55.0		20.0	20.0		23.5	23.5	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Lead/Lag	Lead			Lead			Lead	Lead				
Lead-Lag Optimize?	Yes	0.0		Yes	0.0		Yes	Yes		0.0	0.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 137.5 Actuated Cycle Length: 124.6
Natural Cycle: 140
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			•
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft) Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	9	10	11
Permitted Phases	,	10	
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	2%	2%	2%
Maximum Green (s)	1.0	1.0	1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
Recall Mode	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
Intersection Summary			

	•	→	•	←	†	/	\	↓
Lane Group	EBL	EBT	• WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	189	929	48	1391	426	259	154	154
v/c Ratio	1.44	0.61	0.42	0.92	1.46	0.59	0.75	0.70
Control Delay	275.5	29.8	69.1	39.1	262.4	19.6	74.7	65.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	275.5	29.8	69.1	39.1	262.4	19.6	74.7	65.6
Queue Length 50th (ft)	~206	286	38	466	~469	70	127	117
Queue Length 95th (ft)	#400	448	83	#738	#757	126	214	204
Internal Link Dist (ft)		1272		1244	601			383
Turn Bay Length (ft)	175		165			100	100	
Base Capacity (vph)	131	1520	268	1540	292	574	296	314
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	1.44	0.61	0.18	0.90	1.46	0.45	0.52	0.49
Intersection Summary								

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Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	∱ }		7	ħβ			ર્ન	7	7	4	
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.92			1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	0.99	
Satd. Flow (prot)	1636	3410		1668	3171			1813	1546	1564	1617	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	0.99	
Satd. Flow (perm)	1636	3410		1668	3171			1813	1546	1564	1617	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	909	20	48	664	727	33	393	259	195	75	38
RTOR Reduction (vph)	0	1	0	0	135	0	0	0	86	0	9	0
Lane Group Flow (vph)	189	928	0	48	1256	0	0	426	173	154	145	0
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases	400			0.4	F0.0			00.4	00.5	4,,	411	
Actuated Green, G (s)	10.0	55.5		8.4	53.9			20.1	28.5	16.4	16.4	
Effective Green, g (s)	10.0	55.5		8.4	53.9			20.1	28.5	16.4	16.4	
Actuated g/C Ratio	0.08	0.45		0.07	0.44			0.16	0.23	0.13	0.13	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	257	2.0	2.0	
Lane Grp Cap (vph)	132	1533		113	1385			295	357	207	214	
v/s Ratio Prot	c0.12	0.27		0.03	c0.40			c0.23	0.11	c0.10	0.09	
v/s Ratio Perm	1 40	0 /1		0.40	0.01			1 11	0.40	0.74	0.70	
v/c Ratio	1.43	0.61		0.42	0.91 32.4			1.44	0.48	0.74	0.68	
Uniform Delay, d1	56.7	25.7		55.2				51.6	41.1	51.5	51.0	
Progression Factor	1.00 232.2	1.00 0.5		1.00 0.9	1.00			1.00 218.0	1.00	1.00 11.9	1.00	
Incremental Delay, d2	232.2 288.9	26.1		56.1	8.6 41.0			269.7	0.4 41.5	63.4	6.6 57.6	
Delay (s) Level of Service	200.9 F	20.1 C		56.1 E	41.0 D			209.7 F	41.3 D	03.4 E	57.6 E	
Approach Delay (s)		70.5		L	41.5			183.4	D	L	60.5	
Approach LOS		70.5 E			41.5 D			103.4 F			60.5 E	
• •		L			D			1			L	
Intersection Summary HCM 2000 Control Delay			79.7	Нα	CM 2000 I	evel of Se	rvice		E			
HCM 2000 Volume to Capacity	ratio		1.08	110	J. 2000 L	.0.010100	1 1100		_			
Actuated Cycle Length (s)	. 3110		123.4	Si	ım of lost t	ime (s)			27.0			
Intersection Capacity Utilization			95.7%		U Level of				F			
Analysis Period (min)			15	.0					•			
c Critical Lane Group												
r												

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	•	→	\rightarrow	•	•	•	4	†	~	>	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		€			ર્ન	7		4			4	
Traffic Volume (vph)	0	0	5	42	Ö	5	17	427	406	55	295	2
Future Volume (vph)	0	0	5	42	0	5	17	427	406	55	295	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.935			0.999	
Flt Protected					0.950			0.999			0.992	
Satd. Flow (prot)	0	1611	0	0	1770	1583	0	1740	0	0	1846	0
Flt Permitted					0.950			0.999			0.992	
Satd. Flow (perm)	0	1611	0	0	1770	1583	0	1740	0	0	1846	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Other

Control Type: Unsignalized

Intersection													
Int Delay, s/veh	2												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		4			ર્ન	7		4			4		
Traffic Vol, veh/h	0	0	5	42	0	5	17	427	406	55	295	2	
Future Vol, veh/h	0	0	5	42	0	5	17	427	406	55	295	2	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized		'-	None			None	-	-	None	-	_	None	
Storage Length	-	-	_	_	-	0	-	-	_	-	-	_	
Veh in Median Storage,	# -	0	-	_	0	-	-	0	_	-	0	_	
Grade, %	-	0	_	_	0	_	_	0	_	-	0	_	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	0	0	5	46	0	5	18	464	441	60	321	2	
	3	3	3	.5	J	3	. 3				J	_	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1165	1383	322	1166	1164	685	323	0	0	905	0	0	
Stage 1	442	442	-	721	721	-	-	-	-	-	-	-	
Stage 2	723	941	_	445	443	_	_	_	_	_	_	_	
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	_	_	4.12	_	_	
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	_	_	2.218	_	_	
Pot Cap-1 Maneuver	171	144	719	171	194	448	1237	_	_	752	_	_	
Stage 1	594	576		419	432	-	-	_	_	-	_	_	
Stage 2	417	342	_	592	576	_	_	_	_	_	_	_	
Platoon blocked, %	,	0 12		072	0,0			_	_		_	_	
Mov Cap-1 Maneuver	153	126	719	153	170	448	1237	_	_	752	_	_	
Mov Cap-2 Maneuver	153	126		153	170	-	-	_	_	-		_	
Stage 1	575	520	_	406	418	_	_	_	_	_		_	
Stage 2	399	331	_	531	520	_	_	_	-	_	-	_	
olago z	0,,	001		001	020								
Approach	EB			WB			NB			SB			
HCM Control Delay, s	10			35.5			0.2			1.6			_
HCM LOS	В			55.5 E			0.2			1.0			
HOW LOS	Ь			_									
Minor Lane/Major Mvmt		NBL	NBT	MRD	FRI n1	WBLn1	M/RI n2	SBL	SBT	SBR			
			וטוו	NDIX					301	JUIN			
Capacity (veh/h)		1237 0.015	-	-	719 0.008	153 0.298	448 0.012	752 0.079	-	-			
HCM Control Doloy (c)			-	-					-	-			
HCM Control Delay (s)		8	0	-	10	38.2	13.1	10.2	0	-			
HCM Lane LOS		A	Α	-	В	E	В	В	Α	-			
HCM 95th %tile Q(veh)		0	-	-	0	1.2	0	0.3	-	-			

	•	•	†	~	\	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		f)			ર્ન
Traffic Volume (vph)	13	15	402	134	171	299
Future Volume (vph)	13	15	402	134	171	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.928		0.966			
Flt Protected	0.977					0.982
Satd. Flow (prot)	1723	0	1799	0	0	1831
Flt Permitted	0.977					0.982
Satd. Flow (perm)	1723	0	1799	0	0	1831
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	2%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					

Intersection						
Int Delay, s/veh	2.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		4			4
Traffic Vol, veh/h	13	15	402	134	171	299
Future Vol, veh/h	13	15	402	134	171	299
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized				None	riee -	
	-	None	-			None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	0	3
Mvmt Flow	14	16	437	146	186	325
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1207	510	0	0	583	0
Stage 1	510	-	-	-	-	-
Stage 2	697	_				
Critical Hdwy		6.2	-	-	4.1	-
	6.4		-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	204	567	-	-	1001	-
Stage 1	607	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	158	567	-	_	1001	-
Mov Cap-2 Maneuver	158	-	_	_		_
Stage 1	607					
Stage 2	385					
Stage 2	303	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	20.8		0		3.4	
HCM LOS	20.0 C		U		5.4	
HOW LOS	C					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		-	-	258	1001	-
HCM Lane V/C Ratio		-	-	0.118	0.186	-
HCM Control Delay (s)		-	-	20.8	9.4	0
HCM Lane LOS		-	_	С	Α	Ā
HCM 95th %tile Q(veh)		_	_	0.4	0.7	-
1101VI 70111 70111C Q(VCII)		-	_	0.4	0.7	_

	•	•	†	~	-	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	**		f)			4
Traffic Volume (vph)	32	10	240	66	22	472
Future Volume (vph)	32	10	240	66	22	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.968		0.971			
Flt Protected	0.963					0.998
Satd. Flow (prot)	1601	0	1805	0	0	1810
Flt Permitted	0.963					0.998
Satd. Flow (perm)	1601	0	1805	0	0	1810
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	14%	0%	2%	3%	0%	5%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
	OIL					

Intersection						
Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	WDL WDL	WDIX		INDIX	JUL	
•		10	}		22	4 472
Traffic Vol, veh/h Future Vol, veh/h	32 32	10	240 240	66 44	22 22	472 472
		10		66		
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
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	14	0	2	3	0	5
Mvmt Flow	35	11	261	72	24	513
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	858	297	0	0	333	0
Stage 1	297	-	-	-	555	-
Stage 2	561	_				
Critical Hdwy	6.54	6.2	-	-	4.1	-
			-	-	4.1	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54		-	-	-	-
Follow-up Hdwy	3.626	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	312	747	-	-	1238	-
Stage 1	727	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	304	747	-	-	1238	-
Mov Cap-2 Maneuver	304		_	_		_
Stage 1	727	_	_	_		_
Stage 2	533	_	_	_	_	_
Stage 2	555	-	-	-	-	-
Annroach	WB		NB		SB	
Approach	16.7		0		0.4	
HCM Control Delay, s			U		0.4	
HCM LOS	С					
Minor Lane/Major Mvmt		NBT	NBR '	WBLn1	SBL	SBT
Capacity (veh/h)		_	-	354	1238	_
HCM Lane V/C Ratio		_	_	0.129	0.019	_
HCM Control Delay (s)		_	_	16.7	8	0
HCM Lane LOS		_	_	C	A	A
HCM 95th %tile Q(veh)		-	-	0.4	0.1	-
HOW FOUT WHILE (VEH)		-	-	0.4	U. I	-

	۶	→	\rightarrow	•	←	•	4	†	<i>></i>	>	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	4	1	0	11	0	3	1	173	66	13	489	2
Future Volume (vph)	4	1	0	11	0	3	1	173	66	13	489	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.973			0.963				
Flt Protected		0.962			0.962						0.999	
Satd. Flow (prot)	0	1828	0	0	1647	0	0	1781	0	0	1827	0
Flt Permitted		0.962			0.962						0.999	
Satd. Flow (perm)	0	1828	0	0	1647	0	0	1781	0	0	1827	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	10		6			4	10		4			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	10%	2%	0%	2%	3%	2%	0%	4%	2%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

