84 LUMBER COMPANY SITE DEVELOPMENT

SP# 09-22

STAFF REPORT #3

(Please refer to 1/25/23, 2/22/23 and 3/22/23 reports for earlier comments)

June 14, 2023

SITE: 3 Sullivan Road; Map 145 Lot 015

ZONING: Industrial District (I)

PURPOSE OF PLAN: To depict the proposed lumber yard and associated site improvements over tax map 145 lot 15.

PLANS UNDER REVIEW:

Site Development Plans / 84 Lumber Company, Map 145 Lot 15, 3 Sullivan Road, Hudson, New Hampshire; prepared by: Fieldstone Land Consultants, PLLC, 206 Elm Street, Milford, NH 03055; prepared for 84 Lumber Company, 1019 Route 519, Building 4, Eighty Four, PA 15330; consisting of 11 sheets and general notes 1-26 on Sheet 2 and 6 Exhibit sheets; dated August 2, 2022; last revised April 25, 2023.

ATTACHMENTS:

A. Applicant's engineer update, Fieldstone Land Consultants, June 1, 2023.

B. Peer Review, Fuss & O'Neill, March 29, 2023.

C. Response to Transportation Comments, Vanasse & Associates, May 3, 2023.

D. Signal Warrant Analysis at Route 111 & Lawrence Rd./Sullivan Rd., Vanasse & Associates, May 3, 2023.

E. Environmental Noise Survey and Noise Impact Predictions for Proposed 84 Lumber Site, Hudson, NH; Noise Control Engineering, LLC, received April 12, 2023.

F. Storm Water Management Report – 84 Lumber Company, Fieldstone Land Consultants, received March 8, 2023. *****

G. Phase 1 Environmental Site Assessment, Terracon Consultants, Inc., received March 24, 2023.*****

H. Geotechnical Investigation & Summary, Aardvark Geotechnical Engineering & Testing, Inc., received March 24, 2023. *****

*** provided digitally only**

APPLICATION TRACKING:

- August 2, 2022 – Application received.
- January 25, 2023 – Application accepted, public hearing held and continued.
- February 22, 2023 – Public hearing held and continued.
- March 22, 2023 – Public hearing held and continued to May 10, 2023.
- May 10, 2023 – Deferred to June 14, 2023.
- June 14, 2023 – Public hearing scheduled.

WAIVER REQUESTS

1. §276-11.1 B(12)c: the applicant is requesting a waiver to allow a stormwater management pond, fencing, and landscaping improvements within the 100' building setback line from adjacent residential properties.

COMMENTS & RECOMMENDATIONS:

REVISED PLANS & EXHIBITS

The Applicant submitted revised plans and exhibits, along with an email describing the changes made found in **Attachment A**. The 6 exhibits enclosed with the revised plan set are titled:

1. Sight Distance Exhibit Plan
2. Proposed Sewage Disposal System Plan
3. High Intensity Soil Survey Plan
4. Site Section Exhibit Plan
5. WB-50 Truck Tracking Exhibit Plan
6. Wetlands Worksheet

Among the revised items described in Attachment A is indication that the Applicant had discussions with the abutting resident of Map 145 Lot 14, 15 Sullivan Road regarding sight buffering of the proposed development. The two parties agreed that the Applicant would provide a fence to be located on the resident's property where it has a greater ability to affect sight lines.

Attachment A also addresses questions regarding potential for blasting and drainage calculations. Blasting may be required for some of the site work, and the Applicant is currently in the process of performing additional test pits to estimate the extent required. Drainage calculations were performed using High Intensity Soil Survey (HISS) as required by the Town whereas the Alteration of Terrain (AoT) program requires a similar, but more detailed, Site Specific Soil Mapping (SSSM). The Applicant contends that their calculations were conservative and that any change resulting from SSSM would result in a reduction in the amount of mitigation required. The Town's peer review consultant has evaluated these statements and found them acceptable but recommends that the town be informed of any chance to the stormwater report that results from the AoT report.

PEER REVIEW

The latest peer review letter is found in **Attachment B**. A few items related to drainage remain among their comments.

- **4.a**: Traffic – the Town's peer review consultant finds the Applicant's analysis reasonable but notes the significant delays & queue lengths along Sullivan Road in both No-Build and Build conditions. The Applicant performed a Signal Warrant Analysis and is working with NH DOT District 5 on potential improvements to the intersection of Sullivan Road and Route 111.
- **6.j**: refers to §290-7.A.7 which allows for "any other specific study, calculation of investigation as requested by the Town." To date, the Planning Board has requested additional information regarding wetland flagging and soil types which the Applicant has provided.
- **6.k**: The Applicant should provide outlet protection calculations for review.
- **6.n & 6.q**: The Applicant should inform the Town of any changes to the stormwater plan that may occur as a result of AoT permitting.
- **6.y**: typo references Town of Merrimack
- **6.z & 6.aa**: Feedback on drainage and snow removal designs that were subject of Planning Board discussion.
- **2.a**: The peer reviewer questioned whether or not the Town wants an approval block on the exhibit sheets.

TRAFFIC

The Applicant has provided a response to comments & questions received from the Planning Board in **Attachment C**. Also included are the ITE data sheets for the proposed land uses.

Attachment D is the Signal Warrant Analysis. As noted the Manual on Uniform Traffic Control Devices (MUTCD) has 9 criteria to evaluate the need for a traffic signal. At least one of them should be met to justify the installation of a signal, but meeting one does not by itself require a signal. This requires further engineering evaluation which is currently underway with NHDOT. In their analysis, the Applicant finds that Warrant #3 (peak hour) is currently met under existing conditions. Under No-Build (i.e. without the proposed development), the analysis predicts that and additional warrant (#2 - 4-hour volume) will be met in 2034. With the addition of the proposed development, the analysis predicts a third warrant will be met in 2034 (#1 – 8 hour volume). To reiterate, this is currently under review by NH DOT.

Last, the Applicant is still expected to submit a reconfiguration of the Sullivan Road/Bridle Bridge Path/site driveway intersection. This has not yet been submitted.

NOISE STUDY

A noise impact study has been submitted by the Applicant, included here as **Attachment E**. This study is currently under peer review. The study concludes that the proposed development will adhere to the Town's Noise Ordinance by modeling noise sources of forklifts, trucks and HVAC units.

OTHER SUBMITTALS

The Applicant submitted a revised Stormwater Management Report (**Attachment F**), the Phase 1 Environmental Site Assessment (**Attachment G**) and a Geotechnical Investigation & Summary (**Attachment H**). These items are provided digitally and for informational purposes.

- The Stormwater Management Report has been peer reviewed resulting in the comments discussed earlier.
- The Phase 1 Environmental Site Assessment recommends additional investigations and the preparation of a soil management plan for implementation during construction. While this would ultimately be regulated & monitored by the Engineering Department & Inspectional Services (and potentially NH DES), the Planning Board may wish to consider conditioning a potential approval on the preparation of a soil management plan prior to construction.
- The Geotechnical report makes recommendations relative to construction practices which will be monitored by Inspectional Services as would any blasting activity that might be required.

RSA 674:57 ADVANCE PIPELINE NOTIFICATION

The State introduced new legislation that requires additional notification to gas pipeline operators where a proposed development is within 1,000-feet of the centerline of a gas transmission line. This new requirement applies to this proposal. The Applicant has notified the operator (Kinder Morgan for Tennessee Gas Pipeline Company) and is waiting for their reponse. The Applicant has also filed a form with the Town in accordance with RSA 674:75.III. Procedures for effective administration of this requirement is still under development by Town staff. Full text of the RSA can be found here:
https://www.gencourt.state.nh.us/rsa/html/LXIV/674/674-75.htm

COMMENTS

The following items were previously identified in staff reports and/or Planning Board discussions:

1. **Wellhead** – The Applicant plans on using the existing wellhead in its current location.
2. **Curbing** – The Applicant proposes a 2-foot gravel shoulder around the perimeter of the site and for stormwater to sheet flow to the catch basins at the southerly end of the site.

3. **Outside storage** – The Applicant has identified additional areas for outside storage but may need to clarify some of the labels related to Phasing (the outdoor storage area on the easterly edge of the Phase 1 chain-link fence is labelled as Phase 2 storage).
4. **Rendering** – The Applicant may or may not be updating the rendering to be consistent with the site plan.
5. **Proposed Sign** – The proposed sign location was corrected to be outside of the 25-foot sign setback.
6. **Typos** – Some typographical errors remain e.g. Roll Door, Conservation Plaques. The Exhibit titles may require revision. Some plan call-outs may need revision or clarification (e.g. "Gravel Phase 2 Pavement Area (Phase 1)).
7. **Propane Tank** – The propane tank was relocated in accordance with Fire Department comment.
8. **Access to Drainage Pond -** A "best management practice" access drive to maintain the stormwater treatment area was added.
9. **Sound Study** – The Applicant's sound study (**Attachment E**) is currently under peer review.
10. **Sullivan Road/Bridle Bridge Road** – The Applicant has not yet submitted a design for the intersection of the site driveway/Bridle Bridge Road/Sullivan Road.

RECOMMENDATION

The Applicant is still working with NH DOT on the Signal Warrant, the design of the intersection of Bridle Bridge/Sullivan and the sound study is under peer review, requiring additional time before consideration of approval.

A waiver request for the 100-foot buffer (§276-11.1 B(12)c) is pending. As part of this, the Applicant has made arrangements with the abutting resident. The Board may wish to consider the waiver request while also reviewing the plan updates with the Applicant.

(Draft motions are on the next page)

DRAFT MOTIONS

GRANT a waiver:

I move to grant a waiver from §276-11.1 B(12)c to allow a portion of the stormwater management area within the 100-foot buffer, based on the Board's discussion, the testimony of the Applicant's representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____Second: _____Carried/Failed: _____

CONTINUE the public hearing to a date certain:

I move to continue the site plan application for the Site Development Plans / 84 Lumber Company, Map 145 Lot 15, 3 Sullivan Road, to date certain, _____, 2023.

Motion by: _____Second: _____Carried/Failed: _____

From: nrchamberlin fieldstonelandconsultants.com <nrchamberlin@fieldstonelandconsultants.com>
Sent: Thursday, June 1, 2023 11:51 AM
To: Groth, Brian
Cc: Jim Zaunick
Subject: RE: 84 Lumber Hudson

Good morning, Brian

I am sending this email to outline the changes made to the plans submitted on April 26th for the May planning board hearing which was subsequently continued to the June 14th. In addition, I would like to take this opportunity to respond to Mr. Crowley's March 25th email concerning blasting. In short, I believe that when the applicant stated that there would be no blasting on-site he was referring to blasting for the proposed building construction. 84 Lumber has conducted a geotechnical investigation for the proposed buildings and based on that report no blasting will be required for the building construction. Mr. Crowley is correct in his assessment that blasting will be required to construct the site as currently configured. We are in the process of performing additional test pits to help quantify the amount of blasting necessary. This is a requirement of the NHDES Alteration of Terrain permit.

The plans submitted on April 26th were revised as follows;

- The Exhibit Plan of section through site revised to include a section through the buildings as requested by Mr. Crowley. The applicant met with Mr. Rodier, the owner of Lot 145-14 following the Planning Board meeting and Rodier stated that he would prefer a fence on his property, closer to his house, over the current proposal of a landscaped berm/fence combination. Placing the fence closer to the house would provide a better visual barrier to the development because it would at a higher elevation and potentially be able to shield the entire development from view out of the first-floor windows.
- Provide the Wetland Worksheet Exhibit Plan with the wetland flags shown as requested by Mr. Crowley.
- Provide the WB-50 Truck Tracking Plan (Tractor Trailer Truck) Exhibit Plan as requested.
- Provide a detail of manhole at well on Sheet 9 of 11 (please note that the title and number of this detail incorrect and needs to be edited).
- Access drive to the infiltration basin added.
- Detail of retaining wall added (Detail 8/DT-3, Sheet 10 of 11).
- Location of existing leach field added to Existing Conditions and Site Plans.
- Proposed roof drains added to Grading & Drainage Plan (Sheet 4 of 11).
- Lighting Plan updated to current pole locations.
- Relocate Approval Block on Existing Conditions Plan to avoid waiver request.
- Remove former Note 13 (Variance) as it was not applicable to this site and pertained to a portion of the lot that was subdivided off in 2012.
- Revise Note 9 on Sheet 5 to reference current telecommunications provider.

