The Rail Yard
Langdon Ave
Concord, NH; Tax Map 7913Z Lot 41, and Map 792Z Lot 70 & 71

Project Narrative

Dakota Partners and P&M Realty of Concord, LLC is proposing a mixed-use development in the South End of Concord. The site is located on the south side of Langdon Avenue - between the railroad to the east and South Main Street to the west. The South End Marsh abuts the southwest side of the property. The project includes five (5) condominium units: two (2) commercial and three (3) residential. Each residential building within Unit 2 will be a separate condominium owned by a separate LLC. All other areas within the residential tract will be limited common area.

Of the commercial land units, Land Unit One is currently developed as NH Climbing & Fitness (formerly Evo Rock & Fitness). Land Unit Three will be new commercial office developments with associated parking. Timing of construction of the commercial buildings will be dependent upon the eventual tenants.

Land Unit Two will consist of multi-unit residential buildings with associated parking, built in four phases. The target demographic will be workforce housing, and will include ADA-designated units, though the allocation of these has not yet been determined. The development includes four large multi-story buildings oriented around a central courtyard and two smaller buildings abutting one of the commercial offices. The larger buildings are each comprised of 36-48 residential units; the smaller buildings each contain 12 residential units. Full buildout will create a total of 192 residential units. The development will also include a 2,500 sq ft Clubhouse amenity for use by residents.

Conditional Use Additional Information

In order to effectively develop the property, the project requires the following Conditional Use Permits:

1. CUP per Article 28-7-11(b) Conditional Use Permit Required for Construction of Fewer Parking Spaces.

In support of the Conditional Use Permit Applications, we offer the following supporting information:

- **The use is specifically authorized in this ordinance as conditional use.**

Section 28-7-11(b) Construction of Fewer Parking Spaces states that authorization granted provided that sufficient land is allocated and shown on the plan for the full number of spaces require; and where the Planning Board finds the projected parking demand or other factors indicate that lower number of parking spaces will sufficiently accommodate the principal use. The Langdon Ave Mixed use development request a Conditional Use Permit to defer 96 parking spaces within the property. This reduction will bring the total amount of parking spaces for the development to 288 spaces, which will be 1.5 spaces per unit. There is sufficient space within the site to construct the required amount of spaces. The additional parking has been designed and permitted and can be constructed in the future if required.

- **If completed as proposed by the applicant, the development in its proposed location will comply with all requirements of this Article, and with the specific conditions or standards established in this ordinance for the particular use;**

Refer to the explanation above which demonstrates compliance with this section of the ordinance.

- **The use will not materially endanger the public health or safety;**

The proposed parking will be sufficient on-site parking for the residential use. The total number of parking spaces have been designed and can be built on the property if needed. In the meantime, the extent of impervious area can be minimized while providing adequate on-site parking to meet the parking demand.

- **The use will be compatible with the neighborhood and with adjoining or abutting uses in the area in which it is to be located**

The proposed project is mixed use which supports the City's long-term goals and master plan for the Opportunity Corridor. Because of its secluded location, the property is separated from residential uses to the north by steep slopes and wetlands and industrial uses to the south by the railroad corridor. The reduction of parking will be compatible with surrounding uses.

- **The use will not have an adverse effect on highway or pedestrian safety**

The project increases pedestrian safety by formalizing and reducing curb cuts. Deferring parking will have no effect on highway or pedestrian safety.

- **The use will not have an adverse effect on the natural, environmental, and historic uses of the city**

The project will improve natural and environmental resources by reducing the rate of stormwater runoff from the site. Deferring parking minimizes impervious surface until such time as the parking is required.

- **The use will be adequately serviced by necessary public utilities and by community facilities and services of a sufficient capacity to ensure the proper operation of the proposed use, and will not necessitate excessive public expenditures to provide facilities and services with sufficient additional capacity.**

The site is serviced by municipal sewer and water, three-phase power, natural gas, and telecommunications. The utilities have sufficient capacity to support this development.

The Rail Yard – Waiver Petition

Tax Map 7913Z/41, 792Z/70, and 792Z/71
Rail Yard Mixed Use Development
Langdon Ave
Concord, NH 03301

Per Site Plan Regulation 22.07(3), for new development, the volume of off-site discharge after project development shall not exceed the volume of discharge before development for the 10-year storm event. A waiver is requested from this requirement in accordance with Section 36.10 of the Site Plan Regulations.

Previous activity on the property has resulted in a layer of "urban fill" material over most of the site, as well as groundwater contamination in the vicinity of the commercial buildings. These conditions preclude stormwater infiltration as a method of control and treatment. Although a minor amount of infiltration will occur in the shallow stone drip edges surrounding the residential buildings, it is not sufficient to mitigate the increased volume of stormwater resulting from the entire development.

Waiving the requirement for 10-year volume control will not be detrimental to the public safety, health, or welfare, nor will it cause injury or damage to other property. The increased volume of stormwater will be directed to the South End Marsh, a large wetland along the southwestern property boundary, and to an existing municipal 36-inch diameter pipe conveying stormwater through the property from west to east. The impact of an additional 0.4 acre-feet of volume in the South End Marsh will be negligible, as the wetland encompasses approximately 30 acres. The 36-inch pipe ultimately outlets to the Merrimack River, where the additional 0.1 acre-feet of volume will be inconsequential.

-

Nobis Group®
18 Chenell Drive
Concord, NH 03301
T (603) 224-4182

June 30, 2021
File No. 097400.000

City of Concord
Beth Fenstermacher, Assistant City Planner
41 Green Street
Concord, New Hampshire 03301

Re: Rail Yard Mixed Use Development (2021-024)
Langdon Avenue
Maps 7913Z/41, 792Z/70, and 792Z/71

Dear Beth:

On behalf of Dakota Partners, LLC, we are submitting revised plans in response to the review comments provided in the Memorandums from the City Planning Division dated June 16, 2021, and from the City Engineering Services Division dated June 8, 2021.

Included with this letter are three (3) sets of full-size plans, Stormwater Management Report, and Condominium documents.

Planning Comments – Major Condominium Subdivision

1. General Comments

1.1 No revisions requested.
1.2 No revisions requested. Applicant is going to ADR at the July 6th meeting.
1.3 No revisions requested.
1.4 No revisions requested. All plans to be recorded will be in compliance with the current standards of the Merrimack County Registry of Deeds.
1.5 No revisions requested. The final Condominium Declaration and By-Laws will be reviewed by the City Solicitor. An amended set of condominium documents are attached.

2. Condominium Review Comments

2.1 Condominium plat has been revised to clarify that each residential building will be separate condominium units.
2.2 Condominium Declaration has been revised and attached.
2.3 Plans have been revised with new nomenclature for Land Unit 3A.
2.4 Condominium Plat and Declaration have been revised and are cohesive with one another.

3. Technical Review Comments

3.1 The Existing Conditions Plan and Condominium Plat has been revised with the correct address for the abutter at 337 S. Main Street.
3.2 Text on the Existing Conditions Plan and Condominium Plats have been revised so that the text is readable on the printed copies.

Nobis Group®
18 Chenell Drive
Concord, NH 03301
T (603) 224-4182

Planning Comments – Major Site Plan

1. General Comments

1.1 No revisions requested.

1.2 Applicant is going to ADR at the July 6th meeting.

1.3 Not applicable to project.

1.4 Not applicable to project.

2. Conditional Use Permit(s)

2.1 No revisions requested.

2.2 No revisions requested.

2.3 Grading and Drainage Plan (Sheet C-4.0) has been revised to include a detail of the stormwater system (detention pond 2) with the addition of the future parking spaces. The stormwater pond will shift south and will have the same volumes. To accommodate the additional impervious surface from the future parking lot, an adequately sized underground stormwater system will be designed for the additional stormwater runoff.

3. Comprehensive Development Plan (CDP) Amendment

3.1.1 No revisions requested.

3.1.2 The internal pathways within the courtyard on the residential development are 4-ft wide. All other sidewalks are 5-ft wide.

3.1.3 Site plans have been revised to include a pathway between the two 12-unit residential buildings and a sidewalk/crosswalk to connect the commercial and residential developments.

3.1.4 Site plans have been revised to include parallel parking on both sides of the driveway in front of the 12-unit buildings.

3.1.5 Site plans have been revised to include a connection between the commercial and residential developments.

3.1.6 Cross sections and elevations showing pedestrian corridor between residential and commercial developments will be provided by Warrenstreet under separate cover.

4. Site Layout, Grading and Drainage Comments

4.1 The commercial development will be completed once all 4 phases of the residential development is completed. The time frame of each phase are as follows. Phases 1 & 2 will be completed in 2 years. Phase 3 & 4 will be completed in 2 years. And the commercial development will be completed in 2 years. The total timeframe of all the phases is expected to be 6 years.

4.2 On Sheets C-1.0 and C-3.0 there is a note under the parking analysis that states parking on Land Unit 4 is solely for the commercial buildings on Land Unit 3.

4.3 The project driveway is considered “commercial” and is neither a street nor a private residential (shared) driveway, so the 1,000-ft requirement does not apply. The turnaround has been located at the end of Phase 2.

4.4 Phasing limits have been revised.

4.5 The internal pathways within the courtyard on the residential development are to remain as 4-ft wide.
4.6 Landscape plans have been revised and are attached under separate cover.
4.7 Site plans have been revised to include a sidewalk on both sides of the common roadway area between the rock-climbing gym and the commercial development.
4.8 Location of fence has been revised.
5. Landscape Comments
5.1 Landscape plans have been revised to incorporate native species that support wildlife and pollinators.
5.2 Landscape plans have been revised.
5.3 Landscape plans have been revised to have a standard plant schedule on the Landscape sheet.
5.4 Landscape plans have been revised.
5.5 Landscape plans have been revised.
5.6 Landscape plans have been revised to show correct tree count.

6. Technical Review Comments

6.1 The Land Unit acreage shown on the CDP, Site plans, and Condominium Plats are all cohesive with one another.
6.2 CDP has been revised to not show temporary features, such as temporary fences and turnaround.

7. Off-site Improvements

7.1 No revisions requested.
7.2 No revisions requested.

Engineering Comments

Existing Conditions Plans

1. The 30' wide drainage easement will remain as is. The actual location of the existing 36" RCP drainage pipe is unknown. Once location of the 36" RCP drainage pipe is confirmed during construction of the commercial office buildings the 30' wide drainage easement will be revised.

Notes and Legend

2. Notes (a)-(i) have been added to Sheet G-1 under General Notes.

Comprehensive Development Plan

3. Plans have been revised to label Langdon Ave.

Demolition Plan

4. Note #19-20 has been added to Demolition plan for demolition work to be performed in accordance with the City of Concord's Standards.
5. Note has been added to block off and plug the removed drain line from CB 1275 in the manhole at DMH 8941.

Site Plan

6. The project driveway is considered "commercial" and is neither a street nor a private residential (shared) driveway, so the 1,000-ft requirement does not apply. The turnaround has been located at the end of Phase 2.
7. All sidewalks along the perimeter of the parking, and along Langdon Ave are 5' wide (exclusive of 6" curbing). The pathways within the courtyard of the residential land unit 2 are 4' wide.
8. A 5' wide striped bike land is provided on the south side of Langdon Avenue. The bus company refuses to allow a bike lane on their side of Langdon Ave.
9. Site plans have been revised to include sidewalk connection between the residential buildings and the proposed commercial mixed-use buildings.
10. Developer will video camera the 36" RCP drain line within the 30' drainage easement prior to the start of construction of the commercial projects.
11. A minimum 6' wide landscape strip is provided along Langdon Avenue. There are utility conflicts with the proposed 5'wide sidewalk, therefore an easement will be provided for sidewalk encroaching onto Land Unit 1.
12. Landscape strip expanded to 6' wide along Langdon Avenue.
13. Grading plan (Sheet C-4.1) has been revised to show drainage from the sidewalk slope towards Langdon Ave.
14. Plans have been revised to show a 4' separation between crosswalk and stop bars.
15. Fire hydrant has been included in plans.
16. Crosswalk warning signs have been included on site plans along South Main Street.
17. Crosswalk across South Main Street has been revised to be 8' wide.

Grading and Drainage Plan

18. Access to the stormwater pond outlets is shown on sheet C-4.0.
19. Locations of rigid foam insulation over storm drains are shown on the drainage profiles included in the revised plan set. Detail is shown on sheet C-8.5
20. Drainage profiles are included in the revised plan set (Sheets C-6.5, C-6.6, and C-6.7). Drain manholes are provided at intervals along the 24" diameter pipe for routine inspection and maintenance of the system. Any accumulated sediment/debris will be removed with a JetVac. Construction of the system will be in accordance with City standards, which will preclude any significant sags along the pipe alignment. Given the large diameter pipe, it is not anticipated that minor irregularities will affect the system functionality.
21. Test pit locations have been added to the Grading and Drainage Plans (Sheets C-4.0 and C-4.1). Estimated SHWT elevations are provided at each location.
22. The estimated SHWT elevation at Detention Pond 1 (near commercial parking) is at elevation 230.83. The estimated SHWT elevation at Detention Pond 2 (south of residential development) is at elevation 229.00. Both detention ponds are designed as "wet" ponds in accordance with NHDES Alteration of Terrain standards to provide treatment of stormwater, and therefore intentionally intercept the water table.

Sewer Utility Plan

23. Fittings will be used for the sewer sloped out of the proposed buildings.
24. There is 6’ of cover over the sewer line near the clubhouse except as indicated on the Sewer Profile Plans. In areas of less than 6’ of cover insulation is required.

Construction Details

25. Details have been added to Sheet C-8.8 showing a profile view for each of the detention ponds.
26. Details have been added to Sheets C-8.8 and C-8.9 to illustrate key elevations and construction specifications for the subsurface stormwater detention galleries.

Stormwater Management Plan

27. Modifications have been made to Gallery 1 and to Detention Pond 2 to ensure that pre-development flows are not exceeded post-development for compliance with Site Plan Regulation 22.07(3). The size of Gallery 1 was increased from 66 to 70 chambers. The diameter of the outlet pipe at Detention Pond 2 was reduced from 12” to 10” to further restrict outflows.
28. Due to the inherent constraints of the site, which preclude significant infiltration of stormwater, the proposed development is not able to meet Site Plan Regulation 22.07(3) which requires that post-development stormwater volume in a 2-year and 10-year storm event does not exceed pre-development volume. Stone drip edges are proposed at the residential buildings for infiltration of stormwater during smaller storm events; however, the stormwater model conservatively excludes infiltration. Please refer to the attached waiver request.
29. The Jellyfish is a compact stormwater treatment unit consisting of reusable filter cartridges. The two specified units are sized to capture and treat the WQV from the contributing drainage areas. Maintenance requirements have been included in the Inspection and Maintenance Manual provided in the Stormwater Management Plan and generally consist of periodic sediment/debris removal, as well as cleaning/flushing the filter cartridges. Stormwater treatment capability is reduced if routine maintenance is not performed; however, the units are designed with an upstream bypass structure for flows in excess of the WQF. Failure of the Jellyfish will not compromise the capacity of the stormwater system. NHDES has approved these units on past projects, as they do comply with performance criteria in Env-Wq 1508.10 (f).
30. Electronic version of HydroCAD files will be provided for Engineering to review as part of a subsequent submission.
31. The Stormwater Management Plan has been expanded to include Inspection and Maintenance Procedures.

General Comment

32. Text on the Existing Conditions Plan and Condominium Plats have been revised so that the text is readable on the printed copies.
33. Temporary construction access will be corresponded with the neighboring properties.

34. A Turning Motion Plan has been provided showing a fire truck can navigate around the full site and temporary turnaround without encroaching on any parking spaces or running over any curbing.
35. The intersection of Langdon Ave. and South Main St. has been revised to include a dedicated 11-ft wide left turn lane into the site, 11-ft wide north and south bond lanes, as well as 5-ft wide bike lanes on each side of South Main St. Utilities will be replaced accordingly as well as easements for the new 5' wide sidewalk.
36. Site plans have been revised to include new addresses.
37. Plans prepared by Ed Wojcik have been revised to include unit/apartment numbers.
38. No revisions requested.
39. Plans prepared by Warrenstreet Architect have been revised to reflect building numbering.
40. Approval from fire protection engineer will be obtained for adequacy of proposed water service.