Intersection													
Int Delay, s/veh	0.5												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		4			44			4			4		
Traffic Vol., veh/h	4	1	0	11	0	3	1	173	66	13	489	2	
Future Vol, veh/h	4	1	0	11	0	3	1	173	66	13	489	2	
Conflicting Peds, #/hr	10	0	6	0	0	4	10	0	4	0	0	6	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
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, %	0	0	0	10	2	0	2	3	2	0	4	2	
Mvmt Flow	4	1	0	12	0	3	1	188	72	14	532	2	
		·	,		· ·	Ü	•		. =			_	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	809	837	549	798	802	238	544	0	0	264	0	0	
Stage 1	571	571	-	230	230	-	-	-	-	-	-	-	
Stage 2	238	266	_	568	572	_	_	_	_	_	_	_	
Critical Hdwy	7.1	6.5	6.2	7.2	6.52	6.2	4.12	_	_	4.1	_	_	
Critical Hdwy Stg 1	6.1	5.5	-	6.2	5.52	- 0.2	1.12	_	_		_	_	
Critical Hdwy Stg 2	6.1	5.5	_	6.2	5.52	_	_	_	_	_	_	_	
Follow-up Hdwy	3.5	4	3.3	3.59	4.018	3.3	2.218	_	_	2.2	_	_	
Pot Cap-1 Maneuver	301	305	539	295	317	806	1025	_	_	1312	_	_	
Stage 1	509	508	-	755	714	-	1025	_	_	1012	_	_	
Stage 2	770	692	_	494	504			_	_		_	_	
Platoon blocked, %	770	072		7/7	304			_	_		_	_	
Mov Cap-1 Maneuver	290	296	531	288	307	795	1015	_	_	1307	_	_	
Mov Cap-2 Maneuver	290	296	-	288	307	775	1015	_	_	1007	_	_	
Stage 1	503	495	_	751	710			_	_		_	_	
Stage 2	759	689	_	483	491	_	_	_	_	_	_	_	
Juge 2	707	007		100	171								
Approach	EB			WB			NB			SB			
HCM Control Delay, s	17.6			16.3			0			0.2			_
HCM LOS	C			С			Ü			0.2			
				_									
Minor Lane/Major Mvmt		NBL	NBT	NRR	EBLn1	WRI n1	SBL	SBT	SBR				
Capacity (veh/h)		1015	NDI	NDIX	291	334	1307	351	JDIC				
HCM Lane V/C Ratio		0.001	-	-	0.019	0.046	0.011	-	-				
HCM Control Delay (s)		8.6	0	-	17.6	16.3	7.8	0	-				
HCM Lane LOS		0.0 A	A	-	17.0 C	10.3 C	7.0 A	A	-				
HCM 95th %tile Q(veh)		0	A -	-	0.1	0.1	0	А	-				
HOW FOUT WITHE (VEII)		U	-	-	U. I	U. I	U	-	-				

	-	•	•	←	•	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			र्स	N/	
Traffic Volume (vph)	447	103	181	707	223	213
Future Volume (vph)	447	103	181	707	223	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.975				0.934	
Flt Protected				0.990	0.975	
Satd. Flow (prot)	1838	0	0	1848	1697	0
Flt Permitted				0.990	0.975	
Satd. Flow (perm)	1838	0	0	1848	1697	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)			6			6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	2%	0%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Intersection						
Int Delay, s/veh	349.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			र्स	¥	
Traffic Vol, veh/h	447	103	181	707	223	213
Future Vol, veh/h	447	103	181	707	223	213
Conflicting Peds, #/hr	0	0	6	0	0	6
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	- 4 0	-	-	-	0	-
Veh in Median Storage,		-	-	0	0	-
Grade, % Peak Hour Factor	0 92	92	- 92	0 92	0 92	- 92
Heavy Vehicles, %	92 1	92	92 1	92 2	92	92 4
Mvmt Flow	486	112	197	768	242	232
IVIVIIIL FIUW	400	112	17/	100	242	232
NA - Laur / NA laur	NA-! 1		M-! C		N A! 4	
Major/Minor	Major1		Major2		Minor1	EE A
Conflicting Flow All	0	0	604	0	1710 548	554
Stage 1 Stage 2	-	-	-	-	548 1162	-
Critical Hdwy	-	-	4.11	-	6.4	6.24
Critical Hdwy Stg 1	-	-	4.11	-	5.4	0.24
Critical Hdwy Stg 2	-	-	-	-	5.4 5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.336
Pot Cap-1 Maneuver	-	-	979	-	~ 101	528
Stage 1	_	_	-	_	583	-
Stage 2	_	_	_	_	300	_
Platoon blocked, %	_	_		-	000	
Mov Cap-1 Maneuver	_	-	973	-	~ 65	522
Mov Cap-2 Maneuver	-	-	-	-	~ 65	-
Stage 1	-	-	-	-	580	-
Stage 2	-	-	-	-	~ 194	-
ŭ						
Approach	EB		WB		NB	
HCM Control Delay, s	0		2	\$	1497.7	
HCM LOS	3		_	Ψ	F	
					•	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		114		LDIX -	973	
HCM Lane V/C Ratio		4.157	-	-	0.202	-
HCM Control Delay (s)	\$	1497.7	_	_	9.6	0
HCM Lane LOS	Ψ	F	-	-	Α.	A
HCM 95th %tile Q(veh)		48.6	-	-	0.8	-
Notes	oitu #	'. Dolou:	0400 a d -	2000	C ===	nutotio-
~: Volume exceeds capacity \$: Delay exceeds 300s				300s	+: Con	putation

Lane Group

Lane Configurations

Traffic Volume (vph)

Future Volume (vph)

Ideal Flow (vphpl)

Lane Util. Factor

Ped Bike Factor

Satd. Flow (prot)

Satd. Flow (perm)

Link Speed (mph)

Link Distance (ft)

Confl. Peds. (#/hr)

Peak Hour Factor

Sign Control

Heavy Vehicles (%)

Shared Lane Traffic (%)

Intersection Summary

Travel Time (s)

Flt Permitted

Frt Flt Protected EBT

þ 627

627

1900

1.00

0.999

1861

1861

30

549

12.5

0.92

2%

Free

EBR

3

3

0

0

2

0.92

0%

1900

1.00

WBL

18

18

1900

1.00

0

0

1

0.92

6%

WBT

र्दी 843

843

1900

1.00

0.999

1877

0.999

1877

30

284

6.5

0.92

1%

Free

NBL

**** 17

17

1900

1.00

0.903

0.986

1656

0.986

1656

20

522

17.8

0.92

0%

Stop

2

2030 Build Timing Plan: Weekday PM
_

/

NBR

42

42

1900

1.00

0

0

1

0.92

3%

Area Type: Other Control Type: Unsignalized

2030 Build PM.syn Synchro 10 Report Greenman-Pedersen, Inc. Page 3

Intersection						
Int Delay, s/veh	1.1					
-		EDD	WDI	WDT	MDI	MDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	}		40	ૂર્ન	Y	40
Traffic Vol, veh/h	627	3	18	843	17	42
Future Vol, veh/h	627	3	18	843	17	42
Conflicting Peds, #/hr	_ 0	_ 2	_ 1	_ 0	2	1
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	0	6	1	0	3
Mvmt Flow	682	3	20	916	18	46
WWIIICTIOW	002	3	20	710	10	40
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	687	0	1644	687
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	958	-
Critical Hdwy	-	-	4.16	_	6.4	6.23
Critical Hdwy Stg 1	-	-	-		5.4	-
Critical Hdwy Stg 2	_	_	_	_	5.4	_
Follow-up Hdwy	_	_	2.254	_	3.5	3.327
Pot Cap-1 Maneuver	_		888		111	445
Stage 1	_	_	000		504	-
	-	-	-	-		
Stage 2	-	-	-	-	376	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	886	-	105	444
Mov Cap-2 Maneuver	-	-	-	-	105	-
Stage 1	-	-	-	-	503	-
Stage 2	-	-	-	-	358	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		26.6	
HCM LOS	U		0.2		20.0 D	
HOW LOS					D	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		230	-	-	886	-
HCM Lane V/C Ratio		0.279	-	-	0.022	-
HCM Control Delay (s)		26.6	-	_	9.2	0
HCM Lane LOS		D	-	_	Α	A
HCM 95th %tile Q(veh)		1.1	_	_	0.1	-
HOW JULI JULIE CE(VEII)		1.1	-	-	0.1	-

	-	•	•	•	4	~
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	ĵ.			4	W	
Traffic Volume (vph)	690	2	2	880	0	2
Future Volume (vph)	690	2	2	880	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	1863	0	0	1881	1644	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1881	1644	0
Link Speed (mph)	30			30	20	
Link Distance (ft)	284			471	517	
Travel Time (s)	6.5			10.7	17.6	
Confl. Peds. (#/hr)			1			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	
Intersection Summary						

Area Type: Other Control Type: Unsignalized

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Greenman-Pedersen, Inc.
Synchro 10 Report
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Intersection						
Int Delay, s/veh	0					
•		EDD	WDI	WDT	MDI	MDD
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	f)		_	र्स	Y	_
Traffic Vol, veh/h	690	2	2	880	0	2
Future Vol, veh/h	690	2	2	880	0	2
Conflicting Peds, #/hr	0	0	1	0	0	1
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	0	0	1	0	0
-	750	2	2	957		2
Mvmt Flow	750	2	2	957	0	2
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	753	0	1713	753
Stage 1	_	-	_	_	752	-
Stage 2	_	_	_	_	961	_
Critical Hdwy			4.1	_	6.4	6.2
Critical Hdwy Stg 1	-	-	4.1	-	5.4	0.2
	-	-	-	-	5.4 5.4	
Critical Hdwy Stg 2	-	-	-	-		-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	866	-	101	413
Stage 1	-	-	-	-	469	-
Stage 2	-	-	-	-	374	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	865	-	100	412
Mov Cap-2 Maneuver		-	_	_	100	-
Stage 1	_	_	_	_	469	_
Stage 2		_			372	_
Stage 2					372	
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		13.8	
	U		U			
HCM LOS					В	
Minor Lane/Major Mvmt		NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)		412	-	-	865	-
HCM Lane V/C Ratio		0.005	-	-	0.003	-
HCM Control Delay (s)		13.8	-	_	9.2	0
HCM Lane LOS		В	_	_	Α	Ā
HCM 95th %tile Q(veh)		0	_	_	0	-
/ 0.11 / 0.110 (2(1011)		U			J	

4: Hunting Road/Gou	ld Street &	Highlar	nd Aver	nue						Timing	Plan: Week	day PM
	•	-	•	•	•	4	•	†	~	/	Ţ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	*	∱ β-		7	∱ ∱≽			र्स	7	- ነ	4	
Traffic Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	11	11	11	11
Storage Length (ft)	175		0	165		0	0		100	100		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.997			0.962				0.850		0.956	
Flt Protected	0.950			0.950				0.988		0.950	0.992	
Satd. Flow (prot)	1685	3413	0	1685	3080	0	0	1801	1546	1641	1629	0
Flt Permitted	0.950			0.950				0.988		0.950	0.992	
Satd. Flow (perm)	1685	3413	0	1685	3080	0	0	1801	1546	1641	1629	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			37				94		14	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Shared Lane Traffic (%)										14%		
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	35	٠ 4	4	
Permitted Phases												
Detector Phase	1	6		5	2		3	3	3 5	4	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)	12.0	15.0		12.0	15.0		12.0	12.0		12.0	12.0	
Total Split (s)	16.0	45.0		26.0	55.0		26.0	26.0		36.0	36.0	
Total Split (%)	11.5%	32.4%		18.7%	39.6%		18.7%	18.7%		25.9%	25.9%	
Maximum Green (s)	10.0	40.0		20.0	50.0		20.0	20.0		30.0	30.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Lead/Lag	Lead			Lead			Lead	Lead				
Lead-Lag Optimize?	Yes			Yes			Yes	Yes				
	. 55	0.0			0.0						0.0	

Pedestrian Calls (#/hr) Intersection Summary

Flash Dont Walk (s)

Vehicle Extension (s)

Recall Mode

Walk Time (s)

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 125.8

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Hunting Road/Gould Street & Highland Avenue

2.0

None

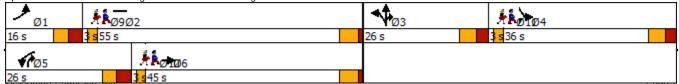
2.0

Min

4.0

11.0

1



2.0

None

2.0

Min

4.0

12.0

1

2.0

None

2.0

None

2.0

4.0

19.5

1

None

2.0

4.0

19.5

1

None

Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	9	10	11
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	2%	2%	2%
Maximum Green (s)	1.0	1.0	1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
Recall Mode	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
Intersection Summary			

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Greenman-Pedersen, Inc.
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	•	_		←	†	/	\	1	
Lane Group	EBL	EBT	▼ WBL	WBT	NBT	r NBR	SBL	▼ SBT	
									_
Lane Group Flow (vph)	73	775	145	1153	159	113	630	625	
v/c Ratio	0.62	0.68	0.74	0.92	0.75	0.26	1.60	1.55	
Control Delay	82.1	41.3	77.1	48.3	75.8	6.7	313.8	294.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	82.1	41.3	77.1	48.3	75.8	6.7	313.8	294.6	
Queue Length 50th (ft)	60	285	118	472	130	7	~798	~780	
Queue Length 95th (ft)	#132	418	200	#708	216	31	#1143	#1125	
Internal Link Dist (ft)		1272		1244	601			383	
Turn Bay Length (ft)	175		165			100	100		
Base Capacity (vph)	135	1161	270	1256	288	559	394	402	
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	0.54	0.67	0.54	0.92	0.55	0.20	1.60	1.55	
Intersection Summary									

Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ β		ሻ	ተ ኈ			र्स	7	ሻ	4	
Traffic Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	0.96			1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (prot)	1685	3411		1685	3081			1801	1546	1641	1628	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	0.99	
Satd. Flow (perm)	1685	3411		1685	3081			1801	1546	1641	1628	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	757	18	145	863	290	38	121	113	733	337	185
RTOR Reduction (vph)	0	1	0	0	22	0	0	0	72	0	11	0
Lane Group Flow (vph)	73	774	0	145	1131	0	0	159	41	630	614	0
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	7.4	43.1		14.7	50.4			14.9	29.6	30.3	30.3	
Effective Green, g (s)	7.4	43.1		14.7	50.4			14.9	29.6	30.3	30.3	
Actuated g/C Ratio	0.06	0.34		0.12	0.40			0.12	0.23	0.24	0.24	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	98	1166		196	1232			212	363	394	391	
v/s Ratio Prot	0.04	0.23		c0.09	c0.37			c0.09	0.03	c0.38	0.38	
v/s Ratio Perm												
v/c Ratio	0.74	0.66		0.74	0.92			0.75	0.11	1.60	1.57	
Uniform Delay, d1	58.4	35.3		53.8	35.8			53.7	37.9	47.9	47.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	23.2	1.1		11.9	10.6			12.4	0.1	281.2	269.2	
Delay (s)	81.6	36.4		65.7	46.5			66.1	37.9	329.1	317.0	
Level of Service	F	D		E	D			Е	D	F	F	
Approach Delay (s)		40.3			48.6			54.4			323.1	
Approach LOS		D			D			D			F	
Intersection Summary												
HCM 2000 Control Delay			140.9	H	CM 2000 L	evel of Se	rvice		F			
HCM 2000 Volume to Capacity ra	atio		1.15									
Actuated Cycle Length (s)			126.0	Sı	um of lost t	ime (s)			27.0			
Intersection Capacity Utilization			88.3%	IC	U Level of	Service			Е			
Analysis Period (min)			15									
c Critical Lane Group												

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4	7		4			4	
Traffic Volume (vph)	0	0	28	490	1	69	7	269	138	14	767	6
Future Volume (vph)	0	0	28	490	1	69	7	269	138	14	767	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850		0.955			0.999	
Flt Protected					0.952			0.999			0.999	
Satd. Flow (prot)	0	1611	0	0	1773	1583	0	1777	0	0	1859	0
Flt Permitted					0.952			0.999			0.999	
Satd. Flow (perm)	0	1611	0	0	1773	1583	0	1777	0	0	1859	0
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

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Intersection													
Int Delay, s/veh	403												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		4			र्स	7		4			4		
Traffic Vol, veh/h	0	0	28	490	1	69	7	269	138	14	767	6	
Future Vol, veh/h	0	0	28	490	1	69	7	269	138	14	767	6	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	0	0	30	533	1	75	8	292	150	15	834	7	
	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1289	1326	838	1266	1254	367	841	0	0	442	0	0	
Stage 1	868	868	-	383	383	-	-	-	-	-	-	-	
Stage 2	421	458	-	883	871	-	-	-	-	-	-	-	
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-	
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	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-	
Pot Cap-1 Maneuver	141	156	366	~ 146	172	678	794	-	-	1118	-	-	
Stage 1	347	370	-	640	612	-	-	-	-	-	-	-	
Stage 2	610	567	-	~ 340	368	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	121	150	366	~ 130	165	678	794	-	-	1118	-	-	
Mov Cap-2 Maneuver	121	150	-	~ 130	165	-	-	-	-	-	-	-	
Stage 1	342	361	-	631	603	-	-	-	-	-	-	-	
Stage 2	534	559	-	~ 304	359	-	-	-	-	-	-	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	15.7		¢	1286.5			0.2			0.1			
HCM LOS	C		Ф	F			0.2			0.1			
Minor Lane/Major Mvmt		NBL	NBT	NRR	FBI n1	WBLn1	WBI n2	SBL	SBT	SBR			
Capacity (veh/h)		794	ועטו	NUN	366	130	678	1118	201	JUIN			
HCM Lane V/C Ratio		0.01	-	-	0.083	4.105	0.111	0.014	-	-			
HCM Control Delay (s)		9.6	0	-		1465.8	11	8.3	0	-			
HCM Lane LOS		_	A	-	13. Д С	1405.6 F	В	6.5 A	A	-			
HCM 95th %tile Q(veh)		A 0	- -	-	0.3	54.2	0.4	0	- -	-			
Notes													
~: Volume exceeds capac	rity \$	S: Delay	exceeds	300s	+: Con	nputation	n Not De	fined	*: All m:	ajor volur	me in nl	atoon	

	•	•	†	~	>	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		£			ર્ન
Traffic Volume (vph)	1 6 3	204	301	46	41	520
Future Volume (vph)	163	204	301	46	41	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.925		0.982			
Flt Protected	0.978					0.996
Satd. Flow (prot)	1719	0	1866	0	0	1793
Flt Permitted	0.978					0.996
Satd. Flow (perm)	1719	0	1866	0	0	1793
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
	OII					

Area Type: Other Control Type: Unsignalized

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Intersection						
Int Delay, s/veh	24					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		1			4
Traffic Vol, veh/h	163	204	301	46	41	520
Future Vol, veh/h	163	204	301	46	41	520
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	INOTIC		NONE -	-	INOTIC
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	6
Mvmt Flow	177	222	327	50	45	565
Major/Minor	Minor1	i	Major1		Major2	
Conflicting Flow All	1007	352	0	0	377	0
Stage 1	352	-	-	-	-	-
Stage 2	655					
	6.4	- 4 2	-	-	11	-
Critical Hdwy		6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4		-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	269	696	-	-	1193	-
Stage 1	716	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	_		-
Mov Cap-1 Maneuver	254	696	_	_	1193	-
Mov Cap-2 Maneuver	254	-	_	_	-	_
Stage 1	716	_	_	_	_	
Stage 2	492	-	-	-	-	-
Staye 2	472	-	-	-	-	-
Δ	14/0		NE		0.5	
Approach	WB		NB		SB	
HCM Control Delay, s	82.3		0		0.6	
HCM LOS	F					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		INDI	ואטוגיו	393	1193	
HCM Lane V/C Ratio		-	-	393 1.015	0.037	-
		-				
HCM Control Delay (s)		-	-	82.3	8.1	0
HCM Lane LOS		-	-	F	A	Α
HCM 95th %tile Q(veh)		-	-	12.6	0.1	-

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	¥		f)			ર્ન
Traffic Volume (vph)	99	21	436	46	11	328
Future Volume (vph)	99	21	436	46	11	328
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.976		0.987			
Flt Protected	0.960					0.998
Satd. Flow (prot)	1766	0	1839	0	0	1896
Flt Permitted	0.960					0.998
Satd. Flow (perm)	1766	0	1839	0	0	1896
Link Speed (mph)	25		30			30
Link Distance (ft)	562		255			293
Travel Time (s)	15.3		5.8			6.7
Confl. Peds. (#/hr)	1	1		1	1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other		•			

Area Type: Control Type: Unsignalized

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Intersection						
Int Delay, s/veh	2.9					
•	WBL	WDD	NDT	NBR	CDI	CDT
Movement		WBR	NBT	NBK	SBL	SBT
Lane Configurations	M	04	(4
Traffic Vol, veh/h	99	21	436	46	11	328
Future Vol, veh/h	99	21	436	46	11	328
Conflicting Peds, #/hr	1	1	0	1	1	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	_	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	2	2	0	0
Mymt Flow	108	23	474	50	12	357
IVIVIIIL I IOW	100	23	4/4	50	12	337
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	882	501	0	0	525	0
Stage 1	500	-	_	-	_	-
Stage 2	382	_	_	_	_	_
Critical Hdwy	6.41	6.2			4.1	
Critical Hdwy Stg 1	5.41	- 0.2	_	_	4.1	_
			-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	318	574	-	-	1052	-
Stage 1	611	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	313	573	-	_	1051	-
Mov Cap-2 Maneuver	313	-	_	_	-	_
Stage 1	610	_	_	_	_	_
Stage 2	682	-	-	-	-	-
Slaye 2	002	-	-	-	-	-
	WE		NID		CD	
Approach	WB		NB		SB	
HCM Control Delay, s	22		0		0.3	
HCM LOS	С					
Minor Lane/Major Mvmt		NBT	NBR \	WBLn1	SBL	SBT
Capacity (veh/h)		1401	, , DIC	340	1051	-
HCM Lane V/C Ratio		-	-	0.384	0.011	-
		-	-			
HCM Control Delay (s)		-	-	22	8.5	0
HCM Lane LOS		-	-	С	A	Α
HCM 95th %tile Q(veh)		-	-	1.8	0	-

	•	→	•	•	←	•	•	†	~	\	↓	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	1	0	0	55	0	2	0	430	23	1	278	0
Future Volume (vph)	1	0	0	55	0	2	0	430	23	1	278	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.996			0.993				
Flt Protected		0.950			0.954							
Satd. Flow (prot)	0	1805	0	0	1805	0	0	1852	0	0	1827	0
Flt Permitted		0.950			0.954							
Satd. Flow (perm)	0	1805	0	0	1805	0	0	1852	0	0	1827	0
Link Speed (mph)		20			25			30			30	
Link Distance (ft)		246			436			293			1225	
Travel Time (s)		8.4			11.9			6.7			27.8	
Confl. Peds. (#/hr)	2		3	3		2	3		3	2		2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	4%	0%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												

Area Type: Control Type: Unsignalized Other

Intersection Int Delay, s/veh	1.4												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		4			4			4		_	4		
Traffic Vol, veh/h	1	0	0	55	0	2	0	430	23	1	278	0	
Future Vol, veh/h	1	0	0	55	0	2	0	430	23	1	278	0	
Conflicting Peds, #/hr	2	0	3	3	0	2	3	_ 0	3	_ 2	0	2	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length Veh in Median Storage,	#	0	-	-	0	-	-	0	-	-	0		
veri in Median Storage, Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	4	0	
Mymt Flow	1	0	0	60	0	2	0	467	25	1	302	0	
WWW. I IOW	•	U	U	00	U	2	U	407	20	'	302	O	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	790	802	308	790	790	485	305	0	0	495	0	0	
Stage 1	307	307	-	483	483	-	-	-	-	-	-	-	
Stage 2	483	495	-	307	307	-	-	-	-	-	-	-	
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-	
critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-	
ritical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-	
ollow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-	
ot Cap-1 Maneuver	310	320	737	310	325	586	1267	-	-	1079	-	-	
Stage 1	707	665	-	569	556	-	-	-	-	-	-	-	
Stage 2	569	549	-	707	665	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Nov Cap-1 Maneuver	307	318	733	308	323	583	1263	-	-	1076	-	-	
Nov Cap-2 Maneuver	307	318	-	308	323	-	-	-	-	-	-	-	
Stage 1	705	662	-	567	554	-	-	-	-	-	-	-	
Stage 2	566	547	-	704	662	-	-	-	-	-	-	-	
Approach	EB			WB			NB			SB			
HCM Control Delay, s	16.8			19.3			0			0			
ICM LOS	С			C			Ü			Ū			
Minor Lane/Major Mvmt		NBL	NBT	NBR	EBLn1		SBL	SBT	SBR				
Capacity (veh/h)		1263	-	-	307	313	1076	-	-				
ICM Lane V/C Ratio		-	-	-	0.004	0.198	0.001	-	-				
HCM Control Delay (s)		0	-	-	16.8	19.3	8.3	0	-				
HCM Lane LOS		Α	-	-	С	С	Α	Α	-				
HCM 95th %tile Q(veh)		0	-	-	0	0.7	0	-	-				

1:	Gould	Street	&	Central	Avenue

	→	•	•	•	4	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1		*	↑	W	
Traffic Volume (vph)	718	296	204	298	75	109
Future Volume (vph)	718	296	204	298	75	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	11	11	12	12
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00		0.98	
Frt	0.961				0.920	
Flt Protected	0.70.		0.950		0.980	
Satd. Flow (prot)	1779	0	1631	1783	1625	0
Flt Permitted	1777	O	0.066	1700	0.980	O
Satd. Flow (perm)	1779	0	113	1783	1618	0
Right Turn on Red	1///	Yes	113	1703	1010	Yes
Satd. Flow (RTOR)	45	163			64	163
Link Speed (mph)	30			30	30	
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8			12.5	27.8	
Confl. Peds. (#/hr)	30.0	2	2	12.5	27.0	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	7%	3%	3%	4%
Shared Lane Traffic (%)	270	270	1 70	370	370	770
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		рит-рі 1	6	4	
Permitted Phases	2		6	U	7	
Detector Phase	2		1	6	4	
Switch Phase	2		1	U	7	
Minimum Initial (s)	10.0		6.0	10.0	6.0	
Minimum Split (s)	15.0		11.0	15.0	11.0	
Total Split (s)	62.0		14.0	76.0	14.0	
Total Split (%)	68.9%		15.6%	84.4%	15.6%	
Maximum Green (s)	57.0		9.0	71.0	9.0	
Yellow Time (s)	4.0		9.0 4.0	4.0	9.0 4.0	
All-Red Time (s)	4.0 1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
				5.0	5.0	
Lead/Lag Ontimize?	Lag Yes		Lead Yes			
Lead-Lag Optimize? Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	3.0 Min		None	3.0 Min	None	
necali ivioue	IVIIII		None	IVIIII	None	
Intersection Summary						

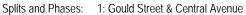
Area Type: Other

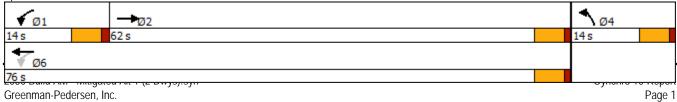
Cycle Length: 90

Actuated Cycle Length: 88.6

Natural Cycle: 90

Control Type: Actuated-Uncoordinated





Greenman-Pedersen, Inc.

