

# **TRAFFIC IMPACT ASSESSMENT**

## **PROPOSED MIXED-USE DEVELOPMENT**

**Concord, New Hampshire**

May 2021

Prepared for

Nobis Group



**Stephen G. Pernaw  
& Company, Inc.**

**TRAFFIC IMPACT ASSESSMENT  
PROPOSED MIXED-USE DEVELOPMENT  
CONCORD, NEW HAMPSHIRE  
MAY 3, 2021**

## **INTRODUCTION**

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This study has been prepared for the Nobis Group, on behalf of their client Dakota Partners, to assess the traffic impacts associated with the proposed mixed-use development that will be located on the south side of Langdon Avenue in Concord, New Hampshire. The subject site was formerly occupied by the Concord B & M railroad shops. A traffic study “scope” meeting was conducted with city officials on April 12, 2021. At that meeting the study area was identified as including the South Main Street/Langdon Avenue intersection, and the analysis periods included the weekday morning (AM) and the weekday evening (PM) peak hour periods. Both Opening Year (2023) and Horizon Year (2033) traffic projections and analyses are included herein.

This report is intended to summarize the traffic count data collected, the future traffic projections, the technical analyses, and our findings relative to traffic operations, capacity, and safety.

## **PROPOSAL**

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According to the plan entitled “*Comprehensive Development Plan*” dated March 2021, by Nobis Group for the property located on Langdon Avenue (see Appendix A), the proposed development consists of 192 residential apartments and 66,000 sf of office space. Vehicular access to the site will be provided via a two two-way driveways that will intersect the south side of Langdon Avenue. The west site driveway (located approximately 400-feet east of South Main Street) will provide access to the residential portion of the development and the east site driveway (located approximately 620-feet east of South Main Street) will provide access to the commercial portion.

Figure 1 shows the location of the subject site with respect to the area roadway system, the traffic count location, and the closest NHDOT short-term automatic traffic recorder count station on South Main Street.

## **EXISTING CONDITIONS**

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### **ROADWAYS**

**South Main Street**, also known as NH Route 3A, functions as a minor arterial roadway with a general north-south orientation in the study area; it carries through vehicles between downtown Concord to the north, past Langdon Avenue and the subject site, to Bow and points south. This roadway will be utilized by all residents, employees and delivery vehicles traveling to/from the site. The section south of Langdon Avenue measures approximately 38-feet in width, and it is delineated with a double-yellow centerline and single white edge lines. The horizontal alignment of South Main Street is essentially straight, and the vertical alignment follows a rolling terrain





-  = AUTOMATIC TRAFFIC RECORDER LOCATION (NHDOT)
-  = INTERSECTION TURNING MOVEMENT COUNT LOCATION



2089A

**Figure 1**

## Site Location

*Traffic Impact Assessment, Proposed Mixed-Use Development, Concord, New Hampshire*

with a slight uphill grade in the northbound direction in this area. The speed limit is posted at 30 mph in both directions.

**Langdon Avenue** is a private two-lane roadway that extends in an easterly direction from its intersection with South Main Street, and has no outlet. This roadway provides access to several businesses along the roadway, as well as several located at 287 South Main Street. The width of Langdon Avenue measures approximately 36-feet (east of South Main Street). The horizontal alignment of Langdon Avenue is relatively straight and the vertical alignment exhibits an uphill grade of approximately +7% approaching South Main Street. There are no pavement markings and no posted speed limit present on Langdon Avenue.

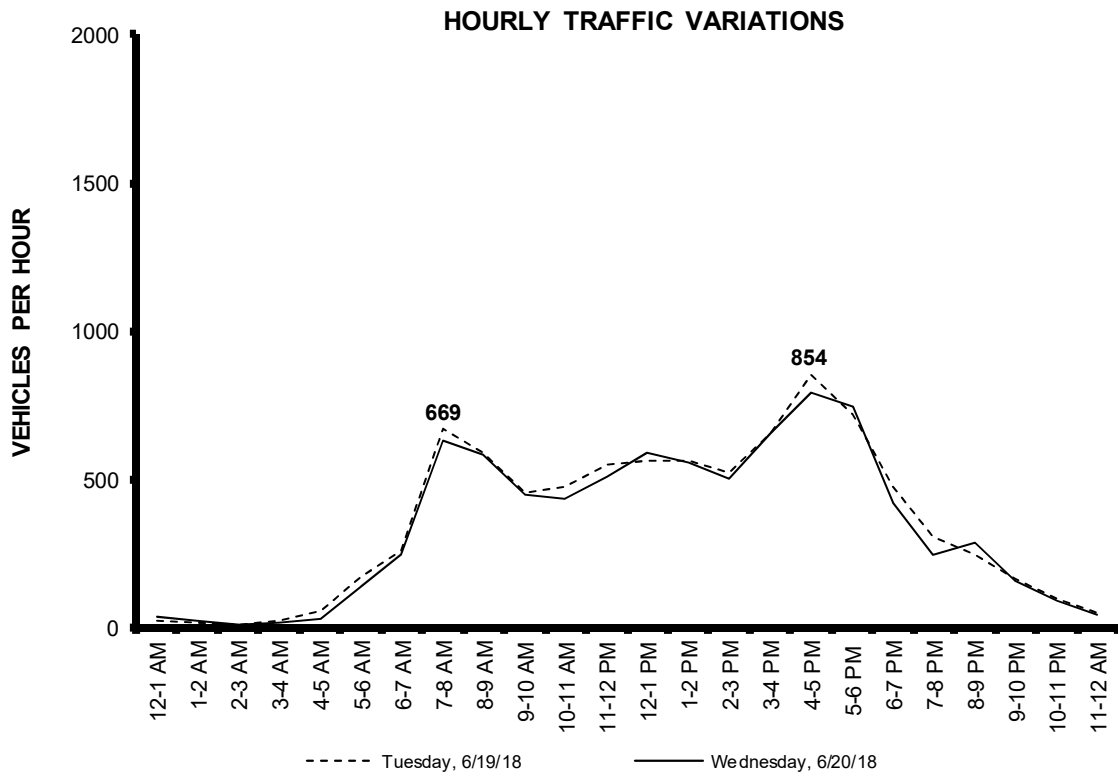
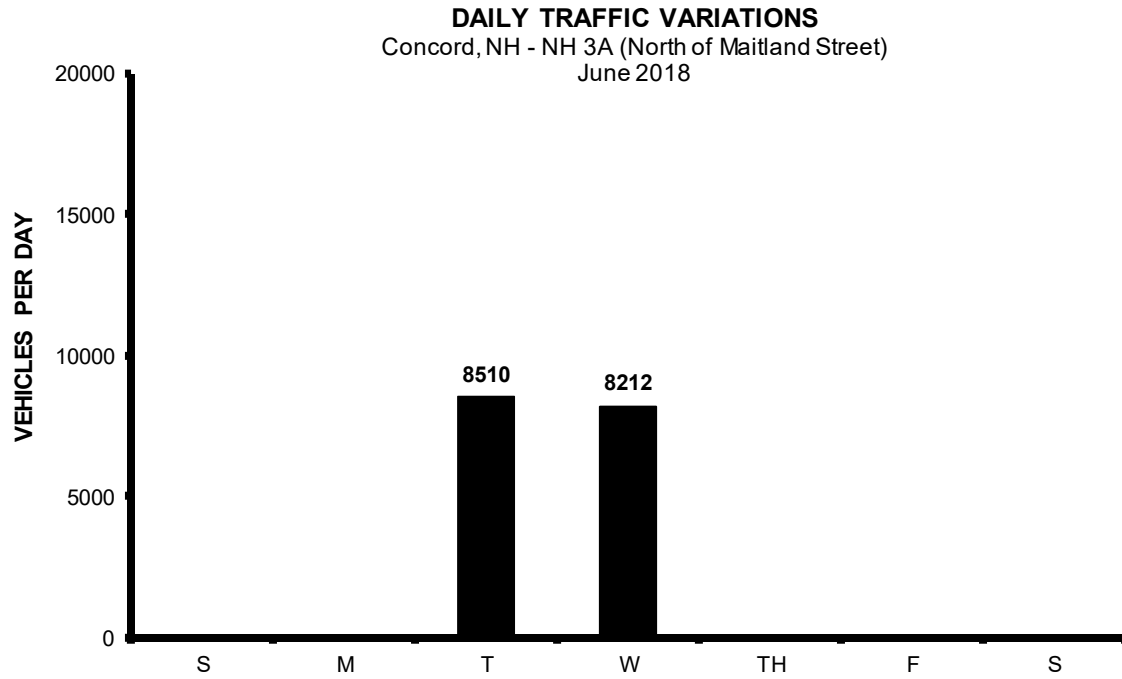
## INTERSECTIONS

The **South Main Street/Langdon Avenue** intersection essentially operates as a typical three-leg “T” unsignalized intersection. Each approach to this intersection provides a single approach lane from which all applicable movements occur. There are no pavement markings or traffic control devices present on the Langdon Avenue approach to South Main Street.

## TRAFFIC VOLUMES

The New Hampshire Department of Transportation conducted a short-term automatic traffic recorder count in June 2018 on South Main Street, north of Maitland Street. This count station is located approximately 200-feet north of Langdon Avenue. The count data indicates that this section of South Main Street carried an Annual Average Daily Traffic (AADT) volume of 6,207 vehicles per day (vpd) in 2020, down considerably from 7,354 vpd in 2019.

These AADT estimates were derived from a two-day traffic count conducted in 2018. This data demonstrates that traffic demand on South Main Street (NH3A) generally reaches peak levels during the typical AM and PM commuter periods on weekdays. The daily and hourly variations in traffic demand at this count station are illustrated graphically on Page 4. Appendix B contains the detail sheet pertaining to this count.



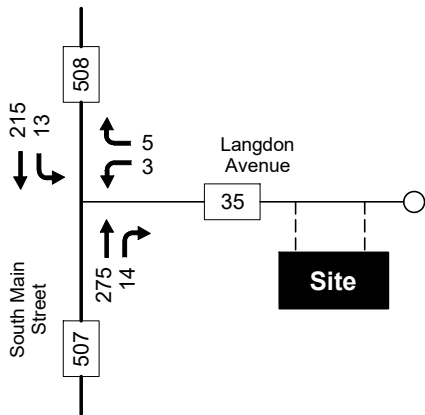
To establish the current traffic demand at the subject intersection, Pernaw & Company, Inc. conducted turning movement and vehicle classification counts on South Main Street at the Langdon Avenue intersection on Wednesday, April 14, 2021 and again on Thursday, April 15, 2021 from 7:00 to 9:00 AM and from 3:00 to 6:00 PM. The traffic volumes on Wednesday generally exceeded those on Thursday, and were therefore selected for traffic projection purposes. Several facts and conclusions are evident from this count data:

- Peak traffic periods on South Main Street were found to occur from 7:30 to 8:30 AM in the morning and from 4:30 to 5:30 PM in the evening. The traffic flow entering the intersection totaled 525 vehicles (AM) and 697 vehicles (PM) during the peak hour periods.
- During the morning peak hour, the majority of traffic traveled in the northbound (57%) direction on South Main Street, and during the evening peak hour the majority of the traffic traveled in the southbound (63%) direction on South Main Street.
- Langdon Avenue, accommodated 35 (AM) and 56 (PM) vehicles during the peak hour periods. Overall, the majority of these vehicles traveled to/from points north on South Main Street.
- Truck traffic on South Main Street accounted for approximately 4% (AM) and 0% (PM) of the total traffic flow passing the site during the peak hour periods.

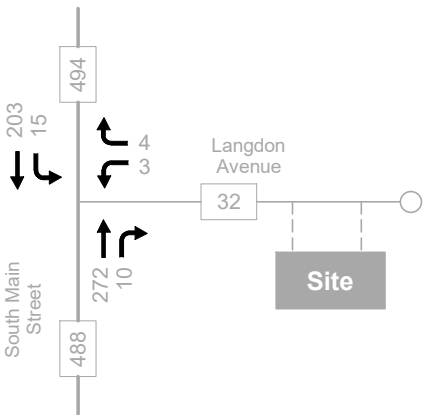
The peak hour traffic count data for the study area intersection is summarized on Figure 2. Appendix C contains the detail sheets from the turning movement counts.

WEDNESDAY

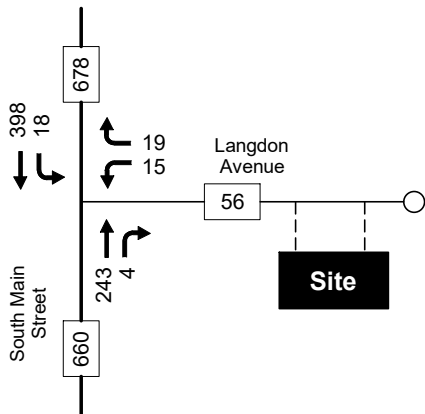
THURSDAY



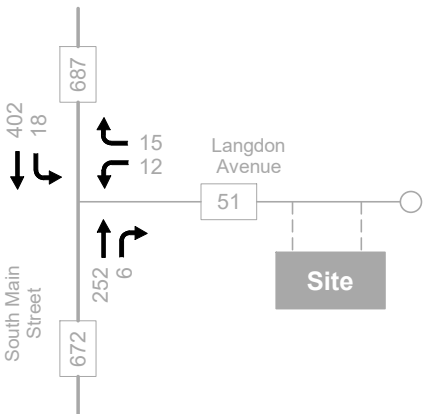
AM PEAK HOUR  
Wednesday, April 14, 2021  
7:30 to 8:30 AM



AM PEAK HOUR  
Thursday, April 15, 2021  
7:30 to 8:30 AM



PM PEAK HOUR  
Wednesday, April 14, 2021  
4:30 to 5:30 PM



PM PEAK HOUR  
Thursday, April 15, 2021  
4:30 to 5:30 PM



Figure 2

2021 Existing Traffic Volumes

Traffic Impact Assessment, Proposed Mixed-Use Development, Concord, New Hampshire



## CRASH HISTORY

Crash data from the City of Concord Police Department for the most recent three-year period (2018-2020, plus part of 2021) was researched to identify crash rates and patterns in the study area. Over the three-year plus period, the crash listing indicates that two reported crashes occurred at the South Main Street/Langdon Avenue intersection. This crash data is contained in Appendix D.

Each of the two collisions involved two vehicles, and resulted in property damage only. Inclement weather or unfavorable surface conditions do not appear to be a contributing factor in either of the crashes. The data indicates that one driver was distracted, and another driver was following too close. Both crashes occurred during daylight hours.

No fatalities were reported in this study group. The following table summarizes the available crash data in terms of frequency, severity, and collision type.

### Crash Summary (1/1/18-4/12/21)<sup>1</sup>

	South Main Street / Langdon Avenue
<b>CRASH FREQUENCY</b>	
Total Crashes	2
Crashes per Year (Ave)	0.62
<b>CRASH SEVERITY</b>	
Property Damage Only	2
Personal Injury	0
Fatalities	0
<b>CRASH TYPE</b>	
Angle/Cross Movement	0
Rear End	1
Distracted	1
Fixed Object	0
Pedestrian	0
Unknown	0
<b>ADVERSE CONDITIONS (%)</b>	(0) 0%

<sup>1</sup> Source: City of Concord (Police Department)



## **NO-BUILD TRAFFIC VOLUMES**

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In order to identify the net impact that site traffic will have in the study area, future traffic projections with and without the proposed mixed-use development are necessary. The future traffic projections without the proposed mixed-use development are referred to as the “No-Build” traffic projections, and these are summarized on Figure 3.

These projections are based on the existing traffic volumes (April 2021 data) using the higher of the two count days, a 1.0 percent annual background traffic growth rate (compounded annually) to account for regional growth in the area, a peak-month seasonal adjustment factor of 1.10 (to reflect peak-month conditions) and Covid-19 adjustment factors of 1.21 (AM) and 1.14 (PM) to reflect non-pandemic conditions. Calculations pertaining to the derivation of the background traffic growth rate, the seasonal adjustment factor and the Covid-19 factors are contained in Appendix E.

At the scoping meeting no other known development projects of significant size were identified that had the potential to affect this study area. The No-Build traffic projections therefore reflect worst-case, peak-month, peak-hour conditions without a pandemic.

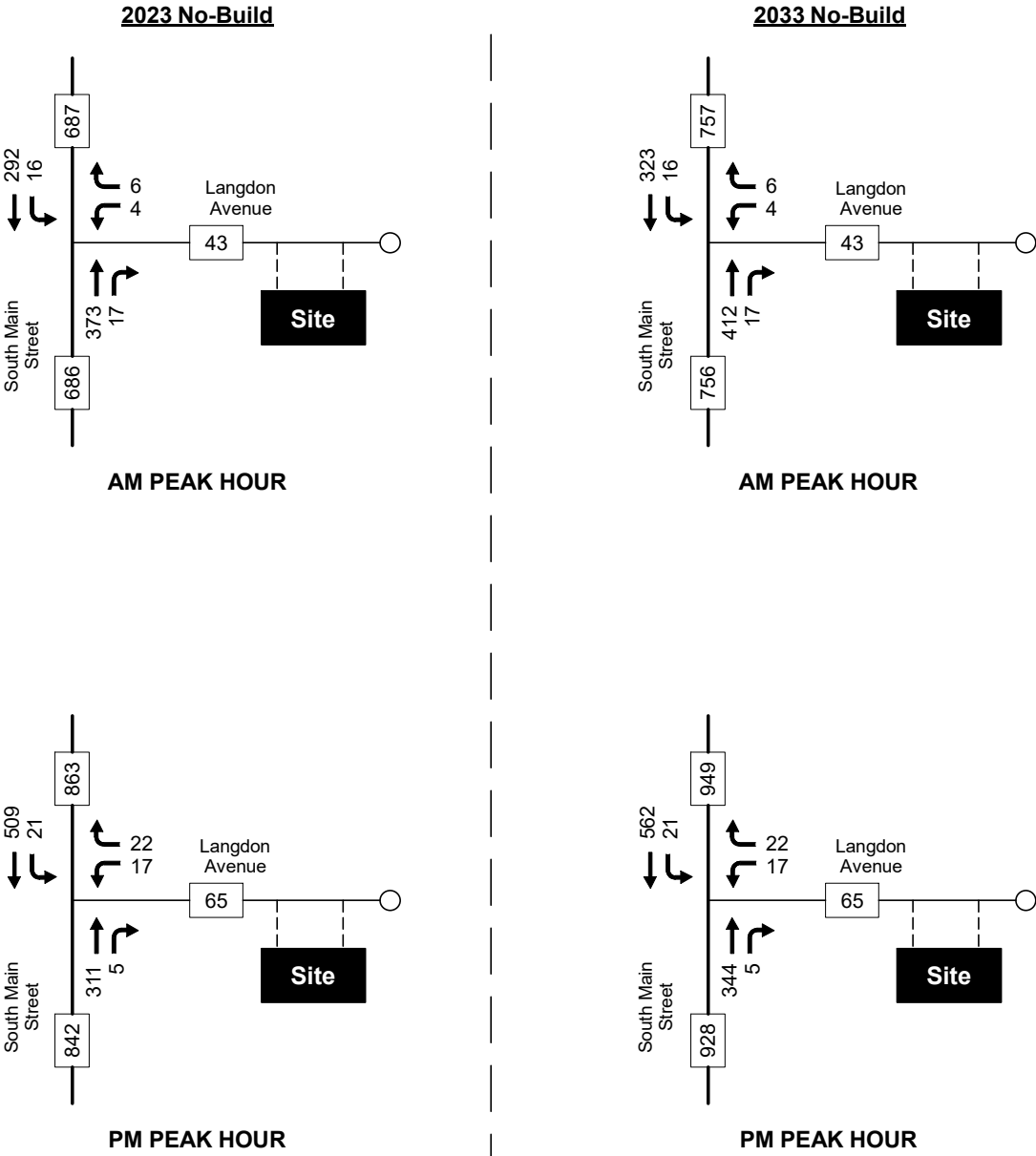


Figure 3

No-Build Traffic Volumes

Traffic Impact Assessment, Proposed Mixed-Use Development, Concord, New Hampshire

## SITE GENERATED TRAFFIC

To estimate the quantity of vehicle trips that will be produced by the proposed mixed-use development, Pernaw & Company, Inc. considered the standardized trip-generation equations published by the Institute of Transportation Engineers (ITE)<sup>1</sup>. The most applicable land use categories are Land Use Code (LUC) 221 – Multifamily Housing (Mid-Rise) for the residential portion and LUC 710 – General Office Building for the commercial portion. The following table summarizes the results of the trip generation analyses.