With regard to your comment below pertaining to the drainage computations and the HISS mapping, in actuality the Alteration of Terrain program requires Site Specific Soil Mapping (SSSM) which is similar to HISS mapping in that it identifies the slopes and soil parameters but it takes it a bit further by identifying the Hydrologic Soil Groups (HSG) and is accompanied with a soil report. The HISS mapping is a local requirement. The soil boundary lines will not change but the delineators will be Site Specific not HISS. The drainage calculations were performed using the most conservative

soils possible (HSG A). HSG A has the lowest Curve Number resulting in the lowest rates of runoff. If the SSSM results in a different HSG value than A then the associated Curve Number will be higher resulting in more runoff in the pre-development conditions which in turn will reduce the amount of mitigation required in the post-development condition. The change in Curve Number has very little significance in the post development condition because it only impacts the open areas and has no impact on the impervious area. Either way, as pointed out by F&O, we will have to adjust the design accordingly based on the SSSM once completed.

I trust that this email assists you in preparation for the June 14th Planning Board meeting. If you have any questions, please don't hesitate to contact me.

Best regards,
Nate

Nathan R. Chamberlin, P.E.
Senior Civil Engineer
FIELDSTONE LAND CONSULTANTS, PLLC
Surveying • Engineering • Environmental
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NRChamberlin@FieldstoneLandConsultants.com
www.FieldstoneLandConsultants.com

From: Groth, Brian <bgroth@hudsonnh.gov>
Sent: Tuesday, May 9, 2023 10:06 AM
To: Jim Zaunick <Jim.Zaunick@84lumber.com>
Cc: Scott Thornton <sthornton@rdva.com>; nrchamberlin fieldstonelandconsultants.com <nrchamberlin@fieldstonelandconsultants.com>; cebranon fieldstonelandconsultants.com <cebranon@fieldstonelandconsultants.com>; Guy Flament <Guy.Flament@84Lumber.com>; Bethany Cypher <Bethany.Cypher@84lumber.com>; Joel Wilder <Joel.Wilder@84lumber.com>
Subject: RE: 84 Lumber Hudson

Jim,

Deferral request received. I have offered a series of comments throughout the process in the form of staff reports. Thee are the peer review comments. There are also the comments and questions from Board members during meetings. Additionally, I sent questions from member Jim Crowley on February 10 (response received) and March 27 (I do not believe a response was given), attached here for reference. Mr. Crowley has a question on consistency/cross-referencing between the HISS soil mapping and the NCSS soil mapping. See this comment from him:

- Stormwater Report STAFF p1; where does it stand?
    1. **Detailed OBSERVATION**: Former F&O peer review stated, "HR 290-7.B.13. We note the requirement of the NHDES AoT permit to utilize HISS soils. If the use of HISS mapping revises the soil types, runoff numbers, and infiltration rates, the applicant should revise the drainage calculations appropriately. "

QUESTION: It makes me wonder if a Soils Report from the CSS exist for correlation of HISS to these parameters. I have seen other soils reports supply this correlation to HSG (Hydrological Soils Group), will the applicant supply this to address the concern of the peer review engineer to him and the PB?

I will be sending a separate email regarding the sound study review shortly after this email. There is no title of Planning Director in Hudson, that would be the Town Planner for all intents & purposes.

Brian

Brian Groth, AICP
Town Planner

Town of Hudson, NH
12 School Street
Hudson, NH 03051
Phone: (603) 886-6008
Fax: (603) 594-1142
bgroth@hudsonnh.gov

From: Jim Zaunick <Jim.Zaunick@84lumber.com>
Sent: Monday, May 1, 2023 2:24 PM
To: Groth, Brian <bgroth@hudsonnh.gov>
Cc: Scott Thornton <sthornton@rdva.com>; nrchamberlin fieldstonelandconsultants.com <nrchamberlin@fieldstonelandconsultants.com>; cebranon fieldstonelandconsultants.com <cebranon@fieldstonelandconsultants.com>; Guy Flament <Guy.Flament@84Lumber.com>; Bethany Cypher <Bethany.Cypher@84lumber.com>; Joel Wilder <Joel.Wilder@84lumber.com>
Subject: 84 Lumber Hudson

Brian – please accept this email as acknowledgement to reschedule to the June 14th meeting
Do you or does the Planning Director have any actual comments or is it just what was noted at the meeting?
Scott – please provide Brian all traffic studies, warrant analysis, applications, etc necessary for Town review and submittal to the DOT
Thanks

James A. Zaunick, P.E.
Director of Engineering
84 Lumber Company
1019 Route 519, Building 5
Eighty Four, PA 15330
Office – 724-228-8820 Ext. 1380
Cell – 412-997-0068

FUSS & O'NEILL

March 29, 2023

Mr. Brian Groth
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Re: Town of Hudson Planning Board Review
84 Lumber Site Plan, 3 Sullivan Road
Tax Map 145 Lot 15; Acct. #1350-529
Reference No. 20030249.2210

Dear Mr. Groth:

Fuss & O'Neill (F&O) has reviewed the fourth submission of the materials received between February 9 and March 9, 2023, related to the above-referenced project. A list of items reviewed is enclosed.

Comments that had been addressed with our third letter dated January 26, 2023, have been removed from this letter for brevity and clarity. Please refer to that letter for additional information on those comments if needed.

The following items have outstanding issues:

4. Traffic

a. *Former Fuss & O'Neill Comment: HR 275-9.B. The applicant has not provided any traffic information as part of their review package. / We have reviewed the Traffic Assessment prepared by Vanasse & Associates, Inc. (VAI) dated October 28, 2022, for the proposed lumber yard to be located on the southeast corner of the Central Street (Route 111) with Sullivan Road/Lawrence Road in Hudson, New Hampshire. The VAI assessment evaluates access requirements, potential off-site improvements, safety considerations, and traffic impacts associated with the project.*

The site currently contains a single-family home, which will be razed and replaced with six new structures as part of the project. Of the six structures, five would be constructed immediately and one would be constructed in the future. The Traffic Assessment notes that the new structures will consist of 4,800 square feet of retail space, 2,700 square feet of office space and 48,000 square feet of storage space. The retail and office spaces will be located together in a single structure, while the remaining five structures will each house 9,600 sf of storage space. Parking will be provided on-site for 35 vehicles and access will be provided via a driveway on Sullivan Road.

50 Commercial Street
Manchester, NH
03101
t 603.668.8223
800.286.2469

www.fando.com

California
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Massachusetts
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The methodology used for determining traffic impacts associated with the proposed site are reasonable with the appropriate ITE data used for the provided scenario. However, it is worth noting that traffic from the Sullivan Road and Lawrence Road stop-controlled approaches of the intersection experience significant delays. For example, the 2034 Weekday Evening Peak Hour No-Build delays for the minor roads are 597 seconds which is approximately 10 minutes, and 1,065 seconds (approximately 18 minutes). These delays increase to 802 seconds (approximately 13 minutes) and 1,221 seconds (approximately 20 minutes) for 2034 Weekday Evening Peak Hour Build conditions. Although the issue of delays along these roads will exist under No-Build conditions, the traffic generated by the proposed site exacerbates these delays. We agree with the report that the site does not generate a significant amount of traffic and understand that the traffic generated by the site is not necessarily the cause of this concern.

These queue lengths along Sullivan Road are a concern both in No-Build and Build conditions as these queues are potentially expected to reach the road's intersection with Bridle Bridge Road even under 2034 No-Build. We recommend that a signal warrant analysis be performed for No-Build and Build scenarios to determine if/when signalizing this intersection could be the proper mitigation for the long delays and queue described above. We recommend current traffic counts not impacted by Covid be used for any warrant analysis. Further, the Town would need to evaluate costs and responsibilities for the implementation of any mitigation measures, and coordination with the NHDOT would be required.

Current Fuss & O'Neill Comment: The applicant has stated that the request for a signal warrant is being addressed by Vanasse & Associates, and the applicant will submit their response under a separate cover once received.

6. Drainage Design/Stormwater Management (HR 275-9.A./Chapter 290)

a. *Former Fuss & O'Neill Comment: HR 276-6.F. The applicant should provide additional information on the groundwater recharge requirement. As an NHDES AoT permit will be required, the GRV BMP worksheet is appropriate. / The applicant should provide the stage storage table to illustrate WQV is met upon the provided BMP worksheet. / The applicant has stated that a storage table for each of the three forebays is provided to illustrate that the volume is sufficient to meet State guidelines for pre-treatment. We note the applicant provided a node summary for the forebays. We are specifically requesting a stage storage table to go along with the BMP worksheet provided for treatment, not pre-treatment as provided. The BMP worksheet notes 55,500 cf volume of WQV, the stage storage table is the table form of the storage tab of the HydroCAD node, illustrating the volume below the lowest outlet.*

Current Fuss & O'Neill Comment: The applicant has provided the requested storage table to coincide with the BMP worksheet. No further Fuss & O'Neill comment.

j. **Former/Current Fuss & O'Neill Comment:** HR 290-7.A.7. The applicant should confirm with the Town if any additional coordination is required due to the close proximity of the onsite wetland.

k. **Former/Current Fuss & O'Neill Comment:** HR 290-7.A.13. The applicant should provide outlet protection calculations to ensure the forebays adequately prevent erosion from occurring.

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n. *Former Fuss & O'Neill Comment: HR 290-7.B.13. We note the requirement of the NHDES AoT permit to utilize HISS soils. If the use of HISS mapping revises the soil types, runoff numbers, and infiltration rates, the applicant should revise the drainage calculations appropriately./ We note the applicant has provided the HISS map in the plan set. As stated previously, if the use of HISS mapping revises the soil types, runoff numbers, and infiltration rates, the applicant should revise the drainage calculations appropriately and address original comment.*

Current Fuss & O'Neill Comment: The applicant has noted that the stormwater design may need to be adjusted based on Site Specific Soil Mapping (SSSM) as part of their Alteration of Terrain (AoT) submission. The applicant should keep the Town informed of all comments and correspondence with the NHDES, and provide updated design calculations as required. See comment 6.q as well. No further Fuss & O'Neill comment.

q. *Former Fuss & O'Neill Comment: HR 290-10.A. The applicant should keep the Town informed of all communication with NHDES in relation to the required Alteration of Terrain and Wetlands Permits being requested to ensure NHDES comments do not alter drainage design/calculations./ The applicant has stated that copies will be provided to the Town. We note that the Town should be informed about all changes to the drainage report and not just changes that the applicant considers drastic.*

Current Fuss & O'Neill Comment: We note that the applicant has not yet submitted the project to Alteration of Terrain for review. We continue to recommend that the Town be informed about all changes to the drainage report and not just changes that the applicant considers drastic.

y. **New Fuss & O'Neill Comment:** The applicant has included a winter salt minimization plan within the Inspection and Maintenance Manual. The winter deicing operations references the Town of Merrimack instead of the Town of Hudson. We request the applicant reference the correct Town.

z. *Town Comment: In your opinion does the snow storage strategy potentially interfere/block the stormwater management design and/or site design? Snow removal/storage is proposed to be plowed through of couple gates on the west side of the site.*

Current Fuss & O'Neill Comment: The two outermost gates appear to be in areas with a distance greater than 100' to wetlands, while one is approximately 40' from the proposed septic. The applicant has included the use of NH Green Snow Pro requirement, which minimizes the use of ice melting salts and related materials. The stormwater management area (infiltration basin 1) does not appear to be directly affected by the snow plowing method. The grading on the plan proposes for snow melt to enter the catch basins where sediment and debris will settle into the catch basin sump or be separated via the outlet hood. If grading varies from plan, and stormwater or snowmelt does happen to find its way directly into the basin, it will be pre-treated by the stone berm forebay in the basin. This will help prolong the lifespan of the treatment practice.

We note that pushing of snow off the proposed "platform" and through gates to landscaped areas from a site design does not seem like a logically maintainable process. Piles of snow with sediment and debris (trash) will be concentrated to a grass slope area. Vegetation could be damaged by the snow/ice as well as the sand/sediment/debris if not regularly maintained. This gravel shoulder will be carved with divots from plows and could redirect stormwater away from the CBs or basin. Snow melt and stormwater runoff to the south should not be an issue. If anything, possibly requesting applicant to add (and maintain) a stone berm around the north and south perimeters of the gravel shoulder

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would help direct stormwater and snow melt into the basin during phase 1. Once this is damaged with a plow, this will need to be constantly maintained, especially in the spring before snow melt.

aa. *Town Comment: With everything sheet flowing, is any curbing needed? The periphery of the site is a 2-foot gravel shoulder… is all of the stormwater going to make it to the catch basins? If some does end up in the gravel shoulder, is that a problem?*

Current Fuss & O'Neill Comment: There are some catch basins located in the phase 1 gravel, which is to be paved in phase 2. These should help collect stormwater in both phases. If grading for both phases is completed during phase 1, and constructed properly, all stormwater should drain into the site for CB collection or directed into the basin. One item to think about, to help minimize unwanted discharges, would be to create the gravel berm around the perimeter of the gravel area (future pavement area) as mentioned above.