1: Gould Street & Cen	ıtral Avenu	ie		Timing Plan: Weekday AM	
	→	•	←	•	
Lane Group	EBT	WBL	WBT	NBL	
Lane Group Flow (vph)	1102	222	324	200	
v/c Ratio	0.97	0.92	0.23	0.90	
Control Delay	37.8	63.7	2.9	68.4	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	37.8	63.7	2.9	68.4	
Queue Length 50th (ft)	517	78	36	78	
Queue Length 95th (ft)	#867	#215	56	#208	
Internal Link Dist (ft)	1274		469	1145	
Turn Bay Length (ft)		100			
Base Capacity (vph)	1161	242	1429	222	
Starvation Cap Reductn	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	
Storage Cap Reductn	0	0	0	0	
Reduced v/c Ratio	0.95	0.92	0.23	0.90	
Intersection Summary					

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

	-	\rightarrow	•	←	•	<i>></i>		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	f		*	•	W			
Traffic Volume (vph)	718	296	204	298	75	109		
Future Volume (vph)	718	296	204	298	75	109		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	11	11	12	12		
Total Lost time (s)	5.0	12	5.0	5.0	5.0	12		
Lane Util. Factor	1.00		1.00	1.00	1.00			
Frpb, ped/bikes	0.99		1.00	1.00	0.98			
Flpb, ped/bikes	1.00		1.00	1.00	1.00			
Frt	0.96		1.00	1.00	0.92			
Flt Protected	1.00		0.95	1.00	0.72			
Satd. Flow (prot)	1778		1631	1783	1625			
Flt Permitted	1.00		0.07	1.00	0.98			
	1.00		113	1783	1625			
Satd. Flow (perm)		0.02				0.02		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	780	322	222	324	82 57	118		
RTOR Reduction (vph)	17	0	0	0		0		
Lane Group Flow (vph)	1085	0	222	324	143	0		
Confl. Peds. (#/hr)	20/	2	2	20/	2	2		
Heavy Vehicles (%)	2%	2%	7%	3%	3%	4%		
Turn Type	NA		pm+pt	NA	Prot			
Protected Phases	2		1	6	4			
Permitted Phases	FF (6		0.0			
Actuated Green, G (s)	55.6		69.6	69.6	9.0			
Effective Green, g (s)	55.6		69.6	69.6	9.0			
Actuated g/C Ratio	0.63		0.79	0.79	0.10			
Clearance Time (s)	5.0		5.0	5.0	5.0			
Vehicle Extension (s)	3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	1115		242	1400	165			
v/s Ratio Prot	c0.61		c0.09	0.18	c0.09			
v/s Ratio Perm			0.62					
v/c Ratio	0.97		0.92	0.23	0.86			
Uniform Delay, d1	15.8		29.7	2.5	39.2			
Progression Factor	1.00		1.00	1.00	1.00			
Incremental Delay, d2	20.6		35.9	0.1	34.4			
Delay (s)	36.4		65.7	2.6	73.6			
Level of Service	D		E	Α	Е			
Approach Delay (s)	36.4			28.2	73.6			
Approach LOS	D			С	Ε			
Intersection Summary								
HCM 2000 Control Delay			38.0	HO	CM 2000 Le	evel of Service	e D	
HCM 2000 Volume to Capacity	ratio		0.95					
Actuated Cycle Length (s)			88.6	Su	ım of lost ti	me (s)	15.0	
Intersection Capacity Utilization			90.7%		U Level of		E	
Analysis Period (min)			15	. •			-	
c Critical Lane Group								
•								

	۶	→	•	•	-	•	4	†	/	-	ļ	4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	↑ ↑		7	^	7		4	7	ሻሻ	†	7
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	13	11	11	11	11	11	11
Storage Length (ft)	175		0	165		400	0		150	200		200
Storage Lanes	1		0	1		1	0		1	1		1
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt	0.050	0.997		0.050		0.850		0.007	0.850	0.050		0.850
Flt Protected	0.950	0.411	0	0.950	2200	1//0	0	0.996	154/	0.950	1001	15/1
Satd. Flow (prot)	1636	3411	0	1668	3388	1669	0	1813	1546	3193	1801	1561
Flt Permitted	0.950	2411	0	0.950	2200	1//0	0	0.996	154/	0.950	1001	15/1
Satd. Flow (perm)	1636	3411	0	1668	3388	1669	0	1813	1546	3193	1801	1561 Voc
Right Turn on Red Satd. Flow (RTOR)		2	Yes			Yes 231			Yes 170			Yes 170
Link Speed (mph)		30			30	231		30	170		30	170
Link Distance (ft)		1352			1324			681			465	
Travel Time (s)		30.7			30.1			15.5			10.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0.72	0.72	1%	1%	6%	2%	0.72
Shared Lane Traffic (%)	370	270	270	170	370	070	070	170	170	070	270	070
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	. 3	3	. 5	. 4	4	· 1
Permitted Phases									3			4
Detector Phase	1	6		5	2	2	3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	18.0	31.0		12.0	25.0		28.0	28.0	12.0	13.0	13.0	18.0
Total Split (%)	20.0%	34.4%		13.3%	27.8%		31.1%	31.1%	13.3%	14.4%	14.4%	20.0%
Maximum Green (s)	12.0	26.0		6.0	20.0		22.0	22.0	6.0	7.0	7.0	12.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5	3.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5	3.0
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)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead			Lead			Lead	Lead	Lead			Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None	None	C-Min	C-Min	None
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	

Area Type: Other

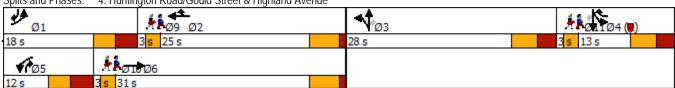
Cycle Length: 90 Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Huntington Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%) Turn Type			
Protected Phases	9	10	11
Permitted Phases	7	10	11
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	3%	3%	3%
Maximum Green (s)	1.0	1.0	1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
Intersection Summary			

Queues

4: Huntington Road/Gould Street & Highland Avenue

Timing Plan: Weekday AM

	•	-	•	•	•	†	~	\	ļ	4
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	189	929	48	664	727	426	259	195	75	38
v/c Ratio	0.89	0.74	0.43	0.78	0.96	0.96	0.46	0.59	0.40	0.06
Control Delay	78.7	30.9	52.9	39.5	39.8	69.7	8.0	46.0	43.2	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.7	30.9	52.9	39.5	39.8	69.7	8.0	46.0	43.2	1.3
Queue Length 50th (ft)	107	256	27	184	161	240	22	55	41	0
Queue Length 95th (ft)	#227	#396	63	#291	#627	#425	58	#112	#95	2
Internal Link Dist (ft)		1272		1244		601			385	
Turn Bay Length (ft)	175		165		400		150	200		200
Base Capacity (vph)	218	1259	111	853	759	443	561	333	188	589
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	0.74	0.43	0.78	0.96	0.96	0.46	0.59	0.40	0.06
Intersection Summary										

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

	۶	→	•	•	←	•	1	†	/	/	↓	-√
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	ħβ		7	^	7		4	7	16.5%	↑ 69	7
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179		35
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	13	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0	5.0		6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1636	3410		1668	3388	1669		1813	1546	3193	1801	1561
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1636	3410	0.00	1668	3388	1669	0.00	1813	1546	3193	1801	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	909	20	48	664	727	33	393	259	195	75	38
RTOR Reduction (vph)	100	1	0	0	0	146	0	0	122	0 105	0	30
Lane Group Flow (vph)	189	928	0	48	664	581	0	426	137	195	75 207	8
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases Permitted Phases	1	6		5	2	2 4	3	3	5 3	4	4	1 4
Actuated Green, G (s)	11.7	33.2		3.6	25.1	33.3		22.0	25.6	8.2	8.2	19.9
Effective Green, g (s)	11.7	33.2 33.2		3.6	25.1 25.1	33.3		22.0	25.6 25.6	8.2 8.2	8.2	19.9
Actuated g/C Ratio	0.13	0.37		0.04	25. I 0.28	33.3 0.37		0.24	0.28	0.09	0.09	0.22
Clearance Time (s)	6.0	5.0		6.0	5.0	0.57		6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	212	1257		66	944	617		443	439	290	164	449
v/s Ratio Prot	c0.12	c0.27		0.03	0.20	c0.35		c0.23	0.01	0.06	0.04	0.00
v/s Ratio Perm	CO. 12	CU.27		0.03	0.20	0.55		00.23	0.01	0.00	0.04	0.00
v/s Ratio Ferm	0.89	0.74		0.73	0.70	0.94		0.96	0.00	0.67	0.46	0.00
Uniform Delay, d1	38.5	24.6		42.7	29.1	27.4		33.6	25.3	39.6	38.8	27.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	0.96	0.94	1.00
Incremental Delay, d2	33.3	2.0		28.4	2.0	22.7		32.7	0.1	11.8	8.9	0.0
Delay (s)	71.8	26.6		71.1	31.1	50.1		66.3	25.4	49.8	45.5	27.4
Level of Service	,e	C		E	С	D		E	C	D	D	C
Approach Delay (s)	_	34.3		_	42.0			50.8	ŭ		46.0	· ·
Approach LOS		С			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			41.6	HO	CM 2000 L	evel of Se	rvice		D			
HCM 2000 Volume to Capacity r	atio		1.00									
Actuated Cycle Length (s)			90.0	Su	ım of lost t	ime (s)			27.0			
Intersection Capacity Utilization			85.9%	IC	U Level of	Service			Е			
Analysis Period (min)			15									
c Critical Lane Group												

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Timing	Plan:	Weekday AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	4			ર્ની	7		413-	
Traffic Volume (vph)	0	0	5	42	0	5	17	427	406	55	295	2
Future Volume (vph)	0	0	5	42	0	5	17	427	406	55	295	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.970				0.850		0.999	
Flt Protected				0.950	0.962			0.998			0.992	
Satd. Flow (prot)	0	1611	0	1681	1651	0	0	1859	1583	0	3507	0
Flt Permitted				0.950	0.962			0.981			0.826	
Satd. Flow (perm)	0	1611	0	1681	1651	0	0	1827	1583	0	2920	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		604			85				441		1	
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			465			307	
Travel Time (s)		14.7			16.0			10.6			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)				44%								
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	11.0	11.0		23.0	23.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	11.0	11.0		24.0	24.0		55.0	55.0	55.0	55.0	55.0	
Total Split (%)	12.2%	12.2%		26.7%	26.7%		61.1%	61.1%	61.1%	61.1%	61.1%	
Maximum Green (s)	6.0	6.0		19.0	19.0		50.0	50.0	50.0	50.0	50.0	
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	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
Walk Time (s)				7.0	7.0					7.0	7.0	
Flash Dont Walk (s)				11.0	11.0					11.0	11.0	
Pedestrian Calls (#/hr)				0	0					0	0	
Intersection Summary												
A T	OII											

Other Area Type:

Cycle Length: 90

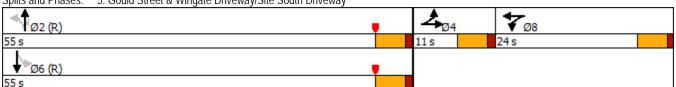
Actuated Cycle Length: 90

Offset: 44 (49%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 5: Gould Street & Wingate Driveway/Site South Driveway



Queues

5: Gould Street & Wingate Driveway/Site South Driveway

	-	•	←	†	~	ţ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	5	26	25	482	441	383
v/c Ratio	0.01	0.20	0.12	0.31	0.31	0.15
Control Delay	0.0	41.8	1.2	2.8	8.0	2.7
Queue Delay	0.0	0.0	0.0	0.4	0.3	0.0
Total Delay	0.0	41.8	1.2	3.2	1.1	2.7
Queue Length 50th (ft)	0	14	0	49	6	17
Queue Length 95th (ft)	0	41	0	m117	m19	56
Internal Link Dist (ft)	351		389	385		227
Turn Bay Length (ft)						
Base Capacity (vph)	671	354	415	1565	1419	2502
Starvation Cap Reductn	0	0	0	583	448	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.07	0.06	0.49	0.45	0.15
Intersection Summary						

m Volume for 95th percentile queue is metered by upstream signal.