We trust that we have responded to all your comments. If you have questions or require additional information, please contact us at (603) 224-4182 or cnadeau@nobis-group.com.

Sincerely,

NOBIS GROUP®

J. Chris Nadeau, PE
Director, Commercial Services

Attachment

c: File No. 097400.000 (w/attach.)

TRAFFIC IMPACT ASSESSMENT

PROPOSED MIXED-USE DEVELOPMENT

Concord, New Hampshire

May 2021

Prepared for

Nobis Group

Stephen G. Pernaw
& Company, Inc.

Stephen G. Pernaw & Company, Inc.
P.O. Box 1721 • Concord, NH 03302
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Transportation: Engineering • Planning • Design

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

INTRODUCTION

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

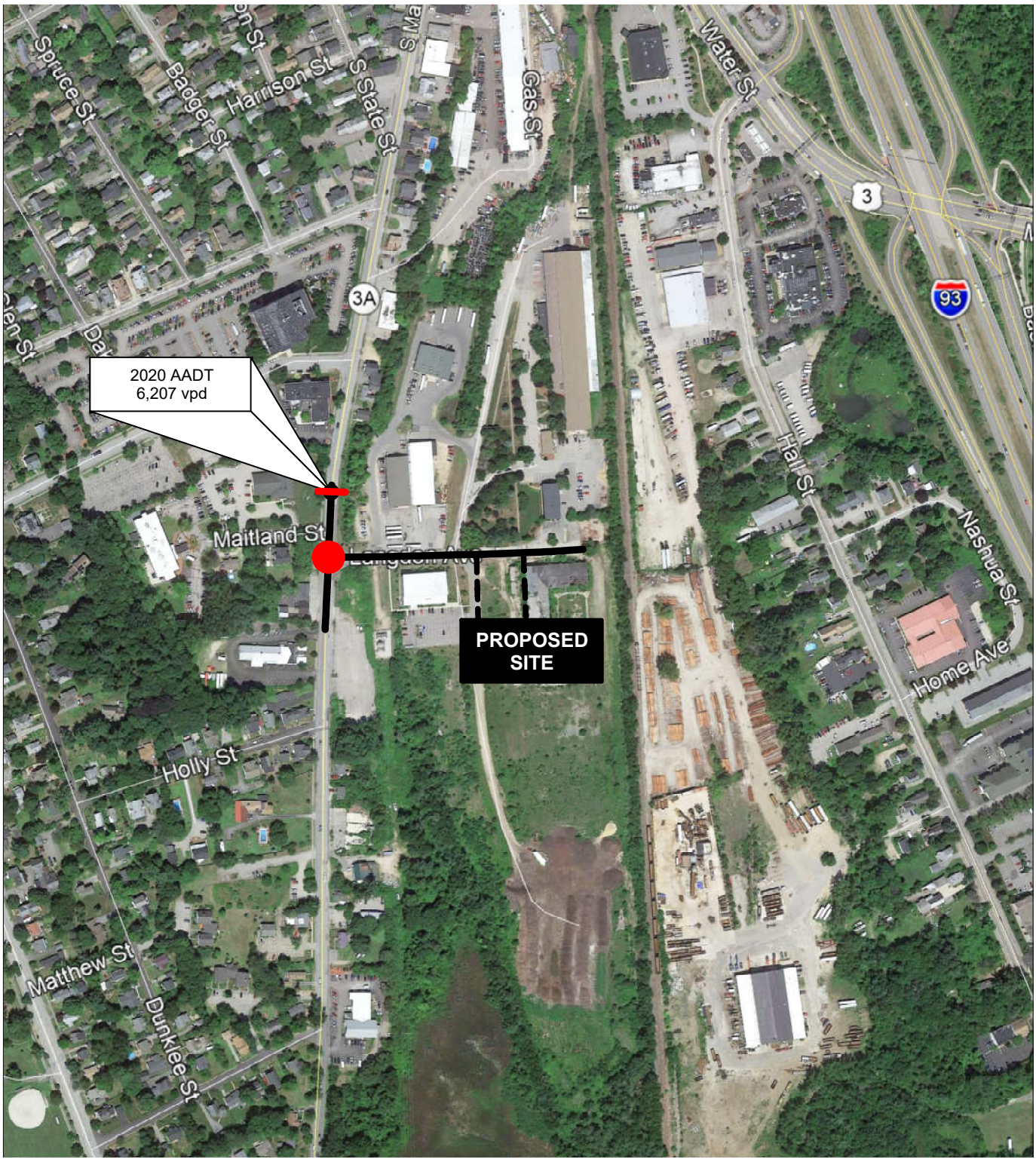
According to the plan entitled *"Comprehensive Development Pan"* dated March 2021, by Nobis Group for the property located on Langdon Avenue (see Appendix A), the proposed development consists of 192 residential apartments and 66,000 sf of office space. Vehicular access to the site will be provided via 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

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

NORTH

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.

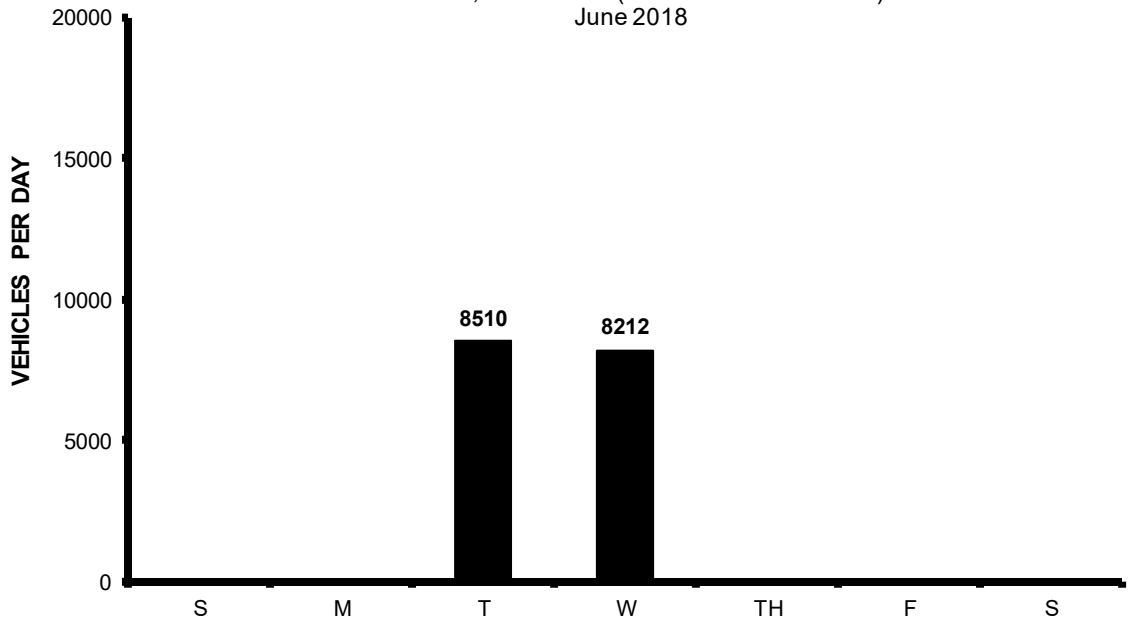
TRAFFIC VOLUMES

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.

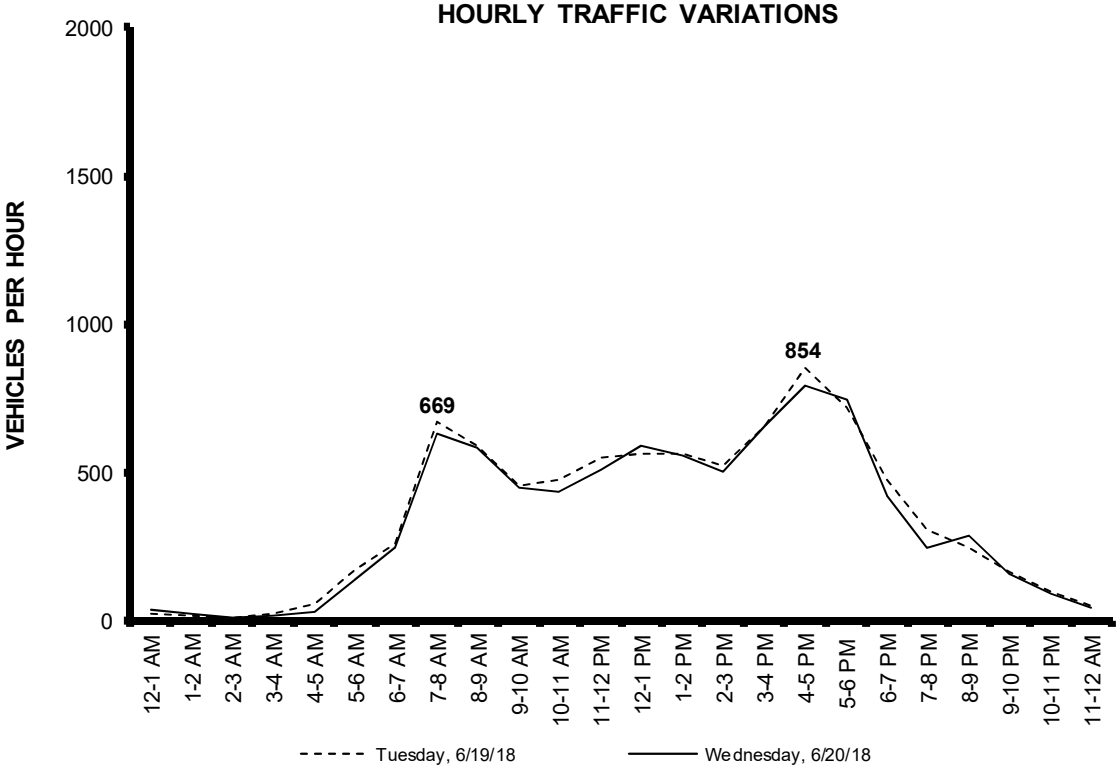
These AADT estimates were derived from a two-day traffic count conducted in 2018. This data demonstrates that traffic demand on South Main Street (NH3A) generally reaches peak levels during the typical AM and PM commuter periods on weekdays. The daily and hourly variations in traffic demand at this count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

DAILY TRAFFIC VARIATIONS

Concord, NH - NH 3A (North of Maitland Street)
June 2018



HOURLY TRAFFIC VARIATIONS



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.

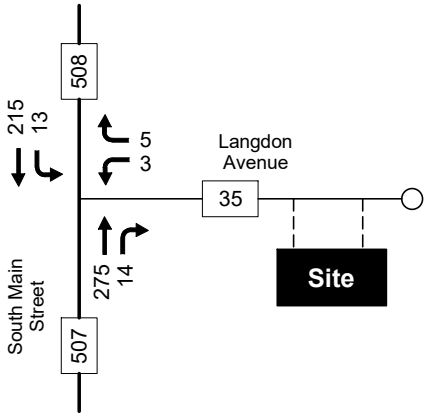
- During the morning peak hour, the majority of traffic traveled in the northbound (57%) direction on South Main Street, and during the evening peak hour the majority of the traffic traveled in the southbound (63%) direction on South Main Street.

- 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.

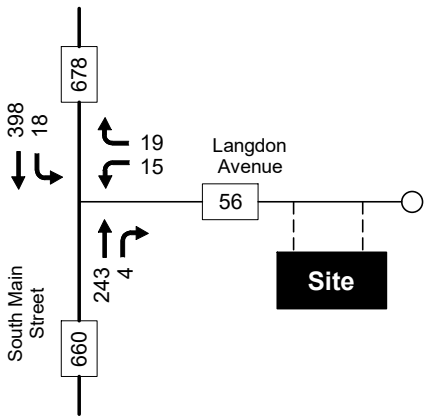
- Truck traffic on South Main Street accounted for approximately 4% (AM) and 0% (PM) of the total traffic flow passing the site during the peak hour periods.

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

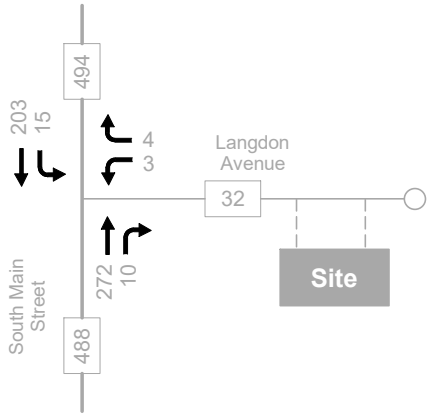


AM PEAK HOUR
Wednesday, April 14, 2021
7:30 to 8:30 AM

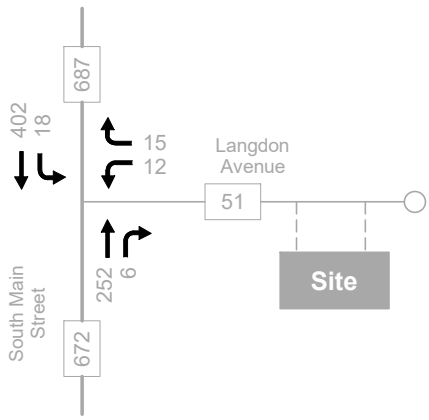


PM PEAK HOUR
Wednesday, April 14, 2021
4:30 to 5:30 PM

THURSDAY



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



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

NORTH

2089A

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 to 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)[1]

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

[1] Source: City of Concord (Police Department)

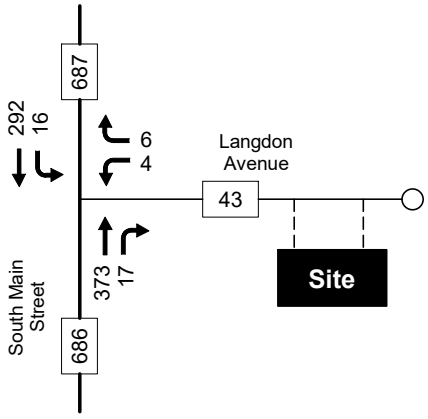
NO-BUILD TRAFFIC VOLUMES

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.

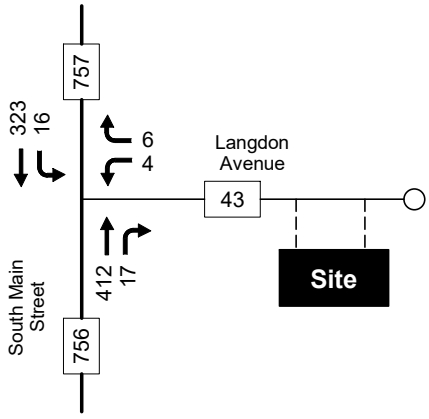
At the scoping meeting no other known development projects of significant size were identified that had the potential to affect this study area. The No-Build traffic projections therefore reflect worst-case, peak-month, peak-hour conditions without a pandemic.

2023 No-Build

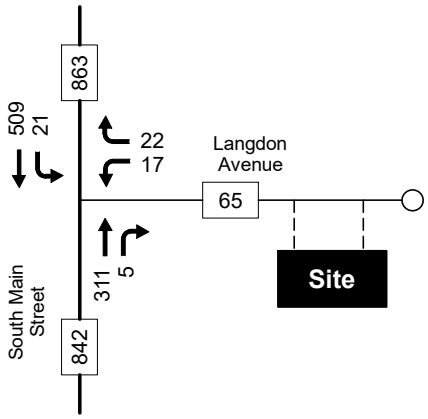


AM PEAK HOUR

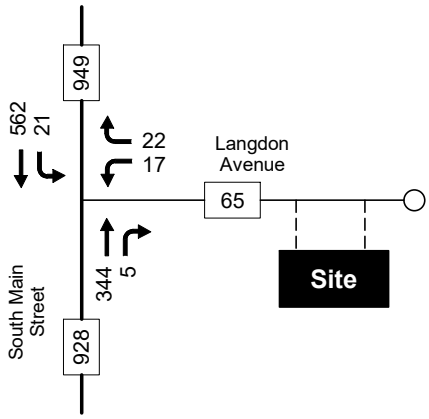
2033 No-Build



AM PEAK HOUR



PM PEAK HOUR



PM PEAK HOUR

NORTH

2089A

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

[1] ITE Land Use Code 710 - General Office Building - Trip Equation Method

[2] 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.