Table 1		Trip Generation Summary			
		General Office Building <sup>1</sup> (48,000 sf)	General Office Building <sup>1</sup> (18,000 sf)	Multi-Family Housing <sup>2</sup> (192 Units)	Total
Weekday (24 Hour)					
	Entering	261 veh	101 veh	523 veh	885 trips
	Exiting	<u>261 veh</u>	<u>101 veh</u>	<u>523 veh</u>	<u>885 trips</u>
	Total	522 trips	202 trips	1046 trips	1770 trips
AM Peak Hour					
	Entering	62 veh	37 veh	17 veh	116 trips
	Exiting	<u>10 veh</u>	<u>6 veh</u>	<u>48 veh</u>	<u>64 trips</u>
	Total	72 trips	43 trips	65 trips	180 trips
PM Peak Hour					
	Entering	9 veh	4 veh	51 veh	64 trips
	Exiting	<u>48 veh</u>	<u>18 veh</u>	<u>32 veh</u>	<u>98 trips</u>
	Total	57 trips	22 trips	83 trips	162 trips

<sup>1</sup> ITE Land Use Code 710 - General Office Building - Trip Equation Method

<sup>2</sup> ITE Land Use Code 221- Multifamily Housing (Mid-Rise) - Trip Equation Method

The trip generation analysis is summarized on Table 1 and shows that the proposed mixed-use development will generate approximately 180 vehicle-trips (116 arrivals, 64 departures) during the AM peak hour period, and approximately 162 vehicle-trips (64 arrivals, 98 departures) during the PM peak hour period, on an average weekday basis. These types of uses generate “primary” type trips, which involve new trips to the area. Appendix F contains the trip generation computations for this project.

<sup>1</sup> Institute of Transportation Engineers, *Trip Generation*, tenth edition (Washington, D.C., 2017)

## **BUILD TRAFFIC VOLUMES**

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The future traffic projections with the proposed mixed-use development in full operation are referred to as the “Build” traffic projections, and these are summarized schematically on Figure 4. These projections are based on the No-Build projections (Figure 3), the site generated traffic levels depicted in Table 1, and the expectation that the majority of the vehicles (57%) will travel to/from points north on South Main Street. The trip distribution analysis was based on an analysis of the traffic count data that was collected on both count days (ten hours total).

Appendix F also contains the trip distribution computations and a diagram that summarizes the distribution of the primary trips at the study area intersection.

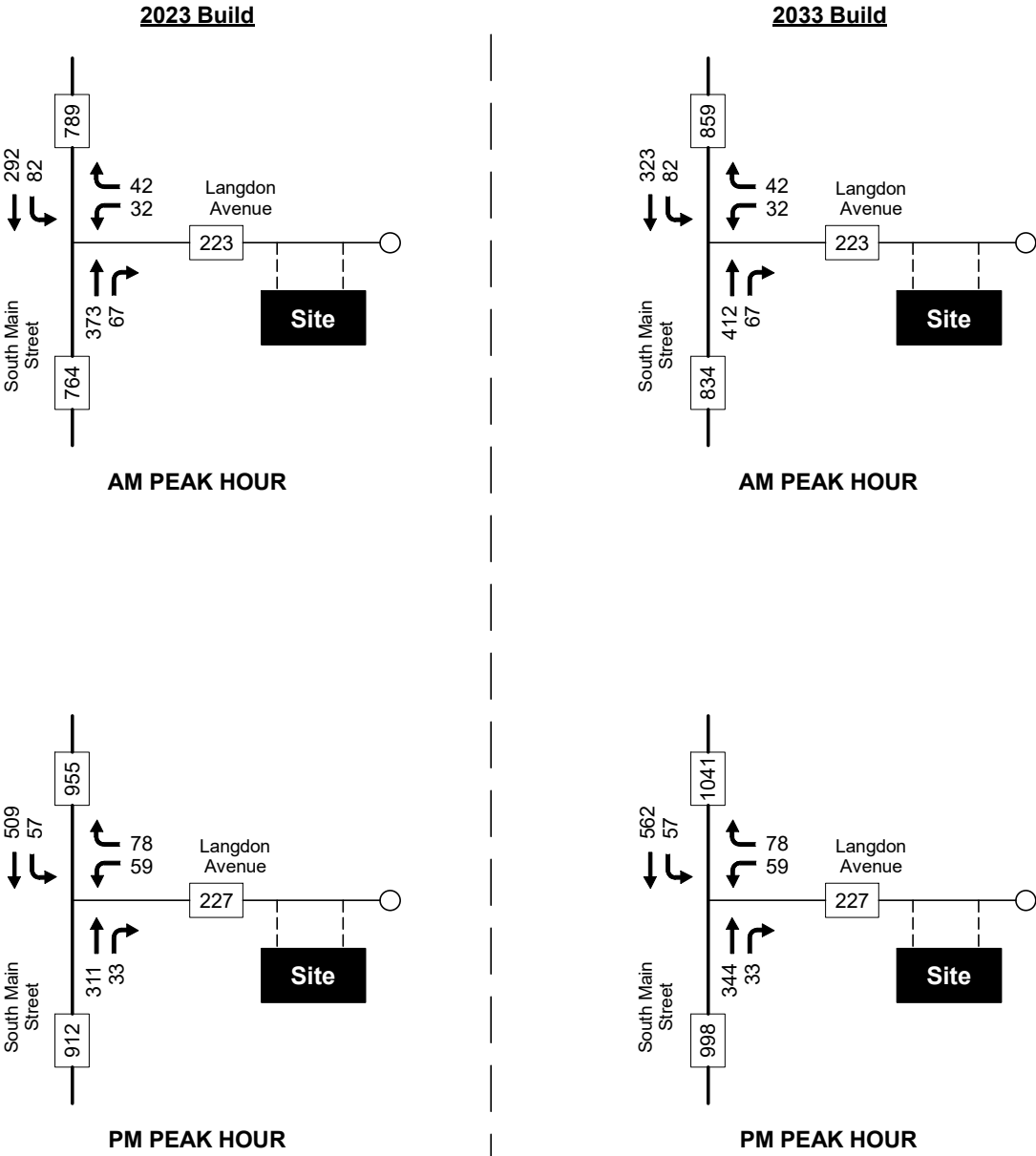


Figure 4

**Build Traffic Volumes**

*Traffic Impact Assessment, Proposed Mixed-Use Development, Concord, New Hampshire*

## IMPACT SUMMARY

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### TRAFFIC VOLUME INCREASES

The net impact that the proposed mixed-use development project will have on traffic levels on South Main Street can be estimated by comparing the No-Build traffic projections with the Build traffic projections. This comparison demonstrates the greatest impact to roadway volumes on South Main Street during the worst-case 2023 weekday PM peak hour period will occur north of Langdon Avenue where traffic volumes are projected to increase by approximately +11%, or by approximately +92 (PM) vehicles north of the site. The impacts south of the site will be less.

During the AM peak hour period, when traffic volumes on South Main Street are lower than during the PM peak hour, the impact north of Langdon Avenue is estimated at approximately 15%, or by approximately +102 vehicles. To put these increases into perspective, the two-day NHDOT traffic count on South Main Street revealed that random traffic flow from one day to the next varied by as much as +8% during the PM peak hour period. A longer duration count would likely show even greater changes percentagewise on a day-to-day basis. Impacts beyond the immediate study area will dissipate as drivers turn at various intersections along the South Main Street corridor.



## TRAFFIC OPERATIONS AND SAFETY

### INTERSECTION CAPACITY - UNSIGNALIZED INTERSECTIONS

The short-range (2023) and long-range (2033) traffic projections form the basis for assessing traffic operations at the South Main Street/Langdon Avenue intersection. This intersection was analyzed according to the methodologies of the *Highway Capacity Manual* as replicated by the latest edition of the *Synchro Traffic Signal Coordination Software (Version 10)*, which also performs unsignalized intersection capacity analyses.

Capacity and Level of Service (LOS) calculations pertaining to unsignalized intersections address the quality of service for those vehicles turning into and out of intersecting side streets. The availability of adequate gaps in the traffic stream on the major street (South Main Street) actually controls the potential capacity for vehicle movements from the minor approach (Langdon Avenue). Levels of Service are simply letter grades (A-F) that categorize the vehicle delays associated with specific turning maneuvers. Table 2 describes the criteria used in this analysis.

Table 2	Level-of-Service Criteria for Unsignalized Intersections	
Control Delay (seconds/vehicle)	Level of Service by Volume-to-Capacity Ratio	
	$v/c \leq 1.0$	$v/c > 1.0$
0 - 10	A	F
> 10 - 15	B	F
> 15 - 25	C	F
> 25 - 35	D	F
> 35 - 50	E	F
> 50	F	F

Source: Transportation Research Board, Highway Capacity Manual 2010.

The results of the analysis for the **South Main Street / Langdon Avenue** intersection are summarized on Table 3. The analysis demonstrates that all applicable turning movements at this intersection will operate well below capacity and at LOS E or higher during all hours of the day through 2033 and beyond. Vehicle queuing (95<sup>th</sup> percentile) on South Main Street for southbound left-turn arrivals at Langdon Avenue is estimated at 0.0 - 0.3 vehicles during both peak hour periods. Vehicle queuing on the Langdon Avenue approach to South Main Street is expected to increase from 1 to 3 vehicles on the shared left-right departure lane during the worst-case PM peak hour period in 2033.

Appendix G contains the computations pertaining to the unsignalized intersection capacity analyses.

**Table 3**

**STOP-Controlled Intersection Capacity Analysis  
South Main Street / Langdon Avenue**

		Weekday AM Peak Hour				Weekday PM Peak Hour			
		<u>Delay</u> <sup>1</sup>	<u>V/C</u> <sup>2</sup>	<u>LOS</u> <sup>3</sup>	<u>Queue</u> <sup>4</sup>	<u>Delay</u> <sup>1</sup>	<u>V/C</u> <sup>2</sup>	<u>LOS</u> <sup>3</sup>	<u>Queue</u> <sup>4</sup>
Langdon Avenue - WB LT & RT Departures									
	2021 Existing	12.7	0.03	B	<1	12.7	0.09	B	<1
	2023 No Build	15.3	0.05	C	<1	15.0	0.12	C	<1
	2023 Build	29.8	0.51	D	3	24.6	0.50	C	3
	2033 No Build	16.5	0.06	C	<1	16.3	0.14	C	1
	2033 Build	36.2	0.57	E	3	29.6	0.56	D	3
South Main Street - SB LT Arrivals									
	2021 Existing	8.1	0.01	A	<1	7.8	0.02	A	<1
	2023 No Build	8.5	0.02	A	<1	8.0	0.02	A	<1
	2023 Build	9.1	0.10	A	<1	8.2	0.06	A	<1
	2033 No Build	8.7	0.02	A	<1	8.1	0.02	A	<1
	2033 Build	9.3	0.11	A	<1	8.3	0.06	A	<1

<sup>1</sup> HCM Control Delay (seconds per vehicle), <sup>2</sup> HCM Volume to Capacity Ratio, <sup>3</sup> HCM Level of Service, <sup>4</sup> HCM 95th Percentile Queue (vehicles)

## AUXILIARY TURN LANE ANALYSES

**Left-Turn Treatment** - The type of treatment needed to accommodate left-turning vehicles from any street or highway to an intersecting side street (or driveway) can range from no treatment, where turning volumes are low; to the provision of a bypass lane for through traffic to travel around left-turning vehicles; to the addition of a formal center turn lane used exclusively by left-turning vehicles for deceleration and storage while waiting to complete their maneuvers.

Analysis of the 2023 Opening Year traffic volumes using NCHRP 457 guidelines indicates that providing left-turn treatment is advisable on South Main Street to accommodate left-turn arrivals on to Langdon Avenue. Fortunately, there is adequate distance between the existing double-yellow centerline and the edge of pavement on South Main Street for through vehicles to bypass any left-turning vehicles destined for Langdon Avenue. The results of this analysis are summarized on Table 4 and the computations are included in Appendix H.

**Right-Turn Treatment** - The type of treatment needed to accommodate right-turning vehicles from any street or highway to any intersecting side street (or driveway) can range from a radius only, where turning volumes are low; to the provision of a short 10:1 right-turn taper; to the addition of an exclusive right-turn lane, where turning volumes and through traffic volumes are significant.

Analysis of the 2033 Horizon Year traffic volume projections using NCHRP 457 guidelines confirmed that right-turn treatment is not necessary on the northbound South Main Street approach to Langdon Avenue. This means that the existing northbound travel lane on South Main Street will continue to function adequately as a shared through-right lane for anticipated traffic volumes. The results of these analyses are also summarized on Table 4 and the computations are included in Appendix H.

**Minor-Road Approach Analysis** – The type of treatment needed to accommodate exiting vehicles from the minor-road approach at a stop-controlled intersection can range from a single lane (shared left-right lane) in low-volume conditions, to two exit lanes (exclusive left-turn lane and exclusive right-turn lane) where turning volumes and through traffic volumes are significant, to multiple exit lanes in extreme cases.

Analysis of the 2033 Horizon Year traffic volumes using NCHRP 457 guidelines confirmed that one departure lane on the Langdon Avenue approach to South Main Street is sufficient for the anticipated traffic volumes. The results of these analyses are summarized on Table 4 and the computations are included in Appendix H.

Table 4

**Auxiliary Turn Lane Warrants Analysis  
South Main Street / Langdon Avenue**

	<b>No-Build Cases</b>		<b>Build Cases</b>	
	2023 AM No-Build Volumes	2023 PM No-Build Volumes	2023 AM Build Volumes	2023 PM Build Volumes
<b><u>I. LEFT-TURN LANE WARRANTS ANALYSIS (2023 &amp; 2033)</u></b>				
Peak Hour Inputs:				
Left-Turn Volume (SB)	16	21	82	57
Advancing Volume (SB)	308	530	374	566
Opposing Volume (NB)	390	316	440	334
Percent Lefts	5.2%	4.0%	21.9%	10.1%
Speed (mph)	30	30	30	30
Limiting Advancing Volume (veh/h)	562	689	286	439
<b>Left-Turn Treatment Warranted?</b>	<b>NO</b>	<b>NO</b>	<b>YES</b>	<b>YES</b>
<b><u>II. RIGHT-TURN LANE WARRANTS ANALYSIS (2033)</u></b>				
Peak Hour Inputs:			2033 AM Build Volumes	2033 PM Build Volumes
Right-Turn Volume (NB)	-	-	67	33
Approach Volume (NB)	-	-	479	377
Speed (mph)	-	-	30	30
Limiting Right-Turn Volume (veh/h)	-	-	678	>1000
<b>Add Right-Turn Bay?</b>	-	-	<b>NO</b>	<b>NO</b>
<b><u>III. MINOR-ROAD APPROACH GEOMETRY ANALYSIS (2033)</u></b>				
Peak Hour Inputs:			2033 AM Build Volumes	2033 PM Build Volumes
Major-Road Volume (NB-SB)	-	-	884	996
% Right-Turns on Minor (WB)	-	-	57	57
Minor-Road Approach Volume	-	-	74	137
Limiting Minor-Road Volume (veh/h)	-	-	250	221
<b>Consider TWO Approach Lanes?</b>	-	-	<b>NO</b>	<b>NO</b>

## **SIGHT DISTANCE**

Sight distance at any intersection is an important safety consideration. The operator of a vehicle approaching an intersection should have an unobstructed view of the intersection and sufficient length of roadway to enable a full stop, should it be required to avoid a collision. Similarly, exiting vehicles from the Langdon Avenue approach to South Main Street should have sufficient visibility of approaching traffic in order to safely enter the traffic flow on to the major street.

Field observations confirmed that ample stopping sight distances (SSD) currently exist looking left and looking right from the Langdon Avenue approach to South Main Street. This means that approaching drivers have sufficient sight distance to anticipate and avoid collisions.

Photographs depicting the available sight distances looking left and looking right from the Langdon Avenue approach to South Main Street are included in Appendix I.

## **PUBLIC TRANSIT SYSTEM**

The Concord Area Transit website provided bus routes and schedules. According to this information, bus service is not provided in this area. The closest bus stop to Langdon Avenue is located at St. John's Church on S. Main Street, approximately 0.6 mi. to the north.

## **STUDY FINDINGS AND RECOMMENDATIONS**

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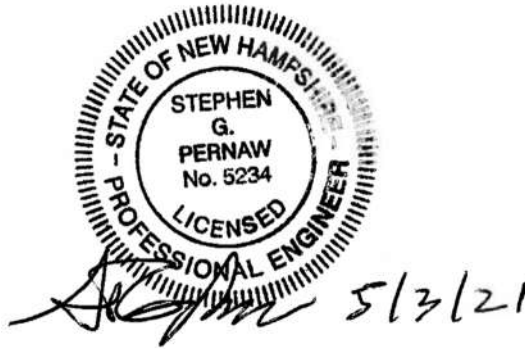
Based upon the existing conditions data collected on South Main Street, the anticipated traffic volume increases associated with the proposed mixed-use development, and the analysis of future traffic conditions at this study area intersection, Pernaw & Company, Inc. finds that:

1. The traffic counts conducted by Pernaw & Company, Inc. at the Langdon Avenue intersection on South Main Street in April 2021 revealed that the peak traffic hours occurred from 7:30 to 8:30 AM and from 4:30 to 5:30 PM on a typical weekday. During these periods, 525 vehicles (AM) and 697 vehicles (PM) were observed entering the subject intersection.
2. The trip generation analysis revealed that, on an average weekday basis, the proposed mixed-use development will generate approximately 180 vehicle-trips (116 arrivals, 64 departures) during the AM peak hour, and 162 vehicle-trips (64 arrivals, 98 departures) during the PM peak hour period. Based on the travel patterns observed at the subject intersection, it is reasonable to expect that the majority of site traffic (approximately 57%) will travel to/from points north on South Main Street.
3. The result of the analysis of the traffic operations at the South Main Street/Langdon Avenue intersection confirmed that all applicable turning movements will operate well below capacity through the 2033 Horizon Year with the site fully operational. Left-turn arrivals from South Main Street will continue to operate at Level of Service A during all hours of the day. Departures from Langdon Avenue will operate at Level of Service D (2023) and Level of Service E (2033) or better during the morning and evening peak hour periods. Vehicle queuing on the Langdon Avenue approach is estimated at three vehicles during the peak hour periods.
4. The left-turn lane warrants analyses contained herein indicates that left-turn treatment is desirable for southbound vehicles turning left onto Langdon Avenue. Fortunately, there is adequate pavement width for through vehicles to travel around left-turning vehicles. This means the existing southbound shoulder area on South Main Street will continue to function adequately as a bypass lane.
5. The right-turn lane warrants analyses indicate that no special treatment is needed for northbound vehicles entering Langdon Avenue. This means that the existing northbound travel lane on South Main Street will function adequately as a shared through-right lane.
6. The minor-road approach geometry analysis indicates that one departure lane is sufficient on the Langdon Avenue approach to South Main Street through 2033 with the subject site fully occupied.
7. The proposed site driveways on Langdon Avenue should operate under STOP sign control (MUTCD R1-1) and be delineated with a 12 to 24-inch white stop line, and a short section of 4-inch double-yellow centerline to separate inbound and outbound vehicles.