	۶	→	•	•	←	•	4	†	/	/	ļ	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		ነ	4			4	7		€1 }	
Traffic Volume (vph)	0	0	5	42	0	5	17	427	406	55	295	2
Future Volume (vph)	0	0	5	42	0	5	17	427	406	55	295	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00		0.95	
Frt		0.86		1.00	0.97			1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.96			1.00	1.00		0.99	
Satd. Flow (prot)		1611		1681	1650			1859	1583		3509	
Flt Permitted		1.00		0.95	0.96			0.98	1.00		0.83	
Satd. Flow (perm)		1611		1681	1650			1828	1583		2922	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	5	46	0	5	18	464	441	60	321	2
RTOR Reduction (vph)	0	5	0	0	24	0	0	0	102	0	0	0
Lane Group Flow (vph)	0	0	0	26	1	0	0	482	339	0	383	0
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		1.2		4.7	4.7			69.1	69.1		69.1	
Effective Green, g (s)		1.2		4.7	4.7			69.1	69.1		69.1	
Actuated g/C Ratio		0.01		0.05	0.05			0.77	0.77		0.77	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		21		87	86			1403	1215		2243	
v/s Ratio Prot		c0.00		c0.02	0.00							
v/s Ratio Perm								c0.26	0.21		0.13	
v/c Ratio		0.00		0.30	0.02			0.34	0.28		0.17	
Uniform Delay, d1		43.8		41.1	40.5			3.3	3.1		2.8	
Progression Factor		1.00		1.00	1.00			0.84	1.20		1.00	
Incremental Delay, d2		0.1		1.9	0.1			0.2	0.2		0.2	
Delay (s)		43.9		43.0	40.5			3.0	3.9		3.0	
Level of Service		D		D	D			Α	Α		Α	
Approach Delay (s)		43.9			41.8			3.4			3.0	
Approach LOS		D			D			Α			Α	
Intersection Summary												
HCM 2000 Control Delay			4.9	H	CM 2000 L	evel of Se	rvice		А			
HCM 2000 Volume to Capacity ratio)		0.34									
Actuated Cycle Length (s)			90.0	Sı	ım of lost t	ime (s)			15.0			
Intersection Capacity Utilization			53.7%	IC	U Level of	Service			Α			
Analysis Period (min)			15									
c Critical Lane Group												

	•	•	†	/	\	↓
Lane Group	WBL	WBR	- NBT	- NBR	SBL	SBT
Lane Configurations	*	7	•	7	7	↑
Traffic Volume (vph)	13	15	402	134	171	299
Future Volume (vph)	13	15	402	134	171	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		100	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1863	1583	1805	1845
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1863	1583	1805	1845
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	2%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Area Type: Other

Control Type: Unsignalized

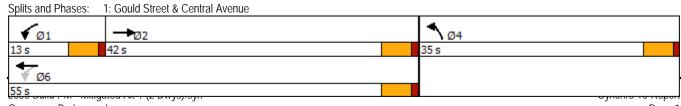
Intersection						
Int Delay, s/veh	2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	ሻ	7	<u> </u>	7	ነ	<u> </u>
Traffic Vol, veh/h	13	15	402	134	171	299
Future Vol, veh/h	13	15	402	134	171	299
Conflicting Peds, #/hr	0	0	402	0	0	299
Sign Control		Stop	Free		Free	
RT Channelized	Stop		Free -	Free	Free -	Free
	-	None		None		None
Storage Length	0	0	-	100	100	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	2	2	0	3
Mvmt Flow	14	16	437	146	186	325
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1134	437	0	0	583	0
Stage 1	437	-	-	-	-	-
Stage 2	697	_	_	_	_	_
Critical Hdwy	6.4	6.2			4.1	_
Critical Hdwy Stg 1	5.4	-			7.1	
Critical Hdwy Stg 2	5.4		-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
			-	-	1001	-
Pot Cap-1 Maneuver	226	624	-	-	1001	-
Stage 1	655	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	184	624	-	-	1001	-
Mov Cap-2 Maneuver	184	-	-	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	405	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	18		0		3.4	
HCM LOS	C		U		5.7	
TIOWI LOG	J					
		NDT	NDC	MDI 43	MDI C	CDI
Minor Lane/Major Mvmt		NBT		WBLn1 \		SBL
Capacity (veh/h)		-	-	184	624	1001
HCM Lane V/C Ratio		-	-	0.077	0.026	0.186
HCM Control Delay (s)		-	-	26.2	10.9	9.4
HCM Lane LOS		-	-	D	В	Α
HCM 95th %tile Q(veh)		-	-	0.2	0.1	0.7

	→	•	•	←	1	/
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	4		*	•	, M	
Traffic Volume (vph)	447	103	181	↑ 707	223	213
Future Volume (vph)	447	103	181	707	223	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	11	11	12	12
Storage Length (ft)		0	100		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		· ·	25		25	· ·
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00	1.00	1.00	0.99	1.00
Frt	0.975		1.00		0.934	
Flt Protected	0.773		0.950		0.975	
Satd. Flow (prot)	1838	0	1728	1801	1673	0
Flt Permitted	1030	U	0.141	1001	0.975	U
Satd. Flow (perm)	1838	0	256	1801	1673	0
Right Turn on Red	1838	Yes	230	1001	10/3	0 Yes
	1/	res			Γ0	res
Satd. Flow (RTOR)	16			20	58 30	
Link Speed (mph)	30			30		
Link Distance (ft)	1354			549	1225	
Travel Time (s)	30.8		,	12.5	27.8	,
Confl. Peds. (#/hr)	0.00	0.00	6	0.00	0.00	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	2%	0%	4%
Shared Lane Traffic (%)						
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Detector Phase	2		1	6	4	
Switch Phase						
Minimum Initial (s)	10.0		6.0	10.0	6.0	
Minimum Split (s)	15.0		11.0	15.0	11.0	
Total Split (s)	42.0		13.0	55.0	35.0	
Total Split (%)	46.7%		14.4%	61.1%	38.9%	
Maximum Green (s)	37.0		8.0	50.0	30.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0	5.0	
Lead/Lag	Lag		Lead	0.0	0.0	
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Min		None	Min	None	
	141111		TVOTIC	171111	None	
Intersection Summary						

Area Type: Other

Cycle Length: 90 Actuated Cycle Length: 77 Natural Cycle: 65

Control Type: Actuated-Uncoordinated



Greenman-Pedersen, Inc.
Page 1

1: Gould Street & Ce	ntral Avenu	е			Timing Plan: Weekday PM
	-	•	←	•	
Lane Group	EBT	WBL	WBT	NBL	
Lane Group Flow (vph)	598	197	768	474	
v/c Ratio	0.84	0.67	0.77	0.84	
Control Delay	33.9	23.5	20.7	37.8	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	33.9	23.5	20.7	37.8	
Queue Length 50th (ft)	261	48	287	195	
Queue Length 95th (ft)	#422	#132	475	#375	
Internal Link Dist (ft)	1274		469	1145	
Turn Bay Length (ft)		100			
Base Capacity (vph)	925	300	1214	711	
Starvation Cap Reductn	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	
Storage Cap Reductn	0	0	0	0	
Reduced v/c Ratio	0.65	0.66	0.63	0.67	

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

	→	•	•	←	4	/	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1 >		ሻ		W		
Traffic Volume (vph)	447	103	181	707	223	213	
Future Volume (vph)	447	103	181	707	223	213	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	11	11	12	12	
Total Lost time (s)	5.0	12	5.0	5.0	5.0	12	
Lane Util. Factor	1.00		1.00	1.00	1.00		
Frpb, ped/bikes	1.00		1.00	1.00	0.99		
Flpb, ped/bikes	1.00		1.00	1.00	1.00		
Frt	0.97		1.00	1.00	0.93		
Flt Protected	1.00		0.95	1.00	0.98		
Satd. Flow (prot)	1837		1727	1801	1673		
Flt Permitted	1.00		0.14	1.00	0.98		
	1837		256	1801	1673		
Satd. Flow (perm)		0.02				0.02	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph) RTOR Reduction (vph)	486	112	197	768	242 40	232	
` ' '	10	0	0	0		0	
Lane Group Flow (vph)	588	0	197	768	434	0	
Confl. Peds. (#/hr)	10/	00/	6	20/	00/	6	
Heavy Vehicles (%)	1%	0%	1%	2%	0%	4%	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	2		1	6	4		
Permitted Phases	00.5		6	40.7	04.0		
Actuated Green, G (s)	29.5		42.6	42.6	24.0		
Effective Green, g (s)	29.5		42.6	42.6	24.0		
Actuated g/C Ratio	0.39		0.56	0.56	0.31		
Clearance Time (s)	5.0		5.0	5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0	3.0		
Lane Grp Cap (vph)	707		297	1001	524		
v/s Ratio Prot	0.32		0.07	c0.43	c0.26		
v/s Ratio Perm			0.30				
v/c Ratio	0.83		0.66	0.77	0.83		
Uniform Delay, d1	21.3		13.3	13.2	24.4		
Progression Factor	1.00		1.00	1.00	1.00		
Incremental Delay, d2	8.3		5.5	3.6	10.4		
Delay (s)	29.6		18.8	16.7	34.8		
Level of Service	С		В	В	С		
Approach Delay (s)	29.6			17.2	34.8		
Approach LOS	С			В	С		
Intersection Summary							
HCM 2000 Control Delay			24.9	Нα	CM 2000 L	evel of Service	e C
HCM 2000 Volume to Capacity rai	tio		0.85	110	5.VI 2000 L	J V G I G I G I V I G I	<u> </u>
Actuated Cycle Length (s)	uo		76.6	Çı	ım of lost ti	me (s)	15.0
Intersection Capacity Utilization			78.0%		U Level of		D
Analysis Period (min)			15	iC	O LCACI OI	JUI VILU	U
c Critical Lane Group			13				
c Ghilear Lane Group							

Timing Plan: Weekday PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	\ 67	∱ }		7	ተተ 794	7		ની	7	ሻሻ	•	7
Traffic Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	13	11	11	11	11	11	11
Storage Length (ft)	175		0	165		400	0		150	200		200
Storage Lanes	1		0	1		1	0		1	1		1
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.997				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.988		0.950		
Satd. Flow (prot)	1685	3413	0	1685	3116	1669	0	1801	1546	3351	1818	1516
Flt Permitted	0.950			0.950				0.988		0.950		
Satd. Flow (perm)	1685	3413	0	1685	3116	1669	0	1801	1546	3351	1818	1516
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				290			170			185
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			463	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	. 3	3	. 5	. 4	4	· 1
Permitted Phases									3			4
Detector Phase	1	6		5	2	2	3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	13.0	25.0		17.0	29.0		17.0	17.0	17.0	25.0	25.0	13.0
Total Split (%)	14.4%	27.8%		18.9%	32.2%		18.9%	18.9%	18.9%	27.8%	27.8%	14.4%
Maximum Green (s)	7.0	20.0		11.0	24.0		11.0	11.0	11.0	19.0	19.0	7.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5	3.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5	3.0
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)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead			Lead			Lead	Lead	Lead			Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None	None	C-Min	C-Min	None
Walk Time (s)	INOTIC	4.0		140110	4.0		140110	140110	140110	4.0	4.0	140110
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			12.0					17.5	17.3	
Intersection Summary		•			•					•	,	

Intersection Summary

Area Type: Other

Cycle Length: 90

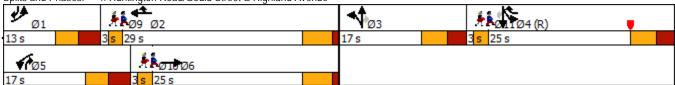
Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Huntington Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR) Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	9	10	11
Permitted Phases	-		
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	3%	3%	3%
Maximum Green (s)	1.0	1.0	1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
Recall Mode	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
Intersection Summary			