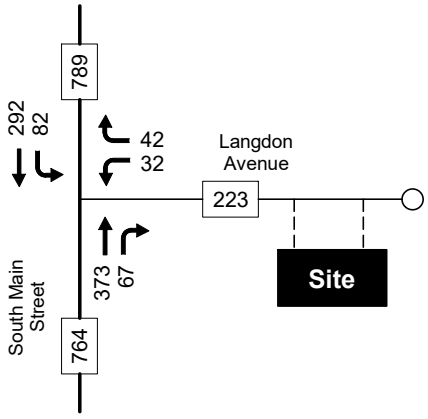
[1] Institute of Transportation Engineers, *Trip Generation*, tenth edition (Washington, D.C., 2017)

BUILD TRAFFIC VOLUMES

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).

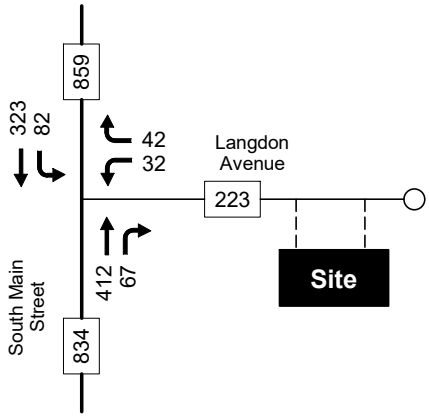
Appendix F also contains the trip distribution computations and a diagram that summarizes the distribution of the primary trips at the study area intersection.

2023 Build

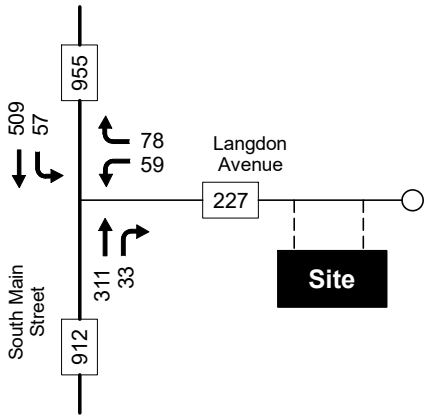


AM PEAK HOUR

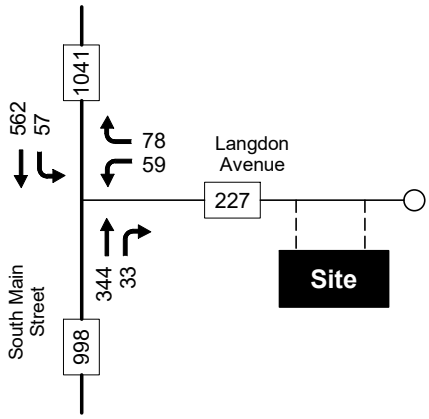
2033 Build



AM PEAK HOUR



PM PEAK HOUR



PM PEAK HOUR

NORTH

2089A

Figure 4

Build Traffic Volumes

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

IMPACT SUMMARY

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 ≤ 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 (95th 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			
	Delay [1]	V/C [2]	LOS [3]	Queue [4]	Delay [1]	V/C [2]	LOS [3]	Queue [4]
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

[1] HCM Control Delay (seconds per vehicle), [2] HCM Volume to Capacity Ratio, [3] HCM Level of Service, [4] 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.

Stephen G. Pernaw & Company, Inc.

Table 4

Auxiliary Turn Lane Warrants Analysis
South Main Street / Langdon Avenue

	No-Build Cases		Build Cases	
	2023 AM No-Build Volumes	2023 PM No-Build Volumes	2023 AM Build Volumes	2023 PM Build Volumes
I. LEFT-TURN LANE WARRANTS ANALYSIS (2023 & 2033)				
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
Left-Turn Treatment Warranted?	**NO**	**NO**	**YES**	**YES**

			2033 AM Build Volumes	2033 PM Build Volumes
II. RIGHT-TURN LANE WARRANTS ANALYSIS (2033)				
Peak Hour Inputs:				
Right-Turn Volume (NB)	-	-	67	33
Approach Volume (NB)	-	-	479	377
Speed (mph)	-	-	30	30
Limiting Right-Turn Volume (veh/h)	-	-	678	>1000
Add Right-Turn Bay?	-	-	**NO**	**NO**

			2033 AM Build Volumes	2033 PM Build Volumes
III. MINOR-ROAD APPROACH GEOMETRY ANALYSIS (2033)				
Peak Hour Inputs:				
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
Consider TWO Approach Lanes?	-	-	**NO**	**NO**

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

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.

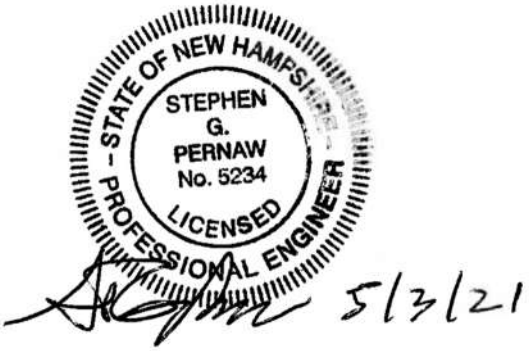
6. The minor-road approach geometry analysis indicates that one departure lane is sufficient on the Langdon Avenue approach to South Main Street through 2033 with the subject site fully occupied.

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.

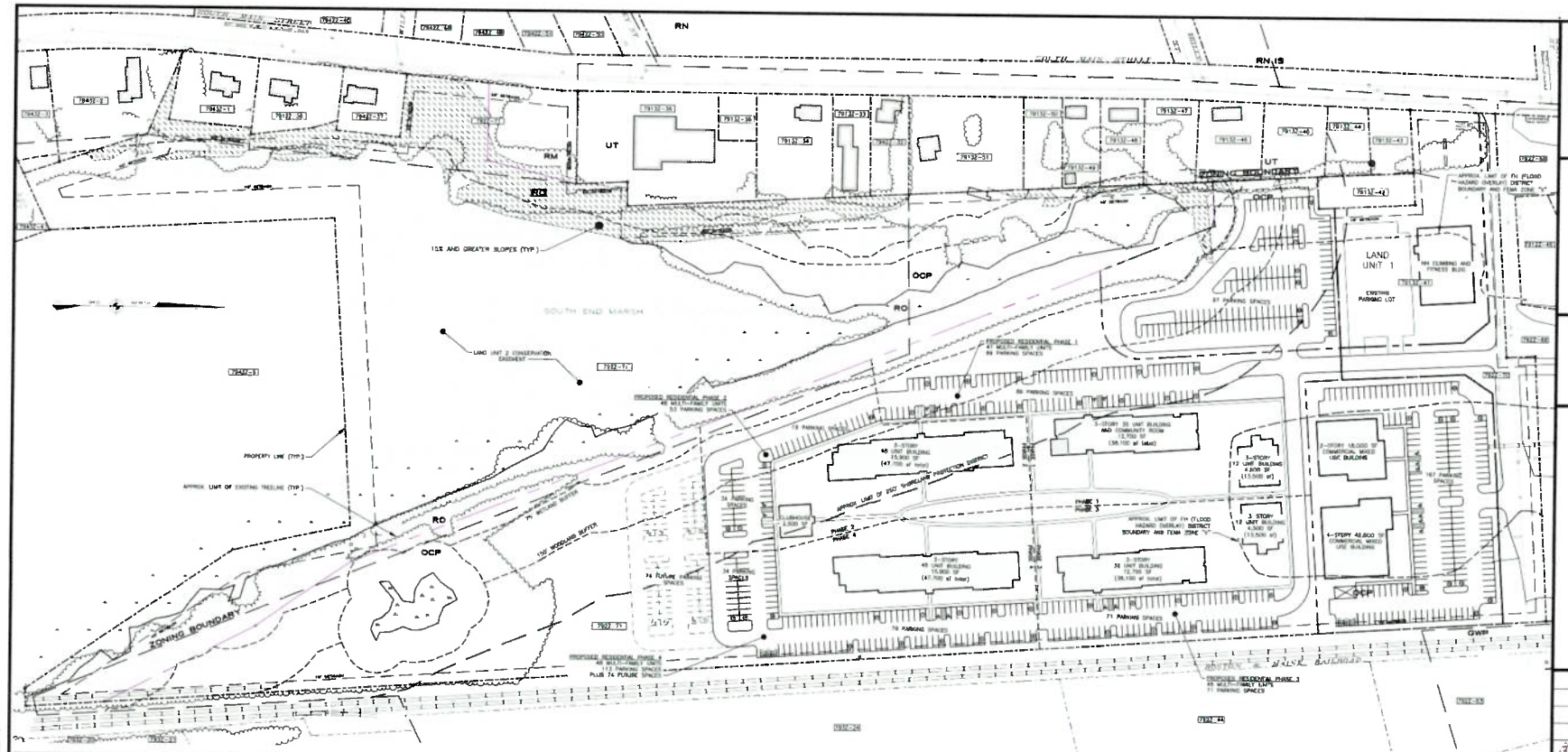
With the installation of the recommended traffic control devices and maintaining clear "sight distance triangles" on the proposed site driveway approaches to Langdon Avenue, vehicular access and egress should be reasonably safe and efficient from a transportation engineering standpoint for the size and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

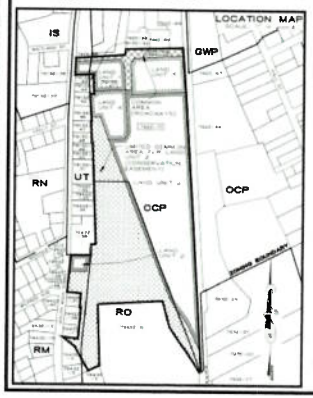


APPENDIX

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

Appendix A **Comprehensive Development Plan**





EXISTING LOT AREA SYNOPSIS

TOTAL AREA MAP 7913Z BLOCK 41, 7922 BLOCKS 70 & 71 (PREVIOUSLY TAX MAP 29E, BLOCK 1 LOT 1)		1,565,202 SQ. FT.	35.93 AC
EXISTING CONDOMINIUM			
LAND UNIT 1		65,152 SQ. FT.	1.50 AC
LAND UNIT 2	(PORTION OFF LANGDON AVE.)	840,899 SQ. FT.	19.30 AC
	(PORTION OFF S. MAIN ST.)	18,830 SQ. FT.	0.42 AC
TOTAL LAND UNIT 2		859,291 SQ. FT.	19.72 AC
LIMITED COMMON AREA FOR LAND UNIT 2 (CONSERVATION EASEMENT)		598,804 SQ. FT.	13.54 AC
COMMON AREA "A" (ROADWAYS)		51,940 SQ. FT.	1.17 AC

PROPOSED LOT AREA SYNOPSIS

TOTAL AREA MAP 7913Z BLOCK 41, 7922 BLOCKS 70 & 71		1,565,202 SQ. FT.	35.93 AC
PROPOSED CONDOMINIUM			
LAND UNIT 1		65,152 SQ. FT.	1.50 AC
LAND UNIT 2	(PORTION OFF LANGDON AVE.)	647,423 SQ. FT.	14.86 AC
	(PORTION OFF S. MAIN ST.)	18,830 SQ. FT.	0.42 AC
TOTAL LAND UNIT 2		666,088 SQ. FT.	15.28 AC
LAND UNIT 3		113,249 SQ. FT.	2.60 AC
LAND UNIT 4		79,992 SQ. FT.	1.84 AC
LIMITED COMMON AREA FOR LAND UNIT 2 (CONSERVATION EASEMENT)		598,804 SQ. FT.	13.54 AC
COMMON AREA "A" (ROADWAYS)		51,940 SQ. FT.	1.17 AC

COMPREHENSIVE DEVELOPMENT PLAN TABULATIONS

	TOTAL GDP
GROSS ACREAGE OF TOTAL LOT	35.93 AC
GROSS ACREAGE FOR LAND UNITS 2 & 4*	33.26 AC
GROUND COVERAGE OF BUILDINGS AND STRUCTURES	86,765 SF - 6.2%
IMPERVIOUS SURFACE COVERAGE (EXCLUDING BUILDINGS)	265,103 SF - 18.4%

*REFER TO EXISTING & PROPOSED CONDOMINIUM LOT AREA SYNOPSIS FOR BREAKDOWN OF COMMON AREAS AND LAND UNITS)

NET LAND AREA CALCULATIONS FOR LAND UNITS 2, 3 & 4 ONLY)	REQUIRED	PROPOSED
MIN. LOT AREA	N/A	33.26 AC
BUILDABLE LAND	N/A	19.70 AC (EXCLUDES LAND UNIT 2 CONSERVATION EASEMENT SHORELAND VEGETATIVE BUFFER AND STEEP SLOPES)
MIN. YARD SETBACKS		
FRONT	15'	+15'
SIDE	15'	+15'
REAR	15'	+15'
MAX LOT COVERAGE	35%	25%
MAX HEIGHT	45'	45'
MAX DENSITY - RES. 12 UNITS/AC.	235 UNITS	191 UNITS

GF OF FLOOR AREA BY USE	
MULTI-FAMILY HOUSING (LAND UNIT 2)	144,000 SF (RESIDENTIAL)
CLUBHOUSE (LAND UNIT 2)	2,500 SF (RESIDENTIAL)
MIXED-USE (LAND UNITS 3 & 4)	48,000 SF (COMMERCIAL)
MIXED-USE (LAND UNIT 1)	13,600 SF (COMMERCIAL)
USE BY PERCENTAGE	
RESIDENTIAL	72%
NON-RESIDENTIAL	28%

REQUIRED PARKING SPACES		
PROJECT CLASSIFICATION = 2 SPACE / UNIT FOR MULTI-FAMILY RESIDENTIAL 1 SPACE / 250 SF GROSS FLOOR AREA FOR COMMERCIAL MIXED USE		
	REQUIRED	PROPOSED
LAND UNIT 2 (RESIDENTIAL)	288	308 (PLUS 74 FUTURE SPACES)
LAND UNIT 3 (COMMERCIAL)	364	167*
LAND UNIT 4 (COMMERCIAL)		97*

*PARKING SPACES ON LAND UNIT 3 & 4 TO PROVIDE PARKING SOLELY FOR THE COMMERCIAL BUILDINGS ON LAND UNIT 2

NOTES

1. THE PURPOSE OF THIS PLAN IS TO DEPICT EXISTING AND PROPOSED CONDITIONS FOR A PHASED MIXED USE DEVELOPMENT.
2. DIMENSIONS SHOWN TAKE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR TO USE CAUTION WHEN SCALING REPRODUCED PLANS. IN THE EVENT OF A CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWINGS AND / OR SPECIFICATIONS, THE ENGINEER WILL BE NOTIFIED BY THE CONTRACTOR.
3. JURISDICTIONAL WETLANDS WERE DELINEATED BY CHRISTOPHER R. SNAFFORD, WETLAND SCIENTIST #77, OF 41 PETER KING ROAD, FRANCESTOWN, NEW HAMPSHIRE (SNAFFORD) BASED ON AN INSPECTION PERFORMED IN THE FALL OF 2017.
4. THE SUBJECT PREMISES LIES WITHIN ZONE X, AREAS OF 0.2% ANNUAL CHANCE OF FLOOD; AREAS OF 1% ANNUAL CHANCE OF FLOOD WITH AVERAGE DEPTH OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD, AS DEPICTED ON THE FLOOD INSURANCE RATE MAPS (FIRM) 33013C0544E (2813C0544E & 2813C0552E) EFFECTIVE DATE APRIL 19, 2010.
5. PROPOSED BUILDING WILL BE SERVICED BY MUNICIPAL WATER AND SEWER.
6. THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND PLOTTED FROM EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTION OF THE UTILITIES.
7. HORIZONTAL DATUM BASED ON THE N.H. STATE PLANE COORDINATE SYSTEM.
8. VERTICAL DATUM BASED ON NGVD 1929.

PLAN REFERENCES

1. EXISTING CONDITIONS, TOPOGRAPHICAL INFORMATION, NORTH ORIENTATION, NORTH ARROW AND COORDINATE VALUES DEPICTED ON THESE DRAWINGS ARE BASED ON PLANS TITLED "CONDOMINIUM PLAT PREPARED FOR THE STEAM POWER BUSINESS CENTER CONDOMINIUM LAND OF P&M REALTY OF CONCORD LLC" DATED JANUARY 14, 2021 BY RICHARD D. BARTLETT & ASSOCIATES. THE FIELD WAS BEEN MODIFIED BY NOBIS GROUP TO REFLECT THE EXISTING TREELINE FROM RECENT AERIAL IMAGERY.