The following items require Town input:

2. Administrative Review Codes (HR 276)

a. *Former Fuss & O'Neill Comment: HR 276-11.1.B.(4).(b). The applicant should provide the approval block on each sheet of the plan set. The block is missing from the Existing Conditions Plan and Construction Details.*

Former/Current Fuss & O'Neill Comment: The applicant has added the approval block to the Existing Conditions Plan and Construction Details. We note that the applicant has added the Proposed Sewage Disposal Plan and the High Intensity Soil Map as exhibits to the plan set. The applicant should review with the Town if approval blocks are required for those sheets in the final approval set of the plans.

c. *Former Fuss & O'Neill Comment: HR 276-11.1.B.(12).(c). The applicant has not shown the 100-foot setback between the commercial use and the residential use adjacent to the site. We note that the proposed infiltration basin and other improvements are proposed within this 100-foot setback, which is not allowed by the Regulation.*

Former/Current Fuss & O'Neill Comment: The applicant has requested a waiver from this requirement.

The following items are resolved or have no further Fuss & O'Neill input:

6. Drainage Design/Stormwater Management (HR 275-9.A./Chapter 290)

v. *Former Fuss & O'Neill Comment: ETGTD 930.4 The applicant shall review the slope of the proposed drainage system with the Town Engineer, although it is self-cleaning velocity, it does not meet the regulations.*

Current Fuss & O'Neill Comment: We've reviewed this with the Town Engineer and the proposed slopes are acceptable as long as the self-cleaning velocities are achieved. No further Fuss & O'Neil comment.

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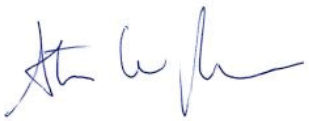
Mr. Brian Groth
March 29, 2023

Please feel free to call if you have any questions.

Very truly yours,



Steven W. Reichert, P.E.

SWR:

Enclosure

cc: Town of Hudson Engineering Division – File
Fieldstone Land Consultants, PLLC – cebranon@feildstonelandconsultants.com

Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

Ref: 9517

May 3, 2023

Mr. Brian Groth, AICP
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Re: Response to Transportation Comments – 84 Lumber
Hudson, New Hampshire

Dear Mr. Groth:

Vanasse & Associates, Inc. (VAI) hereby submits responses to the comments received from a Planning Board member related to traffic associated with the proposed project to be located at the intersection of Central Street (Route 111) and Sullivan Road/Lawrence Road in Hudson, New Hampshire. For convenience, we have reproduced the comment followed by our response.

Planning Board Member
February 10, 2023

Source: October 28, 2022 Traffic Assessment Proposed Lumber Yard Hudson, New Hampshire.

Comment 1: *Page 7 Project-Generated Traffic*

- *Observation: ITE LUC 812 Building Materials and Lumber Store and ITE LUC 150 Warehousing are used for Project Trip-Generation.*

  1. *Request: please supply the Planning Board with the ITE LUC description language information for clarification of what is incorporated in each LUC. Please do not consider this as a request to revise the traffic assessment study with the expanded information.*

Response: As indicated by the ITE Trip Generation Manual(ITE)[1], a warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. A building materials and lumber store is a free-standing building that sells hardware, building materials, and lumber. The lumber may be stored in the main building, yard, or storage shed. The cut sheets from the Manual for the individual Land Use Codes are attached to this letter.

Comment 2: *Page 7 Table 4 Project Trip Generation Summary*

- *Observation: The table and the balance of the Traffic Assessment addresses Weekday Evening peak hour vehicle trips. Per January 25, 2023 testimony primary operations*

[1] *Trip Generation,* 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

*are for Contractor Sales. The ITE calculations indicate Weekday **Evening** peak hour vehicle trips are the controlling factor instead of Weekday **Morning** peak hour vehicle trips*

2. *Question: At other operating sites do these ITE based calculations that Evening peak hour trips are greater than Morning peak hour trips agree with the Applicant's experience for operations focused primarily on Contractor Sales?*

Response: The ITE data indicated that weekday morning peak hour trip rates are approximately 70 percent of the weekday evening peak hour trip rates, but that the Saturday peak hour trip rates are more than 4 times higher than the weekday evening rates. Accordingly, the weekday evening and Saturday peak hour time periods were chosen for analysis. There is no specific ITE data for a lumber yard specializing in contractor sales.

Comment 3: *Source of data: Appendix; Capacity Analysis Central Street at Sullivan Road / Lawrence Road.*

- *2024 Opening Year No-Build Weekday Evening Peak Hour*
- *2024 Opening Year Build Weekday Evening Peak Hour*
- *2034 No-Build Weekday Evening Peak Hour*
- *2034 Build Weekday Evening Peak Hour*

  - *Observation: Note all data and calculations are based on impact to Sullivan Road for Stop control at the intersection.*

    - *The Traffic Assessment seems to conclude the Planning Board should place attention primarily on minor incremental increase in trip generation impact on Central Street. However impact on Sullivan Road traffic trying to access entrance and merge onto Central Street is significant.*

    - *For 2024 No Build versus Build it is approximately 1.64 minute increase (3.86 to 5.5 minutes) or 42% increase in wait time on Sullivan to try and merge with Central Street traffic. Note this is already operating at LOS F weekday.*

    - *For 2034 No Build versus Build is approximately 3.0 minute increase (10 to 13 minutes) or 30% increase in wait time on Sullivan to try and merge with Central Street traffic. Note this is already operating at LOS F weekday.*

    - *For 2024 Build comparison to 2034 Build is approximately 7.5 minute increase (5.5 to 13 minutes) or 236% increase in wait time on Sullivan to try and merge with Central Street traffic.*

      1. *Question: Please check my calculations but in any case does the Applicant propose any offsite improvements to Sullivan Road such as additional turning lanes to mitigate delay times and queuing lengths whether it remains Stop Controlled or Traffic Signal Controlled?*

Response: The Applicant is working with New Hampshire Department of Transportation (NHDOT) District 5 on review of potential improvements at this intersection since the intersection is under state jurisdiction. We have been told that any improvements require a standard NHDOT Driveway Permit application and that a full review of potential improvements will

be conducted involving multiple sections within NHDOT. The Applicant is willing to work with the Town and NHDOT to identify potential improvements that are fair and reasonable and appropriate given the scale of the Project traffic increases.

Comment 4: *Pages 7 thru 9 including figures: Trip Distribution and Assignment*

- *Observation: Trips exiting the site in every scenario all make only a left turn out movement towards the Central Street / Sullivan Road intersection. If the Sullivan / Central intersection remains Stop-controlled for any period of time for future Lumberyard operations significant delays and queues for non-build and build conditions will continue to increase as noted in the traffic assessment report. The study doesn't take into account that even current GPS devices with travel time and distance technology can significantly have impact on choosing alternative routes.*
  - *Question: Why doesn't the traffic assessment modeling analyze possible alternate GPS recommended routes for site generated traffic exiting the site to avoid any Stop-controlled time delay or queue problems?*
    - *Example 1: Seek relief by using Bridle Bridge Road to travel westward to access Windham via the Bridle Bridge / Route 128 intersection.*
    - *Example 2: Make a right turn exit movement onto Sullivan from the site driveway to seek relief by using an overall eastward route into Hudson via a combination of roadways*
  - *I would think these alternate routes would also apply somewhat even with improved Traffic Signal controlled conditions at the Sullivan / Central intersection. Any future increases in traffic on Sullivan and Bridle Bridge Roads in pedestrian areas was a stated concern during the 01-25-2022 public input.*

Response: Bridle Bridge Road is posted for "No Thru Trucking" at the Route 128 intersection which would serve to discourage truck traffic from use of this road. There may be additional traffic using Sullivan Road or Bridle Bridge Road as alternate routes as these roads are viable and may be used to access the site on occasions where delay exists. However, motorists prefer routes that are the easiest to travel and result in the least delay. Therefore, most of the traffic associated with the site is expected to use Route 111 which has a higher posted speed, wider shoulders, and a straighter alignment than Sullivan Road or Bridle Bridge Road.

Comment 5: *Page 12 Conclusions*

- *Observation: Per January 25, 2023 testimony primary operations are for Contractor Sales. However per Traffic Assessment Conclusions it is stated; "The Project is expected to generate* ***210 vehicle trips on an average weekday (two-way, 24-hour volume)****, with 26 vehicle trips (11 entering and 15 exiting) expected during the weekday evening peak hour. On* ***Saturday, the Project is expected to generate 396 vehicle trips*** *with 74 vehicle trips (38 entering and 36 exiting) expected during the Saturday midday peak hour."*
  - *Question: If this is primarily a Contractor Sales operation why is Saturday two-way, 24-hour volume (396) approximately a 188 percent increase over the average* ***weekday*** *two-way, 24-hour volume (210)?*

- *Question: This makes understanding of application of ITE LUC to building areas important in trip generation. Does ITE LUC 802 for 7,500 sf of building favor more Saturday traffic then ITE LUC 150 for 48,000 sf of building?*

Response: See response to Comment 2. There is likely some component of homeowner sales in the ITE data for this use, as the ITE data does not have specific data for a lumber yard specializing in contractor sales. The building materials and lumber store use has a higher Saturday trip generation rate than the warehouse use.

I trust that these responses address the comments and if additional information is required, please do not hesitate to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.

Scott W. Thornton, P.E.
Principal

Attachments: ITE Data

cc: File

Land Use: 150
Warehousing

Description

A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Texas.

Source Numbers

184, 331, 406, 411, 443, 579, 583, 596, 598, 611, 619, 642, 752, 869, 875, 876, 914, 940, 1050

Warehousing
(150)

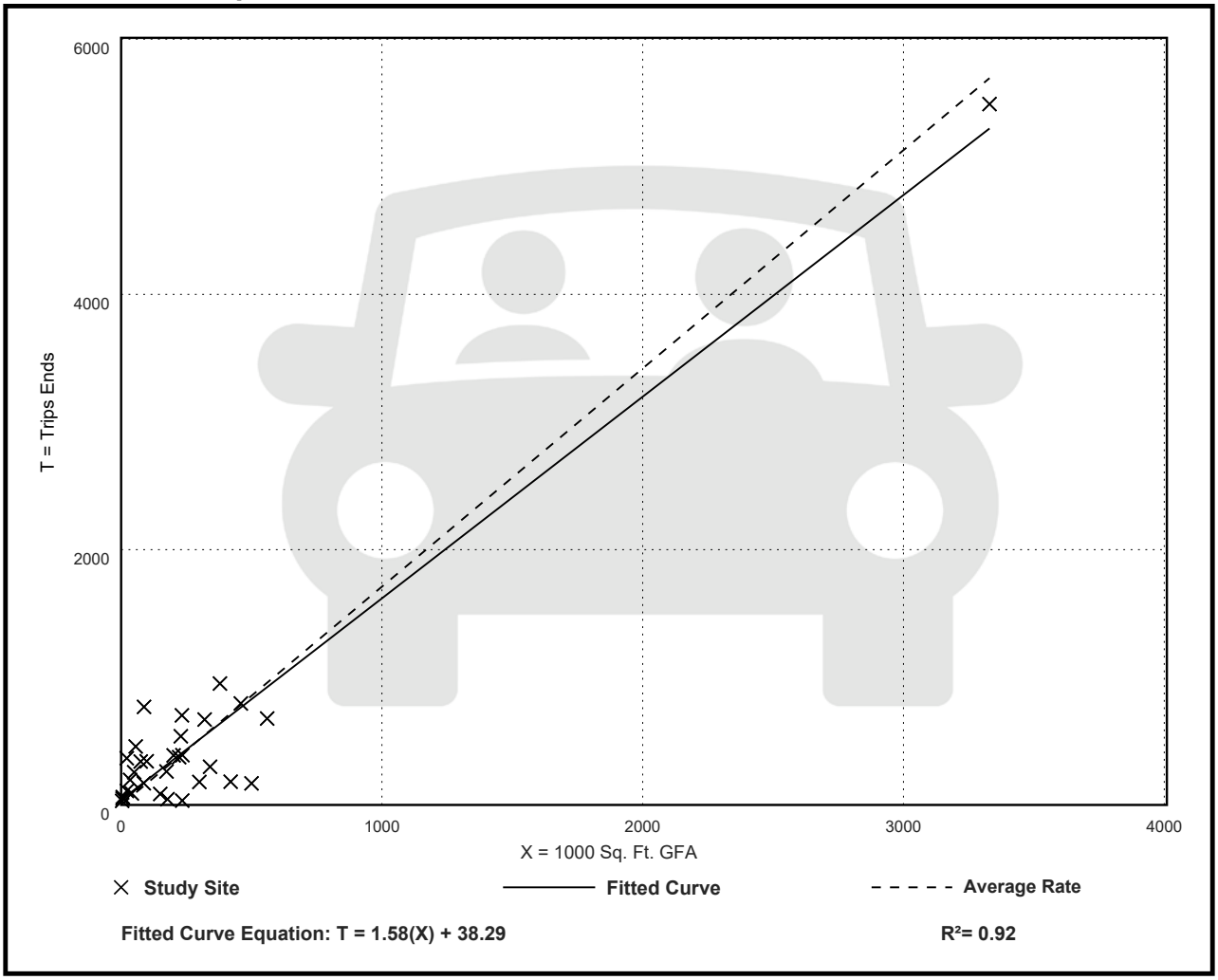
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 292
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.71	0.15 - 16.93	1.48