Queues

4: Huntington Road/Gould Street & Highland Avenue

Timing Plan: Weekday PM

	•	→	•	•	•	†	/	\	Ţ	4	
Lane Group	EBL	EBT	v WBL	WBT	WBR	NBT	• NBR	SBL	• SBT	SBR	
Lane Group Flow (vph)	73	775	145	863	290	159	113	733	337	185	
v/c Ratio	0.57	0.88	0.77	0.86	0.26	0.77	0.23	0.89	0.75	0.28	
Control Delay	58.9	46.2	64.8	40.9	1.4	63.7	1.8	46.0	43.0	6.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	58.9	46.2	64.8	40.9	1.4	63.7	1.8	46.0	43.0	6.2	
Queue Length 50th (ft)	41	222	80	248	0	88	0	141	126	15	
Queue Length 95th (ft)	#96	#366	#167	#400	19	#180	6	#357	#348	42	
Internal Link Dist (ft)		1272		1244		601			383		
Turn Bay Length (ft)	175		165		400		150	200		200	
Base Capacity (vph)	131	878	205	1000	1104	220	493	827	448	667	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.56	0.88	0.71	0.86	0.26	0.72	0.23	0.89	0.75	0.28	
Intersection Summary											

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ î≽		ሻ	^	7		र्स	7	ሻሻ		7
Traffic Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	13	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0	5.0		6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1685	3411		1685	3116	1669		1801	1546	3351	1818	1516
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1685	3411		1685	3116	1669		1801	1546	3351	1818	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	757	18	145	863	290	38	121	113	733	337	185
RTOR Reduction (vph)	0	1	0	0	0	125	0	0	87	0	0	128
Lane Group Flow (vph)	73	774	0	145	863	165	0	159	26	733	337	57
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	3	3	5	4	4	1
Permitted Phases									3			4
Actuated Green, G (s)	5.6	24.3		10.2	28.9	51.1		10.3	20.5	22.2	22.2	27.8
Effective Green, g (s)	5.6	24.3		10.2	28.9	51.1		10.3	20.5	22.2	22.2	27.8
Actuated g/C Ratio	0.06	0.27		0.11	0.32	0.57		0.11	0.23	0.25	0.25	0.31
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	104	920		190	1000	947		206	352	826	448	569
v/s Ratio Prot	0.04	0.23		c0.09	c0.28	0.10		c0.09	0.01	c0.22	0.19	0.01
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.70	0.84		0.76	0.86	0.17		0.77	0.07	0.89	0.75	0.10
Uniform Delay, d1	41.4	31.0		38.7	28.7	9.3		38.7	27.3	32.7	31.4	22.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	0.98	0.98	1.63
Incremental Delay, d2	16.0	6.7		15.0	7.6	0.0		15.0	0.0	12.3	10.0	0.0
Delay (s)	57.4	37.7		53.7	36.2	9.4		53.7	27.3	44.3	40.8	36.2
Level of Service	Е	D		D	D	Α		D	С	D	D	D
Approach Delay (s)		39.4			32.2			42.7			42.2	
Approach LOS		D			С			D			D	
Intersection Summary												
HCM 2000 Control Delay		38.1	HCM 2000 Level of Service			rvice		D				
HCM 2000 Volume to Capacity ratio		0.94						_				
Actuated Cycle Length (s)		90.0	Sum of lost time (s)					27.0				
Intersection Capacity Utilization		73.3%	ICU Level of Service					D				
Analysis Period (min)			15									
c Critical Lane Group												

Timing Plan: Weekday PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		ነ ነ	- 4			र्स	7		41₽	
Traffic Volume (vph)	0	0	28	490	1	69	7	269	138	14	767	6
Future Volume (vph)	0	0	28	490	1	69	7	269	138	14	767	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.865			0.962				0.850		0.999	
Flt Protected				0.950	0.964			0.999			0.999	
Satd. Flow (prot)	0	1611	0	1681	1641	0	0	1861	1583	0	3532	0
Flt Permitted				0.950	0.964			0.978			0.948	
Satd. Flow (perm)	0	1611	0	1681	1641	0	0	1822	1583	0	3352	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		107	. 00		20				150		1	
Link Speed (mph)		20			20			30	100		30	
Link Distance (ft)		431			469			463			307	
Travel Time (s)		14.7			16.0			10.5			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)	0.72	0.72	0.72	42%	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8		1 01111	2	T CITII	T CITII	6	
Permitted Phases	'			O	O		2	_	2	6	O	
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase	•	•		Ü	J		-	_	_	Ü	Ü	
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	11.0	11.0		23.0	23.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	11.0	11.0		36.0	36.0		43.0	43.0	43.0	43.0	43.0	
Total Split (%)	12.2%	12.2%		40.0%	40.0%		47.8%	47.8%	47.8%	47.8%	47.8%	
Maximum Green (s)	6.0	6.0		31.0	31.0		38.0	38.0	38.0	38.0	38.0	
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	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	1.0	0.0		0.0	0.0		1.0	0.0	0.0	1.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag		5.0		5.0	5.0			5.0	5.0		5.0	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
					None		3.0 C-Min		3.0 C-Min	3.0 C-Min	3.0 C-Min	
Recall Mode	None	None		None			C-IVIII	C-Min	C-IVIII			
Walk Time (s)				7.0	7.0					7.0	7.0	
Flash Dont Walk (s)				11.0	11.0					11.0	11.0	
Pedestrian Calls (#/hr)				0	0					0	0	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 90

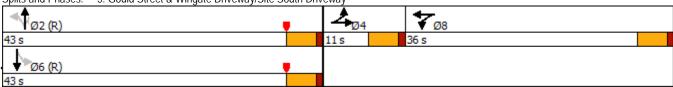
Actuated Cycle Length: 90

Offset: 34 (38%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 5: Gould Street & Wingate Driveway/Site South Driveway



Greenman-Pedersen, Inc.

5: Gould Street & Wingate Driveway/Site South Driveway

	-	•	←	†	~	ļ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	30	309	300	300	150	856
v/c Ratio	0.14	0.72	0.69	0.29	0.16	0.46
Control Delay	1.5	39.2	35.6	13.0	2.8	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	39.2	35.6	13.0	2.8	15.1
Queue Length 50th (ft)	0	167	150	77	0	161
Queue Length 95th (ft)	0	232	214	m179	m21	255
Internal Link Dist (ft)	351		389	383		227
Turn Bay Length (ft)						
Base Capacity (vph)	207	579	578	1018	951	1873
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.53	0.52	0.29	0.16	0.46
Intersection Summary						

m Volume for 95th percentile queue is metered by upstream signal.

	۶	→	•	•	←	•	4	†	/	>	ļ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		* *	4			4	7		€1 }•	
Traffic Volume (vph)	0	0	28	490	·1	69	7	269	138	14	767	6
Future Volume (vph)	0	0	28	490	1	69	7	269	138	14	767	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00		0.95	
Frt		0.86		1.00	0.96			1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.96			1.00	1.00		1.00	
Satd. Flow (prot)		1611		1681	1642			1860	1583		3532	
FIt Permitted		1.00		0.95	0.96			0.98	1.00		0.95	
Satd. Flow (perm)		1611		1681	1642			1821	1583		3350	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	30	533	1	75	8	292	150	15	834	7
RTOR Reduction (vph)	0	29	0	0	15	0	0	0	70	0	0	0
Lane Group Flow (vph)	0	1	0	309	285	0	0	300	81	0	856	0
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		3.6		23.1	23.1			48.3	48.3		48.3	
Effective Green, g (s)		3.6		23.1	23.1			48.3	48.3		48.3	
Actuated g/C Ratio		0.04		0.26	0.26			0.54	0.54		0.54	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		64		431	421			977	849		1797	
v/s Ratio Prot		c0.00		c0.18	0.17							
v/s Ratio Perm								0.16	0.05		c0.26	
v/c Ratio		0.02		0.72	0.68			0.31	0.09		0.48	
Uniform Delay, d1		41.5		30.5	30.1			11.6	10.2		13.0	
Progression Factor		1.00		1.00	1.00			0.91	0.87		1.00	
Incremental Delay, d2		0.1		5.6	4.3			8.0	0.2		0.9	
Delay (s)		41.6		36.1	34.4			11.3	9.1		13.9	
Level of Service		D		D	С			В	Α		В	
Approach Delay (s)		41.6			35.2			10.5			13.9	
Approach LOS		D			D			В			В	
Intersection Summary												
HCM 2000 Control Delay			20.2	H(CM 2000 L	evel of Se	rvice		С			
HCM 2000 Volume to Capacity ratio)		0.53									
Actuated Cycle Length (s)			90.0	Sı	ım of lost t	ime (s)			15.0			
Intersection Capacity Utilization			62.1%		U Level of	٠,			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	7	7	†	7	7	†
Traffic Volume (vph)	163	204	301	46	41	520
Future Volume (vph)	163	204	301	46	41	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		100	100	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1900	1615	1805	1792
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1900	1615	1805	1792
Link Speed (mph)	20		30			30
Link Distance (ft)	474		307			641
Travel Time (s)	16.2		7.0			14.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	7.5					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	ሻ	7	†	7	1	†
Traffic Vol, veh/h	163	204	301	46	41	520
Future Vol, veh/h	163	204	301	46	41	520
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	0	_	100	100	-
Veh in Median Storage,		-	0	-	-	0
Grade, %	0	_	0	_	_	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	6
3						
Mvmt Flow	177	222	327	50	45	565
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	982	327	0	0	377	0
Stage 1	327	-	-	-	-	-
Stage 2	655	-	-	-	-	-
Critical Hdwy	6.4	6.2	_	_	4.1	_
Critical Hdwy Stg 1	5.4	-				_
Critical Hdwy Stg 2	5.4	_		_		_
Follow-up Hdwy	3.5	3.3	_	_	2.2	_
Pot Cap-1 Maneuver	279	3.3 719	-	-	1193	-
			-	-	1193	-
Stage 1	735	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	268	719	-	-	1193	-
Mov Cap-2 Maneuver	268	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	501	_	-	-	-	-
3						
Approach	WB		NB		SB	
HCM Control Delay, s	25.1		0		0.6	
HCM LOS	23.1 D		3		0.0	
TIOWI LOO	D					
Minor Lane/Major Mvmt		NBT	NRD V	WBLn1 \	MRI n2	SBL
			NDK			
Capacity (veh/h)		-	-	268	719	1193
HCM Lane V/C Ratio		-	-	0.661	0.308	0.037
HCM Control Delay (s)		-	-	41.2	12.2	8.1
HCM Lane LOS		-	-	Ε	В	Α
HCM 95th %tile Q(veh)		-	-	4.3	1.3	0.1

Timing Plan: Weekday AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	∱ β		¥	^	7		र्स	7	ሻሻ	↑ 69	7 35
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	12	11	11	11	11	11	11
Storage Length (ft)	175		0	165		400	0		150	200		200
Storage Lanes	1		0	1		1	0		1	1		1
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.997				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.996		0.950		
Satd. Flow (prot)	1636	3411	0	1668	3388	1615	0	1813	1546	3193	1801	1561
Flt Permitted	0.950			0.950				0.996		0.950		
Satd. Flow (perm)	1636	3411	0	1668	3388	1615	0	1813	1546	3193	1801	1561
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				231			170			170
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			462	
Travel Time (s)		30.7			30.1			15.5			10.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	3	3	5	4	4	1
Permitted Phases									3			4
Detector Phase	1	6		5	2	2	3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	18.0	31.0		12.0	25.0		28.0	28.0	12.0	13.0	13.0	18.0
Total Split (%)	20.0%	34.4%		13.3%	27.8%		31.1%	31.1%	13.3%	14.4%	14.4%	20.0%
Maximum Green (s)	12.0	26.0		6.0	20.0		22.0	22.0	6.0	7.0	7.0	12.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5	3.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5	3.0
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)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead			Lead			Lead	Lead	Lead			Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None	None	C-Min	C-Min	None
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	
Intersection Summary												

Intersection Summary

Area Type: Other

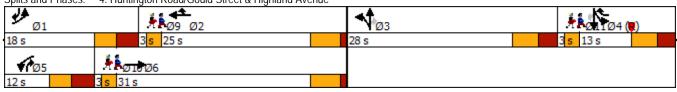
Cycle Length: 90 Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Huntington Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type	0	10	11
Protected Phases	9	10	11
Permitted Phases			
Detector Phase Switch Phase			
	1.0	1.0	1 0
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0 3%	3.0 3%	3.0 3%
Total Split (%)	3% 1.0	3% 1.0	3% 1.0
Maximum Green (s) Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	U.U	0.0	0.0
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
	None	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
• •	'	1	1
Intersection Summary			