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NOT ISSUED FOR CONSTRUCTION

MIXED USE DEVELOPMENT

LANGDON AVENUE
CONCORD, NH

PROPERTY OWNER
P&M REALTY OF CONCORD LLC
C/O PETER BLOOMFIELD
8 SHERWOOD DR.
HOLLIS NH 03049

APPLICANT
DAKOTA PARTNERS
1264 MAIN STREET
WALTHAM, MA 02451

NO.	DATE	DESCRIPTION
2	03/30/2021	REVISED CONCEPT
1	03/23/2021	REVISED CONCEPT

REVISIONS

0 80' 160'
GRAPHIC SCALE

DATE	MARCH 2021
NOBIS PROJECT NO	097400 000
DRAWN BY	SM
CHECKED BY	CN
CAD DRAWING FILE	097400 000-C-280-SITE.dwg

SHEET TITLE

COMPREHENSIVE DEVELOPMENT PLAN

SHEET
C-1

2084

Appendix B **Automatic Traffic Recorder Counts**

New Hampshire DOT
Department of Transportation

MS2
Transportation Data Management System

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%	

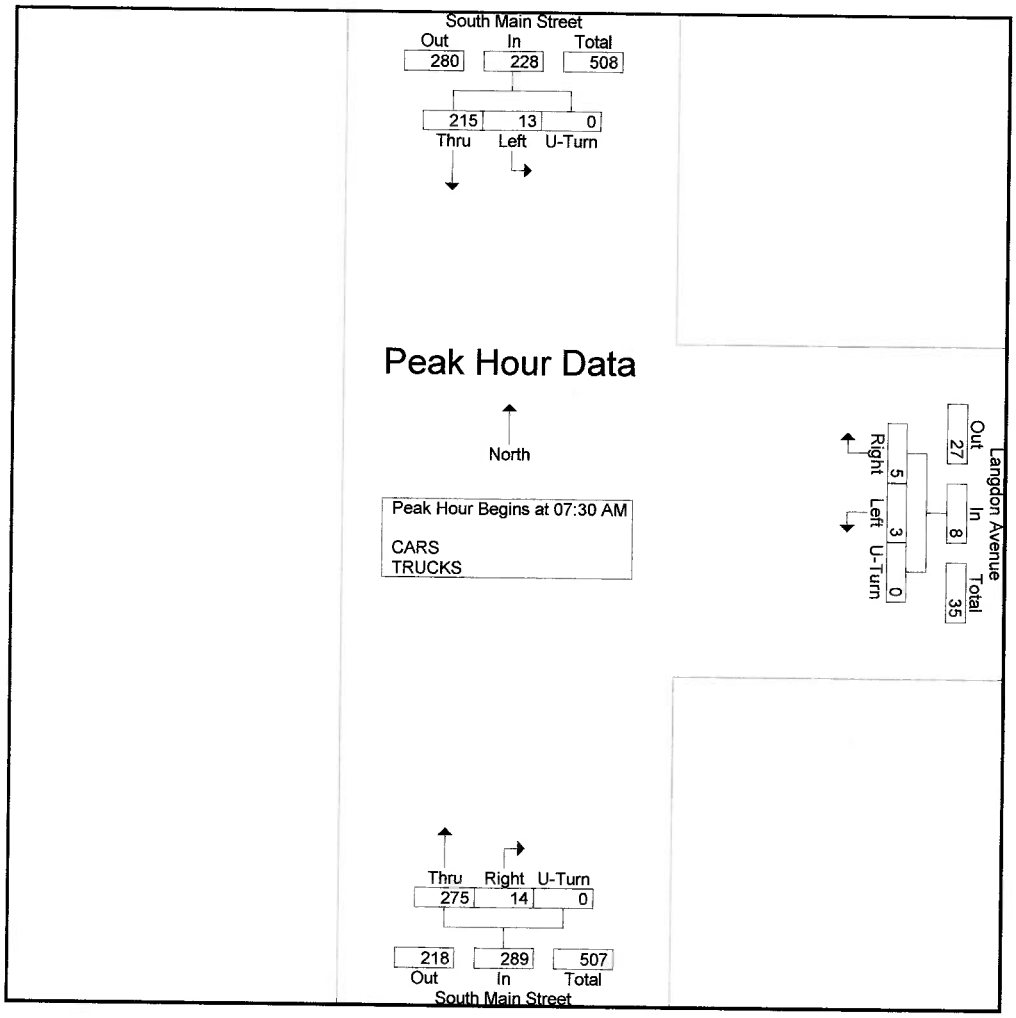
Appendix C **Intersection Turning Movement Counts**

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

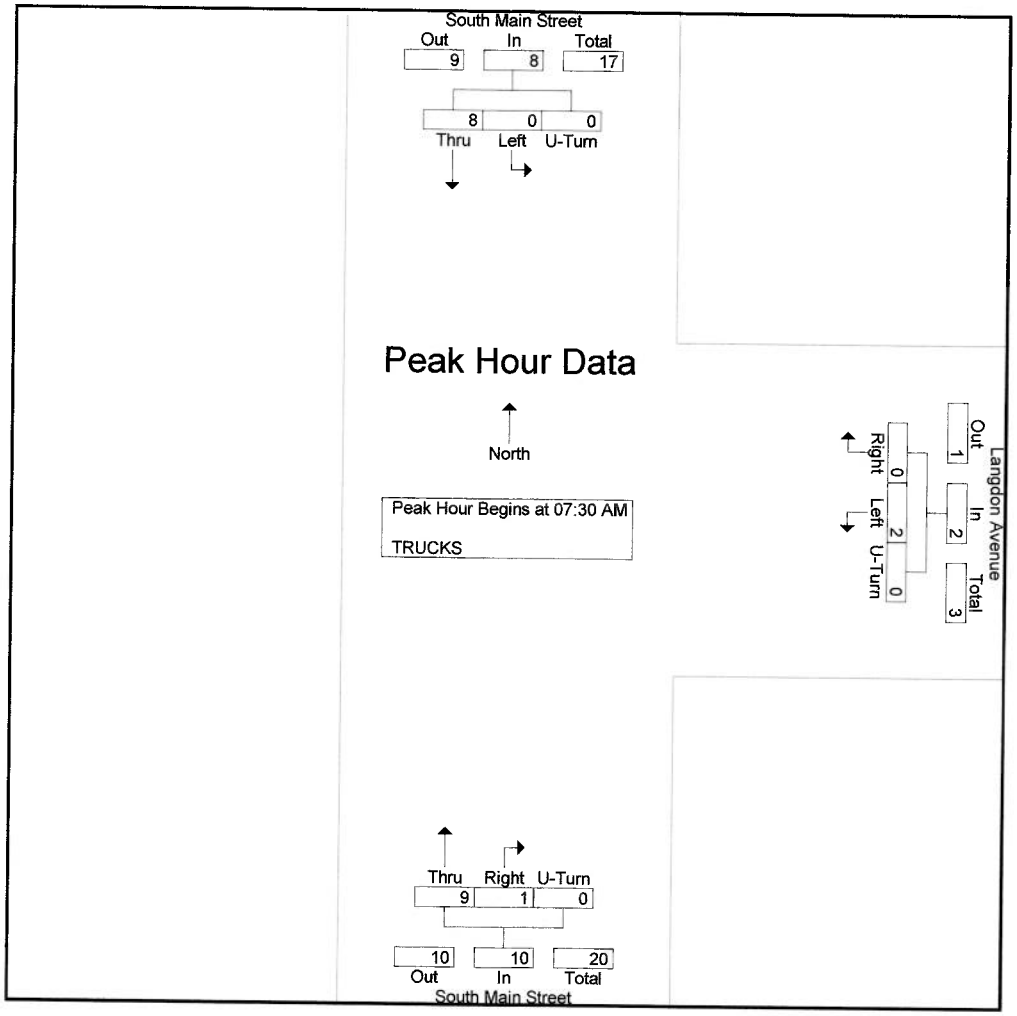


Stephen G. Pernaw & Company, Inc.
P.O. Box 1721
Concord, New Hampshire 03302

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



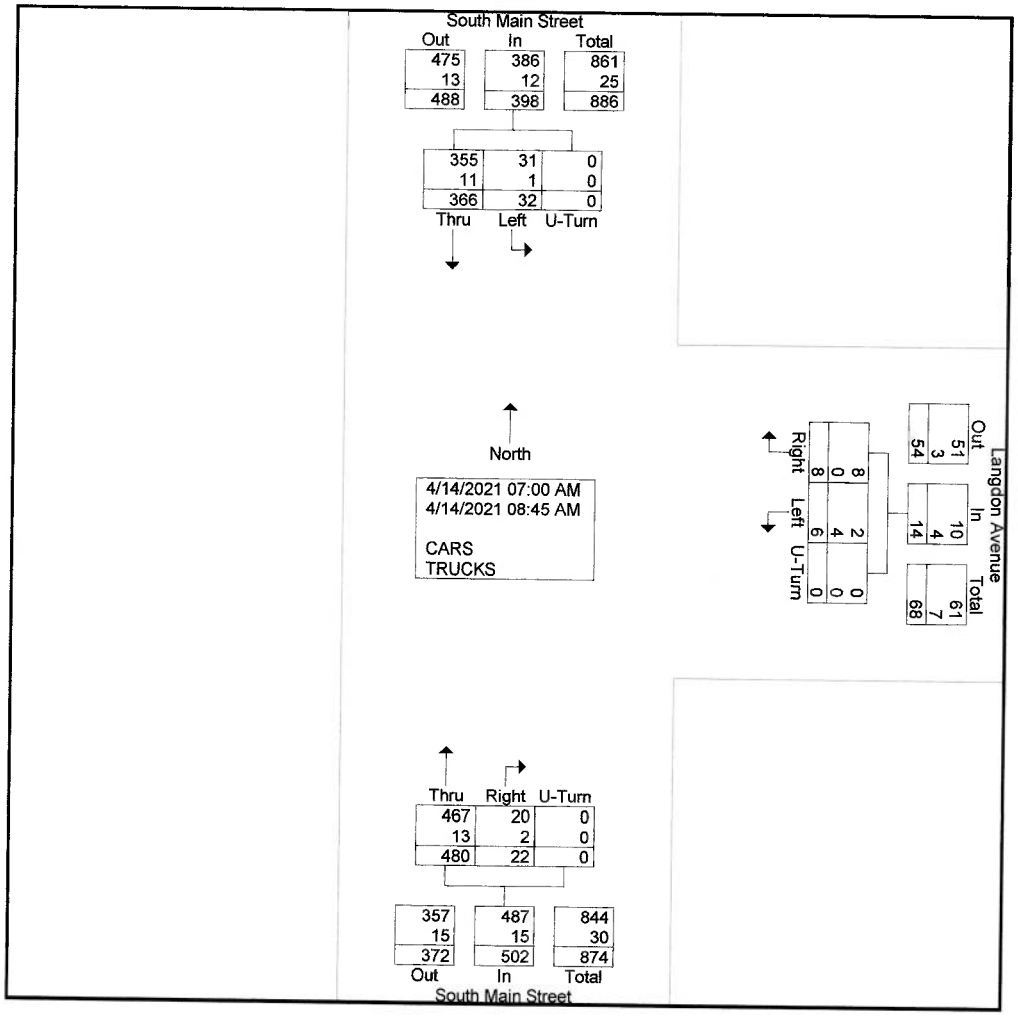
Stephen G. Pernaw & Company, Inc.
P.O. Box 1721
Concord, New Hampshire 03302

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

	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
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



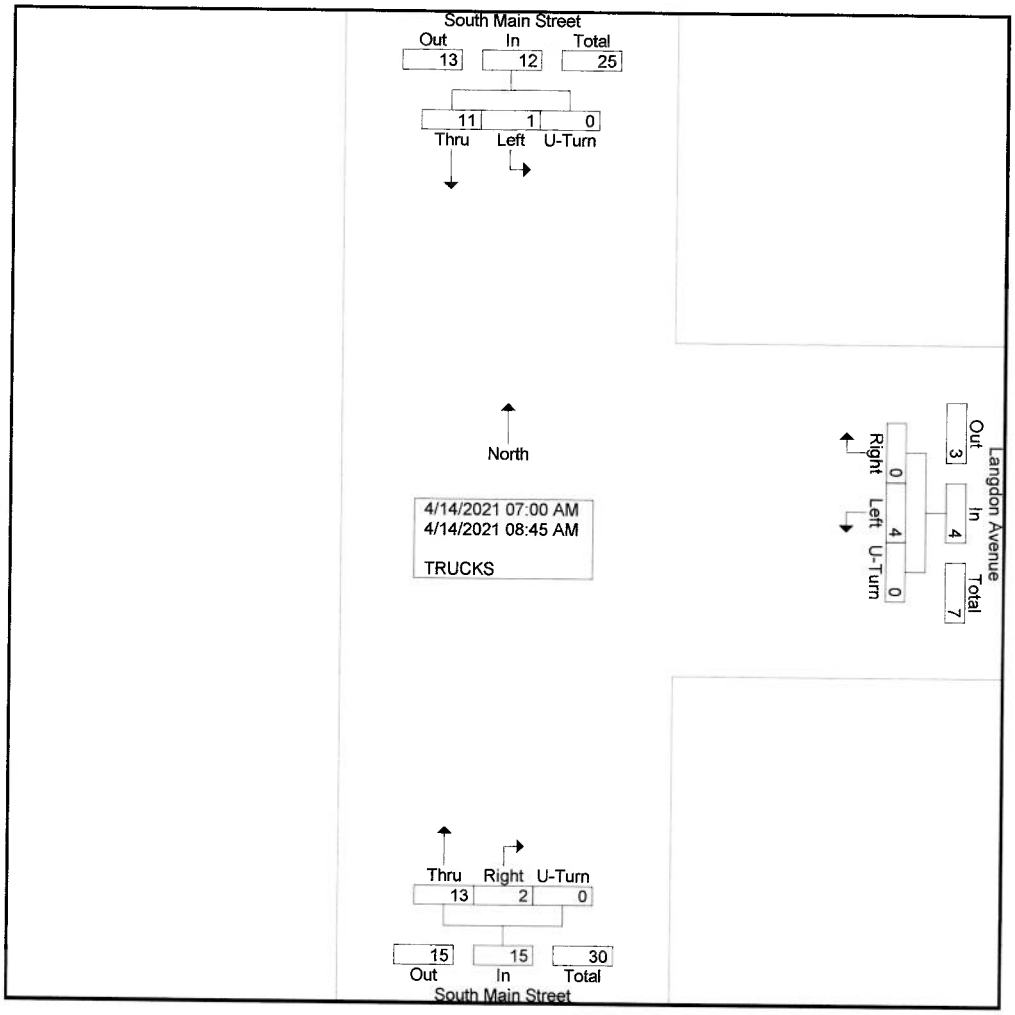
Stephen G. Pernaw & Company, Inc.
P.O. Box 1721
Concord, New Hampshire 03302

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

	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
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	