Data Plot and Equation



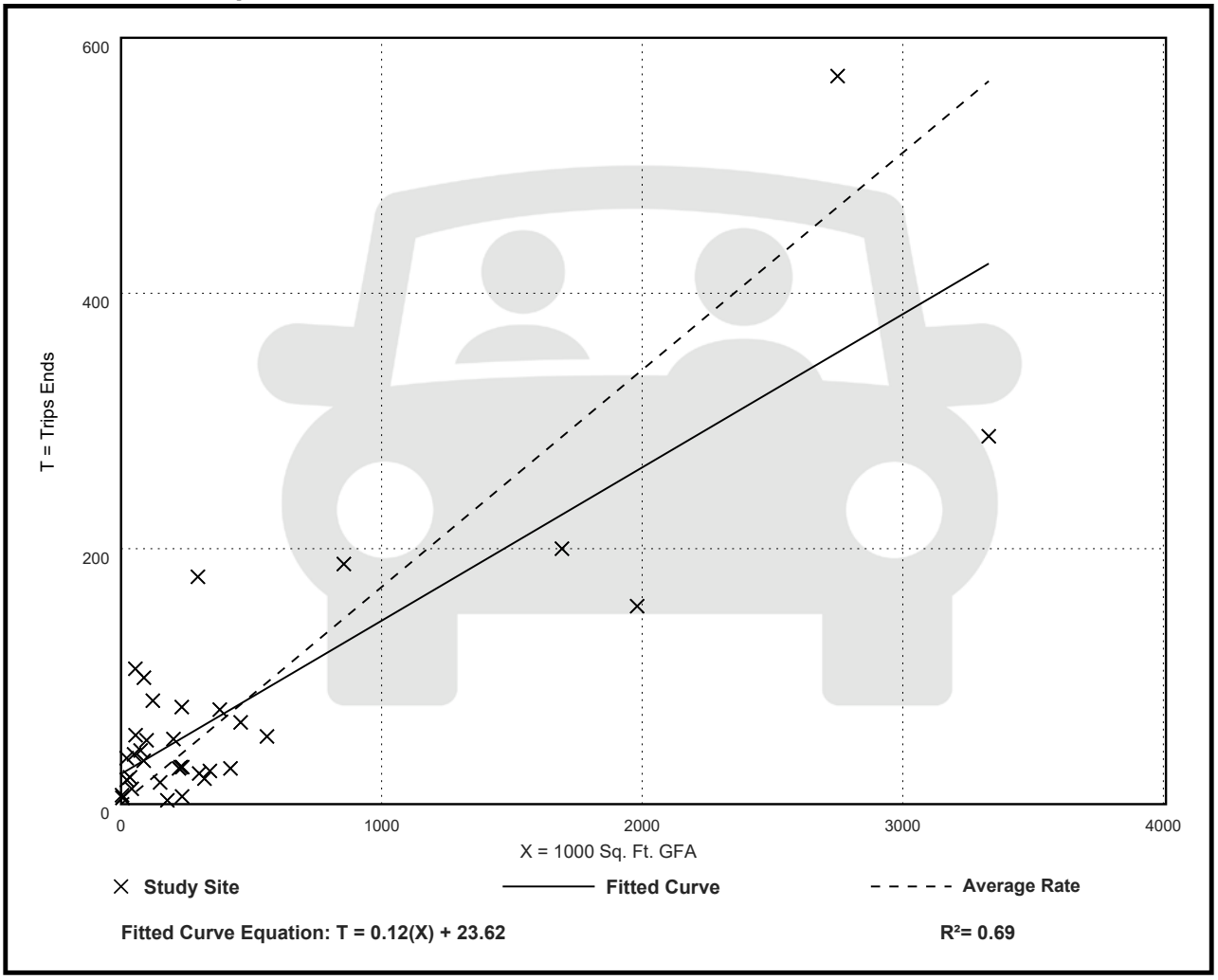
Warehousing
(150)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 36
Avg. 1000 Sq. Ft. GFA: 448
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

Data Plot and Equation



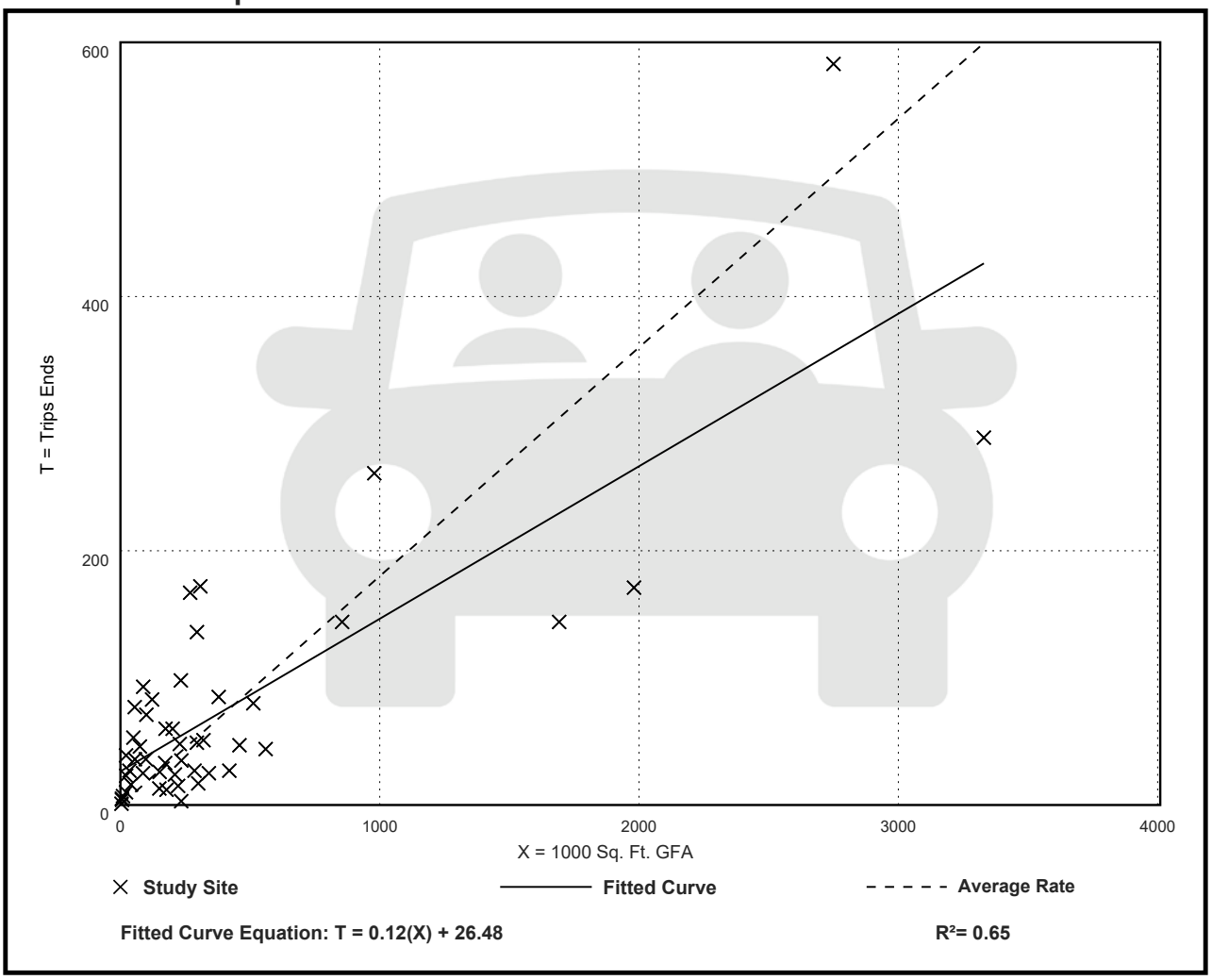
Warehousing
(150)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 49
Avg. 1000 Sq. Ft. GFA: 400
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

Data Plot and Equation



Warehousing
(150)

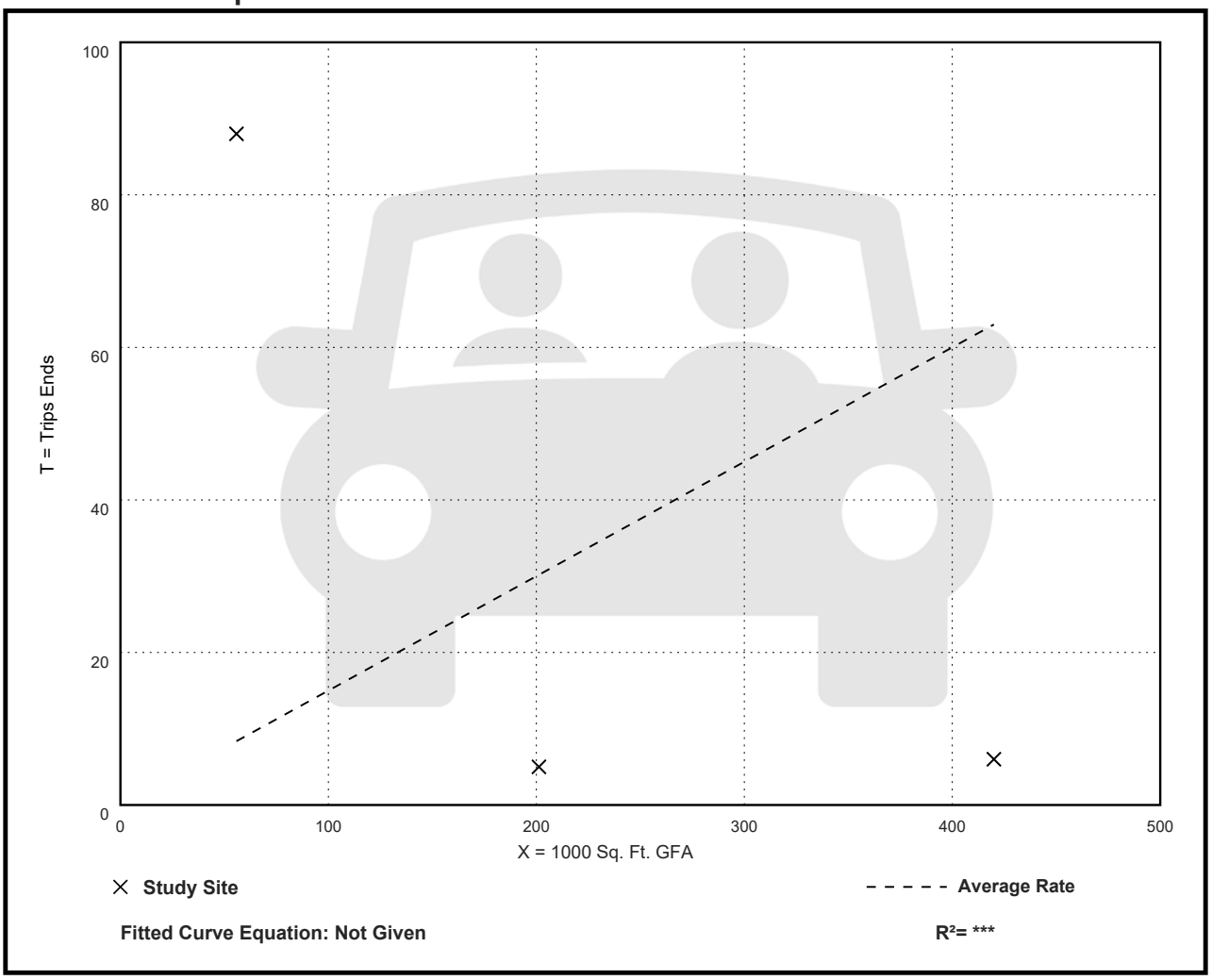
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 226
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.01 - 1.58	0.53