4: Huntington Road/Gould Street & Highland Avenue

• t EBL **EBT** WBL **WBT WBR NBT SBT** SBR Lane Group **NBR** SBL Lane Group Flow (vph) 189 929 48 664 727 426 259 195 75 38 0.89 0.74 0.78 0.98 0.96 0.59 0.40 0.06 v/c Ratio 0.43 0.46 Control Delay 52.9 39.5 46.0 45.7 78.7 30.9 69.7 8.0 42.7 1.0 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 **Total Delay** 78.7 30.9 52.9 39.5 46.0 69.7 8.0 45.7 42.7 1.0 Queue Length 50th (ft) 256 184 107 27 172 240 22 56 41 1 Queue Length 95th (ft) #291 #114 #96 #227 #396 63 #638 #425 58 4 Internal Link Dist (ft) 382 1272 1244 601 Turn Bay Length (ft) 400 200 200 175 165 150 Base Capacity (vph) 218 1259 111 853 739 443 561 333 188 589 Starvation Cap Reductn 0 0 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0 0 0 Reduced v/c Ratio 0.87 0.74 0.43 0.78 0.98 0.96 0.46 0.59 0.40 0.06 Intersection Summary

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

	۶	→	•	•	←	•	•	†	~	/	↓	✓
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ î≽		ሻ	^	7		र्स	7	44	↑	7
Traffic Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Future Volume (vph)	174	836	18	44	611	669	30	362	238	179	69	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	12	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0	5.0		6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1636	3410		1668	3388	1615		1813	1546	3193	1801	1561
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1636	3410		1668	3388	1615		1813	1546	3193	1801	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	909	20	48	664	727	33	393	259	195	75	38
RTOR Reduction (vph)	0	1	0	0	0	146	0	0	122	0	0	30
Lane Group Flow (vph)	189	928	0	48	664	581	0	426	137	195	75	8
Heavy Vehicles (%)	3%	2%	2%	1%	3%	0%	0%	1%	1%	6%	2%	0%
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	3	3	5	4	4	1
Permitted Phases									3			4
Actuated Green, G (s)	11.7	33.2		3.6	25.1	33.3		22.0	25.6	8.2	8.2	19.9
Effective Green, g (s)	11.7	33.2		3.6	25.1	33.3		22.0	25.6	8.2	8.2	19.9
Actuated g/C Ratio	0.13	0.37		0.04	0.28	0.37		0.24	0.28	0.09	0.09	0.22
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	212	1257		66	944	597		443	439	290	164	449
v/s Ratio Prot	c0.12	c0.27		0.03	0.20	c0.36		c0.23	0.01	0.06	0.04	0.00
v/s Ratio Perm									0.08			0.00
v/c Ratio	0.89	0.74		0.73	0.70	0.97		0.96	0.31	0.67	0.46	0.02
Uniform Delay, d1	38.5	24.6		42.7	29.1	27.9		33.6	25.3	39.6	38.8	27.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	0.95	0.94	1.00
Incremental Delay, d2	33.3	2.0		28.4	2.0	30.0		32.7	0.1	11.7	8.9	0.0
Delay (s)	71.8	26.6		71.1	31.1	57.9		66.3	25.4	49.4	45.1	27.4
Level of Service	Е	С		Е	С	Е		Е	С	D	D	С
Approach Delay (s)		34.3			46.0			50.8			45.7	
Approach LOS		С			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			43.2	H(CM 2000 L	evel of Se	rvice		D			
HCM 2000 Volume to Capacity r	atio		1.02						_			
Actuated Cycle Length (s)			90.0		ım of lost t				27.0			
Intersection Capacity Utilization			85.9%	IC	U Level of	Service			Е			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Plan: Weekday AM

	*	→	•	•	←	4	1	†	/	-	↓	1
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	4			ની	7	7	ĵ.	
Traffic Volume (vph)	0	0	5	55	0	10	17	293	540	226	282	2
Future Volume (vph)	0	0	5	55	0	10	17	293	540	226	282	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865			0.953				0.850		0.999	
Flt Protected				0.950	0.967			0.997		0.950		
Satd. Flow (prot)	0	1611	0	1681	1685	0	0	1857	1583	1770	1861	0
Flt Permitted				0.950	0.967			0.978		0.557		
Satd. Flow (perm)	0	1611	0	1681	1685	0	0	1822	1583	1038	1861	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		596			85				587		1	
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			462			408	
Travel Time (s)		14.7			16.0			10.5			9.3	
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
Shared Lane Traffic (%)				40%								
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		. 8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	11.0	11.0		23.0	23.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	11.0	11.0		23.0	23.0		56.0	56.0	56.0	56.0	56.0	
Total Split (%)	12.2%	12.2%		25.6%	25.6%		62.2%	62.2%	62.2%	62.2%	62.2%	
Maximum Green (s)	6.0	6.0		18.0	18.0		51.0	51.0	51.0	51.0	51.0	
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	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
Walk Time (s)				7.0	7.0			- "		7.0	7.0	
Flash Dont Walk (s)				11.0	11.0					11.0	11.0	
Pedestrian Calls (#/hr)				0	0					0	0	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 90

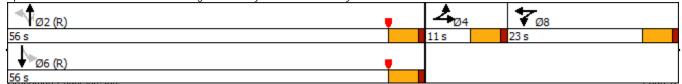
Actuated Cycle Length: 90

Offset: 49 (54%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 5: Gould Street & Wingate Driveway/Site South Driveway



5: Gould Street & Wingate Driveway/Site South Driveway

	-	•	←	†	/	-	ļ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	5	36	35	336	587	246	309
v/c Ratio	0.01	0.26	0.16	0.23	0.42	0.29	0.20
Control Delay	0.0	42.5	1.6	3.0	1.0	4.7	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.4	0.0	0.0
Total Delay	0.0	42.5	1.6	3.0	1.5	4.7	3.6
Queue Length 50th (ft)	0	21	0	33	9	25	29
Queue Length 95th (ft)	0	50	1	m74	m28	99	101
Internal Link Dist (ft)	351		389	382			328
Turn Bay Length (ft)						100	
Base Capacity (vph)	663	336	405	1486	1399	846	1518
Starvation Cap Reductn	0	0	0	0	384	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.11	0.09	0.23	0.58	0.29	0.20
Intersection Summary							

m Volume for 95th percentile queue is metered by upstream signal.

	۶	→	•	•	←	•	•	†	<i>></i>	/	↓	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		- ↔		ሻ	4			र्स	7	ሻ	₽	
Traffic Volume (vph)	0	0	5	55	0	10	17	293	540	226	282	2
Future Volume (vph)	0	0	5	55	0	10	17	293	540	226	282	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	1.00	
Frt		0.86		1.00	0.95			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	0.97			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1611		1681	1685			1858	1583	1770	1861	
Flt Permitted /		1.00		0.95	0.97			0.98	1.00	0.56	1.00	
Satd. Flow (perm)		1611		1681	1685			1822	1583	1037	1861	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	5	60	0	11	18	318	587	246	307	2
RTOR Reduction (vph)	0	5	0	0	33	0	0	0	147	0	0	0
Lane Group Flow (vph)	0	0	0	36	2	0	0	336	440	246	309	0
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		3piit 8	8		I CIIII	2	I CIIII	I CIIII	6	
Permitted Phases	4	7		U	U		2	2	2	6	U	
Actuated Green, G (s)		1.2		6.4	6.4		2	67.4	67.4	67.4	67.4	
Effective Green, g (s)		1.2		6.4	6.4			67.4	67.4	67.4	67.4	
Actuated g/C Ratio		0.01		0.07	0.07			0.75	0.75	0.75	0.75	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		21		119	119			1364	1185	776	1393	
v/s Ratio Prot		c0.00		c0.02	0.00			1304	1100	770	0.17	
		CU.UU		CU.U2	0.00			0.18	c0.28	0.24	0.17	
v/s Ratio Perm		0.00		0.20	0.00						0.00	
v/c Ratio		0.00		0.30	0.02			0.25	0.37	0.32	0.22	
Uniform Delay, d1		43.8		39.7	38.9			3.5	3.9	3.7	3.4	
Progression Factor		1.00		1.00	1.00			0.85	1.53	1.00	1.00	
Incremental Delay, d2		0.1		1.4	0.1			0.1	0.3	1.1	0.4	
Delay (s)		43.9		41.1	39.0			3.1	6.3	4.8	3.8	
Level of Service		D		D	D			A	Α	Α	A	
Approach Delay (s)		43.9			40.1			5.1			4.2	
Approach LOS		D			D			Α			Α	
Intersection Summary												
HCM 2000 Control Delay			6.5	HO	CM 2000 L	evel of Se	rvice		Α			
HCM 2000 Volume to Capacity rate	tio		0.36									
Actuated Cycle Length (s)			90.0	Su	ım of lost t	ime (s)			15.0			
Intersection Capacity Utilization			65.9%	IC	U Level of	Service			С			
Analysis Period (min)			15									
c Critical Lane Group			10									

	•	•	†	~	-	ļ
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7	•			^
Traffic Volume (vph)	0	10	407	0	0	470
Future Volume (vph)	0	10	407	0	0	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						
Satd. Flow (prot)	0	1644	1863	0	0	1845
Flt Permitted						
Satd. Flow (perm)	0	1644	1863	0	0	1845
Link Speed (mph)	20		30			30
Link Distance (ft)	474		408			540
Travel Time (s)	16.2		9.3			12.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	2%	0%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	0.1					
,		WDD	NDT	NDD	CDI	CDT
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7				
Traffic Vol, veh/h	0	10	407	0	0	470
Future Vol, veh/h	0	10	407	0	0	470
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, %	0	0	2	2	0	3
Mymt Flow	0	11	442	0	0	5 511
WWITH FIOW	U	11	442	U	U	311
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	442	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	_	_	_	_	_	_
Critical Hdwy	_	6.2	_	_	_	_
Critical Hdwy Stg 1	_	0.2		_	_	_
Critical Hdwy Stg 2	-	-	-	-	-	-
	-	3.3	-	-	-	-
Follow-up Hdwy	-		-	-	-	-
Pot Cap-1 Maneuver	0	620	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	620	-	-	-	-
Mov Cap-2 Maneuver	-	_	_	_	_	_
Stage 1	_	_	_	_	_	_
Stage 2	_	_	_	_	_	_
Jiaye 2	-	-	-	-	-	-
Approach	WB		NB		SB	
HCM Control Delay, s	10.9		0		0	
HCM LOS	В					
Minor Lane/Major Mvmt		NBT \	WBLn1	SBT		
Capacity (veh/h)			620	-		
HCM Lane V/C Ratio		-	0.018	-		
		-	10.9	-		
HCM Control Delay (s)		-		-		
HCM Lane LOS		-	В	-		
HCM 95th %tile Q(veh)		-	0.1	-		

Timing Plan: Weekday PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	\ 67	∱ ⊅		7	ተተ 794	7		र्स	7	ሻሻ	•	7
Traffic Volume (vph)		696	17	133		267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	11	10	11	11	11	11	11	11	11	11
Storage Length (ft)	175		0	165		400	0		150	200		200
Storage Lanes	1		0	1		1	0		1	1		1
Taper Length (ft)	150			75			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.997				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.988		0.950		
Satd. Flow (prot)	1685	3413	0	1685	3116	1561	0	1801	1546	3351	1818	1516
Flt Permitted	0.950			0.950				0.988		0.950		
Satd. Flow (perm)	1685	3413	0	1685	3116	1561	0	1801	1546	3351	1818	1516
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				290			170			185
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1352			1324			681			465	
Travel Time (s)		30.7			30.1			15.5			10.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	3	3	5	4	4	1
Permitted Phases									3			4
Detector Phase	1	6		5	2	2	3	3	3	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	12.0	15.0		12.0	15.0		12.0	12.0	12.0	12.0	12.0	12.0
Total Split (s)	13.0	25.0		17.0	29.0		17.0	17.0	17.0	25.0	25.0	13.0
Total Split (%)	14.4%	27.8%		18.9%	32.2%		18.9%	18.9%	18.9%	27.8%	27.8%	14.4%
Maximum Green (s)	7.0	20.0		11.0	24.0		11.0	11.0	11.0	19.0	19.0	7.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5	3.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5	3.0
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)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead			Lead			Lead	Lead	Lead			Lead
Lead-Lag Optimize?	Yes			Yes			Yes	Yes	Yes			Yes
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None	None	C-Min	C-Min	None
Walk Time (s)		4.0			4.0					4.0	4.0	
Flash Dont Walk (s)		11.0			12.0					19.5	19.5	
Pedestrian Calls (#/hr)		1			1					1	1	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 90