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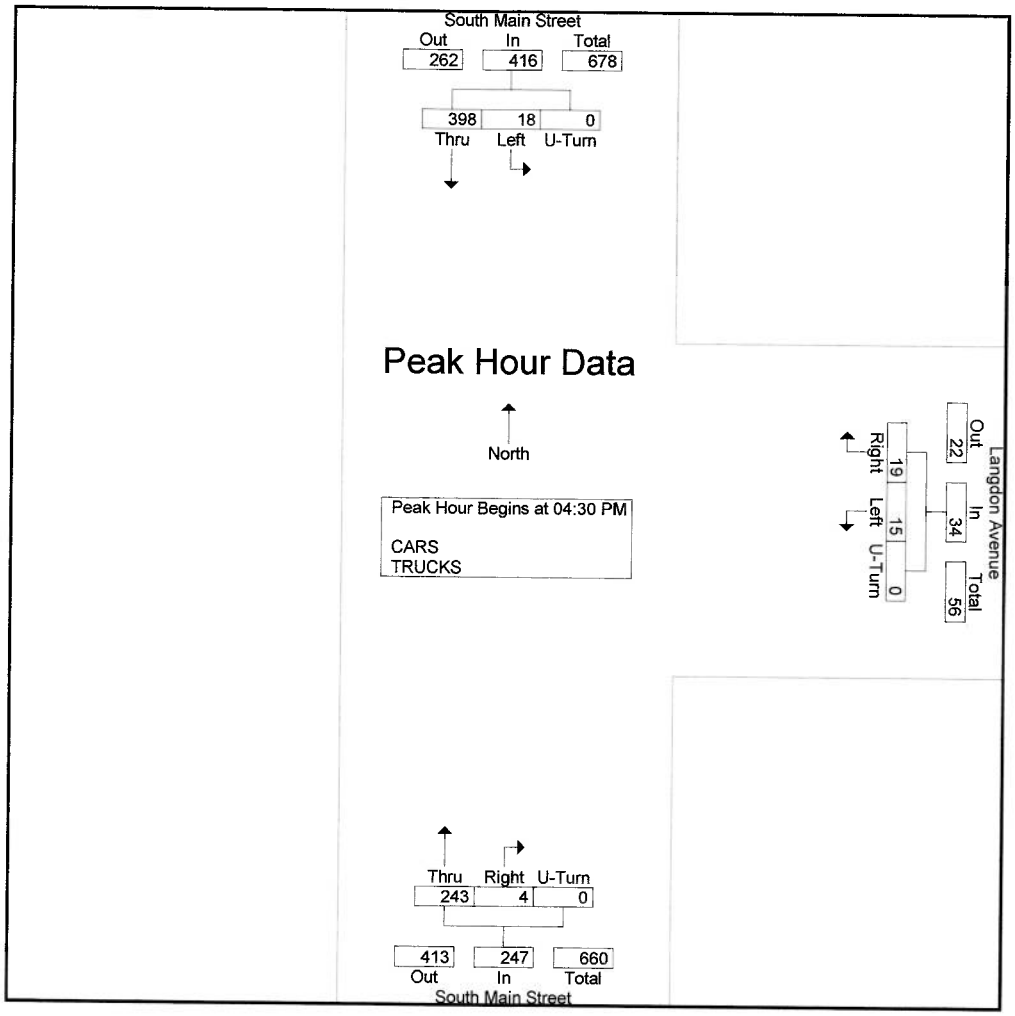
Concord, New Hampshire 03302

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



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Weather: Clear
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Job Number: 2089A
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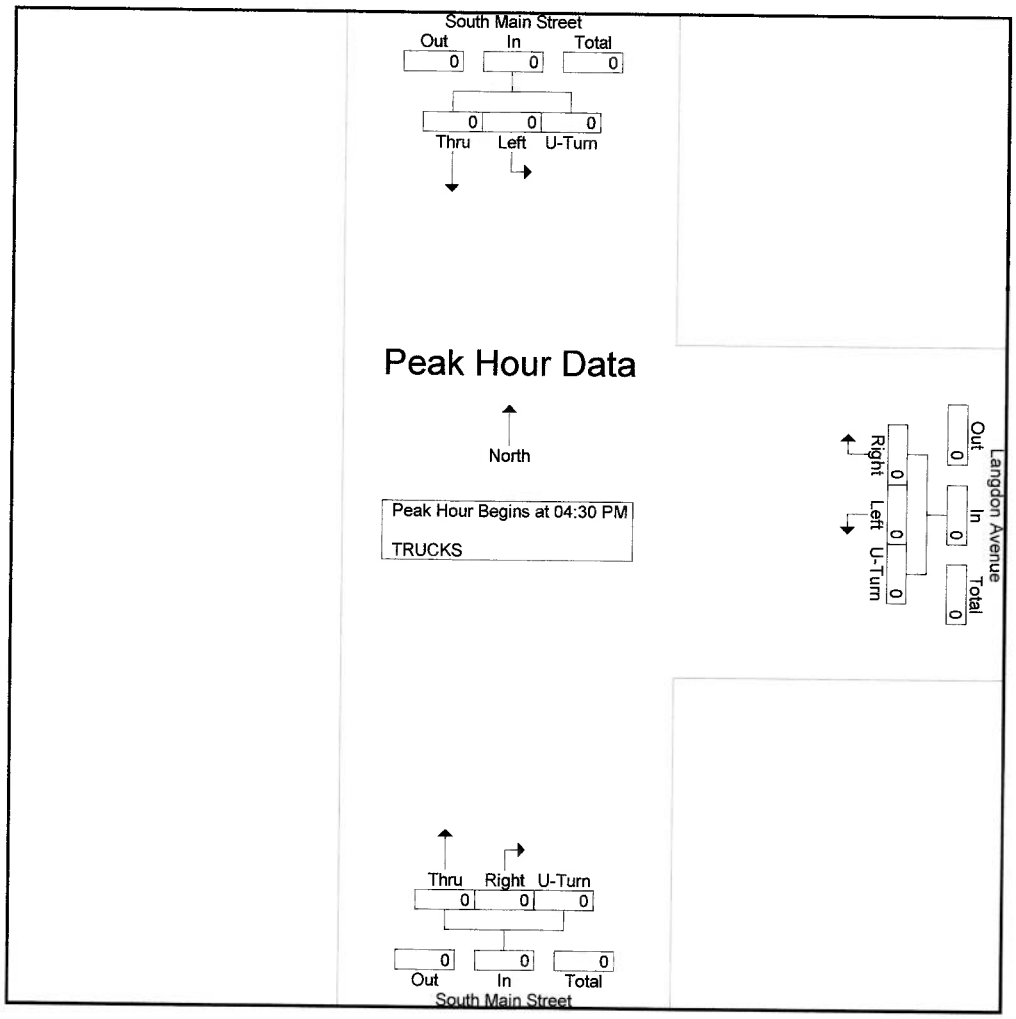
File Name : 2089A_INT_A__AM_&_PM_Wed
Site Code : 2089A
Start Date : 4/14/2021
Page No : 2

	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		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



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_Wed
Site Code : 2089A
Start Date : 4/14/2021
Page No : 1

Groups Printed- CARS - TRUCKS

	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
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.
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Weather: Clear
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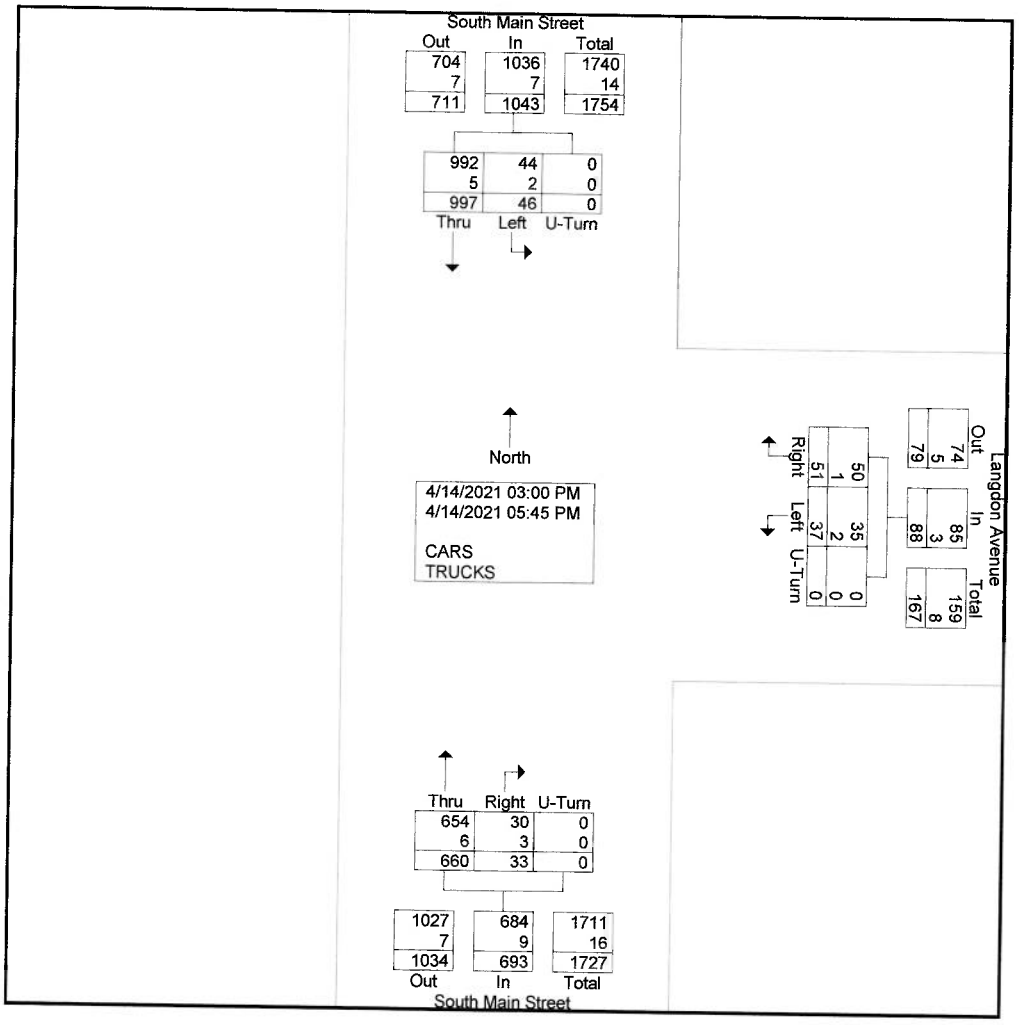
File Name : 2089A_INT_A__AM_&_PM_Wed
Site Code : 2089A
Start Date : 4/14/2021
Page No : 2



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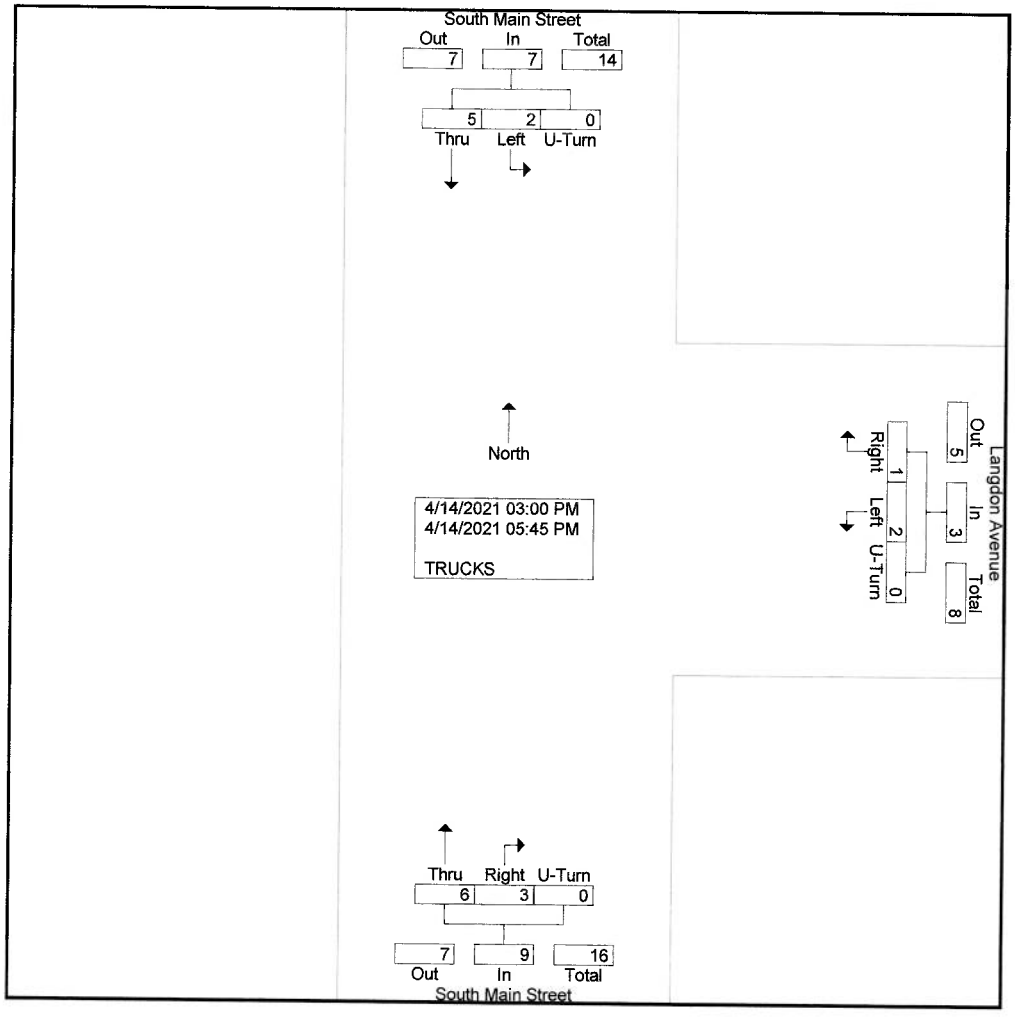
Weather: Clear
Collected By: MV
Job Number: 2089A
Town/State: Concord, NH

File Name : 2089A_INT_A__AM_&_PM_Wed
Site Code : 2089A
Start Date : 4/14/2021
Page No : 1

Groups Printed- TRUCKS

	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
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	



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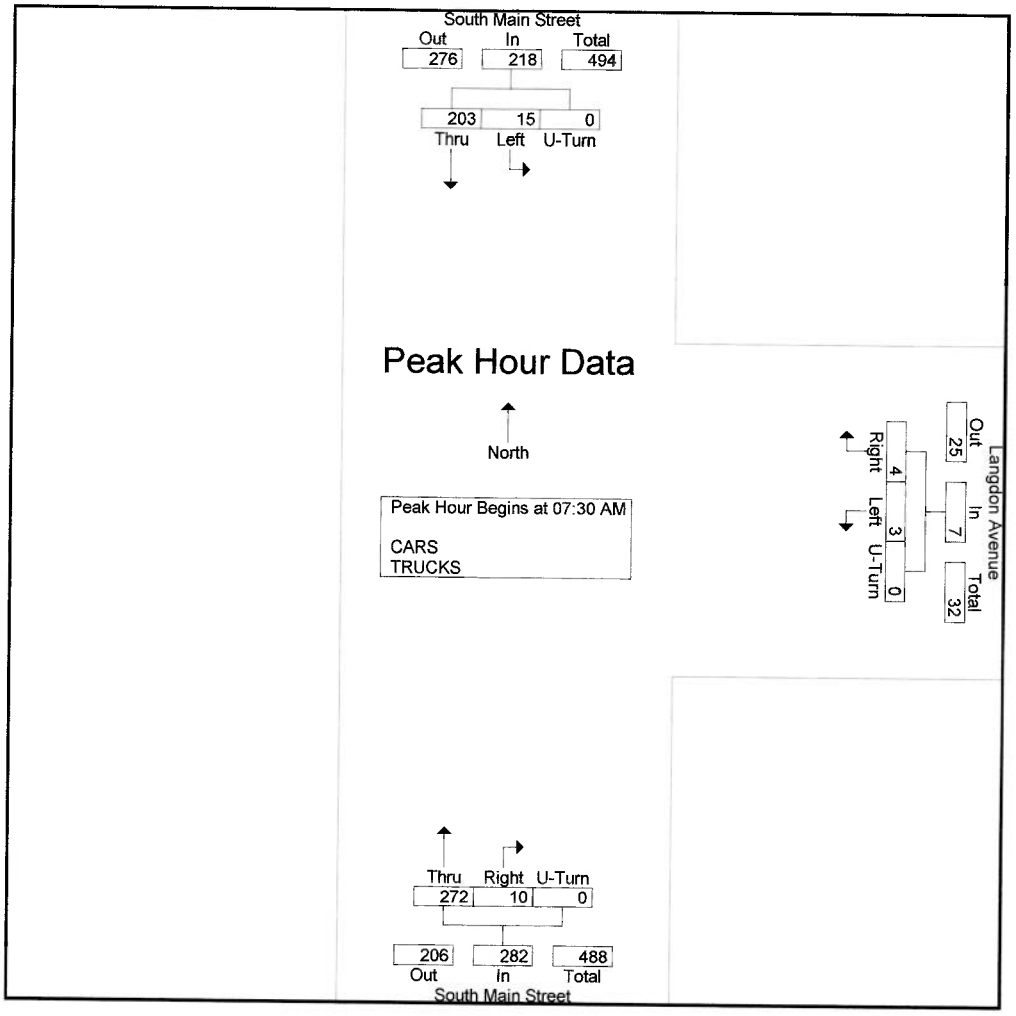
Weather: Clear
Collected By: MV
Job Number: 2089A
Town/State: Concord, NH