8. STOP sign control should also be installed on the Langdon Avenue approach to South Main Street, along with similar pavement markings.
9. Ample sight distances currently exist looking left and right from the Langdon Avenue approach on South Main Street. Placement of any future signs and/or plantings in the vicinity of this intersection should not restrict the view of approaching vehicles on South Main Street.

With the installation of the recommended traffic control devices and maintaining clear “sight distance triangles” on the proposed site driveway approaches to Langdon Avenue, vehicular access and egress should be reasonably safe and efficient from a transportation engineering standpoint for the size and type of development that is proposed.



## **APPENDIX**

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<b>Appendix A</b>	<b>Comprehensive Development Plan</b>
<b>Appendix B</b>	<b>Automatic Traffic Recorder Counts</b>
<b>Appendix C</b>	<b>Intersection Turning Movement Counts</b>
<b>Appendix D</b>	<b>Crash Data</b>
<b>Appendix E</b>	<b>Adjustment Factors</b>
<b>Appendix F</b>	<b>Site Generated Traffic Volumes / Trip Distribution</b>
<b>Appendix G</b>	<b>Capacity and Level of Service Calculations – Unsignalized</b>
<b>Appendix H</b>	<b>Auxiliary Turn Lane Analysis</b>
<b>Appendix I</b>	<b>Sight Distance Photographs</b>

## **Appendix A**

## **Comprehensive Development Plan**



## **Appendix B**

## **Automatic Traffic Recorder Counts**



Excel Version

Weekly Volume Report			
Location ID:	82099073	Type:	SPOT
Located On:	S Main St	:	
Direction:	2-WAY		
Community:	CONCORD	Period:	Mon 6/18/2018 - Sun 6/24/2018
AADT:	7267		

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg	Graph
12:00 AM		24	35					30	0.4%
1:00 AM		15	22					19	0.2%
2:00 AM		8	13					11	0.1%
3:00 AM		22	19					21	0.2%
4:00 AM		57	29					43	0.5%
5:00 AM		170	138					154	1.8%
6:00 AM		259	247					253	3.0%
7:00 AM		669	633					651	7.8%
8:00 AM		592	580					586	7.0%
9:00 AM		454	449					452	5.4%
10:00 AM		477	434					456	5.4%
11:00 AM		549	512					531	6.3%
12:00 PM		561	590					576	6.9%
1:00 PM		566	559					563	6.7%
2:00 PM		525	505					515	6.2%
3:00 PM		654	659					657	7.9%
4:00 PM		854	793					824	9.8%
5:00 PM		718	744					731	8.7%
6:00 PM		475	421					448	5.4%
7:00 PM		306	243					275	3.3%
8:00 PM		246	289					268	3.2%
9:00 PM		165	160					163	1.9%
10:00 PM		96	92					94	1.1%
11:00 PM		48	46					47	0.6%
Total	0	8,510	8,212	0	0	0	0		
24hr Total		8510	8212					8,361	
AM Pk Hr		7:00	7:00						
AM Peak		669	633					651	
PM Pk Hr		4:00	4:00						
PM Peak		854	793					824	
% Pk Hr		10.04%	9.66%					9.85%	



## **Appendix C**

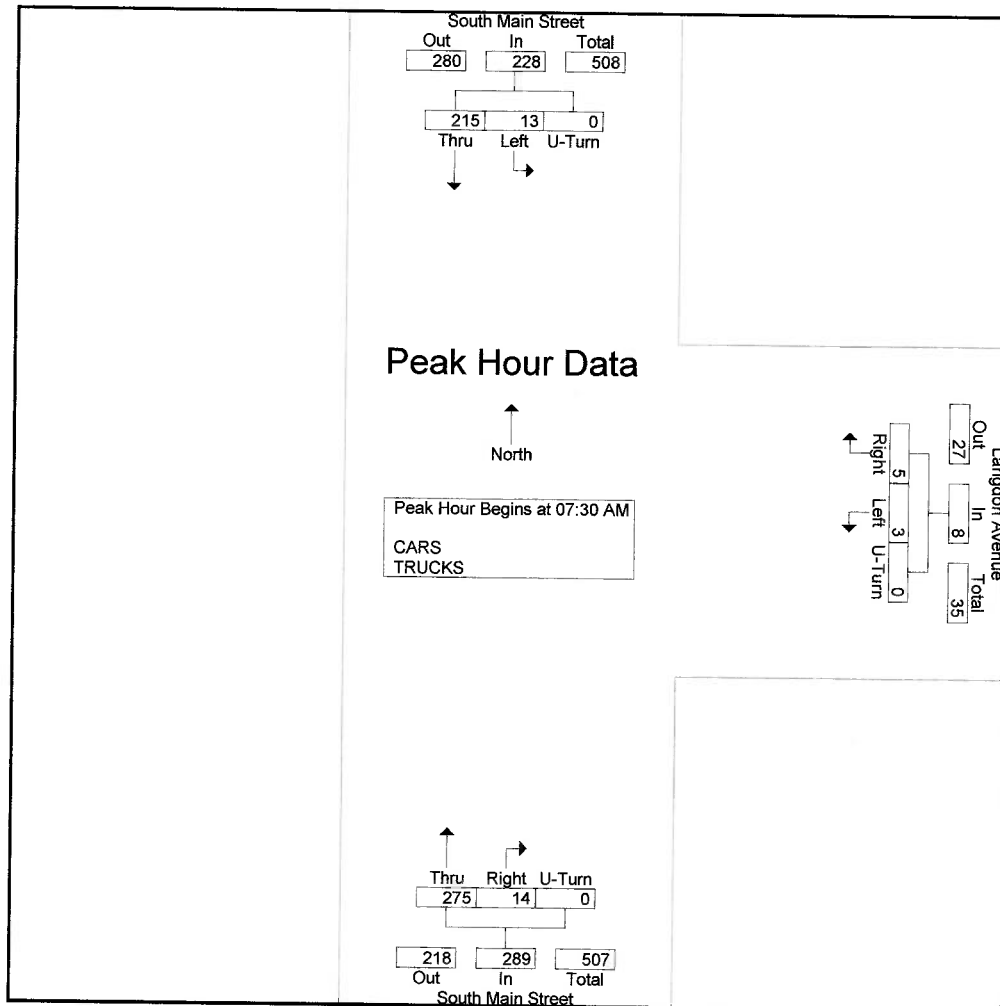
## **Intersection Turning Movement Counts**

Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	54	4	0	58	0	0	0	0	2	67	0	69	127
07:45 AM	61	7	0	68	2	1	0	3	3	97	0	100	171
08:00 AM	46	1	0	47	1	0	0	1	6	61	0	67	115
08:15 AM	54	1	0	55	2	2	0	4	3	50	0	53	112
Total Volume	215	13	0	228	5	3	0	8	14	275	0	289	525
% App. Total	94.3	5.7	0		62.5	37.5	0		4.8	95.2	0		
PHF	.881	.464	.000	.838	.625	.375	.000	.500	.583	.709	.000	.723	.768

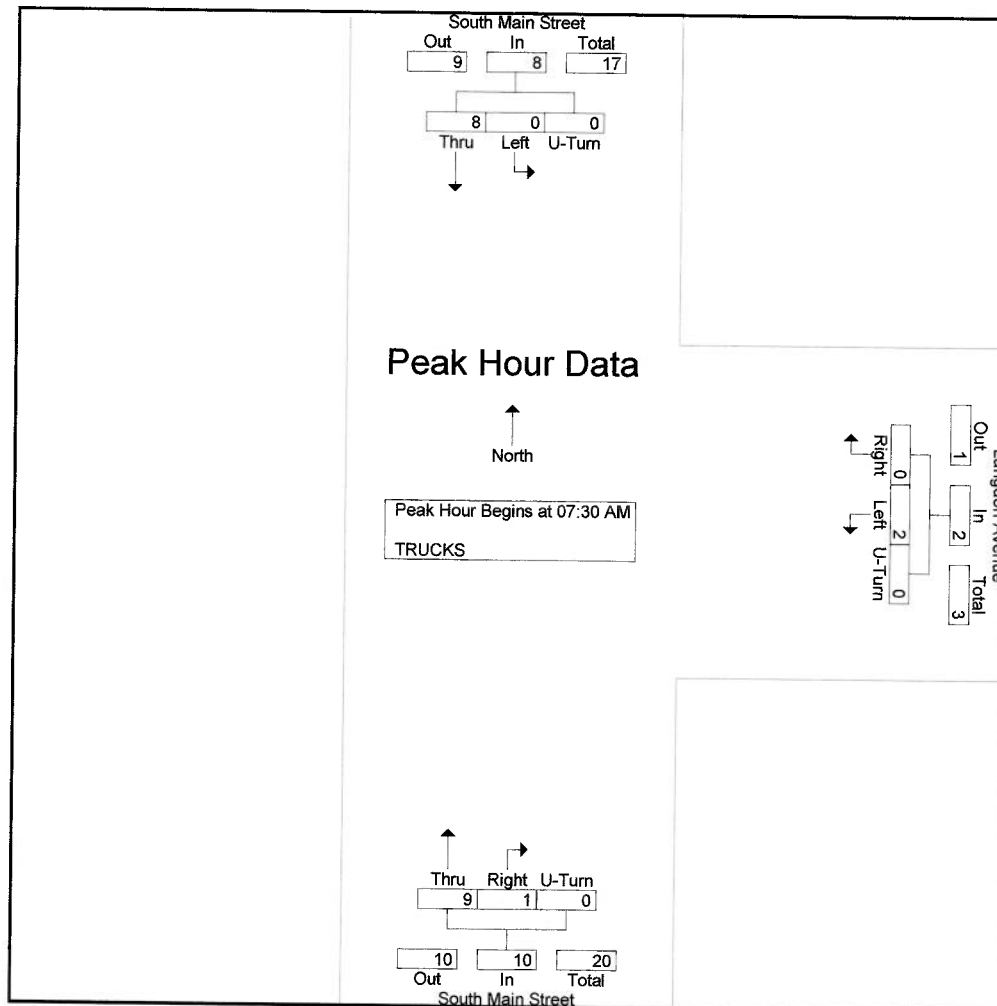


Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	3	0	0	3	0	0	0	0	1	2	0	3	6
07:45 AM	1	0	0	1	0	1	0	1	0	5	0	5	7
08:00 AM	3	0	0	3	0	0	0	0	0	0	0	0	3
08:15 AM	1	0	0	1	0	1	0	1	0	2	0	2	4
Total Volume	8	0	0	8	0	2	0	2	1	9	0	10	20
% App. Total	100	0	0		0	100	0		10	90	0		
PHF	.667	.000	.000	.667	.000	.500	.000	.500	.250	.450	.000	.500	.714



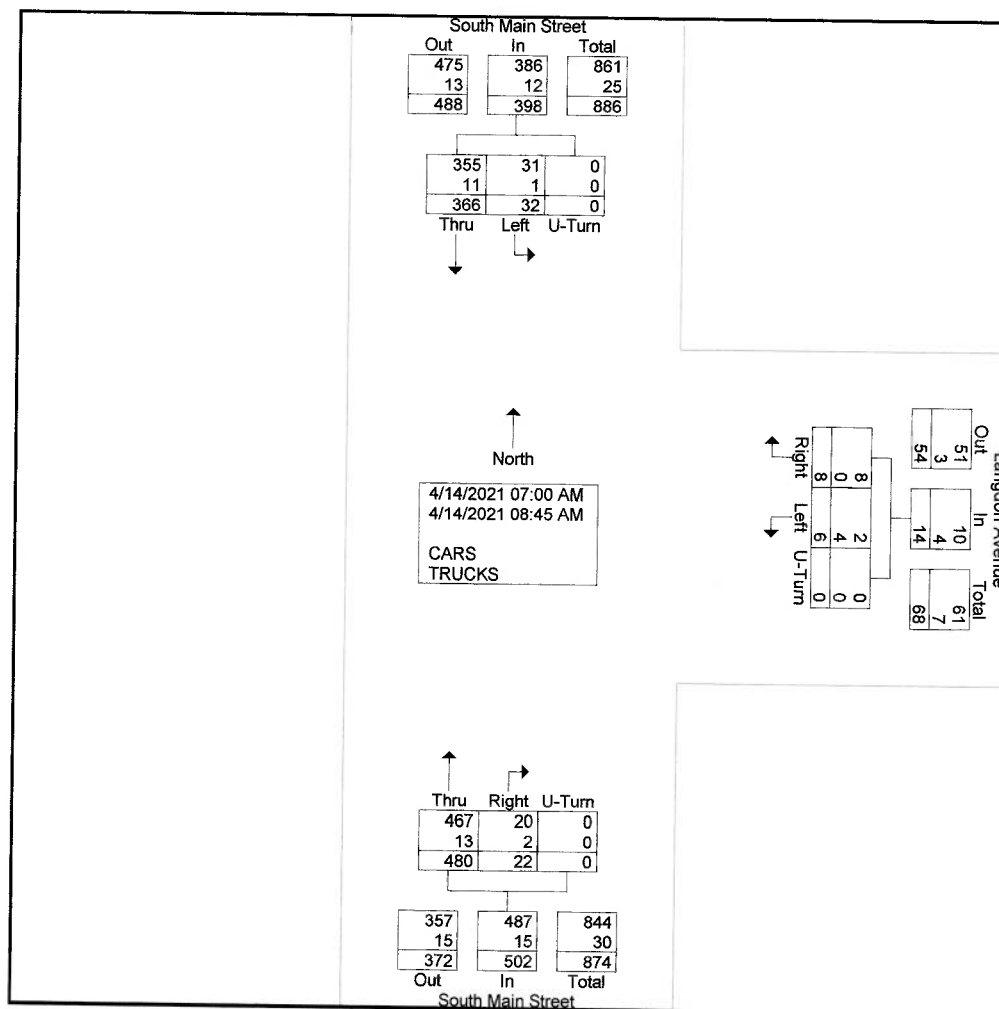
Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 1

Groups Printed- CARS - TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
07:00 AM	34	3	0	37	0	0	0	0	0	33	0	33	70
07:15 AM	45	0	0	45	0	0	0	0	1	55	0	56	101
07:30 AM	54	4	0	58	0	0	0	0	2	67	0	69	127
07:45 AM	61	7	0	68	2	1	0	3	3	97	0	100	171
Total	194	14	0	208	2	1	0	3	6	252	0	258	469
08:00 AM	46	1	0	47	1	0	0	1	6	61	0	67	115
08:15 AM	54	1	0	55	2	2	0	4	3	50	0	53	112
08:30 AM	41	6	0	47	2	2	0	4	3	63	0	66	117
08:45 AM	31	10	0	41	1	1	0	2	4	54	0	58	101
Total	172	18	0	190	6	5	0	11	16	228	0	244	445
Grand Total	366	32	0	398	8	6	0	14	22	480	0	502	914
Apprch %	92	8	0		57.1	42.9	0		4.4	95.6	0		
Total %	40	3.5	0	43.5	0.9	0.7	0	1.5	2.4	52.5	0	54.9	
CARS	355	31	0	386	8	2	0	10	20	467	0	487	883
% CARS	97	96.9	0	97	100	33.3	0	71.4	90.9	97.3	0	97	96.6
TRUCKS	11	1	0	12	0	4	0	4	2	13	0	15	31
% TRUCKS	3	3.1	0	3	0	66.7	0	28.6	9.1	2.7	0	3	3.4



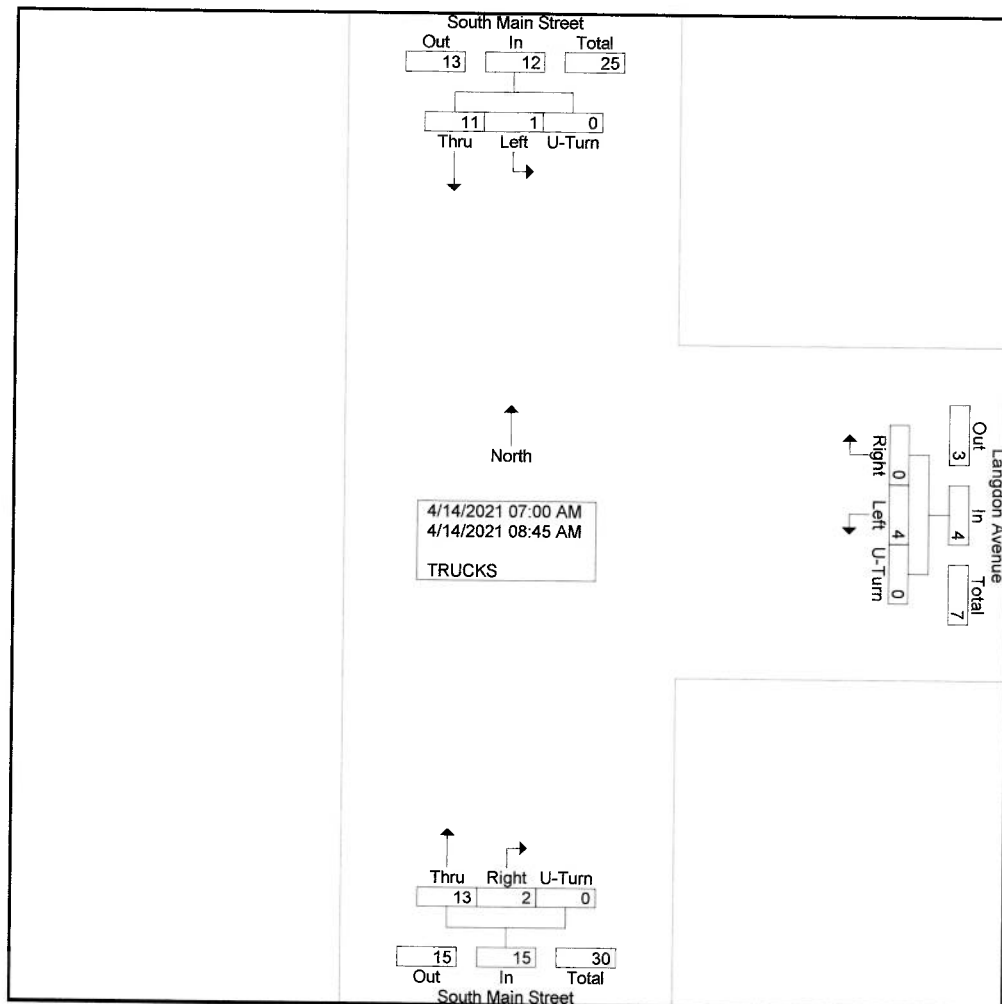
Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 1