Data Plot and Equation



Warehousing
(150)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

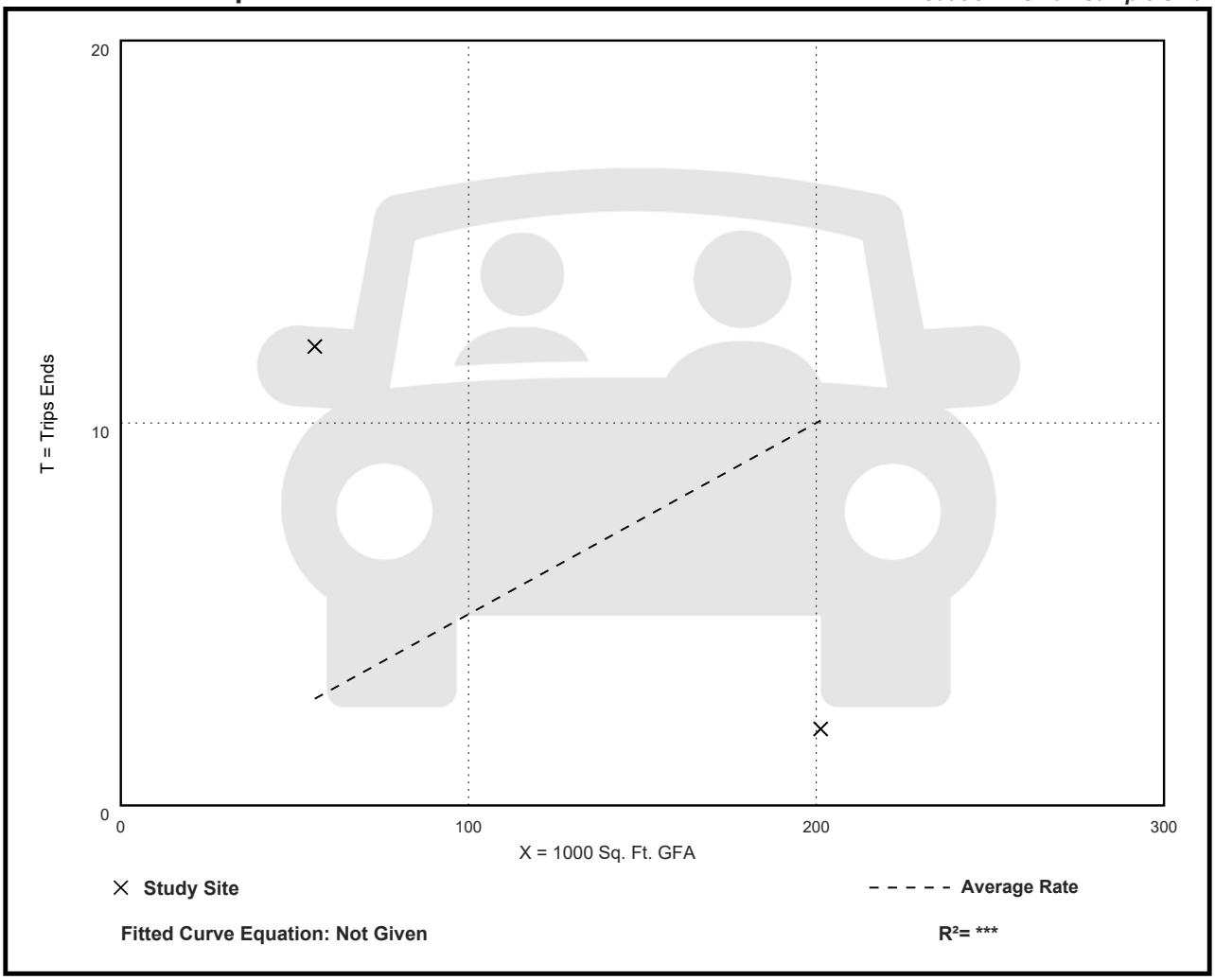
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 129
Directional Distribution: 64% entering, 36% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.05	0.01 - 0.22	***

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= *

Land Use: 812
Building Materials and Lumber Store

Description

A building materials and lumber store is a free-standing building that sells hardware, building materials, and lumber. The lumber may be stored in the main building, yard, or storage shed. Hardware/paint store (Land Use 816) and home improvement superstore (Land Use 862) are related uses.

Additional Data

An outside storage area is not included in the overall gross floor area measurements. However, if the storage area is located within the principal outside faces of the exterior walls, it is included in the overall gross floor area of the building.

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s and the 2010s in California, New York, Texas, and Washington.

Source Numbers

126, 280, 879, 1019

Building Materials and Lumber Store (812)

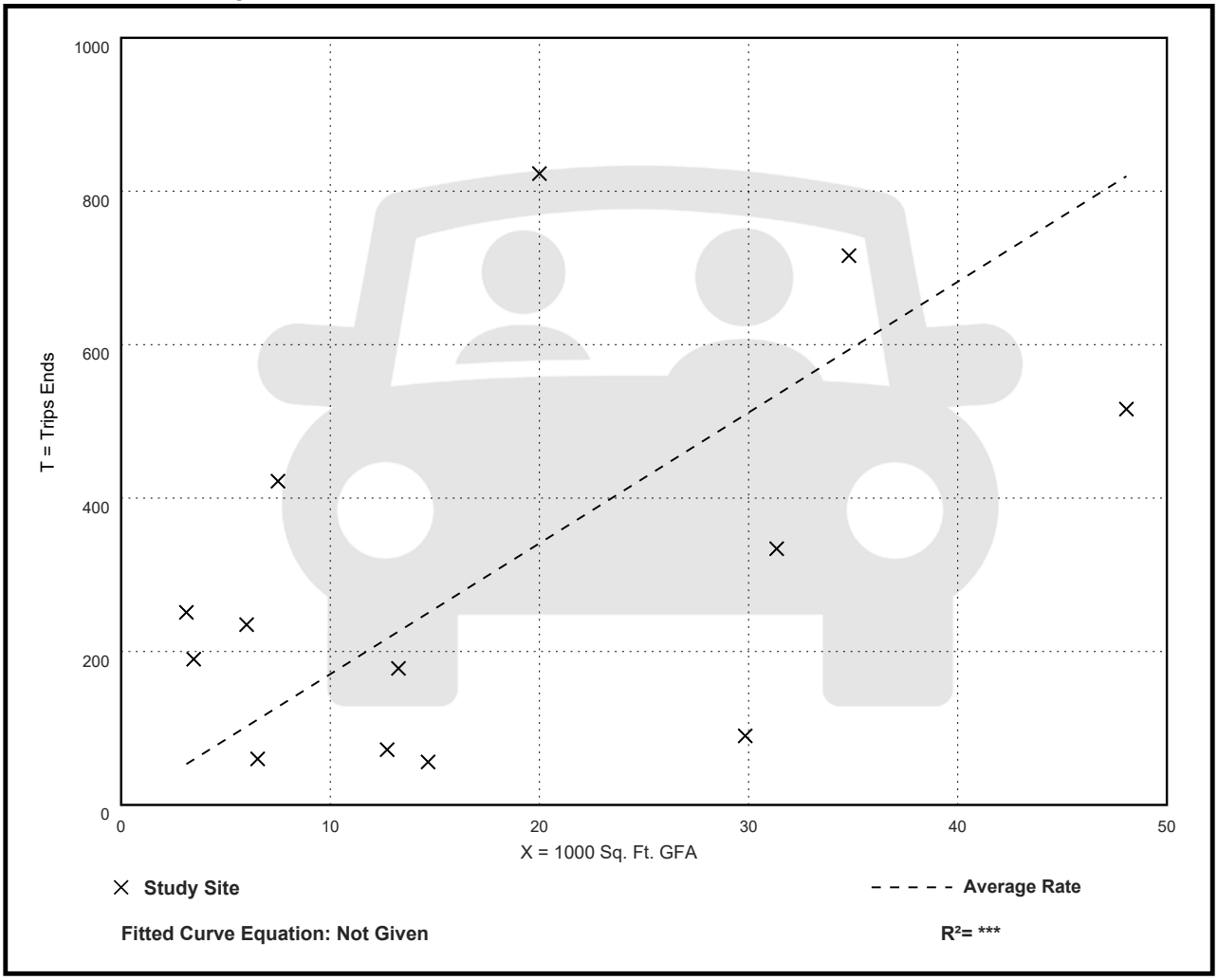
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 18
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
17.05	3.02 - 80.45	16.46

Data Plot and Equation



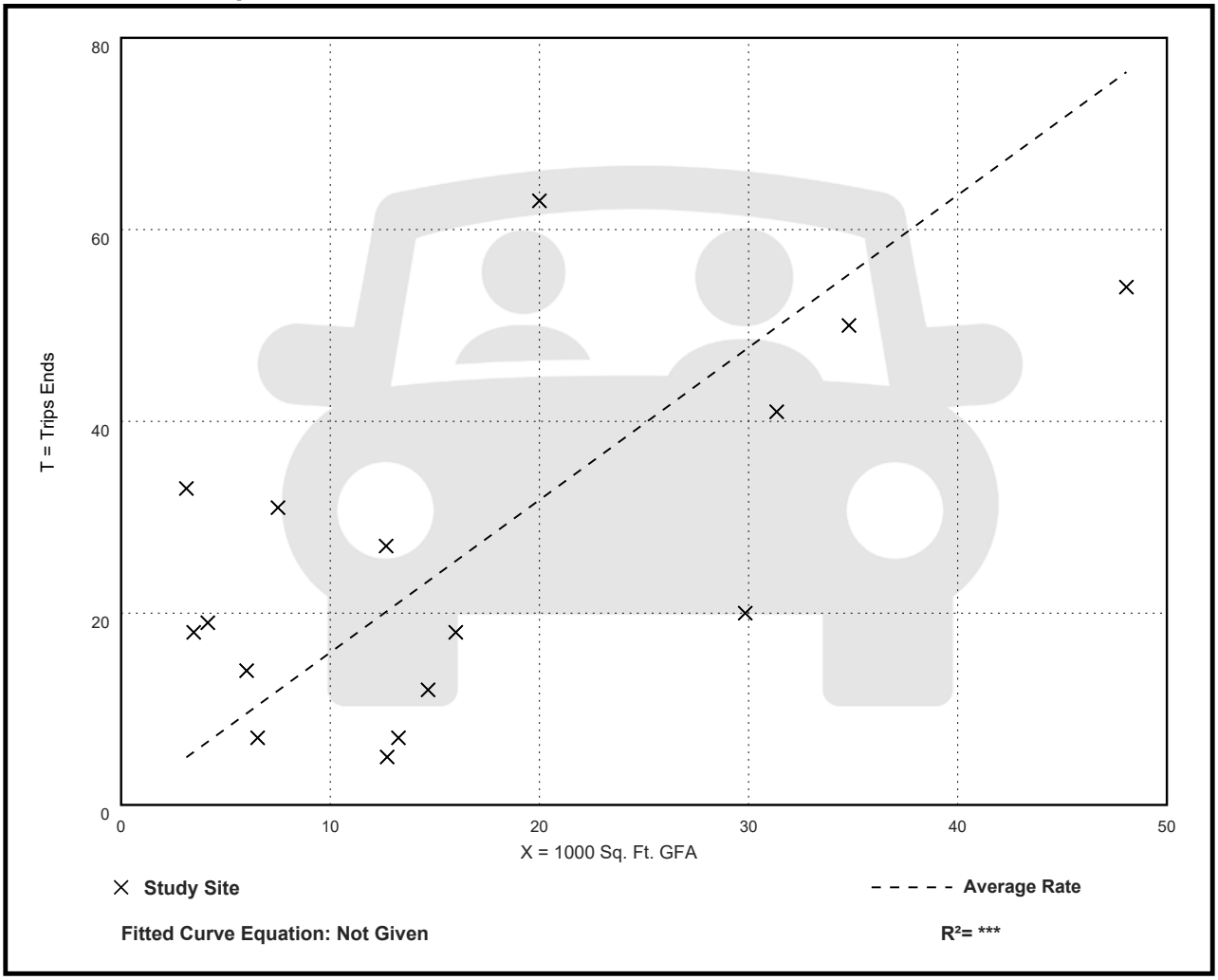
Building Materials and Lumber Store
(812)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 16
Avg. 1000 Sq. Ft. GFA: 17
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.59	0.39 - 10.58	1.46