File Name : 2089A_INT_A__AM_&_PM_Thurs
Site Code : 2089A
Start Date : 4/15/2021
Page No : 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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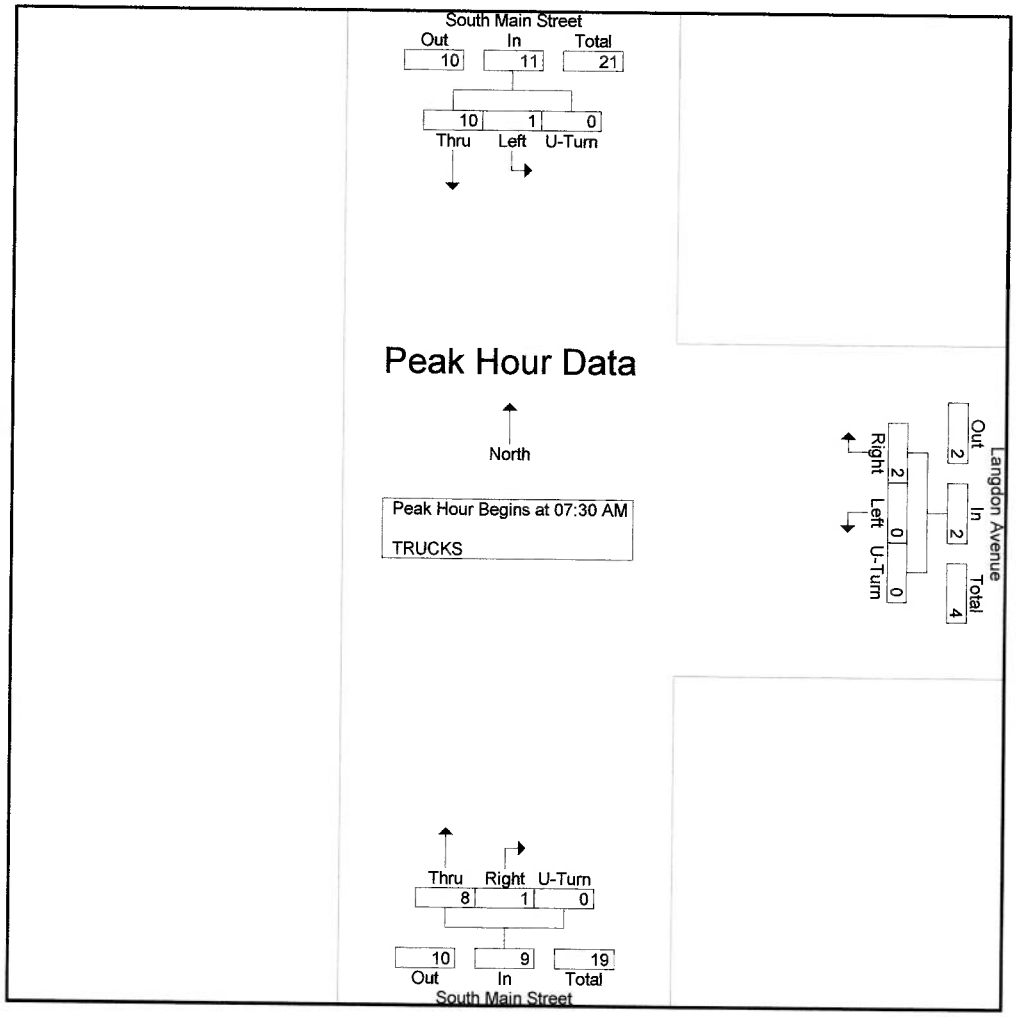
File Name : 2089A_INT_A__AM_&_PM_Thurs
Site Code : 2089A
Start Date : 4/15/2021
Page No : 2

	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



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Weather: Clear
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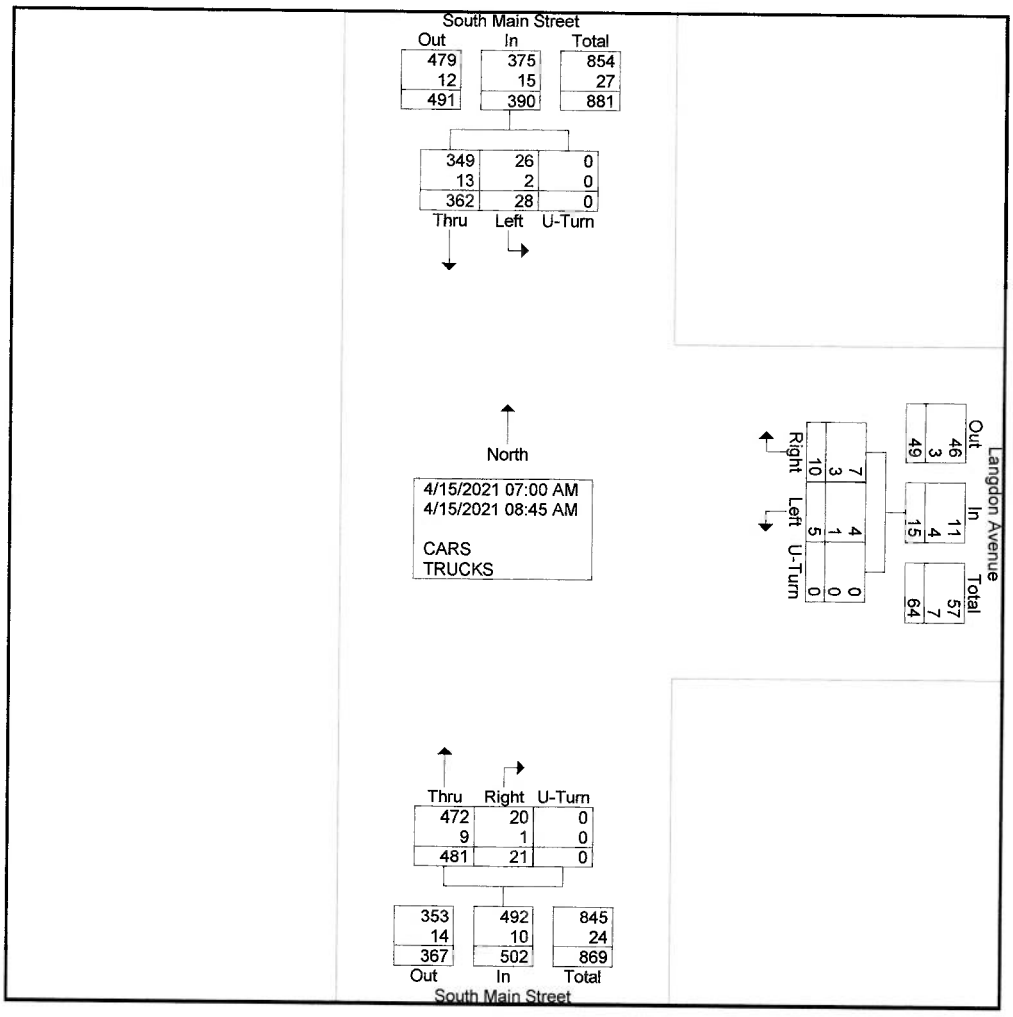
File Name : 2089A_INT_A__AM_&_PM_Thurs
Site Code : 2089A
Start Date : 4/15/2021
Page No : 1

Groups Printed- CARS - TRUCKS

	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
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



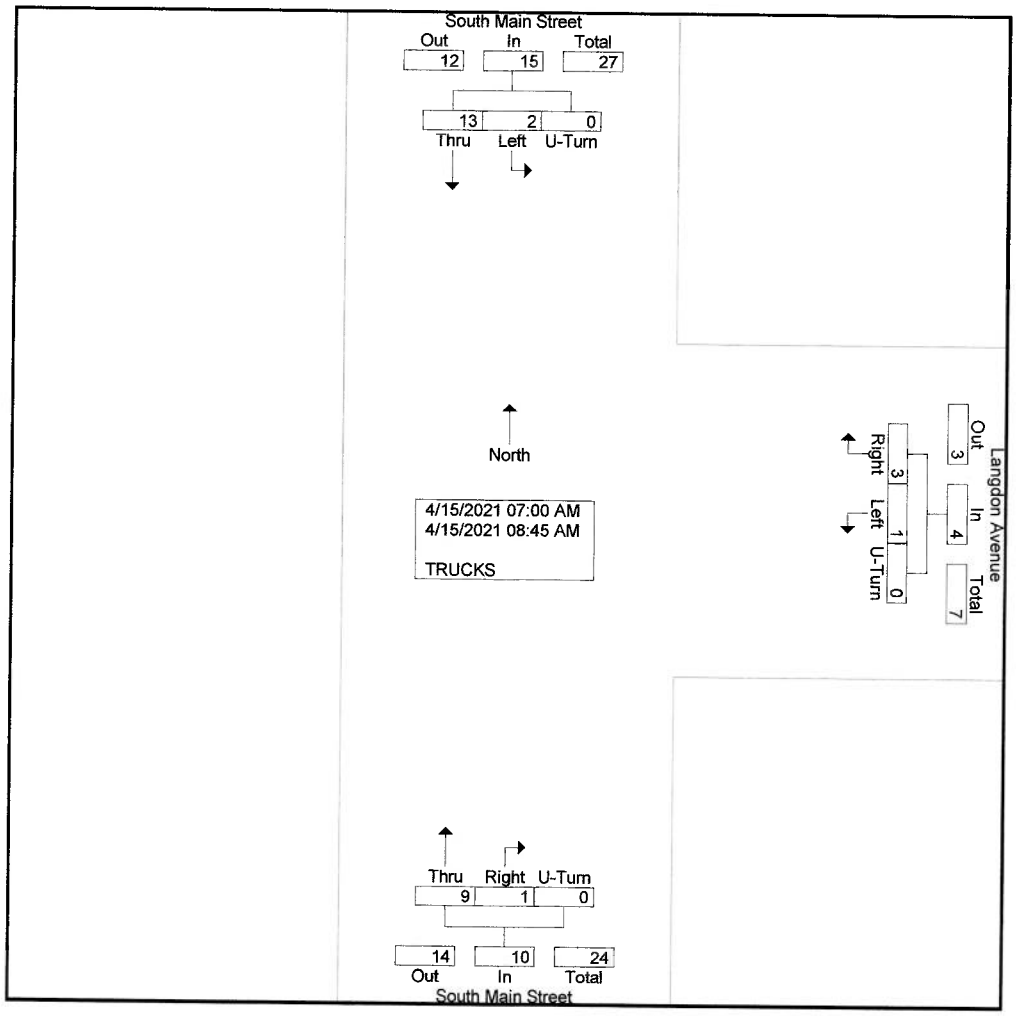
Stephen G. Pernaw & Company, Inc.
P.O. Box 1721
Concord, New Hampshire 03302

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

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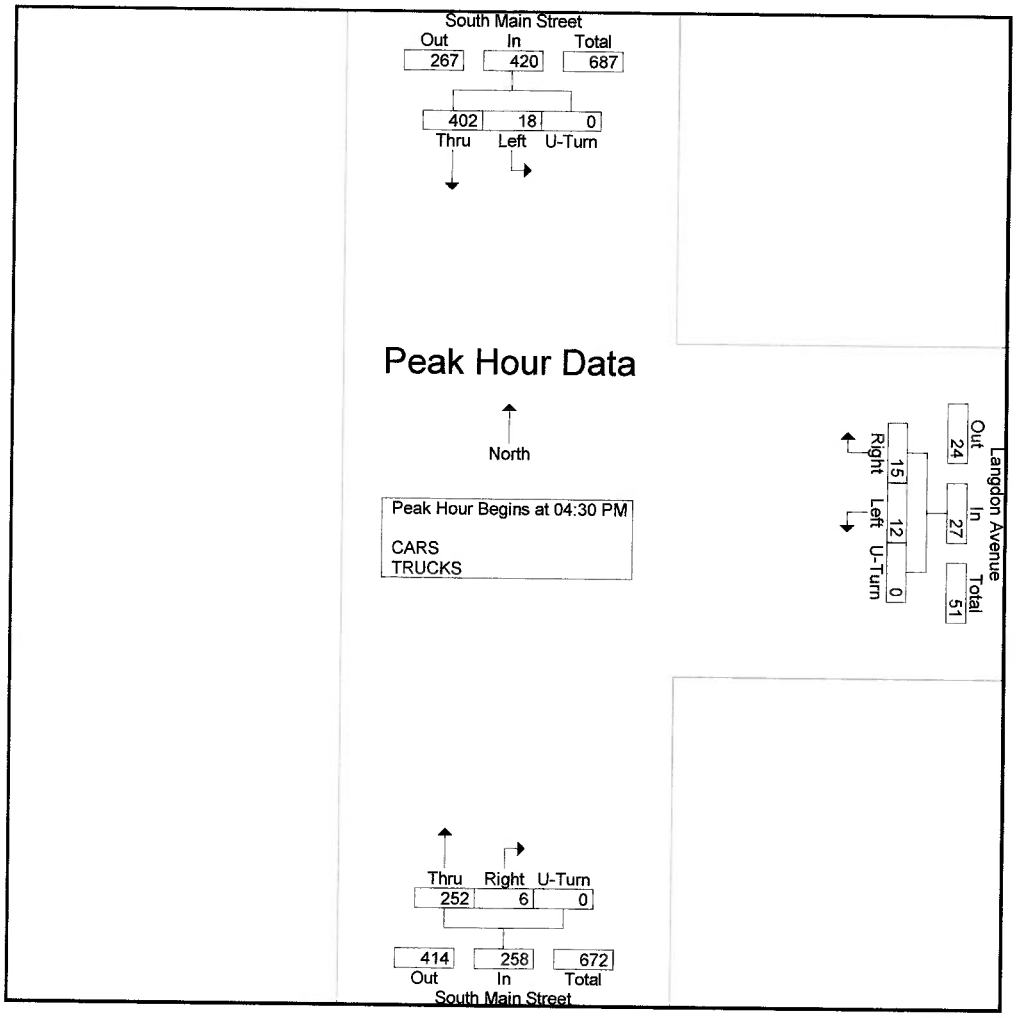
Weather: Clear
Collected By: MV
Job Number: 2089A
Town/State: Concord, NH

File Name : 2089A_INT_A__AM_&_PM_Thurs
Site Code : 2089A
Start Date : 4/15/2021
Page No : 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