Groups Printed- TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	1
07:15 AM	2	0	0	2	0	0	0	0	0	1	0	1	3
07:30 AM	3	0	0	3	0	0	0	0	1	2	0	3	6
07:45 AM	1	0	0	1	0	1	0	1	0	5	0	5	7
Total	6	0	0	6	0	1	0	1	1	9	0	10	17
08:00 AM	3	0	0	3	0	0	0	0	0	0	0	0	3
08:15 AM	1	0	0	1	0	1	0	1	0	2	0	2	4
08:30 AM	1	0	0	1	0	1	0	1	1	2	0	3	5
08:45 AM	0	1	0	1	0	1	0	1	0	0	0	0	2
Total	5	1	0	6	0	3	0	3	1	4	0	5	14
Grand Total	11	1	0	12	0	4	0	4	2	13	0	15	31
Apprch %	91.7	8.3	0		0	100	0		13.3	86.7	0		
Total %	35.5	3.2	0	38.7	0	12.9	0	12.9	6.5	41.9	0	48.4	

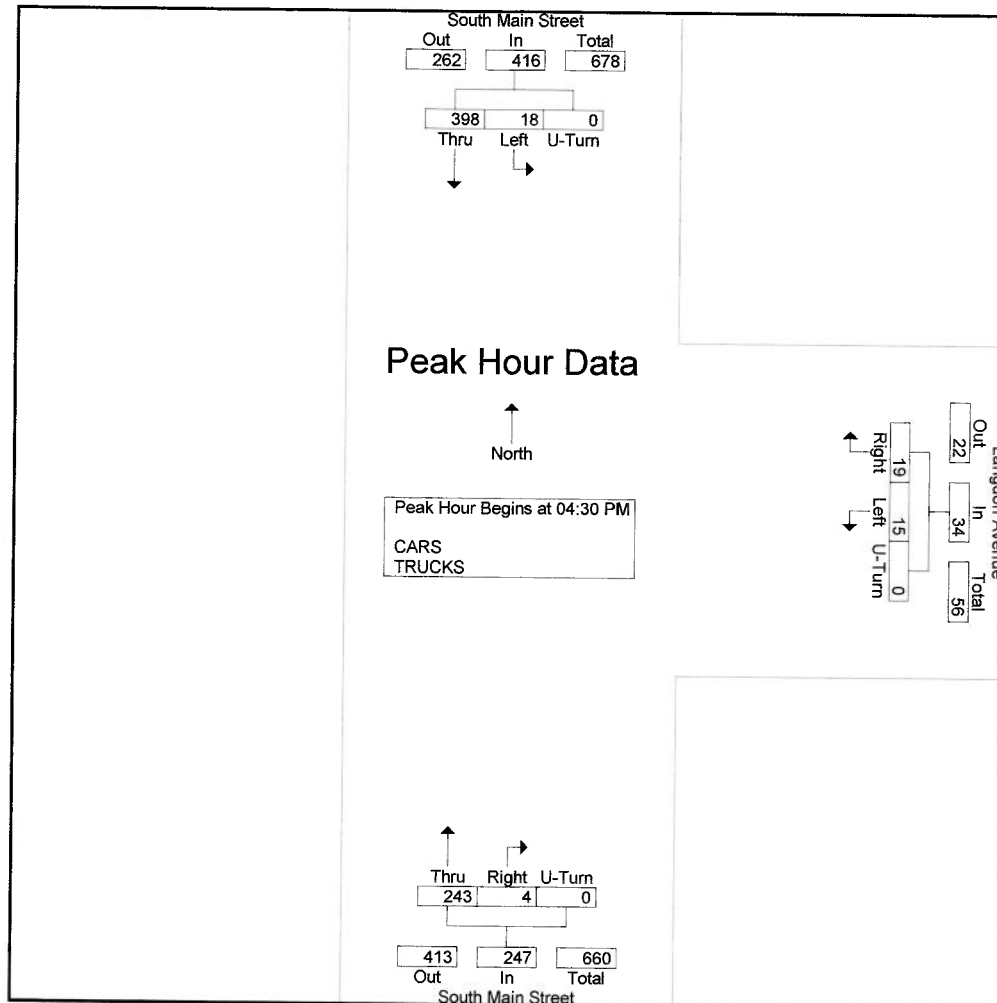


Stephen G. Pernaw & Company, Inc.  
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Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 3

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	102	5	0	107	5	5	0	10	1	66	0	67	184
04:45 PM	87	6	0	93	2	9	0	11	1	56	0	57	161
05:00 PM	119	4	0	123	6	1	0	7	0	55	0	55	185
05:15 PM	90	3	0	93	6	0	0	6	2	66	0	68	167
Total Volume	398	18	0	416	19	15	0	34	4	243	0	247	697
% App. Total	95.7	4.3	0		55.9	44.1	0		1.6	98.4	0		
PHF	.836	.750	.000	.846	.792	.417	.000	.773	.500	.920	.000	.908	.942



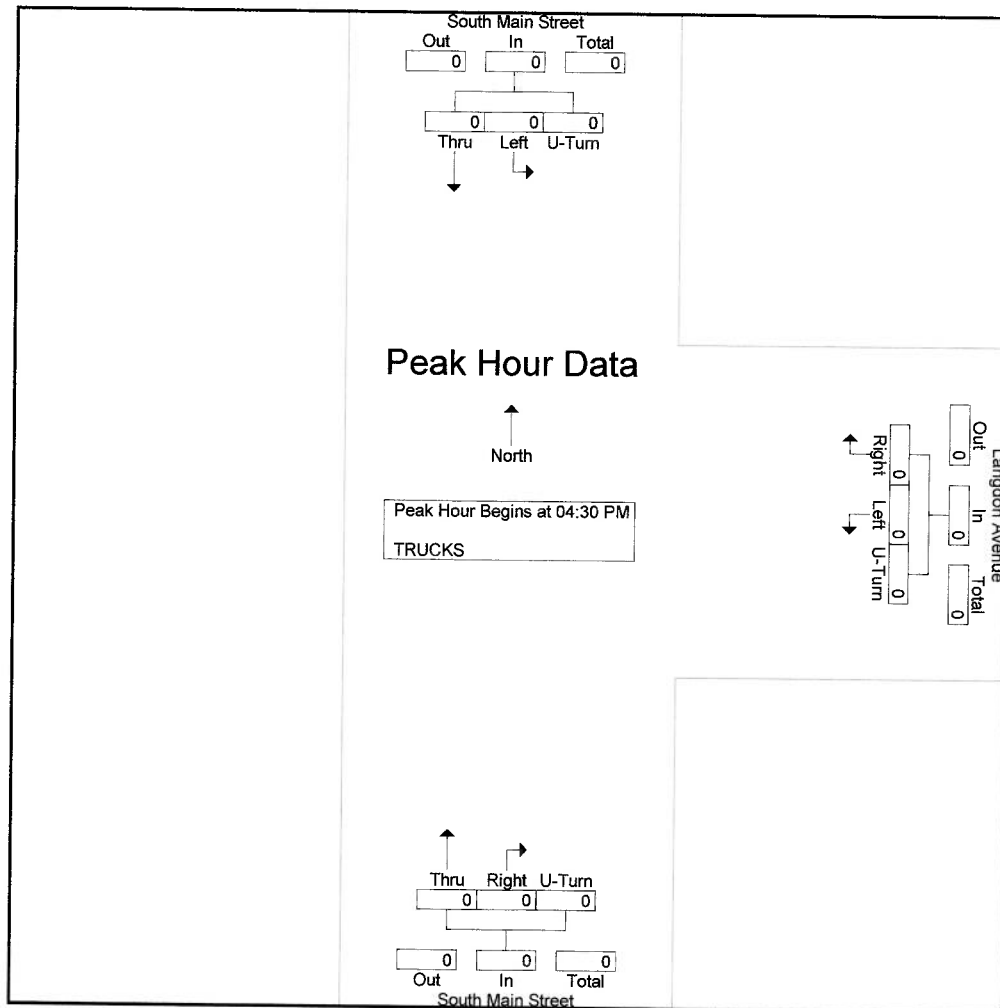


Stephen G. Pernaw & Company, Inc.  
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Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South					
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total	
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 04:30 PM														
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	



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Weather: Clear  
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Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 1

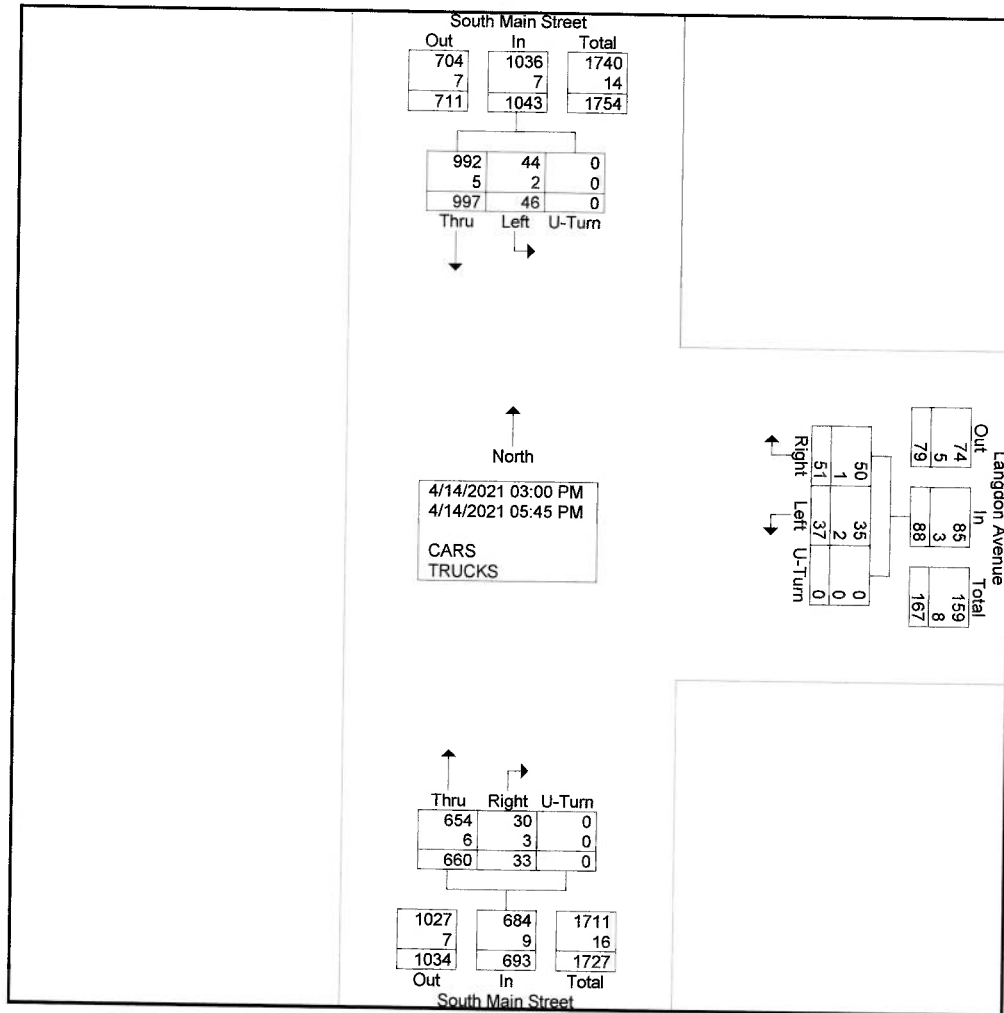
Groups Printed- CARS - TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
03:00 PM	75	4	0	79	1	3	0	4	4	46	0	50	133
03:15 PM	70	1	0	71	5	1	0	6	5	51	0	56	133
03:30 PM	71	3	0	74	5	1	0	6	3	49	0	52	132
03:45 PM	61	6	0	67	2	5	0	7	5	68	0	73	147
Total	277	14	0	291	13	10	0	23	17	214	0	231	545
04:00 PM	108	5	0	113	7	5	0	12	5	54	0	59	184
04:15 PM	79	4	0	83	5	6	0	11	3	55	0	58	152
04:30 PM	102	5	0	107	5	5	0	10	1	66	0	67	184
04:45 PM	87	6	0	93	2	9	0	11	1	56	0	57	161
Total	376	20	0	396	19	25	0	44	10	231	0	241	681
05:00 PM	119	4	0	123	6	1	0	7	0	55	0	55	185
05:15 PM	90	3	0	93	6	0	0	6	2	66	0	68	167
05:30 PM	72	0	0	72	2	1	0	3	1	55	0	56	131
05:45 PM	63	5	0	68	5	0	0	5	3	39	0	42	115
Total	344	12	0	356	19	2	0	21	6	215	0	221	598
Grand Total	997	46	0	1043	51	37	0	88	33	660	0	693	1824
Apprch %	95.6	4.4	0		58	42	0		4.8	95.2	0		
Total %	54.7	2.5	0	57.2	2.8	2	0	4.8	1.8	36.2	0	38	
CARS	992	44	0	1036	50	35	0	85	30	654	0	684	1805
% CARS	99.5	95.7	0	99.3	98	94.6	0	96.6	90.9	99.1	0	98.7	99
TRUCKS	5	2	0	7	1	2	0	3	3	6	0	9	19
% TRUCKS	0.5	4.3	0	0.7	2	5.4	0	3.4	9.1	0.9	0	1.3	1

Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
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Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 2



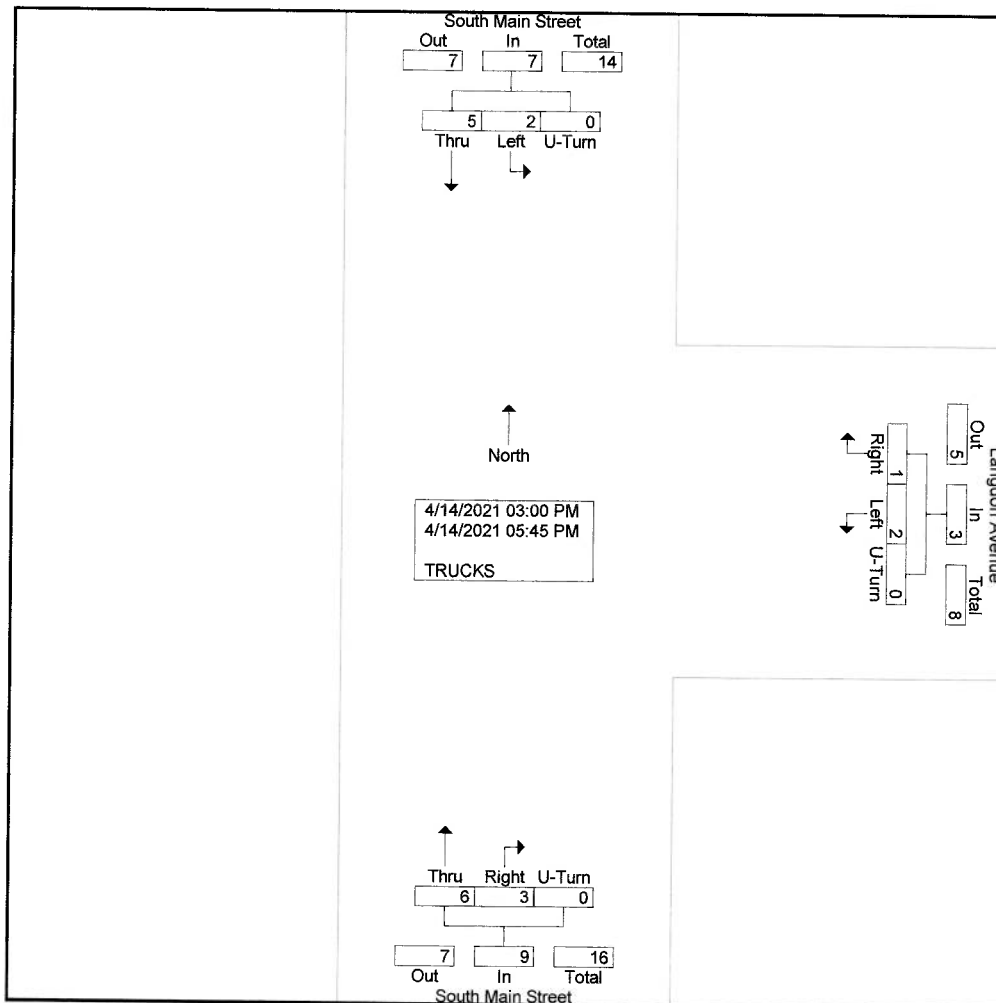
Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Wed  
Site Code : 2089A  
Start Date : 4/14/2021  
Page No : 1

Groups Printed- TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
03:00 PM	0	1	0	1	0	1	0	1	0	0	0	0	2
03:15 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
03:30 PM	0	0	0	0	1	0	0	1	3	2	0	5	6
03:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	1
Total	1	1	0	2	1	2	0	3	3	2	0	5	10
04:00 PM	2	0	0	2	0	0	0	0	0	1	0	1	3
04:15 PM	1	1	0	2	0	0	0	0	0	2	0	2	4
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	1	0	4	0	0	0	0	0	3	0	3	7
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	1	0	0	1	0	0	0	0	0	1	0	1	2
Grand Total	5	2	0	7	1	2	0	3	3	6	0	9	19
Apprch %	71.4	28.6	0		33.3	66.7	0		33.3	66.7	0		
Total %	26.3	10.5	0	36.8	5.3	10.5	0	15.8	15.8	31.6	0	47.4	

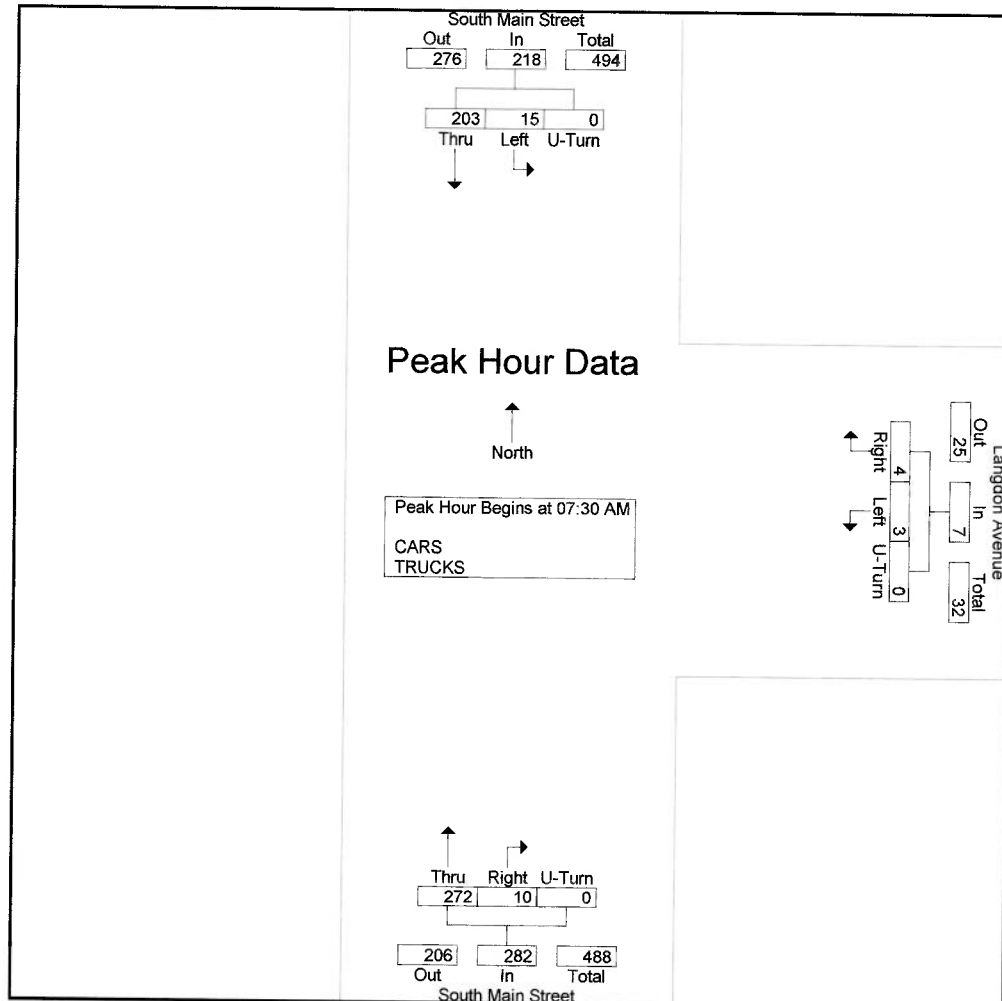


Stephen G. Pernaw & Company, Inc.  
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Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South					
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 07:30 AM														
07:30 AM	52	3	0	55	1	0	0	1	1	55	0	56	112	
07:45 AM	64	5	0	69	0	0	0	0	5	104	0	109	178	
08:00 AM	47	5	0	52	1	3	0	4	4	57	0	61	117	
08:15 AM	40	2	0	42	2	0	0	2	0	56	0	56	100	
Total Volume	203	15	0	218	4	3	0	7	10	272	0	282	507	
% App. Total	93.1	6.9	0		57.1	42.9	0		3.5	96.5	0			
PHF	.793	.750	.000	.790	.500	.250	.000	.438	.500	.654	.000	.647	.712	