Data Plot and Equation



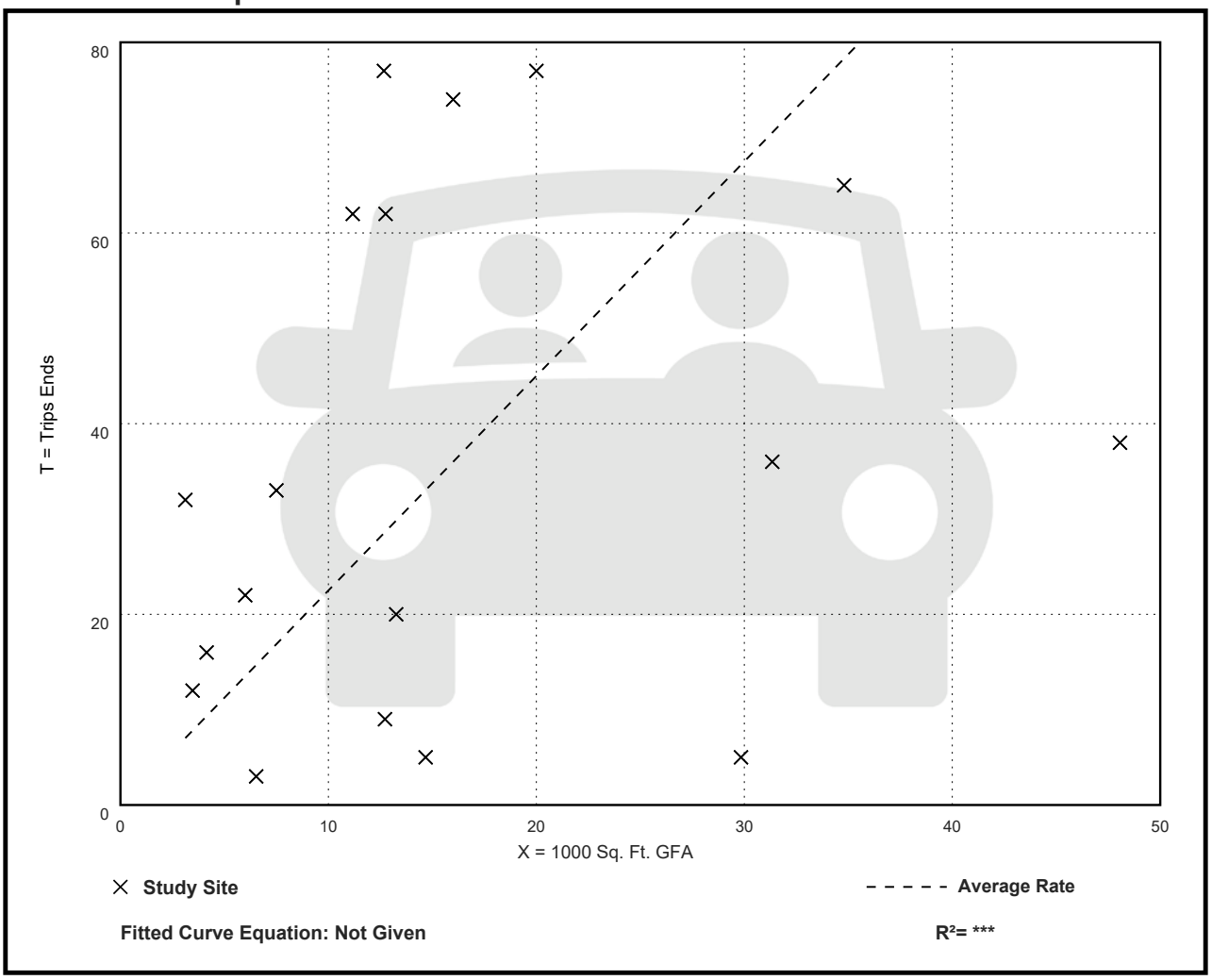
Building Materials and Lumber Store
(812)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 18
Avg. 1000 Sq. Ft. GFA: 16
Directional Distribution: 46% entering, 54% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.25	0.17 - 10.26	2.09

Data Plot and Equation



Building Materials and Lumber Store
(812)

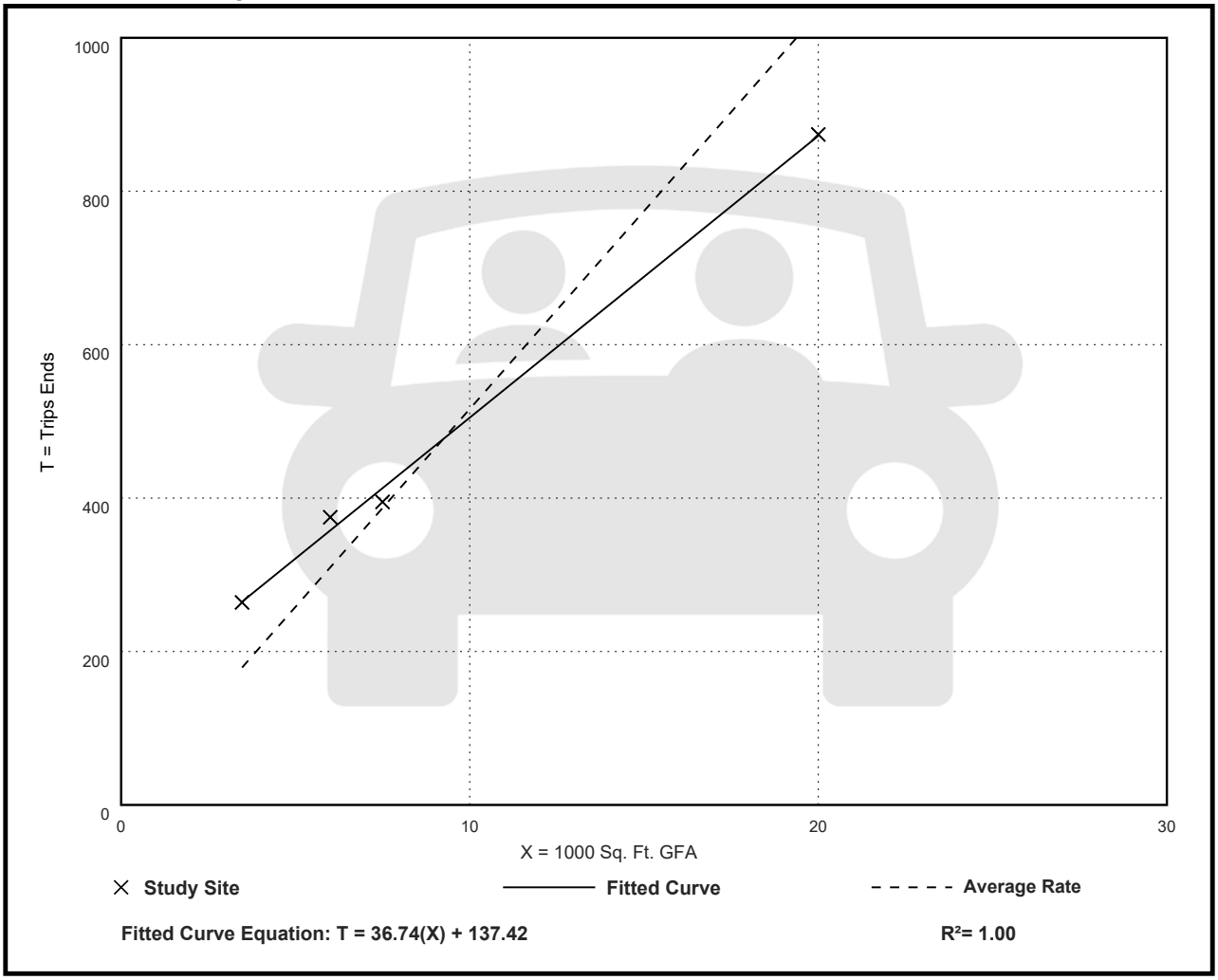
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday

Setting/Location: General Urban/Suburban
Number of Studies: 4
Avg. 1000 Sq. Ft. GFA: 9
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
51.61	43.70 - 76.08	12.08

Data Plot and Equation



Fitted Curve Equation: T = 36.74(X) + 137.42

R^2= 1.00

Building Materials and Lumber Store
(812)

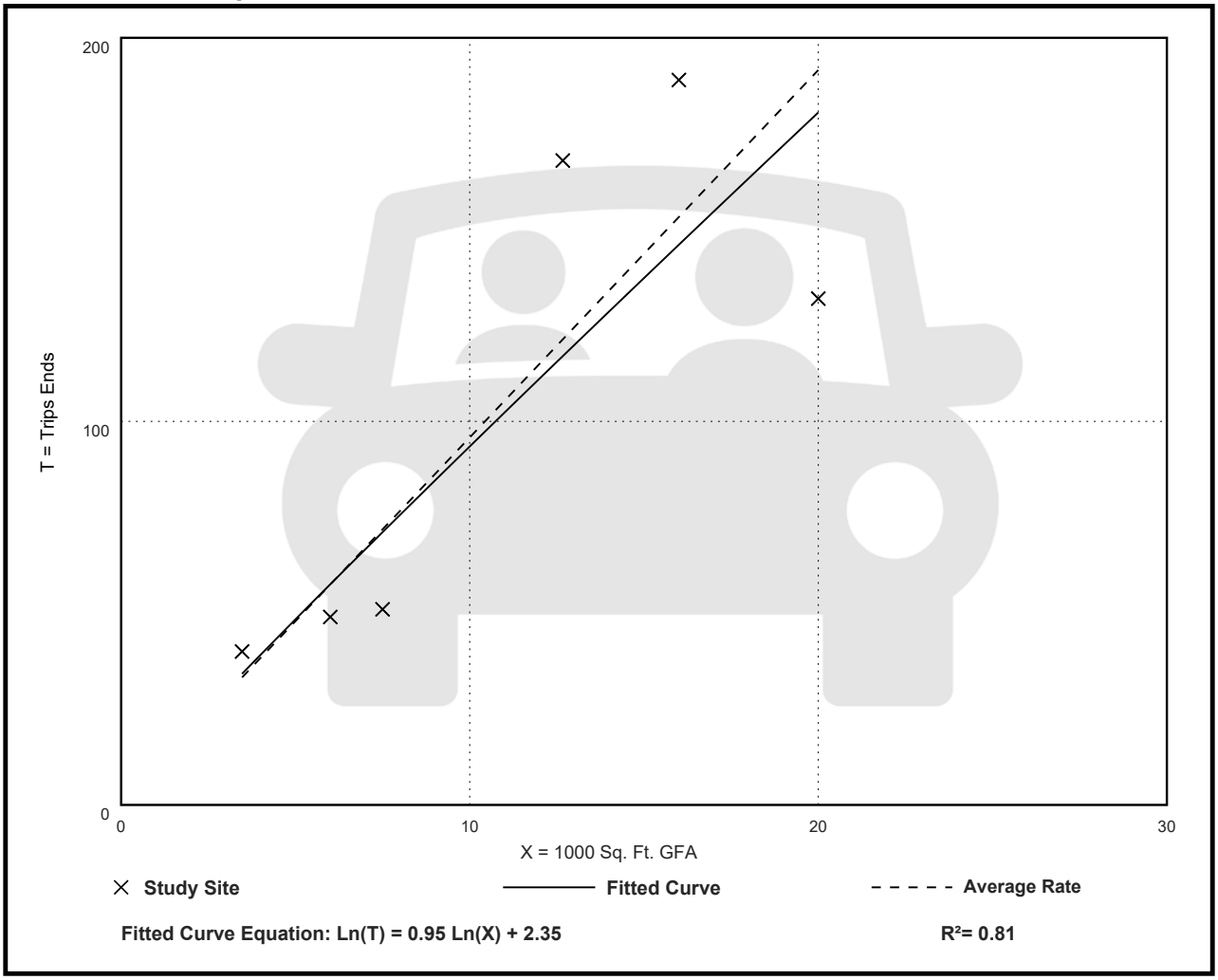
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 6
Avg. 1000 Sq. Ft. GFA: 11
Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.58	6.60 - 13.26	3.06

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.95 Ln(X) + 2.35

R^2= 0.81

Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

Ref: 9517

May 3, 2023

Mr. Brian Groth, AICP
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Re: Signal Warrant Analysis – Central Street (Route 111) at Lawrence Road/Sullivan Road
Proposed Lumber Yard
Hudson, New Hampshire

Dear Mr. Groth:

Vanasse & Associates, Inc. (VAI) has prepared a Traffic Signal Warrants Analysis for the above-referenced intersection as requested by the town's peer review consultant, Fuss & O'Neill. VAI conducted 12-hour traffic counts at the intersection in January 2023 and combined these with estimates of future conditions and the Project trip-generation estimates contained in the Traffic Assessment for the Project dated October 28, 2022 in order to complete the analysis. A description of the intersection results from the analysis are provided below.