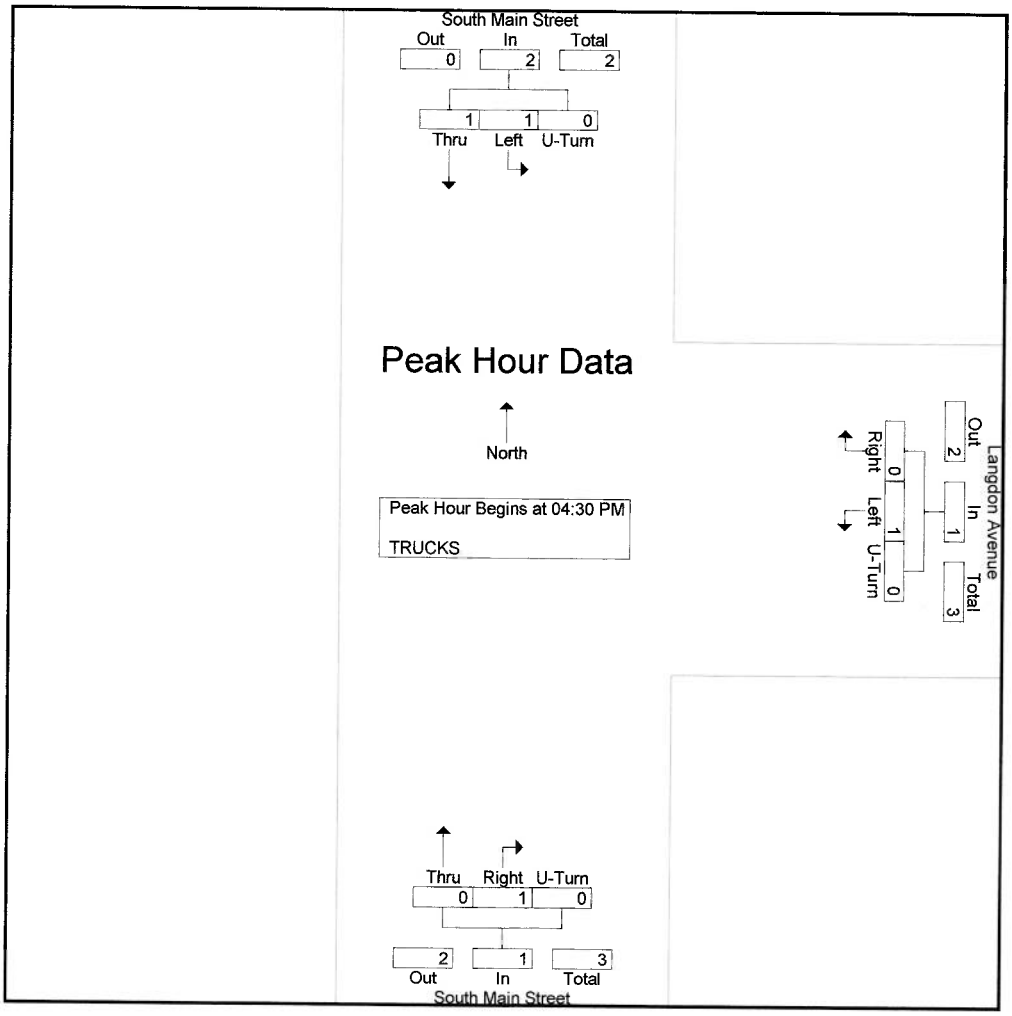


Stephen G. Pernaw & Company, Inc.
P.O. Box 1721
Concord, New Hampshire 03302

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

	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
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.
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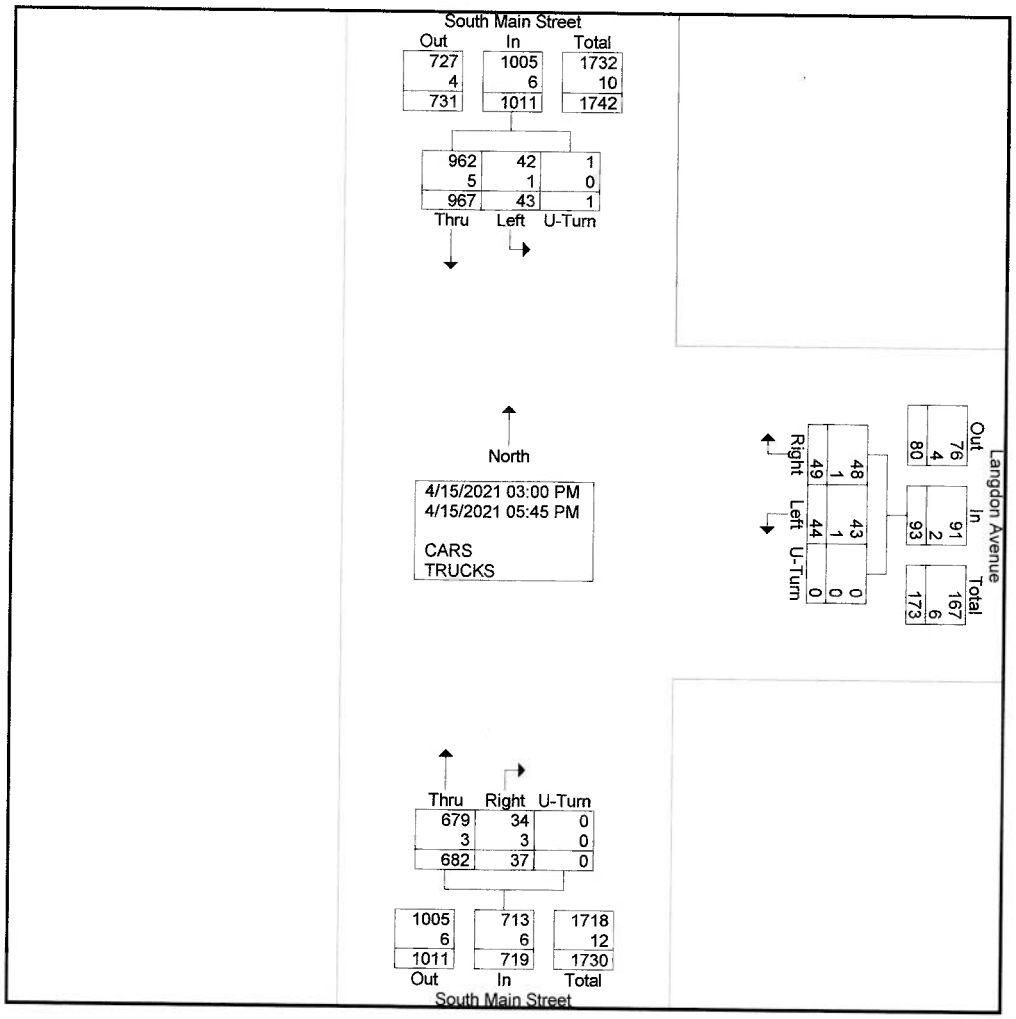
Page No : 2



Stephen G. Pernaw & Company, Inc.
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Weather: Clear
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Job Number: 2089A
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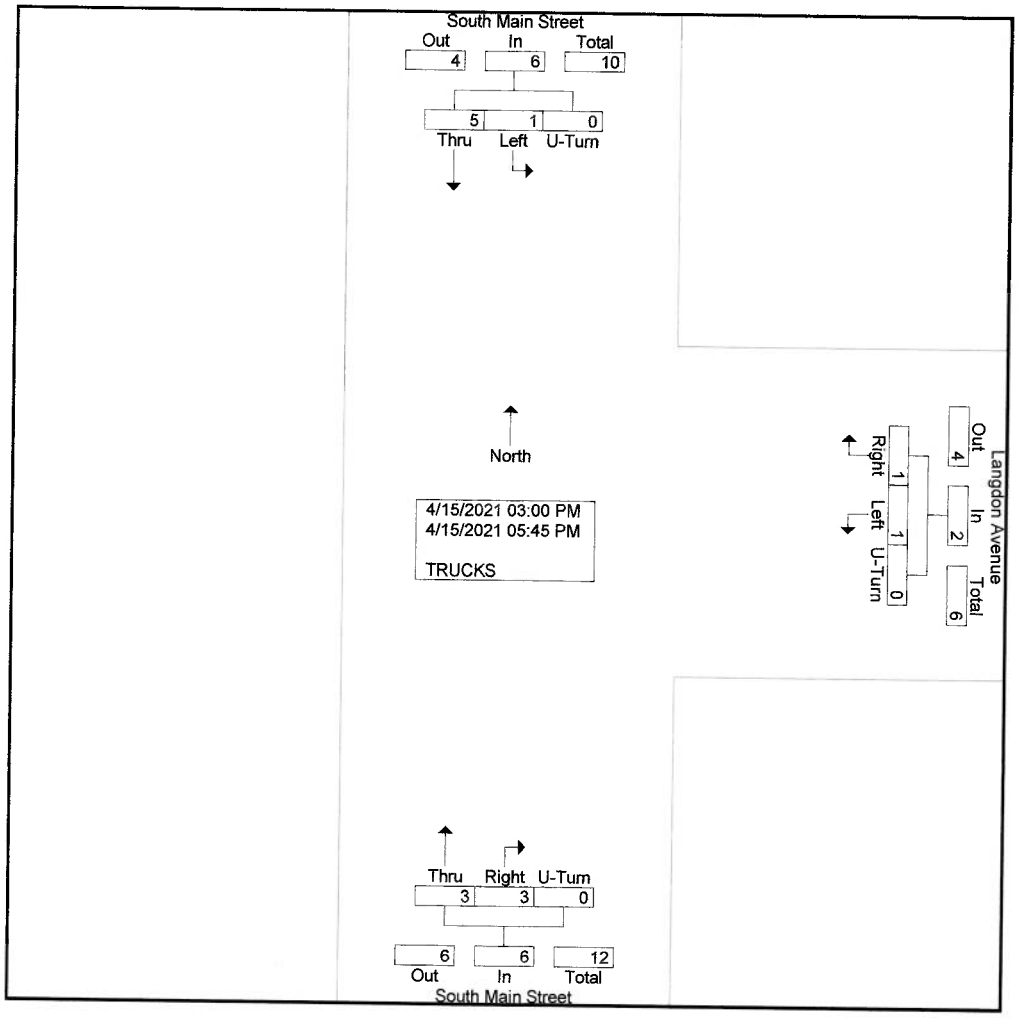
File Name : 2089A_INT_A__AM_&_PM_Thurs
Site Code : 2089A
Start Date : 4/15/2021
Page No : 1

Groups Printed- TRUCKS

	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
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**

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

Accident Statistics By Time of Day

	SUN	MON	TUE	WED	THR	FRI	SAT	TOTALS
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	0	1	0	0	1	0	0	2

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

	< 19	19-21	22-25	26-35	36-45	46-60	> 60	TOTALS
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	0	0	1	0	1	1	1	4

	Occurrence(s)	Percentage
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)

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

Veh. Action Prior To Accident (prior to 4.6.19)

	Occurrence(s)	Percentage
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)

	Occurrence(s)	Percentage

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
Total Occurrences	4	100.0 %

Appendix E Adjustment Factors

Seasonal Adjustment Factors
NHDOT Group 4 (Urban Highways)

Stephen G. Pernaw & Company, Inc.

Year 2019 Monthly Data - Urban

		Adjustment to	
Month	ADT	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

		Adjustment to	
Month	ADT	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

		Adjustment to	
Month	ADT	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.

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	
2016	7140	
2017	7283	
2018	7267	
2019	7354	
2020	6207	DNU

Regression Output:

Constant	-119034.5
Std Err of Y Est	45.91405
R Squared	0.8229231
No. of Observations	4
Degrees of Freedom	2
X Coefficient	62.6
Std Err of Coef.	17.782435

PROJECTIONS

2021	7480
2022	7543
2023	7605
2024	7668
2025	7731
2026	7793
2027	7856
2028	7918
2029	7981
2030	8044
2031	8106

RATE = 63 VPD/YEAR

GEOMETRIC PROJECTIONS

YEAR	AADT	Ln AADT	
2016	7140	8.87347	
2017	7283	8.89330	
2018	7267	8.89110	
2019	7354	8.90300	
2020	6207	DNU	

Regression Output:

Constant	-8.54008
Std Err of Y Est	0.0063634
R Squared	0.8216943
No. of Observations	4
Degrees of Freedom	2
X Coefficient	0.0086396
Std Err of Coef.	0.0028458

PROJECTIONS

2021	7483
2022	7548
2023	7614
2024	7680
2025	7747
2026	7814
2027	7882
2028	7950
2029	8019
2030	8089
2031	8159

CONCLUSION: Use 1% per year

RATE = 0.9 % / YEAR

New Hampshire DOT
Department of Transportation

MS2

Transportation Data Management System

List View | All DIRs

Record 1 of 1 Goto Record go

Location ID	82099073	MPO ID	
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		
Fnct'l Class	Minor Arterial	Milepost	
Located On	S Main St		
Loc On Alias	NH 3A (SOUTH MAIN ST) NORTH OF MAITLAND ST		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2020	6,207[3]		12		5,650 (91%)	557 (9%)	Grown from 2019
	2019	7,354[3]		12		6,737 (92%)	617 (8%)	Grown from 2018
	2018	7,267	854	12		6,699 (92%)	568 (8%)	
	2017	7,283[3]				6,759 (93%)	524 (7%)	Grown from 2016
	2016	7,140[3]				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

	Date	Int	Total
	Wed 6/20/2018	60	8,212
	Tue 6/19/2018	60	8,510
	Thu 6/18/2015	60	8,177
	Wed 6/17/2015	60	8,224
	Tue 6/16/2015	60	8,094
	Thu 6/14/2012	60	9,032
	Wed 6/13/2012	60	8,729
	Tue 6/12/2012	60	8,591
	Sun 5/17/2009	60	3,912

VOLUME TREND

Year	Annual Growth
2020	-16%
2019	1%
2018	0%
2017	2%
2016	2%
2015	-2%
2012	-2%
2009	1%
2006	6%

CALCULATION SHEET

Stephen G. Pernaw & Company, Inc.

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

New Hampshire DOT
Department of Transportation

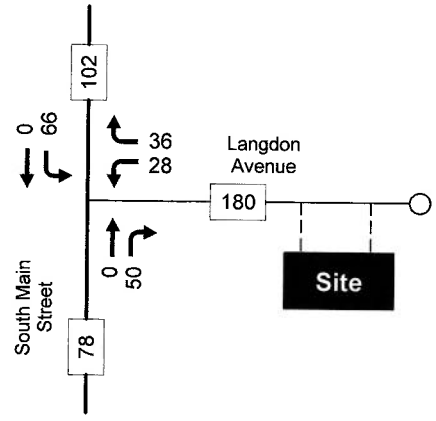
MS2
Transportation Data Management System

Excel Version

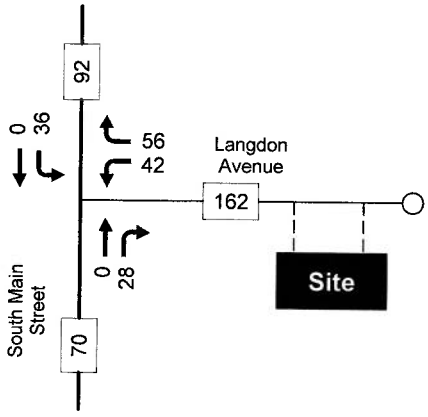
Weekly Volume Report			
Location ID:	82099073	**Type:**	SPOT
Located On:	S Main St	**:**	
Direction:	2-WAY		
Community:	CONCORD	**Period:**	Mon 6/18/2018 - Sun 6/24/2018
AADT:	7267		

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 *	Enter	Exit	Total	Weekday AM Peak Hour of Adjacent Street Traffic *	Enter	Exit	Total	Weekday PM Peak Hour of Adjacent Street Traffic *	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

Stephen G. Pernaw & Company, Inc.