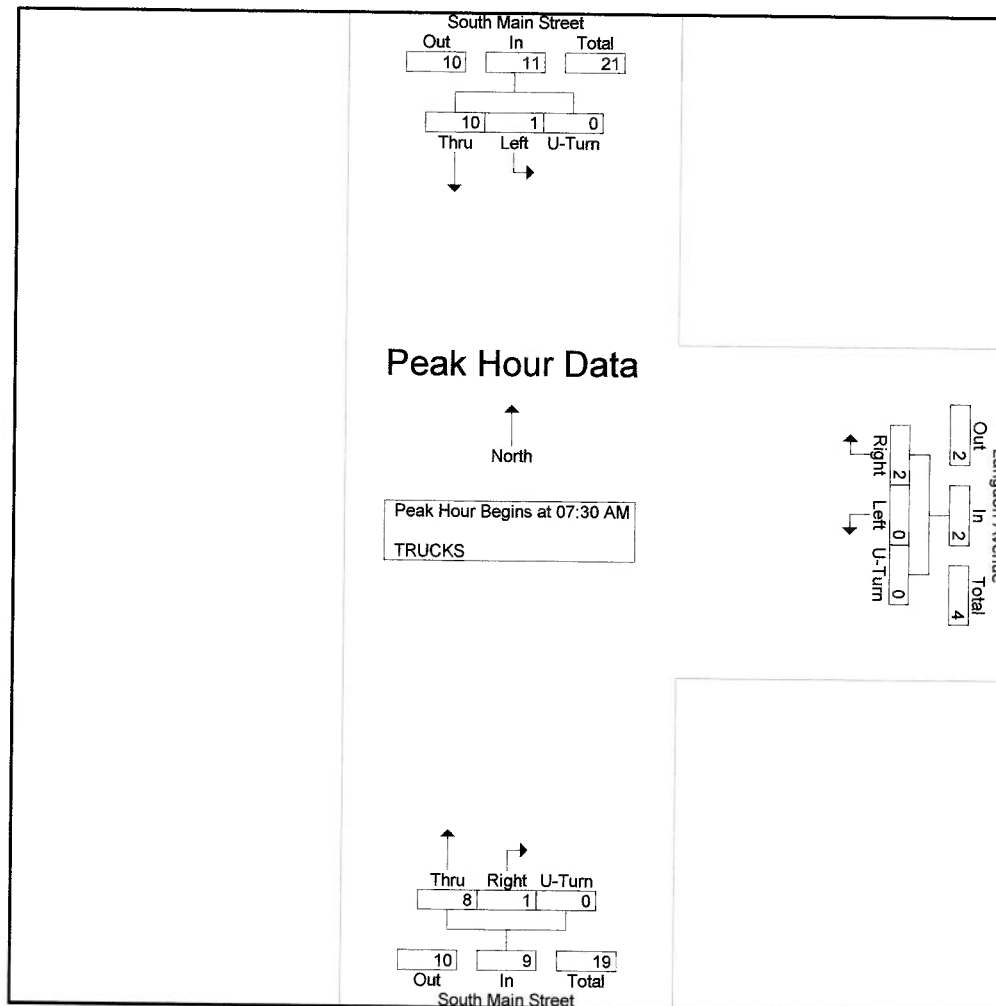


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Weather: Clear  
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Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	3	0	0	3	0	0	0	0	0	3	0	3	6
07:45 AM	2	1	0	3	0	0	0	0	1	2	0	3	6
08:00 AM	4	0	0	4	1	0	0	1	0	2	0	2	7
08:15 AM	1	0	0	1	1	0	0	1	0	1	0	1	3
Total Volume	10	1	0	11	2	0	0	2	1	8	0	9	22
% App. Total	90.9	9.1	0		100	0	0		11.1	88.9	0		
PHF	.625	.250	.000	.688	.500	.000	.000	.500	.250	.667	.000	.750	.786



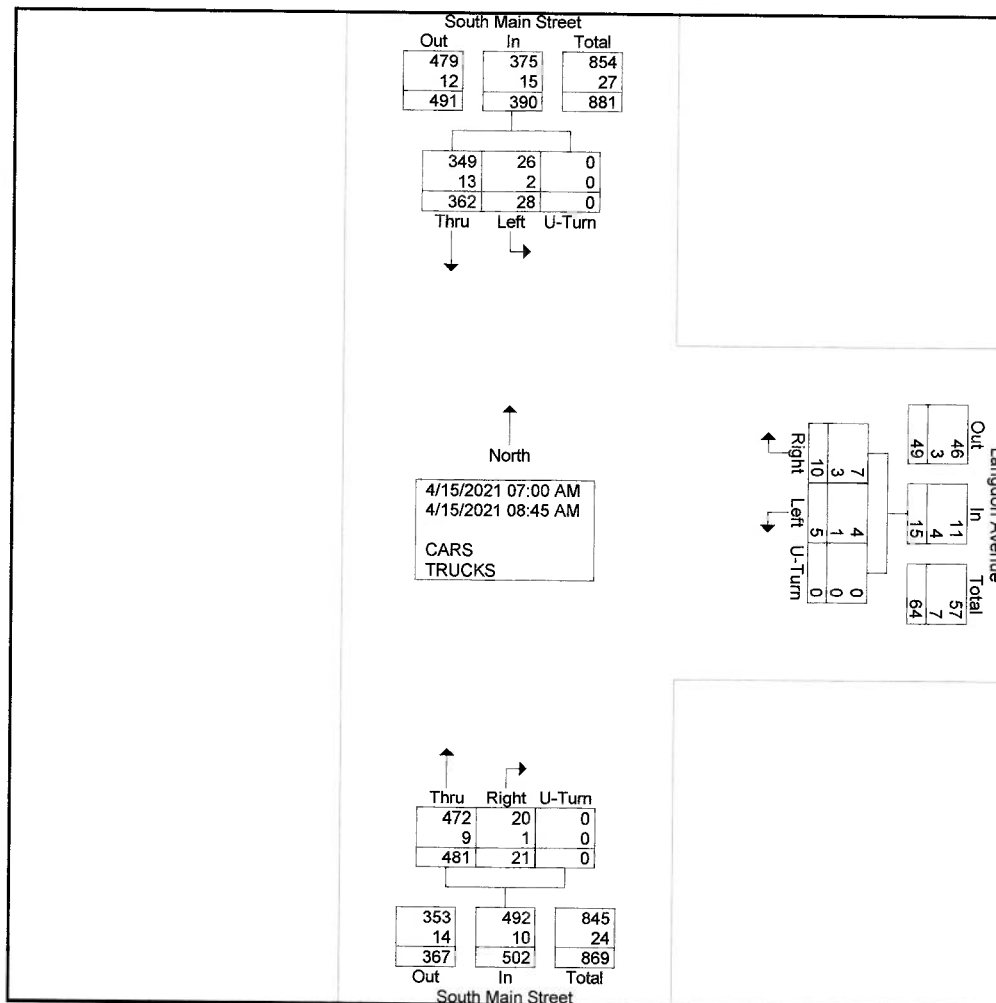
Stephen G. Pernaw & Company, Inc.  
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Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 1

Groups Printed- CARS - TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
07:00 AM	36	1	0	37	0	0	0	0	0	40	0	40	77
07:15 AM	43	0	0	43	0	0	0	0	0	56	0	56	99
07:30 AM	52	3	0	55	1	0	0	1	1	55	0	56	112
07:45 AM	64	5	0	69	0	0	0	0	5	104	0	109	178
Total	195	9	0	204	1	0	0	1	6	255	0	261	466
08:00 AM	47	5	0	52	1	3	0	4	4	57	0	61	117
08:15 AM	40	2	0	42	2	0	0	2	0	56	0	56	100
08:30 AM	47	6	0	53	2	1	0	3	5	47	0	52	108
08:45 AM	33	6	0	39	4	1	0	5	6	66	0	72	116
Total	167	19	0	186	9	5	0	14	15	226	0	241	441
Grand Total	362	28	0	390	10	5	0	15	21	481	0	502	907
Apprch %	92.8	7.2	0		66.7	33.3	0		4.2	95.8	0		
Total %	39.9	3.1	0	43	1.1	0.6	0	1.7	2.3	53	0	55.3	
CARS	349	26	0	375	7	4	0	11	20	472	0	492	878
% CARS	96.4	92.9	0	96.2	70	80	0	73.3	95.2	98.1	0	98	96.8
TRUCKS	13	2	0	15	3	1	0	4	1	9	0	10	29
% TRUCKS	3.6	7.1	0	3.8	30	20	0	26.7	4.8	1.9	0	2	3.2



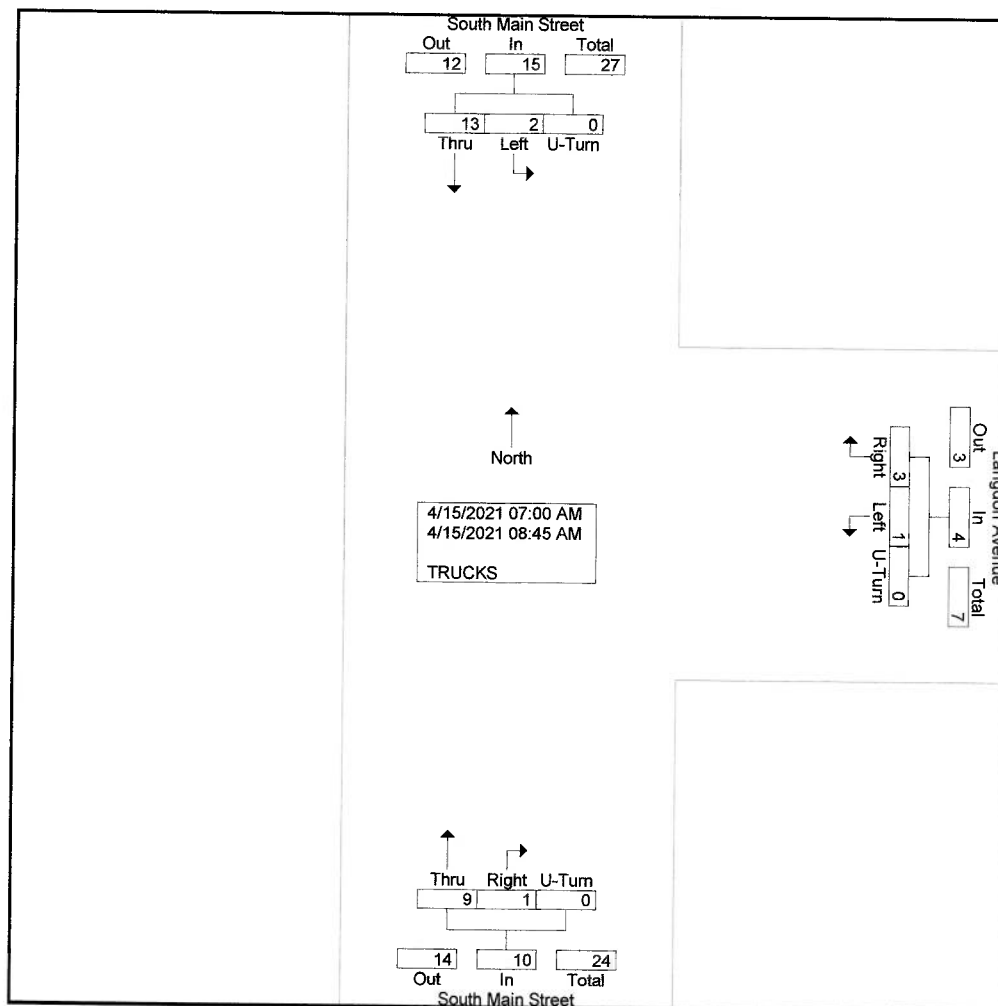
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Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 1

Groups Printed- TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	3	0	0	3	0	0	0	0	0	3	0	3	6
07:45 AM	2	1	0	3	0	0	0	0	1	2	0	3	6
Total	6	1	0	7	0	0	0	0	1	5	0	6	13
08:00 AM	4	0	0	4	1	0	0	1	0	2	0	2	7
08:15 AM	1	0	0	1	1	0	0	1	0	1	0	1	3
08:30 AM	0	1	0	1	0	1	0	1	0	0	0	0	2
08:45 AM	2	0	0	2	1	0	0	1	0	1	0	1	4
Total	7	1	0	8	3	1	0	4	0	4	0	4	16
Grand Total	13	2	0	15	3	1	0	4	1	9	0	10	29
Apprch %	86.7	13.3	0		75	25	0		10	90	0		
Total %	44.8	6.9	0	51.7	10.3	3.4	0	13.8	3.4	31	0	34.5	



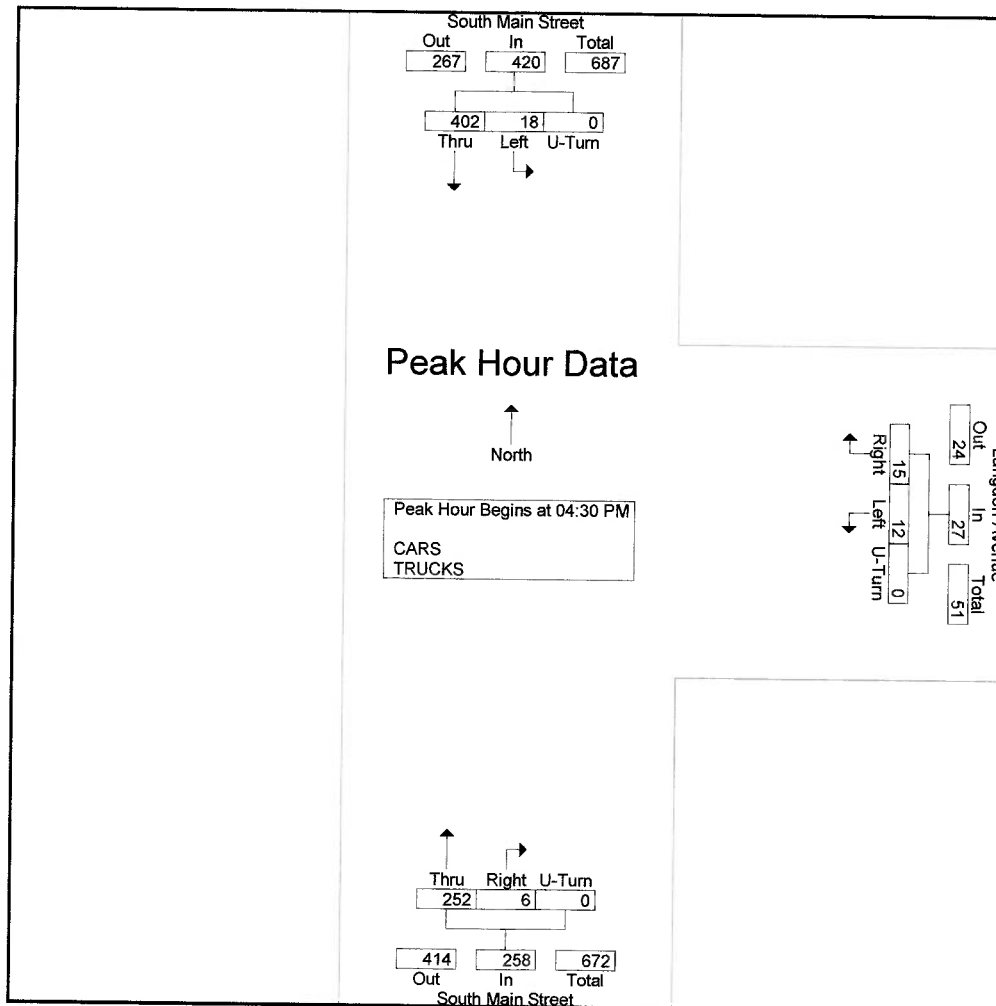


Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 3

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	106	7	0	113	2	5	0	7	3	54	0	57	177
04:45 PM	86	3	0	89	3	4	0	7	1	71	0	72	168
05:00 PM	118	6	0	124	6	2	0	8	0	55	0	55	187
05:15 PM	92	2	0	94	4	1	0	5	2	72	0	74	173
Total Volume	402	18	0	420	15	12	0	27	6	252	0	258	705
% App. Total	95.7	4.3	0		55.6	44.4	0		2.3	97.7	0		
PHF	.852	.643	.000	.847	.625	.600	.000	.844	.500	.875	.000	.872	.943