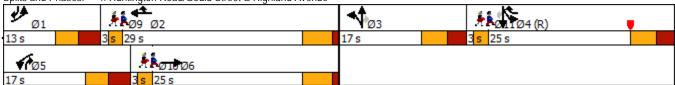
Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Yellow, Master Intersection

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Huntington Road/Gould Street & Highland Avenue



Lane Group	Ø9	Ø10	Ø11
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Lane Util. Factor			
Frt			
Flt Protected			
Satd. Flow (prot)			
Flt Permitted			
Satd. Flow (perm)			
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph) Link Distance (ft)			
Travel Time (s)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	9	10	11
Permitted Phases	,	10	" "
Detector Phase			
Switch Phase			
Minimum Initial (s)	1.0	1.0	1.0
Minimum Split (s)	3.0	3.0	3.0
Total Split (s)	3.0	3.0	3.0
Total Split (%)	3%	3%	3%
Maximum Green (s)	1.0	1.0	1.0
Yellow Time (s)	2.0	2.0	2.0
All-Red Time (s)	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	3.0	0.0
Total Lost Time (s)			
Lead/Lag	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0
	Vone	None	None
Walk Time (s)	0.0	0.0	0.0
Flash Dont Walk (s)	0.0	0.0	0.0
Pedestrian Calls (#/hr)	1	1	1
Intersection Summary			

Timing Plan: Weekday PM

Queues

4: Huntington Road/Gould Street & Highland Avenue

• t EBL WBL **WBT WBR NBT** Lane Group **EBT NBR** SBL **SBT** SBR Lane Group Flow (vph) 73 775 145 863 290 159 113 733 337 185 0.57 0.88 0.77 0.86 0.89 0.75 0.28 v/c Ratio 0.28 0.77 0.23 Control Delay 40.9 58.9 46.2 64.8 1.5 63.7 1.8 45.1 41.6 6.0 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 **Total Delay** 58.9 46.2 64.8 40.9 1.5 63.7 1.8 45.1 41.6 6.0 Queue Length 50th (ft) 248 41 222 80 0 88 0 194 163 22 Queue Length 95th (ft) #96 #366 #167 #400 19 #180 6 m#346 m#313 m39 Internal Link Dist (ft) 1272 1244 385 601 Turn Bay Length (ft) 175 400 200 165 150 200 Base Capacity (vph) 878 131 205 1000 1040 220 493 827 448 667 Starvation Cap Reductn 0 0 0 0 0 0 0 0 0 0 Spillback Cap Reductn 0 0 0 0 0 0 0 0 0 0 Storage Cap Reductn 0 0 0 0 0 0 0 0 0 0 Reduced v/c Ratio 0.56 0.88 0.71 0.86 0.28 0.72 0.23 0.89 0.75 0.28 **Intersection Summary**

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ î≽		ሻ	^	7		सी	7	ሻሻ		7
Traffic Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Future Volume (vph)	67	696	17	133	794	267	35	111	104	674	310	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	10	11	11	11	11	11	11	11	11
Total Lost time (s)	6.0	5.0		6.0	5.0	5.0		6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1685	3411		1685	3116	1561		1801	1546	3351	1818	1516
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1685	3411		1685	3116	1561		1801	1546	3351	1818	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	757	18	145	863	290	38	121	113	733	337	185
RTOR Reduction (vph)	0	1	0	0	0	125	0	0	87	0	0	128
Lane Group Flow (vph)	73	774	0	145	863	165	0	159	26	733	337	57
Heavy Vehicles (%)	0%	2%	0%	0%	12%	0%	0%	1%	1%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA	pt+ov	Split	NA	pm+ov	Split	NA	pm+ov
Protected Phases	1	6		5	2	2 4	3	3	5	4	4	1
Permitted Phases									3			4
Actuated Green, G (s)	5.6	24.3		10.2	28.9	51.1		10.3	20.5	22.2	22.2	27.8
Effective Green, g (s)	5.6	24.3		10.2	28.9	51.1		10.3	20.5	22.2	22.2	27.8
Actuated g/C Ratio	0.06	0.27		0.11	0.32	0.57		0.11	0.23	0.25	0.25	0.31
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	104	920		190	1000	886		206	352	826	448	569
v/s Ratio Prot	0.04	0.23		c0.09	c0.28	0.11		c0.09	0.01	c0.22	0.19	0.01
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.70	0.84		0.76	0.86	0.19		0.77	0.07	0.89	0.75	0.10
Uniform Delay, d1	41.4	31.0		38.7	28.7	9.4		38.7	27.3	32.7	31.4	22.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.04	1.02	1.62
Incremental Delay, d2	16.0	6.7		15.0	7.6	0.0		15.0	0.0	9.6	7.6	0.0
Delay (s)	57.4	37.7		53.7	36.2	9.4		53.7	27.3	43.6	39.4	35.8
Level of Service	Е	D		D	D	Α		D	С	D	D	D
Approach Delay (s)		39.4			32.2			42.7			41.3	
Approach LOS		D			С			D			D	
Intersection Summary												
HCM 2000 Control Delay			37.8	H	CM 2000 L	evel of Se	rvice		D			
HCM 2000 Volume to Capacity ra	tio		0.94						_			
Actuated Cycle Length (s)			90.0		ım of lost 1				27.0			
Intersection Capacity Utilization			73.3%	IC	U Level of	Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Plan: Weekday PM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		ሻ	4			4	7	ሻ	(Î	
Traffic Volume (vph)	0	0	28	653	·1	136	7	223	184	55	604	6
Future Volume (vph)	0	0	28	653	1	136	7	223	184	55	604	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865			0.947				0.850		0.998	
Flt Protected				0.950	0.969			0.998		0.950		
Satd. Flow (prot)	0	1611	0	1681	1678	0	0	1859	1583	1770	1859	0
Flt Permitted				0.950	0.969			0.980		0.570		
Satd. Flow (perm)	0	1611	0	1681	1678	0	0	1825	1583	1062	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		114			32				200		1	
Link Speed (mph)		20			20			30			30	
Link Distance (ft)		431			469			465			408	
Travel Time (s)		14.7			16.0			10.6			9.3	
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
Shared Lane Traffic (%)				38%								
Turn Type		NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase											400	
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	11.0	11.0		23.0	23.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	11.0	11.0		34.0	34.0		45.0	45.0	45.0	45.0	45.0	
Total Split (%)	12.2%	12.2%		37.8%	37.8%		50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	6.0	6.0		29.0	29.0		40.0	40.0	40.0	40.0	40.0	
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	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lead/Lag												
Lead-Lag Optimize?	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Vehicle Extension (s)	3.0 None	3.0 None		3.0	3.0 None		3.0	3.0	3.0 C Min	3.0 C Min	3.0 C Min	
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
Walk Time (s)				7.0	7.0 11.0					7.0	7.0 11.0	
Flash Dont Walk (s) Pedestrian Calls (#/hr)				11.0 0	0					11.0 0	11.0	
				U	U					U	U	
Intersection Summary												

Intersection Summary

Area Type: Other

Cycle Length: 90

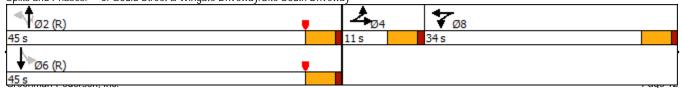
Actuated Cycle Length: 90

Offset: 8 (9%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Splits and Phases: 5: Gould Street & Wingate Driveway/Site South Driveway



5: Gould Street & Wingate Driveway/Site South Driveway

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Lane Group	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	440	419	250	200	60	664
v/c Ratio	0.14	0.85	0.78	0.27	0.22	0.11	0.70
Control Delay	1.4	46.0	37.1	14.6	3.9	15.1	24.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.4	46.0	37.1	14.6	3.9	15.1	24.3
Queue Length 50th (ft)	0	234	201	77	0	20	324
Queue Length 95th (ft)	0	#404	#331	m114	m5	44	#481
Internal Link Dist (ft)	351		389	385			328
Turn Bay Length (ft)						100	
Base Capacity (vph)	213	546	566	931	905	542	949
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.81	0.74	0.27	0.22	0.11	0.70
Intersection Summary							

^{# 95}th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		7	4			ર્ન	7	ħ	ĵ.	
Traffic Volume (vph)	0	0	28	653	1	136	7	223	184	55	604	6
Future Volume (vph)	0	0	28	653	1	136	7	223	184	55	604	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	1.00	
Frt		0.86		1.00	0.95			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	0.97			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1611		1681	1678			1860	1583	1770	1860	
Flt Permitted		1.00		0.95	0.97			0.98	1.00	0.57	1.00	
Satd. Flow (perm)		1611		1681	1678			1826	1583	1062	1860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0.72	0.72	30	710	0.72	148	8	242	200	60	657	7
RTOR Reduction (vph)	0	29	0	0	22	0	0	0	103	0	1	0
Lane Group Flow (vph)	0	1	0	440	397	0	0	250	97	60	663	0
Turn Type	U	NA	0		NA	0		NA	Perm	Perm	NA	
	4			Split			Perm		Perm	Perm		
Protected Phases	4	4		8	8		2	2	2	,	6	
Permitted Phases		2.7		27.7	27.7		2	40.7	2	6	40.7	
Actuated Green, G (s)		3.6		27.7	27.7			43.7	43.7	43.7	43.7	
Effective Green, g (s)		3.6		27.7	27.7			43.7	43.7	43.7	43.7	
Actuated g/C Ratio		0.04		0.31	0.31			0.49	0.49	0.49	0.49	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		64		517	516			886	768	515	903	
v/s Ratio Prot		c0.00		c0.26	0.24						c0.36	
v/s Ratio Perm								0.14	0.06	0.06		
v/c Ratio		0.02		0.85	0.77			0.28	0.13	0.12	0.73	
Uniform Delay, d1		41.5		29.2	28.2			13.8	12.7	12.6	18.5	
Progression Factor		1.00		1.00	1.00			0.95	1.39	1.00	1.00	
Incremental Delay, d2		0.1		12.7	6.8			0.7	0.3	0.5	5.3	
Delay (s)		41.6		41.9	35.1			13.8	18.0	13.1	23.8	
Level of Service		D		D	D			В	В	В	С	
Approach Delay (s)		41.6			38.6			15.6			22.9	
Approach LOS		D			D			В			С	
Intersection Summary												
HCM 2000 Control Delay			28.1	H	CM 2000 L	evel of Se	rvice		С			
HCM 2000 Volume to Capacity ratio)		0.74									
Actuated Cycle Length (s)			90.0	Sı	ım of lost t	ime (s)			15.0			
Intersection Capacity Utilization			83.0%	IC	U Level of	Service			E			
Analysis Period (min)			15									
Analysis Penou (IIIIII)			13									

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Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		7	•			
Traffic Volume (vph)	0	137	368	0	0	561
Future Volume (vph)	0	137	368	0	0	561
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						
Satd. Flow (prot)	0	1644	1900	0	0	1792
Flt Permitted						
Satd. Flow (perm)	0	1644	1900	0	0	1792
Link Speed (mph)	20		30			30
Link Distance (ft)	474		408			540
Travel Time (s)	16.2		9.3			12.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free
Intersection Summary						

Area Type: Other

Control Type: Unsignalized

Intersection						
Int Delay, s/veh	1.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	VVDL			NDIX	JUL	
	0	7	†	0	0	↑
Traffic Vol, veh/h	0	137	368	0	0	561
Future Vol, veh/h	0	137	368	0	0	561
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, %	0	0	0	0	0	6
Mvmt Flow	0	149	400	0	0	610
WIVIII I IOW	U	147	400	U	U	010
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	400	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	_	_	_	-	_	_
Follow-up Hdwy	_	3.3	_	_	_	_
Pot Cap-1 Maneuver	0	654	_	0	0	_
Stage 1	0	-		0	0	
Stage 2	0		-	0	0	-
	U	-	-	U	U	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	654	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
-						
Approach	WB		NB		SB	
HCM Control Delay, s	12.1		0		0	
HCM LOS	12.1 B		U		U	
HOW LUS	D					
Minor Lane/Major Mvmt		NBT \	NBLn1	SBT		
Capacity (veh/h)		-	654	-		
HCM Lane V/C Ratio		-	0.228	-		
HCM Control Delay (s)		_	12.1	-		
HCM Lane LOS		_	В	-		
HCM 95th %tile Q(veh)		_	0.9	-		