Project Location: Concord, NH
Project Number: 2089A

TRIP DISTRIBUTION ANALYSIS

TMC Patterns at South Main Street/Langdon Avenue Intersection

Combined (5 hrs)	Wednesday, April 14, 2021						Thursday, April 15, 2021					
To/From North =	78	+	59	=	137	58%	71	+	59	=	130	55%
To/From South =	43	+	55	=	98	42%	49	+	58	=	107	45%
					235	100%					237	100%

Combined Both Days						**USE**
To/From North =	137	+	130	=	267	**57%**
To/From South =	98	+	107	=	205	**43%**
					472	**100%**

Appendix G **Capacity and Level of Service Calculations – Unsignalized**

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	0	401	0
Stage 1	392	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.4	6.87	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.903	-	-	2.2	-
Pot Cap-1 Maneuver	421	536	-	-	1169	-
Stage 1	687	-	-	-	-	-
Stage 2	767	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	415	536	-	-	1169	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	483	1169	-
HCM Lane V/C Ratio	-	-	0.033	0.013	-
HCM Control Delay (s)	-	-	12.7	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	0	542	0
Stage 1	530	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.4	6.87	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.903	-	-	2.2	-
Pot Cap-1 Maneuver	305	441	-	-	1037	-
Stage 1	594	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	298	441	-	-	1037	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	1037	-
HCM Lane V/C Ratio	-	-	0.054	0.018	-
HCM Control Delay (s)	-	-	15.3	8.5	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

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	0	611	0
Stage 1	565	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Critical Hdwy	6.4	6.87	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.903	-	-	2.2	-
Pot Cap-1 Maneuver	234	420	-	-	978	-
Stage 1	573	-	-	-	-	-
Stage 2	586	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	205	420	-	-	978	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	289	978	-
HCM Lane V/C Ratio	-	-	0.512	0.1	-
HCM Control Delay (s)	-	-	29.8	9.1	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	2.7	0.3	-

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	0	596	0
Stage 1	584	-	-	-	-	-
Stage 2	423	-	-	-	-	-
Critical Hdwy	6.4	6.87	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.903	-	-	2.2	-
Pot Cap-1 Maneuver	269	408	-	-	990	-
Stage 1	561	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	263	408	-	-	990	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	334	990	-
HCM Lane V/C Ratio	-	-	0.06	0.019	-
HCM Control Delay (s)	-	-	16.5	8.7	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

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	0	665	0
Stage 1	619	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Critical Hdwy	6.4	6.87	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.903	-	-	2.2	-
Pot Cap-1 Maneuver	206	389	-	-	934	-
Stage 1	541	-	-	-	-	-
Stage 2	563	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	179	389	-	-	934	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	258	934	-
HCM Lane V/C Ratio	-	-	0.574	0.105	-
HCM Control Delay (s)	-	-	36.2	9.3	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	3.3	0.3	-

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	0	271	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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	513	1304	-
HCM Lane V/C Ratio	-	-	0.086	0.016	-
HCM Control Delay (s)	-	-	12.7	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	0	347	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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	409	1223	-
HCM Lane V/C Ratio	-	-	0.124	0.02	-
HCM Control Delay (s)	-	-	15	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.1	-

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	0	378	0
Stage 1	360	-	-	-	-	-
Stage 2	733	-	-	-	-	-
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	239	689	-	-	1192	-
Stage 1	710	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	219	689	-	-	1192	-
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	358	1192	-
HCM Lane V/C Ratio	-	-	0.497	0.056	-
HCM Control Delay (s)	-	-	24.6	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.7	0.2	-

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	0	383	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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	368	1187	-
HCM Lane V/C Ratio	-	-	0.138	0.021	-
HCM Control Delay (s)	-	-	16.3	8.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
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	0	414	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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	319	1156	-
HCM Lane V/C Ratio	-	-	0.558	0.058	-
HCM Control Delay (s)	-	-	29.6	8.3	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	3.2	0.2	-

Appendix H **Auxiliary Turn Lane Analysis**

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

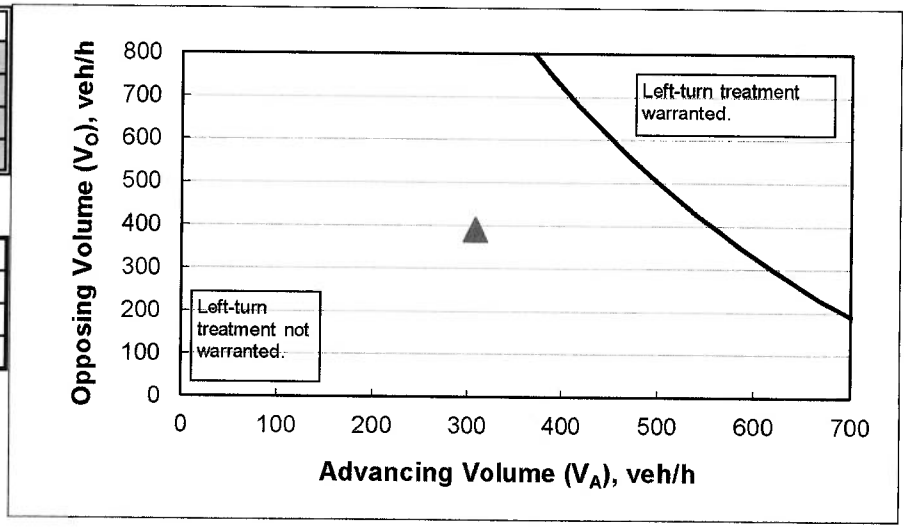
2-lane roadway (English)

INPUT

Variable	Value
85th 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
Guidance for determining the need for a major-road left-turn bay:	
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

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

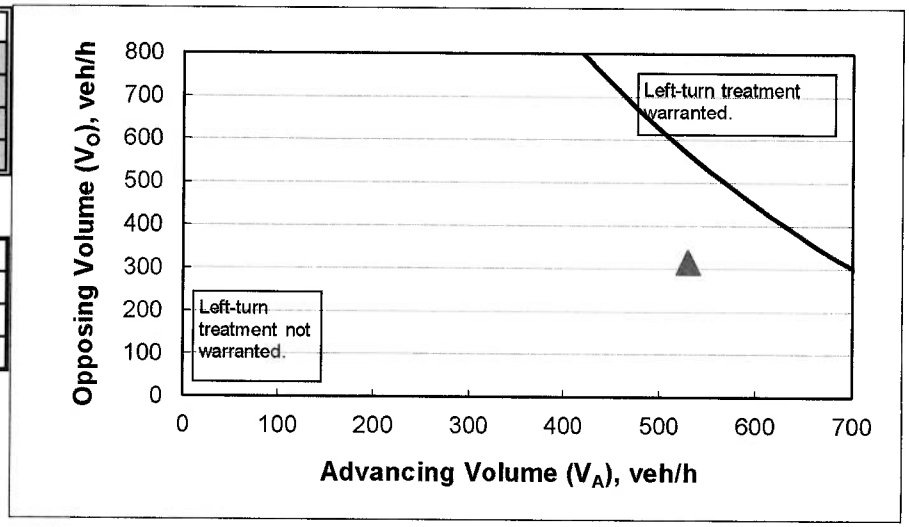
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	30
Percent of left-turns in advancing volume (V_A), %:	4%
Advancing volume (V_A), veh/h:	530
Opposing volume (V_O), veh/h:	316

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	689
Guidance for determining the need for a major-road left-turn bay:	
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

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

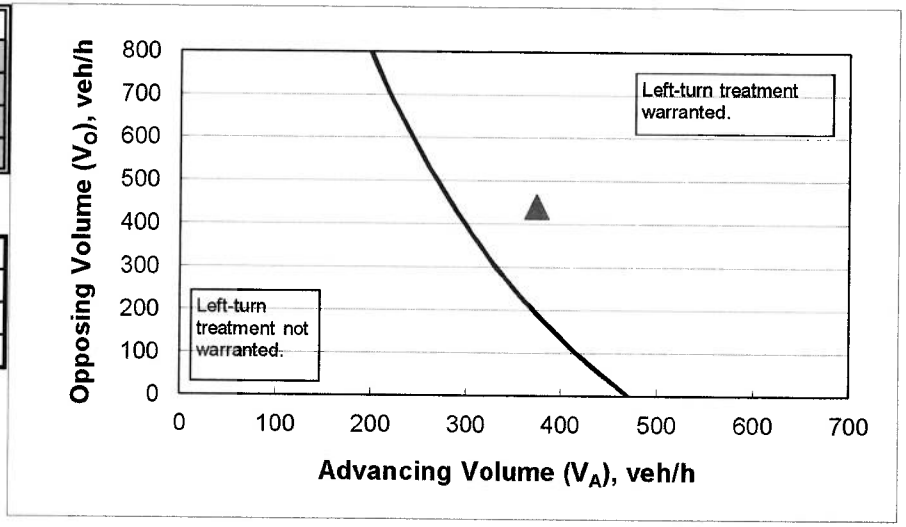
2-lane roadway (English)

INPUT

Variable	Value
85th 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
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

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

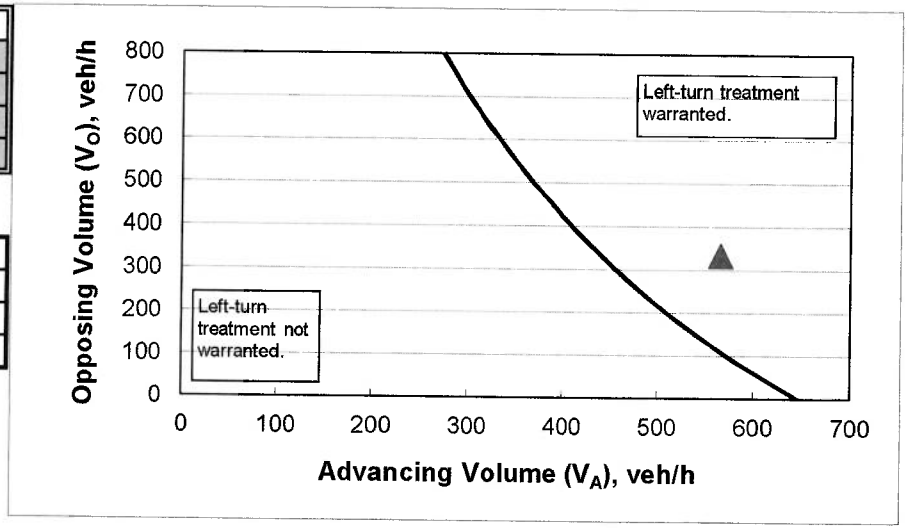
2-lane roadway (English)

INPUT

Variable	Value
85th 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

2033 AM Build
South Main Street / Langdon Avenue

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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
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	

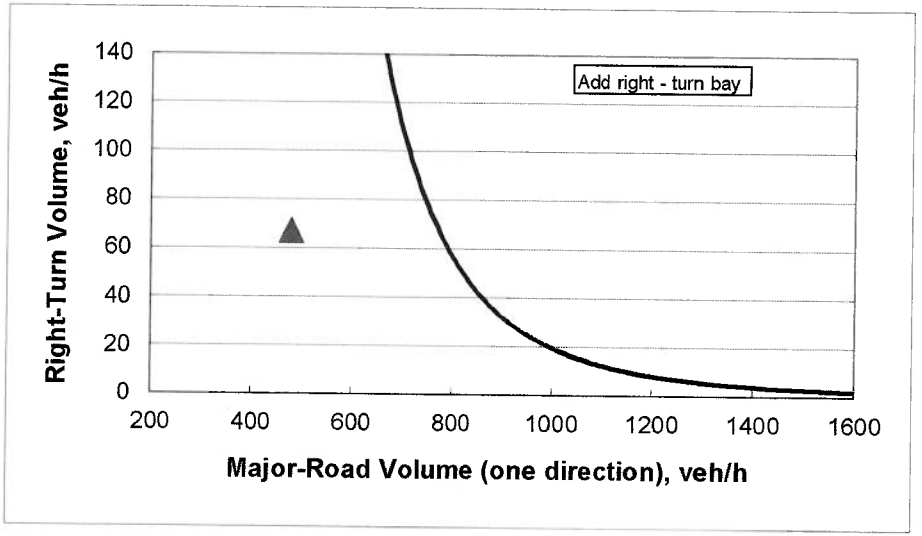

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Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.

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
Guidance for determining the need for a major-road right-turn bay for a 2-lane roadway:	
Do NOT add right-turn bay.	

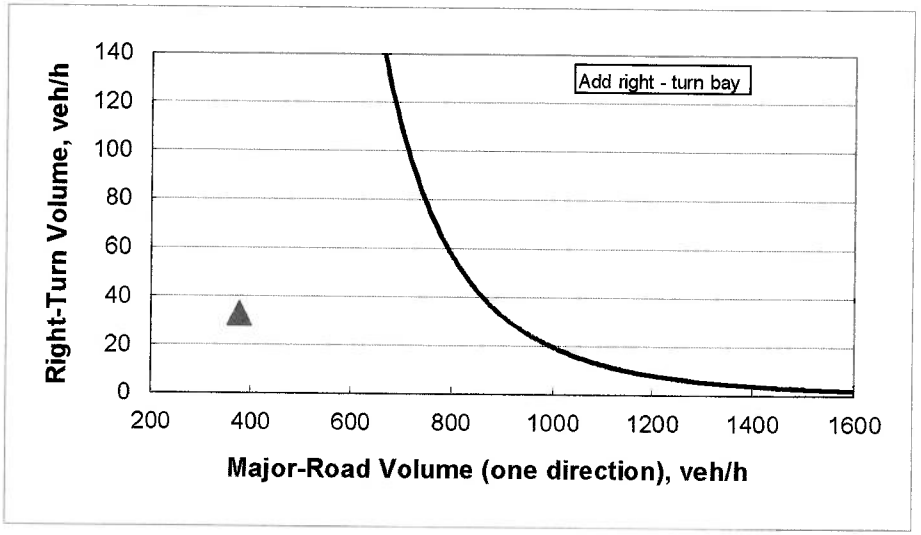

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Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

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
Guidance for determining minor-road approach geometry:	
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

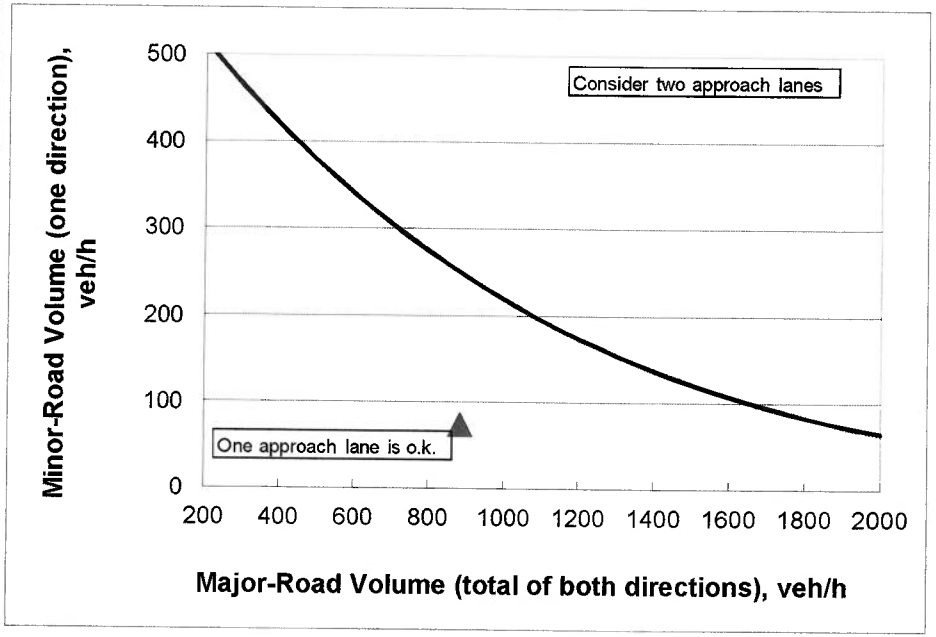

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Figure 2 - 4. Guideline for determining minor-road approach geometry at two-way stop-controlled intersections.

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

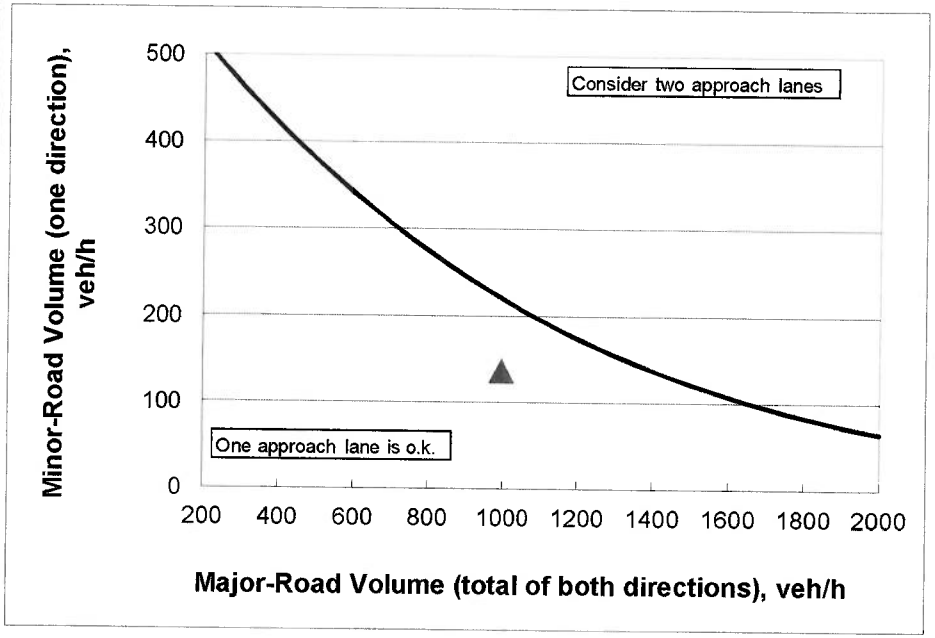
OUTPUT

Variable	Value
Limiting minor-road volume (one direction), veh/h:	221
Guidance for determining minor-road approach geometry:	
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