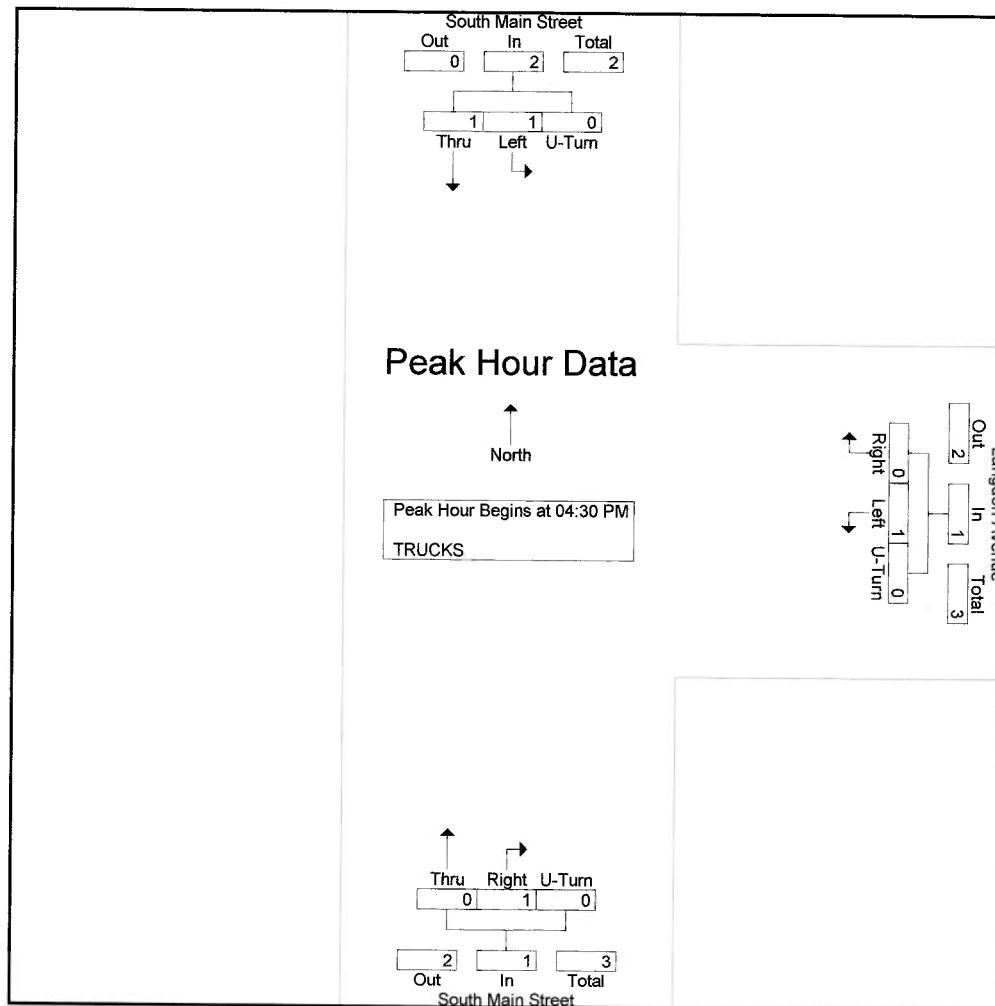


Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 2

	South Main Street From North				Langdon Avenue From East				South Main Street From South				
Start Time	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	0	1	0	1	0	1	0	1	1	0	0	1	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	1	1	0	2	0	1	0	1	1	0	0	1	4
% App. Total	50	50	0		0	100	0		100	0	0		
PHF	.250	.250	.000	.500	.000	.250	.000	.250	.250	.000	.000	.250	.333



Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 1

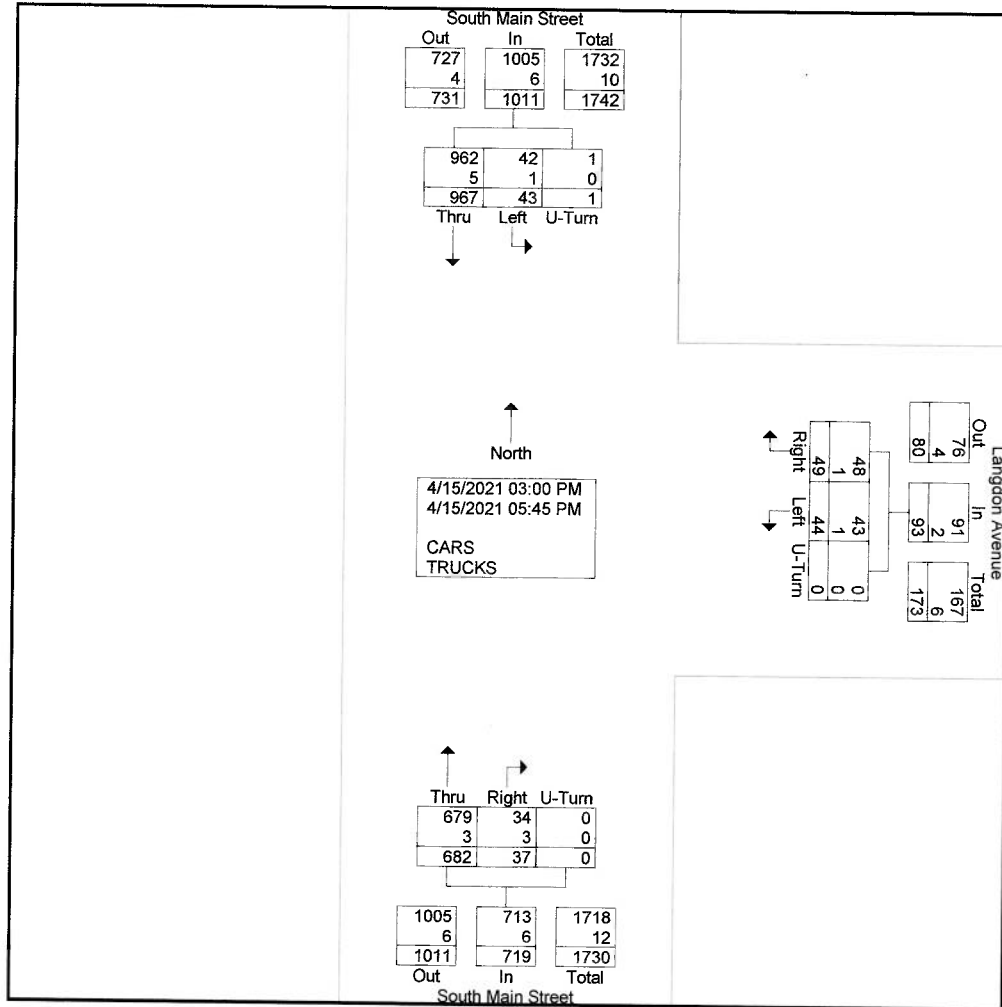
Groups Printed- CARS - TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
03:00 PM	57	5	0	62	5	4	0	9	3	37	0	40	111
03:15 PM	68	4	0	72	5	2	0	7	3	64	0	67	146
03:30 PM	72	4	0	76	5	4	0	9	6	68	0	74	159
03:45 PM	50	2	0	52	5	5	0	10	6	57	0	63	125
Total	247	15	0	262	20	15	0	35	18	226	0	244	541
04:00 PM	95	2	0	97	4	7	0	11	5	61	0	66	174
04:15 PM	84	6	1	91	2	7	0	9	4	40	0	44	144
04:30 PM	106	7	0	113	2	5	0	7	3	54	0	57	177
04:45 PM	86	3	0	89	3	4	0	7	1	71	0	72	168
Total	371	18	1	390	11	23	0	34	13	226	0	239	663
05:00 PM	118	6	0	124	6	2	0	8	0	55	0	55	187
05:15 PM	92	2	0	94	4	1	0	5	2	72	0	74	173
05:30 PM	71	1	0	72	4	3	0	7	2	56	0	58	137
05:45 PM	68	1	0	69	4	0	0	4	2	47	0	49	122
Total	349	10	0	359	18	6	0	24	6	230	0	236	619
Grand Total	967	43	1	1011	49	44	0	93	37	682	0	719	1823
Apprch %	95.6	4.3	0.1		52.7	47.3	0		5.1	94.9	0		
Total %	53	2.4	0.1	55.5	2.7	2.4	0	5.1	2	37.4	0	39.4	
CARS	962	42	1	1005	48	43	0	91	34	679	0	713	1809
% CARS	99.5	97.7	100	99.4	98	97.7	0	97.8	91.9	99.6	0	99.2	99.2
TRUCKS	5	1	0	6	1	1	0	2	3	3	0	6	14
% TRUCKS	0.5	2.3	0	0.6	2	2.3	0	2.2	8.1	0.4	0	0.8	0.8

Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 2



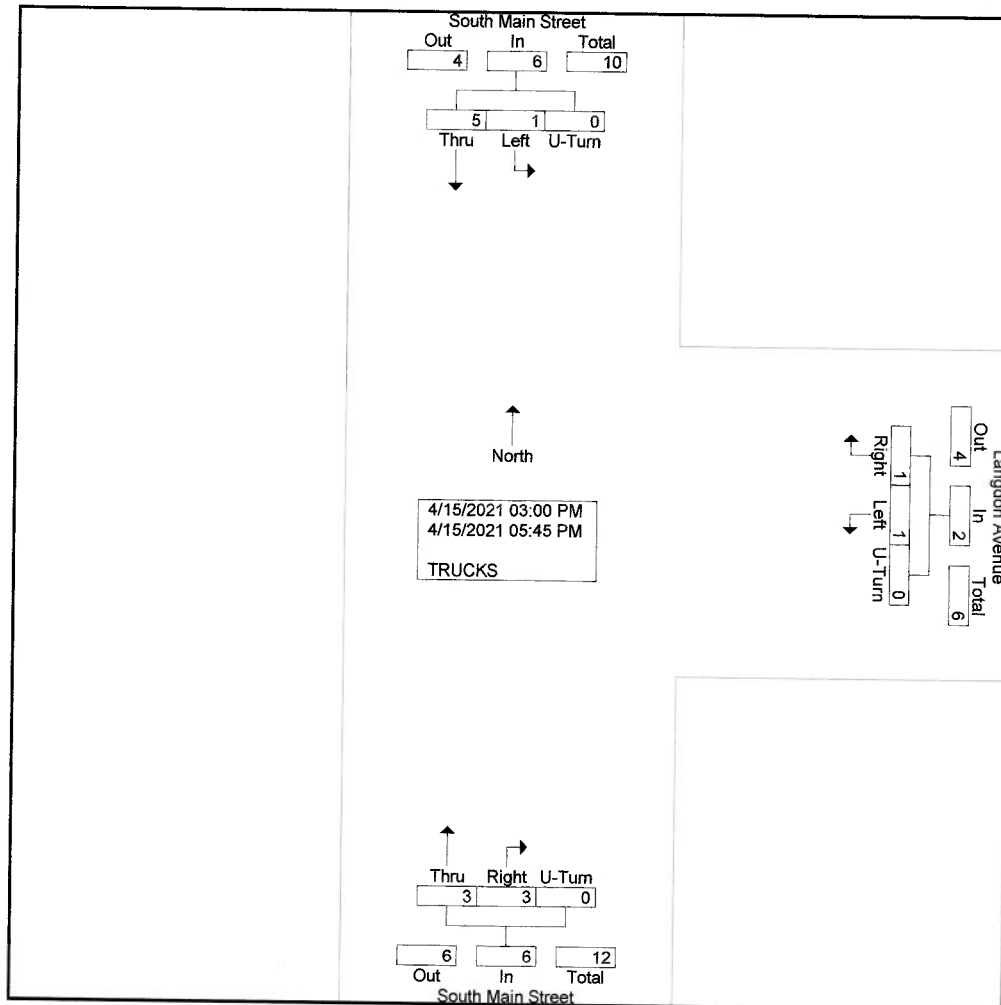
Stephen G. Pernaw & Company, Inc.  
P.O. Box 1721  
Concord, New Hampshire 03302

Weather: Clear  
Collected By: MV  
Job Number: 2089A  
Town/State: Concord, NH

File Name : 2089A\_INT\_A\_AM\_&\_PM\_Thurs  
Site Code : 2089A  
Start Date : 4/15/2021  
Page No : 1

Groups Printed- TRUCKS

Start Time	South Main Street From North				Langdon Avenue From East				South Main Street From South				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
03:30 PM	1	0	0	1	1	0	0	1	2	1	0	3	5
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	1	1	0	0	1	2	2	0	4	6
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
04:30 PM	0	1	0	1	0	1	0	1	1	0	0	1	3
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	1	0	2	0	1	0	1	1	0	0	1	4
05:00 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	1	0	0	1	0	0	0	0	0	1	0	1	2
05:45 PM	1	0	0	1	0	0	0	0	0	0	0	0	1
Total	3	0	0	3	0	0	0	0	0	1	0	1	4
Grand Total	5	1	0	6	1	1	0	2	3	3	0	6	14
Apprch %	83.3	16.7	0		50	50	0		50	50	0		
Total %	35.7	7.1	0	42.9	7.1	7.1	0	14.3	21.4	21.4	0	42.9	



## **Appendix D**

## **Crash Data**



Concord Police Department  
From: 01/01/2018 Thru: 04/12/2021

Page: 1

Jurisdictions: ALL  
Location: ALL  
Street: CON > S MAIN ST  
Intersecting Street: CON > LANGDON ST  
Zones: ALL

Accident Statistics By Time of Day

	<u>SUN</u>	<u>MON</u>	<u>TUE</u>	<u>WED</u>	<u>THR</u>	<u>FRI</u>	<u>SAT</u>	<u>TOTALS</u>
1 AM	0	0	0	0	0	0	0	0
2 AM	0	0	0	0	0	0	0	0
3 AM	0	0	0	0	0	0	0	0
4 AM	0	0	0	0	0	0	0	0
5 AM	0	0	0	0	0	0	0	0
6 AM	0	0	0	0	0	0	0	0
7 AM	0	0	0	0	0	0	0	0
8 AM	0	0	0	0	0	0	0	0
9 AM	0	1	0	0	0	0	0	1
10 AM	0	0	0	0	0	0	0	0
11 AM	0	0	0	0	0	0	0	0
12 PM	0	0	0	0	1	0	0	1
1 PM	0	0	0	0	0	0	0	0
2 PM	0	0	0	0	0	0	0	0
3 PM	0	0	0	0	0	0	0	0
4 PM	0	0	0	0	0	0	0	0
5 PM	0	0	0	0	0	0	0	0
6 PM	0	0	0	0	0	0	0	0
7 PM	0	0	0	0	0	0	0	0
8 PM	0	0	0	0	0	0	0	0
9 PM	0	0	0	0	0	0	0	0
10 PM	0	0	0	0	0	0	0	0
11 PM	0	0	0	0	0	0	0	0
12 AM	0	0	0	0	0	0	0	0
TOTALS	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>2</u>

Accident Particulars

	Occurrence (s)	Percentage
Average posted speed at the accident scene		30 MPH
Occurred at On-ramps	0	0.0
Occurred at Off-ramps	0	0.0
Occurred at an intersection	1	50.0
Occurred at a rotary	0	0.0
Occurred on a one lane road/highway	0	0.0
Occurred on a two lane road/highway	0	0.0
Occurred on a three lane road/highway	0	0.0
Occurred on a four lane road/highway	0	0.0
Occurred on other number of lanes	2	100.0
Involved OUI violation(s)	0	0.0
Photos were taken	0	0.0

Measurements were taken	0	0.0
Investigation took place	1	50.0
Involved Injuries	0	0.0
Involved Fatalities	0	0.0

**Age and Sex Breakdown of Operators**

	<u>&lt; 19</u>	<u>19-21</u>	<u>22-25</u>	<u>26-35</u>	<u>36-45</u>	<u>46-60</u>	<u>&gt; 60</u>	<u>TOTALS</u>
Male	0	0	1	0	1	0	0	2
Female	0	0	0	0	0	1	1	2
Non-Binary	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0
TOTALS	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>4</u>

	<u>Occurrence (s)</u>	<u>Percentage</u>
Number of out of state operators	0	0.0
Number of operators who were cited	0	0.0

**Road Surface (prior to 4.6.19)**

	<u>Occurrence (s)</u>	<u>Percentage</u>
DRY	2	100.0
Total Occurrences	2	100.0 %

**Veh. Action Prior To Accident (prior to 4.6.19)**

	<u>Occurrence (s)</u>	<u>Percentage</u>
FOLLOWING ROADWAY	2	50.0
MAKING LEFT TURN	1	25.0
STOPPED IN TRAFFIC	1	25.0
Total Occurrences	4	100.0 %

**Apparent Contributing Factors (prior to 4.6.19)**

	<u>Occurrence (s)</u>	<u>Percentage</u>
--	-----------------------	-------------------



DRIVER INATTENTION/DISTRACTION	1	25.0
NO IMPROPER DRIVING	2	50.0
FOLLOWING TOO CLOSE	1	25.0

---

Total Occurrences	4	100.0 %
-------------------	---	---------

**Vehicle Defects (prior to 4.6.19)**

	Occurrence (s)	Percentage
NO APPARENT DEFECTS	4	100.0

---

Total Occurrences	4	100.0 %
-------------------	---	---------

**Hazardous Material Code (prior to 4.6.19)**

	Occurrence (s)	Percentage
N - Not On File	4	100.0

---

Total Occurrences	4	100.0 %
-------------------	---	---------

**Point Of Impact (prior to 4.6.19)**

	Occurrence (s)	Percentage
CENTER FRONT	2	50.0
CENTER REAR	2	50.0

---

Total Occurrences	4	100.0 %
-------------------	---	---------

**Ejection Code (prior to 4.6.19)**

	Occurrence (s)	Percentage
NOT EJECTED	5	100.0

---

Total Occurrences	5	100.0 %
-------------------	---	---------

**Injury Severity (prior to 4.6.19)**

	Occurrence (s)	Percentage
--	----------------	------------

NO APPARENT INJURY	5	100.0
Total Occurrences	5	100.0 %

Restraint System (prior to 4.6.19)

	Occurrence(s)	Percentage
AIR BAG & SEAT RESTRAINT USED	1	20.0
RESTRAINT INSTALLED-USED	4	80.0
Total Occurrences	5	100.0 %

Vehicle Occupied (prior to 4.6.19)

	Occurrence(s)	Percentage
USE UNIT (VEHICLE) NUMBER	5	100.0
Total Occurrences	5	100.0 %

Location Of Most Severe Injury (prior to 4.6.19)

	Occurrence(s)	Percentage
NONE	5	100.0
Total Occurrences	5	100.0 %

Injured Position in Vehicle (prior to 4.6.19)

	Occurrence(s)	Percentage
DRIVER	4	80.0
PASSENGER - FRONT RIGHT	1	20.0
Total Occurrences	5	100.0 %

Collision With (prior to 4.6.19)

	Occurrence(s)	Percentage
--	---------------	------------

OTHER MOTOR VEHICLE	2	100.0
Total Occurrences	2	100.0 %

Traffic Controls (prior to 4.6.19)

	Occurrence(s)	Percentage
NONE	1	50.0
LANE CONTROL	1	50.0
Total Occurrences	2	100.0 %

Road Conditions (prior to 4.6.19)

	Occurrence(s)	Percentage
NORMAL	2	100.0
Total Occurrences	2	100.0 %

Light Conditions (prior to 4.6.19)

	Occurrence(s)	Percentage
DAYLIGHT	2	100.0
Total Occurrences	2	100.0 %

Weather Conditions (prior to 4.6.19)

	Occurrence(s)	Percentage
CLEAR	2	100.0
Total Occurrences	2	100.0 %

Road Alignment (prior to 4.6.19)

	Occurrence(s)	Percentage
--	---------------	------------

STRAIGHT AND UPGRADE	1	50.0
STRAIGHT AT HILLCREST	1	50.0
Total Occurrences	2	100.0 %

Road Design (prior to 4.6.19)

	Occurrence(s)	Percentage
NOT PHYSICALLY DIVIDED (2-WAY)	2	100.0
Total Occurrences	2	100.0 %

Apparant Roadway Features (prior to 4.6.19)

	Occurrence(s)	Percentage
NOT APPLICABLE	2	100.0
Total Occurrences	2	100.0 %

Location First Harmful Event (prior to 4.6.19)

	Occurrence(s)	Percentage
AT INTERSECTION	1	50.0
INTERSECTION RELATED	1	50.0
Total Occurrences	2	100.0 %

Apparent Physical Condition (prior to 4.6.19)

	Occurrence(s)	Percentage
APPARENTLY NORMAL	4	100.0
Total Occurrences	4	100.0 %

Vision Obscurement (prior to 4.6.19)

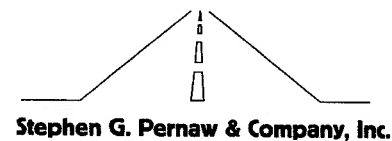
	Occurrence(s)	Percentage
--	---------------	------------

NO APPARENT OBSCUREMENT	4	100.0
<hr/>		
Total Occurrences	4	100.0 %

## **Appendix E**

## **Adjustment Factors**

**Seasonal Adjustment Factors  
NHDOT Group 4 (Urban Highways)**



**Year 2019 Monthly Data - Urban**

Month	ADT	Adjustment to	
		Average	Peak
Jan	11,431	1.12	1.23
Feb	11,848	1.08	1.18
Mar	12,141	1.06	1.15
Apr	12,860	1.00	1.09
May	13,551	0.95	1.03
Jun	13,785	0.93	1.02
Jul	13,942	0.92	1.01
Aug	14,016	0.92	1.00
Sep	13,379	0.96	1.05
Oct	13,339	0.96	1.05
Nov	12,265	1.05	1.14
Dec	11,496	1.12	1.22

**Year 2018 Monthly Data - Urban**

Month	ADT	Adjustment to	
		Average	Peak
Jan	11,282	1.13	1.24
Feb	11,848	1.08	1.18
Mar	11,828	1.08	1.18
Apr	12,491	1.02	1.12
May	13,587	0.94	1.03
Jun	13,911	0.92	1.00
Jul	13,765	0.93	1.01
Aug	13,945	0.92	1.00
Sep	13,168	0.97	1.06
Oct	13,367	0.96	1.04
Nov	12,215	1.05	1.14
Dec	11,963	1.07	1.17

**Year 2017 Monthly Data - Urban**

Month	ADT	Adjustment to	
		Average	Peak
Jan	12254	1.21	1.33
Feb	13494	1.10	1.21
Mar	14,335	1.03	1.14
Apr	15004	0.99	1.09
May	15547	0.95	1.05
Jun	16310	0.91	1.00
Jul	15523	0.95	1.05
Aug	15974	0.93	1.02
Sep	15546	0.95	1.05
Oct	15104	0.98	1.08
Nov	14,544	1.02	1.12
Dec	14151	1.05	1.15

**Average Peak-Month Factor 1.10**



STEPHEN G. PERNAW & COMPANY, INC.