Route 111 at Lawrence Road/Sullivan Road

Lawrence Road and Sullivan Road intersect Route 111 from the northwest and southeast, respectively, to form this four-way intersection under two-way STOP control. Route 111 is classified as a principal arterial under the jurisdiction of the New Hampshire Department of Transportation (NHDOT) District 5 and allows two-way travel separated by a double-yellow centerline. Both Route 111 approaches provide an 11- to 12-foot wide left-turn lane and a shared through/right-turn lane of between 12 and 13 feet wide. The Lawrence Road and Sullivan Road approaches each provide a 13-foot wide general purpose lane under STOP-sign control. Land uses at the intersection generally consist of open and wooded areas, a motel, and the Project site.

Traffic Signal Warrant Analysis (TSWA)

The *Manual on Uniform Traffic Control Devices* (MUTCD)[1] establishes nine warrants or criteria to evaluate a location for the installation or retention of a traffic signal. At least one of the nine warrants should be satisfied in order to justify the installation or retention of a traffic signal; however, satisfaction of a warrant in and of itself does not justify traffic signal control. An engineering evaluation of the location in question should indicate that the establishment of traffic signal control will improve the overall safety and/or operation of the intersection. Table 1 identifies the nine traffic signal warrants that were reviewed for this analysis.

[1]*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2009.

Table 1
TRAFFIC SIGNAL WARRANTS

Warrant No.	Description
1	Eight-Hour Vehicular Volume
2	Four-Hour Vehicular Volume
3	Peak Hour Vehicular Volume
4	Pedestrian Volume
5	School Crossing
6	Coordinated Signal System
7	Crash Experience
8	Roadway Network
9	Intersection near a Grade Crossing

A TSWA was conducted using 2023 Existing, 2034 No-Build, and 2034 Build traffic volumes. All volume scenarios were adjusted to average-month conditions, rather than peak-month conditions. Existing geometry was utilized. Based on the TSWA analysis the following was determined:

- 2023 Existing Conditions – Warrant 3 (Peak-Hour) is met;
- 2034 No-Build Conditions – Warrant 2 (Four-Hour) and Warrant 3 (Peak Hour) are met;
- 2034 Build Conditions – Warrant 1 (Eight-Hour), Warrant 2 (Four-Hour), and Warrant 3 (Peak Hour) are met.

Warrant 4 is related to pedestrian volume at an intersection. This warrant requires a minimum of 75 pedestrians per hour for each of four hours or a minimum of 93 pedestrians per hour for a peak hour. A review of the count data indicated that zero pedestrians were observed in 12 hours. Therefore, this warrant is not satisfied.

Warrant 5 is related to street crossings by schoolchildren, including elementary through high school students. This warrant requires a minimum of 20 schoolchildren crossing during the highest crossing hour. As noted, zero pedestrians were observed, and the intersection is not near a school. Therefore, this warrant is not satisfied.

Warrant 6 is related to the potential installation of a traffic signal at an intersection in the middle of a coordinated signal system to improve progressive traffic movement on a corridor. The intersection is not in a coordinated signal system; therefore, this warrant is not satisfied.

Warrant 7 is related to crash experience and involves adequate trial of alternatives with no reduction in outcome of crashes and five or more reported crashes of a type that could be corrected by a traffic control signal have occurred within a twelve-month period. Crash data from the Hudson Police Department indicated that a total of 8 crashes occurred at the intersection over the period 2019 to 2021 with a maximum of 4 crashes in one twelve-month period; therefore, this warrant is not satisfied.

Warrant 8 is related to the installation of a signal to encourage concentration and organization of traffic flow on a roadway network. As with Warrant 6, the intersection is not part of a coordinated signal system

and is also not at the intersection of two major routes that might benefit from organization of traffic flows. Therefore, this warrant is not satisfied.

Warrant 9 is related to the installation of a signal at an intersection near a railroad grade crossing, where none of the other warrants are met, but the proximity of the intersection to a railroad grade crossing is the principal reason to consider installation of signal control. There are no railroad grade crossings near the intersection; therefore, this warrant is not satisfied.

Table 2 summarizes the traffic signal warrant analysis.

Table 2
TRAFFIC SIGNAL WARRANTS ANALYSIS RESULTS[a]
ROUTE 111 AT LAWRENCE ROAD/SULLIVAN ROAD

Warrant No.	Description	Satisfied for 2023 Existing Conditions	Satisfied for 2034 No-Build Conditions	Satisfied for 2034 Build Conditions
1	Eight-Hour Vehicular Volume	No	No	Yes
2	Four-Hour Vehicular Volume	No	Yes	Yes
3	Peak Hour	Yes	Yes	Yes
4	Pedestrian Volume	No	No	No
5	School Crossing	No	No	No
6	Coordinated Signal System	No	No	No
7	Crash Experience	No	No	No
8	Roadway Network	No	No	No
9	Grade Crossing	No	No	No

[a]TSWA based on counts conducted in January 2023.

Since the intersection is under the jurisdiction of NHDOT, the signal warrant results have been provided to NHDOT in March 2023. However, they have indicated that a full review of the intersection conditions is required through their Driveway Permit process, which the Applicant is committed to participate in.

If additional information is required, please do not hesitate to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.

Scott W. Thornton, P.E.
Principal

Attachments: Traffic Counts and Signal Warrant Analysis

cc: File

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 1

Groups Printed- Cars - Trucks

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	18	11	6	2	148	3	5	3	6	1	111	2	316
07:15 AM	8	4	7	2	158	2	4	9	4	0	121	3	322
07:30 AM	10	15	5	0	158	4	3	5	12	0	113	3	328
07:45 AM	10	10	6	1	163	8	4	5	4	5	129	1	346
Total	46	40	24	5	627	17	16	22	26	6	474	9	1312
08:00 AM	7	2	6	1	122	5	4	2	6	1	104	7	267
08:15 AM	9	9	4	3	110	2	4	4	8	0	112	5	270
08:30 AM	10	2	2	3	124	5	4	1	9	1	95	0	256
08:45 AM	5	3	5	5	133	6	2	4	7	2	77	4	253
Total	31	16	17	12	489	18	14	11	30	4	388	16	1046
09:00 AM	5	6	2	2	108	8	6	3	4	3	79	1	227
09:15 AM	5	1	1	4	91	2	3	2	2	2	72	1	186
09:30 AM	5	4	3	3	83	4	1	4	3	1	79	2	192
09:45 AM	5	5	0	3	101	3	2	7	2	0	74	4	206
Total	20	16	6	12	383	17	12	16	11	6	304	8	811
10:00 AM	4	1	2	4	76	2	4	2	8	1	84	4	192
10:15 AM	11	1	5	0	83	2	3	6	7	4	65	3	190
10:30 AM	7	5	4	4	72	1	8	0	1	1	69	1	173
10:45 AM	2	8	3	3	79	8	6	3	2	0	69	3	186
Total	24	15	14	11	310	13	21	11	18	6	287	11	741
11:00 AM	4	5	0	2	78	5	1	5	4	0	63	6	173
11:15 AM	5	3	1	2	90	3	2	0	1	4	66	5	182
11:30 AM	8	3	2	3	78	7	6	4	4	1	71	2	189
11:45 AM	1	4	2	5	73	7	2	1	4	1	79	2	181
Total	18	15	5	12	319	22	11	10	13	6	279	15	725
12:00 PM	3	2	3	1	66	5	1	1	4	1	72	3	162
12:15 PM	4	1	5	7	95	9	2	6	3	2	81	2	217
12:30 PM	5	1	1	3	69	9	7	5	4	0	88	4	196
12:45 PM	2	6	0	4	78	6	1	3	5	3	65	6	179
Total	14	10	9	15	308	29	11	15	16	6	306	15	754
01:00 PM	3	5	2	6	67	4	4	3	3	3	82	2	184
01:15 PM	5	2	1	0	87	8	4	8	2	4	72	4	197
01:30 PM	2	3	4	2	92	5	1	1	2	2	84	1	199
01:45 PM	5	1	4	3	71	6	1	1	3	3	96	2	196
Total	15	11	11	11	317	23	10	13	10	12	334	9	776
02:00 PM	3	3	3	5	77	5	4	1	6	1	111	2	221
02:15 PM	6	2	0	4	86	9	3	2	4	4	121	7	248
02:30 PM	3	5	2	4	110	11	1	3	4	2	110	8	263
02:45 PM	3	3	1	5	99	12	1	6	4	3	116	8	261
Total	15	13	6	18	372	37	9	12	18	10	458	25	993
03:00 PM	2	2	2	10	123	9	3	4	5	0	127	4	291
03:15 PM	3	3	0	11	119	17	3	8	6	0	140	3	313
03:30 PM	6	6	4	9	128	8	3	4	3	3	122	4	300
03:45 PM	7	3	4	8	121	10	3	1	3	4	150	4	318
Total	18	14	10	38	491	44	12	17	17	7	539	15	1222
04:00 PM	8	1	1	7	103	18	5	6	6	1	160	7	323
04:15 PM	6	5	1	8	106	12	7	4	4	0	190	5	348
04:30 PM	5	7	3	4	114	16	4	2	8	5	164	7	339
04:45 PM	3	8	4	5	132	10	2	12	6	5	212	9	408
Total	22	21	9	24	455	56	18	24	24	11	726	28	1418
05:00 PM	6	7	3	10	133	8	0	2	5	1	164	6	345
05:15 PM	4	5	1	9	129	13	2	9	4	4	211	5	396
05:30 PM	4	0	2	10	110	16	4	5	9	4	188	6	358

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 2

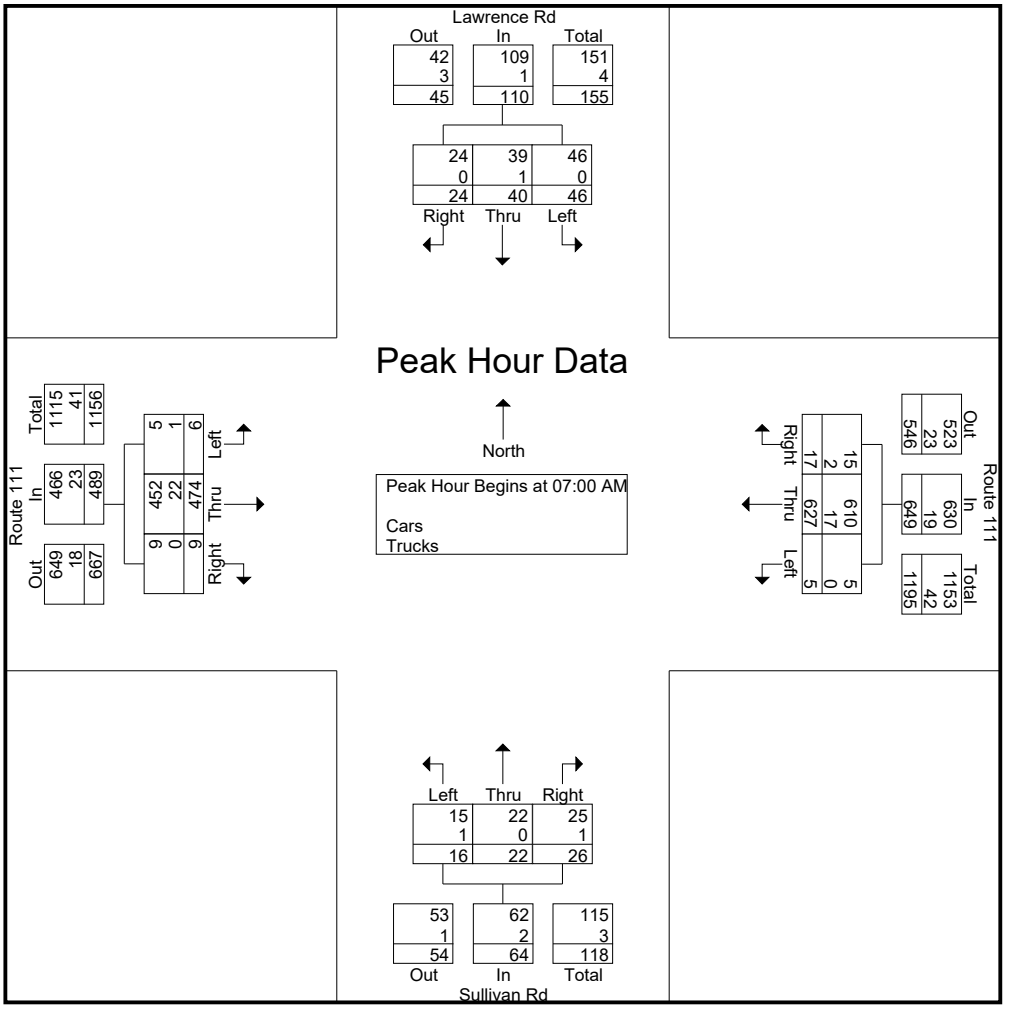
Groups Printed- Cars - Trucks

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
05:45 PM	3	0	4	10	106	10	4	9	2	0	130	6	284
Total	17	12	10	39	478	47	10	25	20	9	693	23	1383
06:00 PM	4	3	3	8	95	15	1	6	6	2	100	7	250
06:15 PM	1	2	1	5	90	8	5	2	5	4	118	6	247
06:30 PM	4	3	1	6	78	13	5	1	6	4	88	6	215
06:45 PM	4	4	5	8	65	10	3	5	3	4	74	4	189
Total	13	12	10	27	328	46	14	14	20	14	380	23	901
Grand Total	253	195	131	224	4877	369	158	190	223	97	5168	197	12082
Apprch %	43.7	33.7	22.6	4.1	89.2	6.7	27.7	33.3	39.1	1.8	94.6	3.6	
Total %	2.1	1.6	1.1	1.9	40.4	3.1	1.3	1.6	1.8	0.8	42.8	1.6	
Cars	248	184	129	221	4654	351	154	185	217	94	4994	189	11620
% Cars	98	94.4	98.5	98.7	95.4	95.1	97.5	97.4	97.3	96.9	96.6	95.9	96.2
Trucks	5	11	2	3	223	18	4	5	6	3	174	8	462
% Trucks	2	5.6	1.5	1.3	4.6	4.9	2.5	2.6	2.7	3.1	3.4	4.1	3.8