PROJECT: Proposed Mixed-Use Development, Concord, New Hampshire  
NUMBER: 2089A  
COUNT STATION: 82099073

## HISTORICAL GROWTH CALCULATIONS

LOCATION : NH3A (North of Maitland Street) - Concord, NH  
CASE : AADT

### ARITHMETIC PROJECTIONS

YEAR	AADT	Regression Output:		PROJECTIONS	
2016	7140	Constant	-119034.5	2021	7480
2017	7283	Std Err of Y Est	45.91405	2022	7543
2018	7267	R Squared	0.8229231	2023	7605
2019	7354	No. of Observations	4	2024	7668
2020	6207	DNU	Degrees of Freedom 2	2025	7731
		X Coefficient	62.6	2026	7793
		Std Err of Coef.	17.782435	2027	7856
				2028	7918
				2029	7981
				2030	8044
				2031	8106

RATE = 63 VPD/YEAR

### GEOMETRIC PROJECTIONS

YEAR	AADT	Ln AADT	Regression Output:		PROJECTIONS	
2016	7140	8.87347	Constant	-8.54008	2021	7483
2017	7283	8.89330	Std Err of Y Est	0.0063634	2022	7548
2018	7267	8.89110	R Squared	0.8216943	2023	7614
2019	7354	8.90300	No. of Observations	4	2024	7680
2020	6207	DNU	Degrees of Freedom	2	2025	7747
			X Coefficient	0.0086396	2026	7814
			Std Err of Coef.	0.0028458	2027	7882
					2028	7950
					2029	8019
					2030	8089
					2031	8159

CONCLUSION: Use 1% per year

RATE = 0.9 % / YEAR



List View

All DIRs

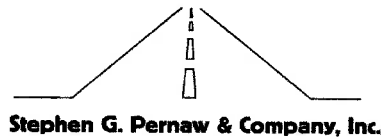
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Type	SPOT		HPMS ID	
On NHS	No		On HPMS	No
LRS ID	S0000003A_		LRS Loc Pt.	
SF Group	04	Route Type		
AF Group	04	Route	NH 3A	
GF Group	E	Active	Yes	
Class Dist Grp	Default	Category	3	
Seas Clss Grp	Default			
WIM Group	Default			
QC Group	Default			
Funct'l Class	Minor Arterial	Milepost		
Located On	S Main St			
Loc On Alias	NH 3A (SOUTH MAIN ST) NORTH OF MAITLAND ST			
More Detail				
<b>STATION DATA</b>				

Directions: 2-WAY ?

AADT ?								
	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2020	6,207 <sup>3</sup>		12		5,650 (91%)	557 (9%)	Grown from 2019
	2019	7,354 <sup>3</sup>		12		6,737 (92%)	617 (8%)	Grown from 2018
	2018	7,267	854	12		6,699 (92%)	568 (8%)	
	2017	7,283 <sup>3</sup>				6,759 (93%)	524 (7%)	Grown from 2016
	2016	7,140 <sup>3</sup>				6,511 (91%)	629 (9%)	Grown from 2015
1-5 of 13								

Travel Demand Model										
Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV	

VOLUME COUNT				VOLUME TREND ?	
	Date	Int	Total	Year	Annual Growth
	Wed 6/20/2018	60	8,212	2020	-16%
	Tue 6/19/2018	60	8,510	2019	1%
	Thu 6/18/2015	60	8,177	2018	0%
	Wed 6/17/2015	60	8,224	2017	2%
	Tue 6/16/2015	60	8,094	2016	2%
	Thu 6/14/2012	60	9,032	2015	-2%
	Wed 6/13/2012	60	8,729	2012	-2%
	Tue 6/12/2012	60	8,591	2009	1%
	Sun 5/17/2009	60	3,912	2006	6%



## CALCULATION SHEET

Project:	Mixed-Use Dev.	Job Number:	2089A
Calculated By:	SP	Date:	4/27/2021
Checked By:	CA	Date:	4/27/2021
Sheet No:	1	Of:	1
Subject:	Covid-19 Adjustment Factor		

### I. Givens:

#### A. NHDOT count station on S. Main Street (north of Maitland Ave)

1. June 2018 average AM peak hour = 651 vehicles (see Appendix B) during pre-pandemic conditions.
2. June 2018 average PM peak hour = 824 vehicles (see Appendix B) during pre-pandemic conditions.
3. April 2021 AM peak hour 508 vehicles south of Maitland Avenue (see Figure 2) during pandemic conditions.
4. April 2021 PM peak hour 678 vehicles south of Maitland Avenue (see Figure 2) during pandemic conditions.
5. Traffic volume north of Maitland Avenue = +0 (AM) and +6 (PM) per supplemental count at Maitland Avenue.

B. Peak-month seasonal adjustment factor for June = 1.01 (average three years), for April = 1.10 (average three years) per Appendix E.

C. Historical growth rate = 1.0% per year, compounded annually (see Appendix E)

### II. Calculate 2021 peak-month volumes north of Maitland Avenue based on June 2018 pre-pandemic conditions

A. AM =  $651 \times 1.01^3 \times 1.01 = 677$  vehicles

B. PM =  $824 \times 1.01^3 \times 1.01 = 857$  vehicles

### III. Calculate 2021 peak-month volumes north of Maitland Avenue based on April 2021 pandemic conditions

A. AM =  $(508+0) \times 1.10 = 559$  vehicles

B. PM =  $(678+6) \times 1.10 = 752$  vehicles

### IV. Calculate Covid-19 Adjustment Factors

A. AM Covid-19 factor =  $677 / 559 = 1.21$

B. PM Covid-19 factor =  $857 / 752 = 1.14$



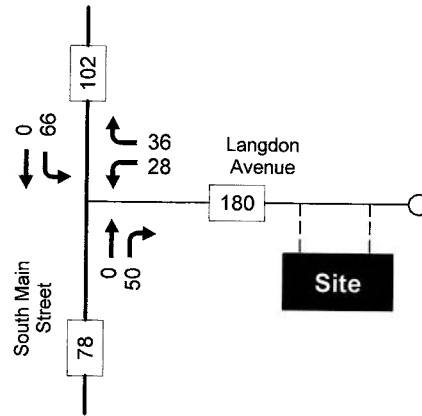
Excel Version

Weekly Volume Report			
Location ID:	82099073	Type:	SPOT
Located On:	S Main St	:	
Direction:	2-WAY		
Community:	CONCORD	Period:	Mon 6/18/2018 - Sun 6/24/2018
AADT:	7267		

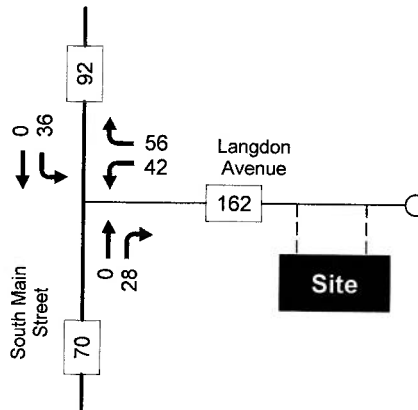
Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg	Graph
12:00 AM		24	35					30	0.4%
1:00 AM		15	22					19	0.2%
2:00 AM		8	13					11	0.1%
3:00 AM		22	19					21	0.2%
4:00 AM		57	29					43	0.5%
5:00 AM		170	138					154	1.8%
6:00 AM		259	247					253	3.0%
7:00 AM		669	633					651	7.8%
8:00 AM		592	580					586	7.0%
9:00 AM		454	449					452	5.4%
10:00 AM		477	434					456	5.4%
11:00 AM		549	512					531	6.3%
12:00 PM		561	590					576	6.9%
1:00 PM		566	559					563	6.7%
2:00 PM		525	505					515	6.2%
3:00 PM		654	659					657	7.9%
4:00 PM		854	793					824	9.8%
5:00 PM		718	744					731	8.7%
6:00 PM		475	421					448	5.4%
7:00 PM		306	243					275	3.3%
8:00 PM		246	289					268	3.2%
9:00 PM		165	160					163	1.9%
10:00 PM		96	92					94	1.1%
11:00 PM		48	46					47	0.6%
Total	0	8,510	8,212	0	0	0	0		
24hr Total		8510	8212					8,361	
AM Pk Hr		7:00	7:00						
AM Peak		669	633					651	
PM Pk Hr		4:00	4:00						
PM Peak		854	793					824	
% Pk Hr		10.04%	9.66%					9.85%	

## **Appendix F**

## **Site Generated Traffic Volumes / Trip Distribution**



AM PEAK HOUR



PM PEAK HOUR

## Trip Generation Summary

Alternative: Alternative 1

Phase:

Project: 2089A Gen

Open Date: 4/21/2021

Analysis Date: 4/21/2021

ITE	Land Use	Weekday Average Daily Trips				Weekday AM Peak Hour of Adjacent Street Traffic				Weekday PM Peak Hour of Adjacent Street Traffic			
		*	Enter	Exit	Total	*	Enter	Exit	Total	*	Enter	Exit	Total
221	MID-RISE 1		523	522	1045		17	48	65		51	32	83
	192 Dwelling Units												
710	OFFICEGENERAL 2		101	100	201		37	6	43		4	18	22
	18 1000 Sq. Ft. GFA												
710	OFFICEGENERAL 1		261	260	521		62	10	72		9	48	57
	48 1000 Sq. Ft. GFA												
	Unadjusted Volume		885	882	1767		116	64	180		64	98	162
	Internal Capture Trips		0	0	0		1	1	2		2	2	4
	Pass-By Trips		0	0	0		0	0	0		0	0	0
	Volume Added to Adjacent Streets		885	882	1767		115	63	178		62	96	158

Total Weekday Average Daily Trips Internal Capture = 0 Percent

Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 1 Percent

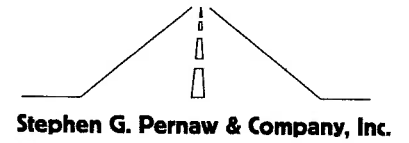
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 2 Percent

\* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 10th Edition

**TRIP GENERATION 10, TRAFFICWARE, LLC**

Project Location: Concord, NH  
Project Number: 2089A



### **TRIP DISTRIBUTION ANALYSIS**

#### **TMC Patterns at South Main Street/Langdon Avenue Intersection**

	Wednesday, April 14, 2021					Thursday, April 15, 2021						
Combined (5 hrs)												
To/From North =	78	+	59	=	137	58%	71	+	59	=	130	55%
To/From South =	43	+	55	=	<u>98</u>	42%	49	+	58	=	<u>107</u>	45%
					235	100%					237	100%
Combined Both Days												
						<u>USE</u>						
To/From North =	137	+	130	=	267	<b>57%</b>						
To/From South =	98	+	107	=	<u>205</u>	<b>43%</b>						
					472	<b>100%</b>						

## **Appendix G**

## **Capacity and Level of Service Calculations – Unsignalized**









# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	3	5	275	14	13	215
Future Vol, veh/h	3	5	275	14	13	215
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	50	50	72	72	84	84
Heavy Vehicles, %	0	67	3	7	0	4
Mvmt Flow	6	10	382	19	15	256

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	678	392	0
Stage 1	392	-	-
Stage 2	286	-	-
Critical Hdwy	6.4	6.87	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.903	-
Pot Cap-1 Maneuver	421	536	-
Stage 1	687	-	-
Stage 2	767	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	415	536	-
Mov Cap-2 Maneuver	415	-	-
Stage 1	687	-	-
Stage 2	755	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	483	1169
HCM Lane V/C Ratio	-	-	0.033	0.013
HCM Control Delay (s)	-	-	12.7	8.1
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		Y		Y	
Traffic Vol, veh/h	4 ✓	6 ✓	373 ✓	17 ✓	16 ✓	292 ✓
Future Vol, veh/h	4	6	373	17	16	292
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	50	50	72	72	84	84
Heavy Vehicles, %	0	67	3	7	0	4
Mvmt Flow	8	12	518	24	19	348

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	916	530	0
Stage 1	530	-	-
Stage 2	386	-	-
Critical Hdwy	6.4	6.87	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.903	-
Pot Cap-1 Maneuver	305	441	-
Stage 1	594	-	-
Stage 2	691	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	298	441	-
Mov Cap-2 Maneuver	298	-	-
Stage 1	594	-	-
Stage 2	675	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.3	0	0.4
HCM LOS	C		




Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	1037
HCM Lane V/C Ratio	-	-	0.054	0.018
HCM Control Delay (s)	-	-	15.3	8.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32 ✓	42 ✓	373 ✓	67 ✓	82 ✓	292 ✓
Future Vol, veh/h	32	42	373	67	82	292
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	50	50	72	72	84	84
Heavy Vehicles, %	0	67	3	7	0	4
Mvmt Flow	64	84	518	93	98	348

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1109	565	0
Stage 1	565	-	-
Stage 2	544	-	-
Critical Hdwy	6.4	6.87	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.903	-
Pot Cap-1 Maneuver	234	420	-
Stage 1	573	-	-
Stage 2	586	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	205	420	-
Mov Cap-2 Maneuver	205	-	-
Stage 1	573	-	-
Stage 2	513	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.8	0	2
HCM LOS	D		




Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	289	978
HCM Lane V/C Ratio	-	-	0.512	0.1
HCM Control Delay (s)	-	-	29.8	9.1
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	2.7	0.3

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4 ✓	6 ✓	412 ✓	17 ✓	16 ✓	323 ✓
Future Vol, veh/h	4	6	412	17	16	323
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	50	50	72	72	84	84
Heavy Vehicles, %	0	67	3	7	0	4
Mvmt Flow	8	12	572	24	19	385

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1007	584	0
Stage 1	584	-	-
Stage 2	423	-	-
Critical Hdwy	6.4	6.87	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.903	-
Pot Cap-1 Maneuver	269	408	-
Stage 1	561	-	-
Stage 2	665	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	263	408	-
Mov Cap-2 Maneuver	263	-	-
Stage 1	561	-	-
Stage 2	649	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.5	0	0.4
HCM LOS	C		




Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	334	990
HCM Lane V/C Ratio	-	-	0.06	0.019
HCM Control Delay (s)	-	-	16.5	8.7
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 4.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32 ✓	42 ✓	412 ✓	67 ✓	82 ✓	323 ✓
Future Vol, veh/h	32	42	412	67	82	323
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	50	50	72	72	84	84
Heavy Vehicles, %	0	67	3	7	0	4
Mvmt Flow	64	84	572	93	98	385

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1200	619	0
Stage 1	619	-	-
Stage 2	581	-	-
Critical Hdwy	6.4	6.87	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.903	-
Pot Cap-1 Maneuver	206	389	-
Stage 1	541	-	-
Stage 2	563	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	179	389	-
Mov Cap-2 Maneuver	179	-	-
Stage 1	541	-	-
Stage 2	488	-	-

Approach	WB	NB	SB
HCM Control Delay, s	36.2	0	1.9
HCM LOS	E		




Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	258	934
HCM Lane V/C Ratio	-	-	0.574	0.105
HCM Control Delay (s)	-	-	36.2	9.3
HCM Lane LOS	-	-	E	A
HCM 95th %tile Q(veh)	-	-	3.3	0.3

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15✓	19✓	243✓	4✓	18✓	398✓
Future Vol, veh/h	15	19	243	4	18	398
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	77	77	91	91	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	19	25	267	4	21	468

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	779	269	0
Stage 1	269	-	-
Stage 2	510	-	-
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	367	775	1304
Stage 1	781	-	-
Stage 2	607	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	359	775	1304
Mov Cap-2 Maneuver	359	-	-
Stage 1	781	-	-
Stage 2	594	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	513	1304
HCM Lane V/C Ratio	-	-	0.086	0.016
HCM Control Delay (s)	-	-	12.7	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	Y		Y			Y
Traffic Vol, veh/h	17	22	311	5	21	509
Future Vol, veh/h	17	22	311	5	21	509
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	77	77	91	91	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	22	29	342	5	25	599

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	994	345	0
Stage 1	345	-	-
Stage 2	649	-	-
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	274	702	1223
Stage 1	722	-	-
Stage 2	524	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	266	702	1223
Mov Cap-2 Maneuver	266	-	-
Stage 1	722	-	-
Stage 2	508	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	409	1223
HCM Lane V/C Ratio	-	-	0.124	0.02
HCM Control Delay (s)	-	-	15	8
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1









# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	59✓	78✓	311✓	33✓	57✓	509✓
Future Vol, veh/h	59	78	311	33	57	509
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	77	77	91	91	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	77	101	342	36	67	599

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1093	360	0
Stage 1	360	-	-
Stage 2	733	-	-
Critical Hdwy	6.4	6.2	-
Critical Hdwy Stg 1	5.4	-	-
Critical Hdwy Stg 2	5.4	-	-
Follow-up Hdwy	3.5	3.3	-
Pot Cap-1 Maneuver	239	689	-
Stage 1	710	-	-
Stage 2	479	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	219	689	-
Mov Cap-2 Maneuver	219	-	-
Stage 1	710	-	-
Stage 2	439	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.6	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	358	1192
HCM Lane V/C Ratio	-	-	0.497	0.056
HCM Control Delay (s)	-	-	24.6	8.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	2.7	0.2









# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 0.9

### Movement

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	22	344	5	21	562
Future Vol, veh/h	17	22	344	5	21	562
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	77	77	91	91	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	22	29	378	5	25	661

### Major/Minor

	Minor1	Major1	Major2
Conflicting Flow All	1092	381	0
Stage 1	381	-	-
Stage 2	711	-	-
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	240	671	1187
Stage 1	695	-	-
Stage 2	490	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	232	671	1187
Mov Cap-2 Maneuver	232	-	-
Stage 1	695	-	-
Stage 2	474	-	-

### Approach

	WB	NB	SB
HCM Control Delay, s	16.3	0	0.3
HCM LOS	C		

### Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	368	1187
HCM Lane V/C Ratio	-	-	0.138	0.021
HCM Control Delay (s)	-	-	16.3	8.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1

# HCM 2010 TWSC

## 1: South Main Street & Langdon Avenue

### Intersection

Int Delay, s/veh 4.4

### Movement

	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W	W	T	T	T	T
Traffic Vol, veh/h	59	78	344	33	57	562
Future Vol, veh/h	59	78	344	33	57	562
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	77	77	91	91	85	85
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	77	101	378	36	67	661

### Major/Minor

	Minor1	Major1	Major2
Conflicting Flow All	1191	396	0
Stage 1	396	-	-
Stage 2	795	-	-
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	209	658	1156
Stage 1	684	-	-
Stage 2	448	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	190	658	1156
Mov Cap-2 Maneuver	190	-	-
Stage 1	684	-	-
Stage 2	407	-	-

### Approach

	WB	NB	SB
HCM Control Delay, s	29.6	0	0.8
HCM LOS	D		

### Minor Lane/Major Mvmt

	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	319	1156
HCM Lane V/C Ratio	-	-	0.558	0.058
HCM Control Delay (s)	-	-	29.6	8.3
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q(veh)	-	-	3.2	0.2

## **Appendix H**

## **Auxiliary Turn Lane Analysis**

**Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.**

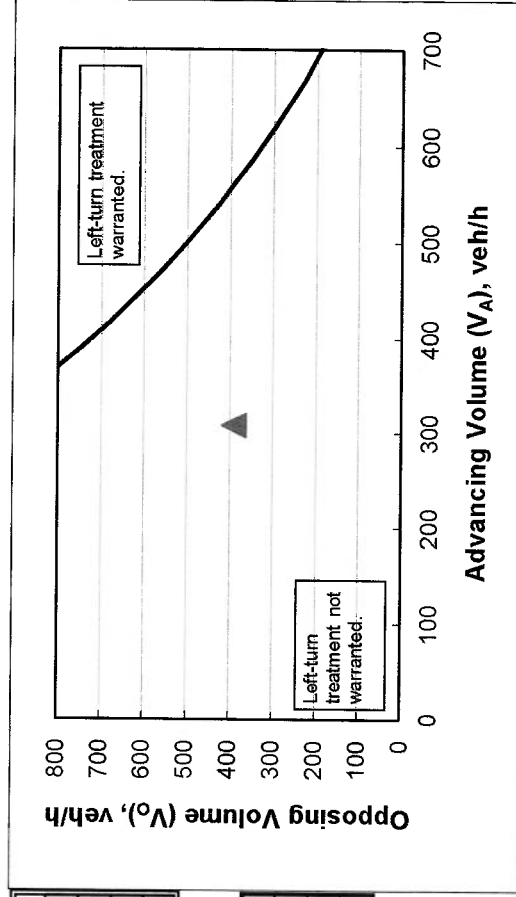
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	30
Percent of left-turns in advancing volume ( $V_A$ ), %:	5%
Advancing volume ( $V_A$ ), veh/h:	308
Opposing volume ( $V_O$ ), veh/h:	390

**OUTPUT**

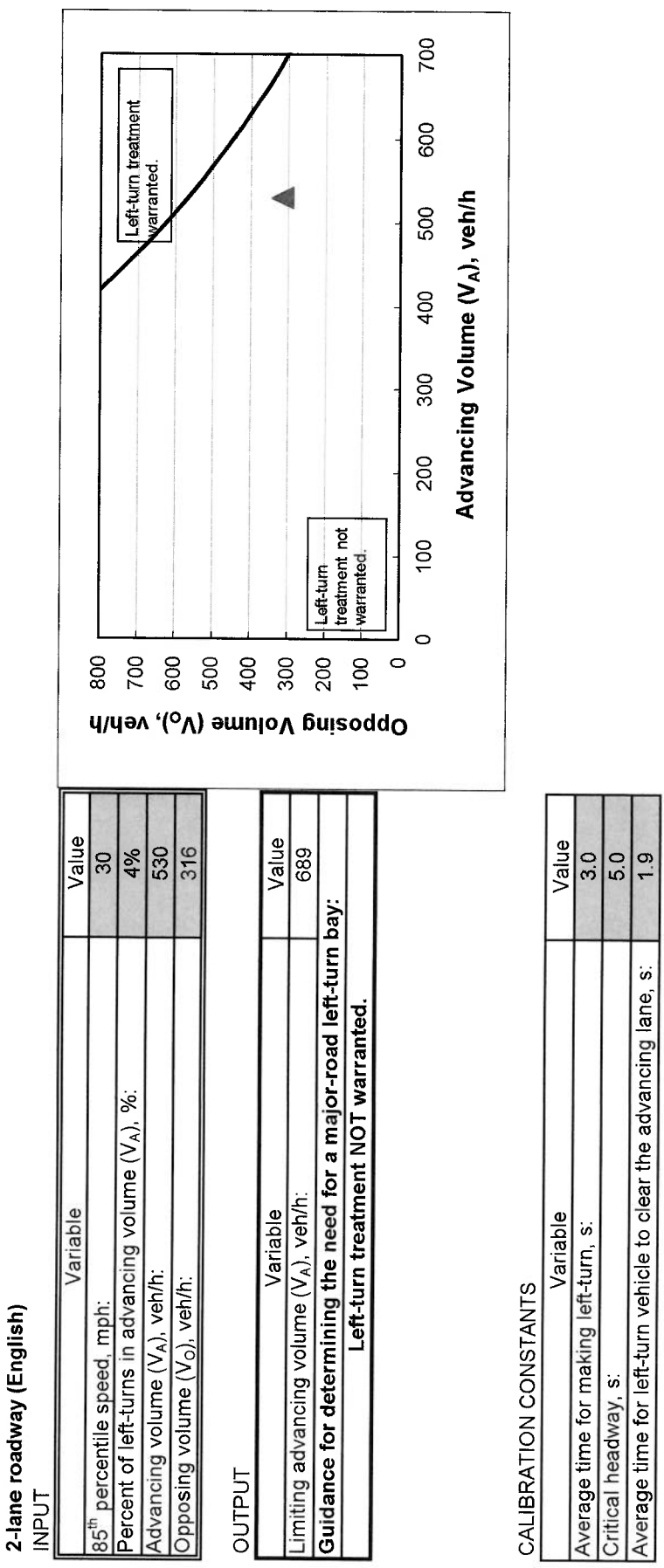
Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	562
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
Left-turn treatment NOT warranted.	



**CALIBRATION CONSTANTS**

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.



**Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.**

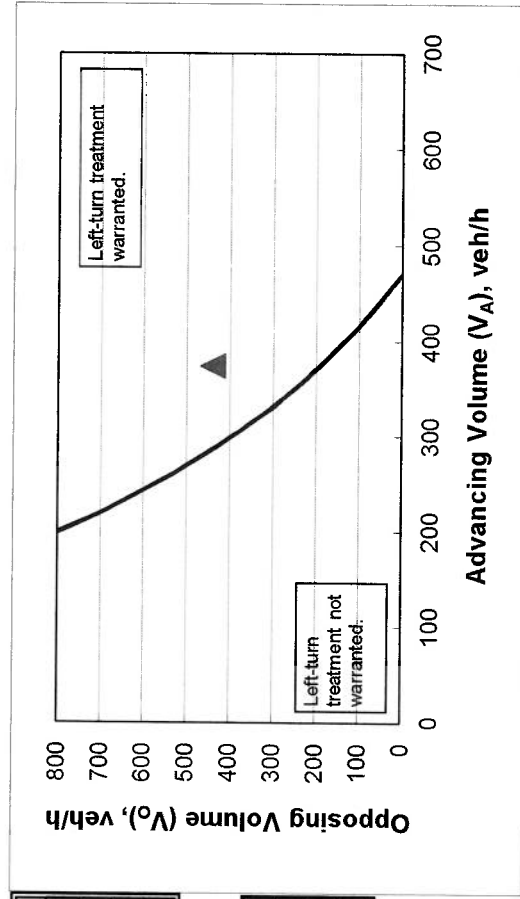
**2-lane roadway (English)**

**INPUT**

Variable	Value
85 <sup>th</sup> percentile speed, mph:	30
Percent of left-turns in advancing volume ( $V_A$ ), %:	22%
Advancing volume ( $V_A$ ), veh/h:	374
Opposing volume ( $V_O$ ), veh/h:	440

**OUTPUT**

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	286
<b>Guidance for determining the need for a major-road left-turn bay:</b>	
Left-turn treatment warranted.	



**CALIBRATION CONSTANTS**

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

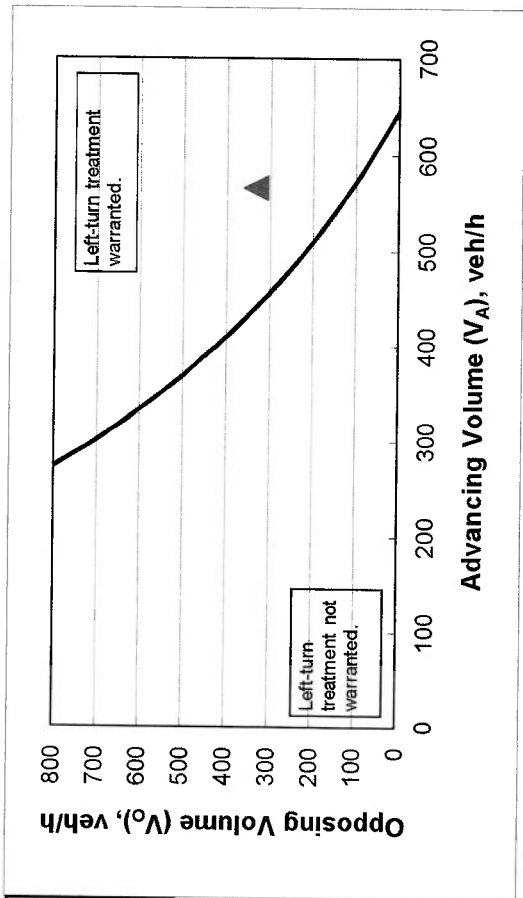
2-lane roadway (English)

INPUT

Variable	Value
85 <sup>th</sup> percentile speed, mph:	30
Percent of left-turns in advancing volume ( $V_A$ ), %:	10%
Advancing volume ( $V_A$ ), veh/h:	566
Opposing volume ( $V_O$ ), veh/h:	334

OUTPUT

Variable	Value
Limiting advancing volume ( $V_A$ ), veh/h:	439
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

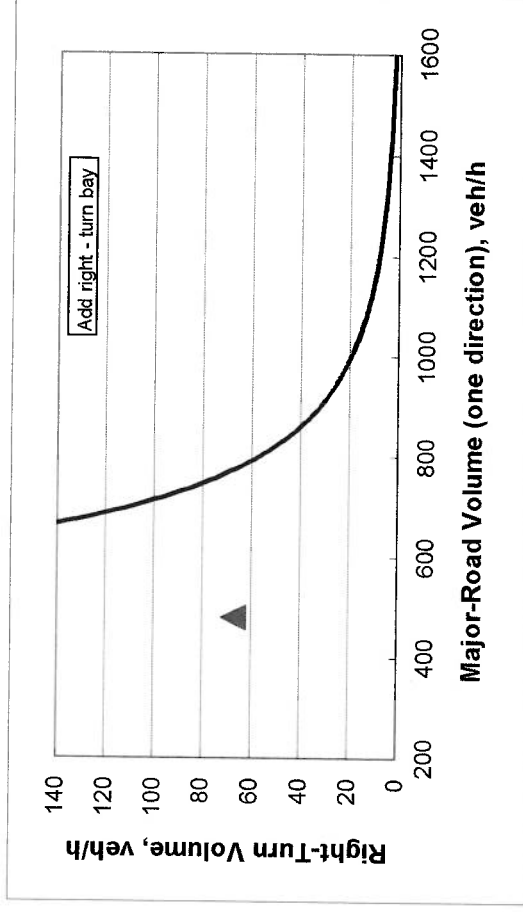
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

**INPUT**

2-lane roadway	
Variable	Value
Major-road speed, mph:	30
Major-road volume (one direction), veh/h:	479
Right-turn volume, veh/h:	67

**OUTPUT**

Variable	Value
Limiting right-turn volume, veh/h:	678
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
Do NOT add right-turn bay.	





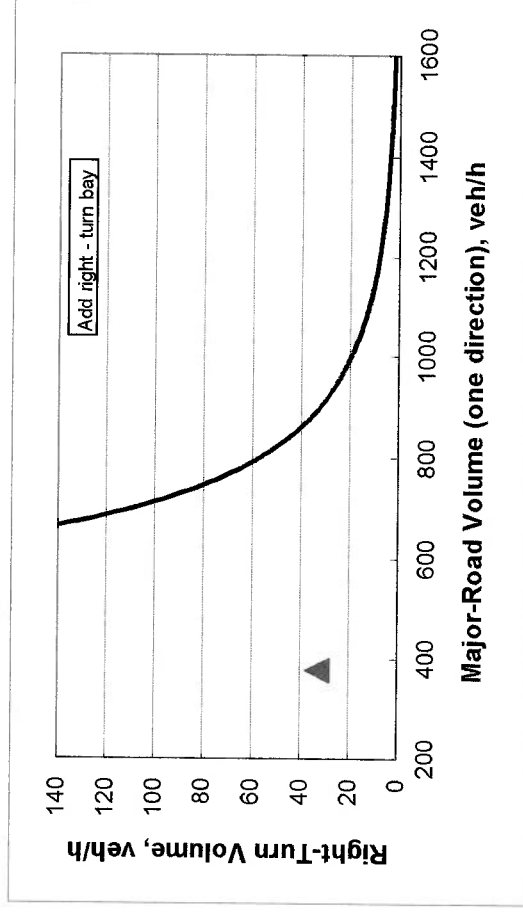
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

**INPUT**

2-lane roadway	
Variable	Value
Major-road speed, mph:	30
Major-road volume (one direction), veh/h:	377
Right-turn volume, veh/h:	33

**OUTPUT**

Variable	Value
Limiting right-turn volume, veh/h:	2150
<b>Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:</b>	
Do NOT add right-turn bay.	



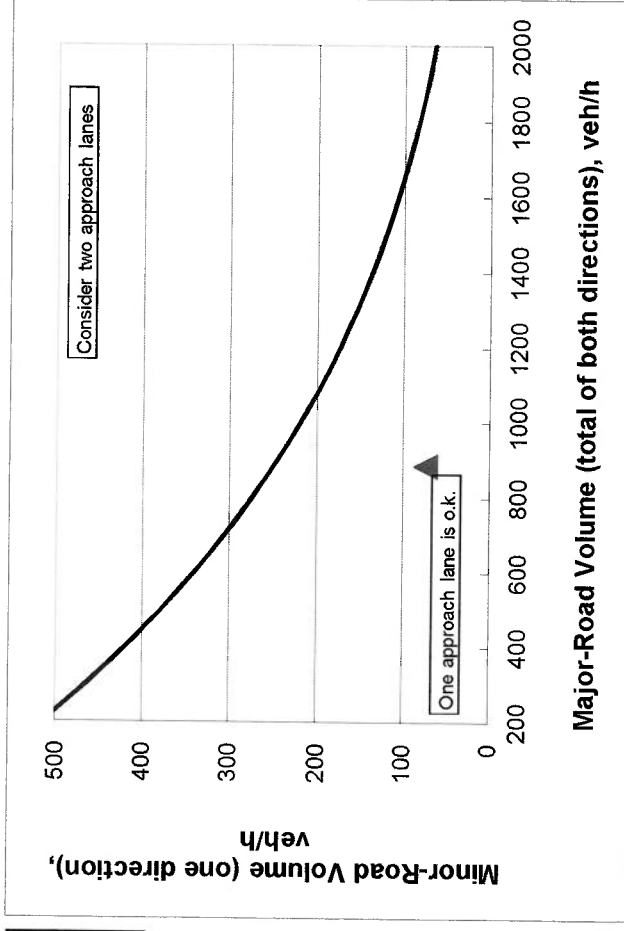
**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	884
Percentage of right-turns on minor road, %:	57%
Minor-road volume (one direction), veh/h:	74

**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	250
<b>Guidance for determining minor-road approach geometry:</b>	
ONE approach lane is o.k.	



**CALIBRATION CONSTANTS**

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

\* according to Table 17 - 5 of the HCM

**Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.**

**INPUT**

Variable	Value
Major-road volume (total of both directions), veh/h:	996
Percentage of right-turns on minor road, %:	57%
Minor-road volume (one direction), veh/h:	137

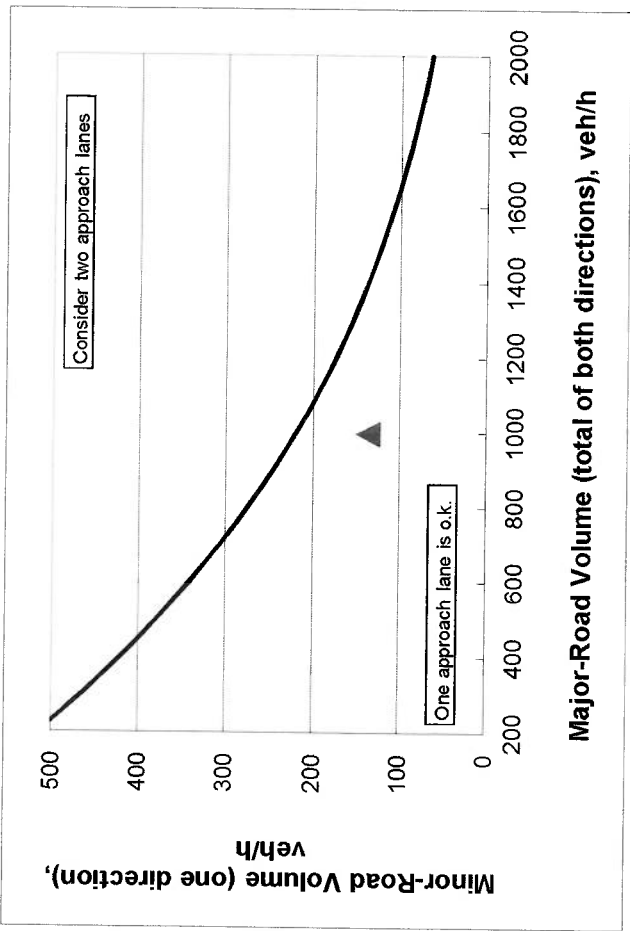
**OUTPUT**

Variable	Value
Limiting minor-road volume (one direction), veh/h:	221
<b>Guidance for determining minor-road approach geometry:</b>	
ONE approach lane is o.k.	

**CALIBRATION CONSTANTS**

Minor Road	Critical gap, s:	Follow-up gap, s:
Right-turn capacity, veh/h:	6.2	3.3
Left-turn and through capacity, veh/h:	6.5	4.0

\* according to Table 17 - 5 of the HCM



## **Appendix I**

## **Sight Distance Photographs**

**Looking Left**



**Looking Right**