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**18**	11	6	**35**	**2**	148	3	153	**5**	3	6	14	1	111	2	114	316
07:15 AM	8	4	**7**	19	2	158	2	162	4	**9**	4	17	0	121	**3**	124	322
07:30 AM	10	**15**	5	30	0	158	4	162	3	5	**12**	**20**	0	113	3	116	328
07:45 AM	10	10	6	26	1	**163**	**8**	**172**	4	5	4	13	**5**	**129**	1	**135**	**346**
Total Volume	46	40	24	110	5	627	17	649	16	22	26	64	6	474	9	489	1312
% App. Total	41.8	36.4	21.8		0.8	96.6	2.6		25	34.4	40.6		1.2	96.9	1.8		
PHF	.639	.667	.857	.786	.625	.962	.531	.943	.800	.611	.542	.800	.300	.919	.750	.906	.948
Cars	46	39	24	109	5	610	15	630	15	22	25	62	5	452	9	466	1267
% Cars	100	97.5	100	99.1	100	97.3	88.2	97.1	93.8	100	96.2	96.9	83.3	95.4	100	95.3	96.6
Trucks	0	1	0	1	0	17	2	19	1	0	1	2	1	22	0	23	45
% Trucks	0	2.5	0	0.9	0	2.7	11.8	2.9	6.3	0	3.8	3.1	16.7	4.6	0	4.7	3.4

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 3

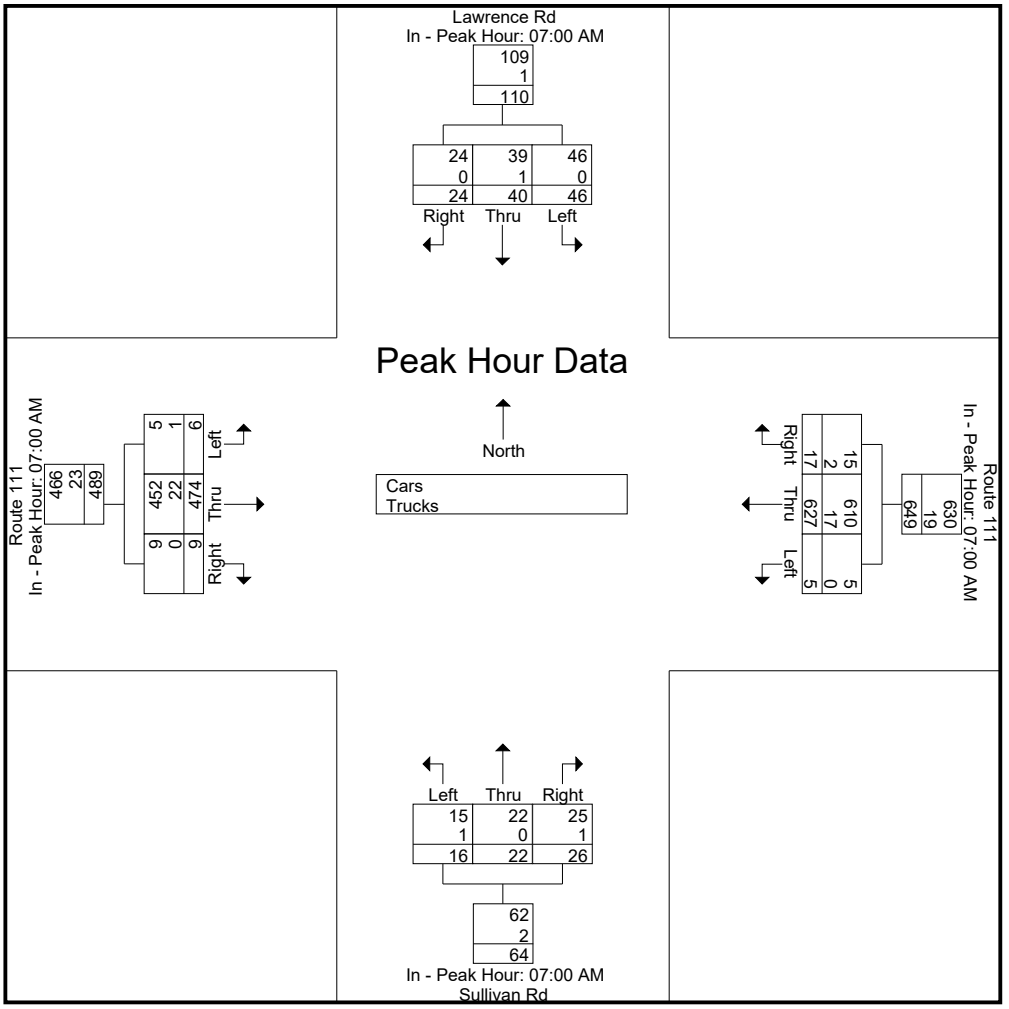


Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	**18**	11	6	**35**	**2**	148	3	153	**5**	3	6	14	1	111	2	114
+15 mins.	8	4	**7**	19	2	158	2	162	4	**9**	4	17	0	121	**3**	124
+30 mins.	10	**15**	5	30	0	158	4	162	3	5	**12**	**20**	0	113	3	116
+45 mins.	10	10	6	26	1	**163**	**8**	**172**	4	5	4	13	**5**	**129**	1	**135**
Total Volume	46	40	24	110	5	627	17	649	16	22	26	64	6	474	9	489
% App. Total	41.8	36.4	21.8		0.8	96.6	2.6		25	34.4	40.6		1.2	96.9	1.8	
PHF	.639	.667	.857	.786	.625	.962	.531	.943	.800	.611	.542	.800	.300	.919	.750	.906
Cars	46	39	24	109	5	610	15	630	15	22	25	62	5	452	9	466
% Cars	100	97.5	100	99.1	100	97.3	88.2	97.1	93.8	100	96.2	96.9	83.3	95.4	100	95.3
Trucks	0	1	0	1	0	17	2	19	1	0	1	2	1	22	0	23
% Trucks	0	2.5	0	0.9	0	2.7	11.8	2.9	6.2	0	3.8	3.1	16.7	4.6	0	4.7

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 4

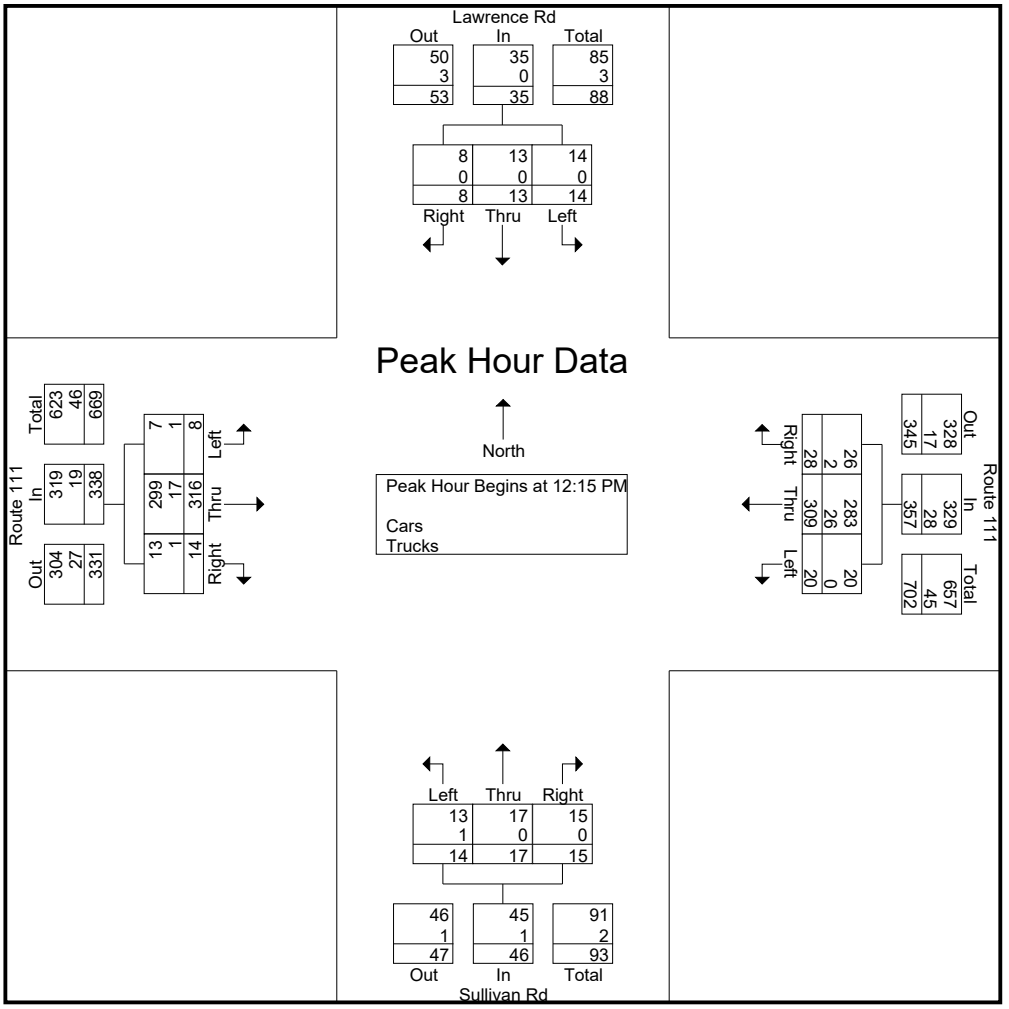


Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:15 PM

12:15 PM	4	1	**5**	**10**	**7**	**95**	**9**	**111**	2	**6**	3	11	2	81	2	85	**217**
12:30 PM	**5**	1	1	7	3	69	9	81	**7**	5	4	**16**	0	**88**	4	**92**	196
12:45 PM	2	**6**	0	8	4	78	6	88	1	3	**5**	9	**3**	65	**6**	74	179
01:00 PM	3	5	2	10	6	67	4	77	4	3	3	10	3	82	2	87	184
Total Volume	14	13	8	35	20	309	28	357	14	17	15	46	8	316	14	338	776
% App. Total	40	37.1	22.9		5.6	86.6	7.8		30.4	37	32.6		2.4	93.5	4.1		
PHF	.700	.542	.400	.875	.714	.813	.778	.804	.500	.708	.750	.719	.667	.898	.583	.918	.894
Cars	14	13	8	35	20	283	26	329	13	17	15	45	7	299	13	319	728
% Cars	100	100	100	100	100	91.6	92.9	92.2	92.9	100	100	97.8	87.5	94.6	92.9	94.4	93.8
Trucks	0	0	0	0	0	26	2	28	1	0	0	1	1	17	1	19	48
% Trucks	0	0	0	0	0	8.4	7.1	7.8	7.1	0	0	2.2	12.5	5.4	7.1	5.6	6.2

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 5

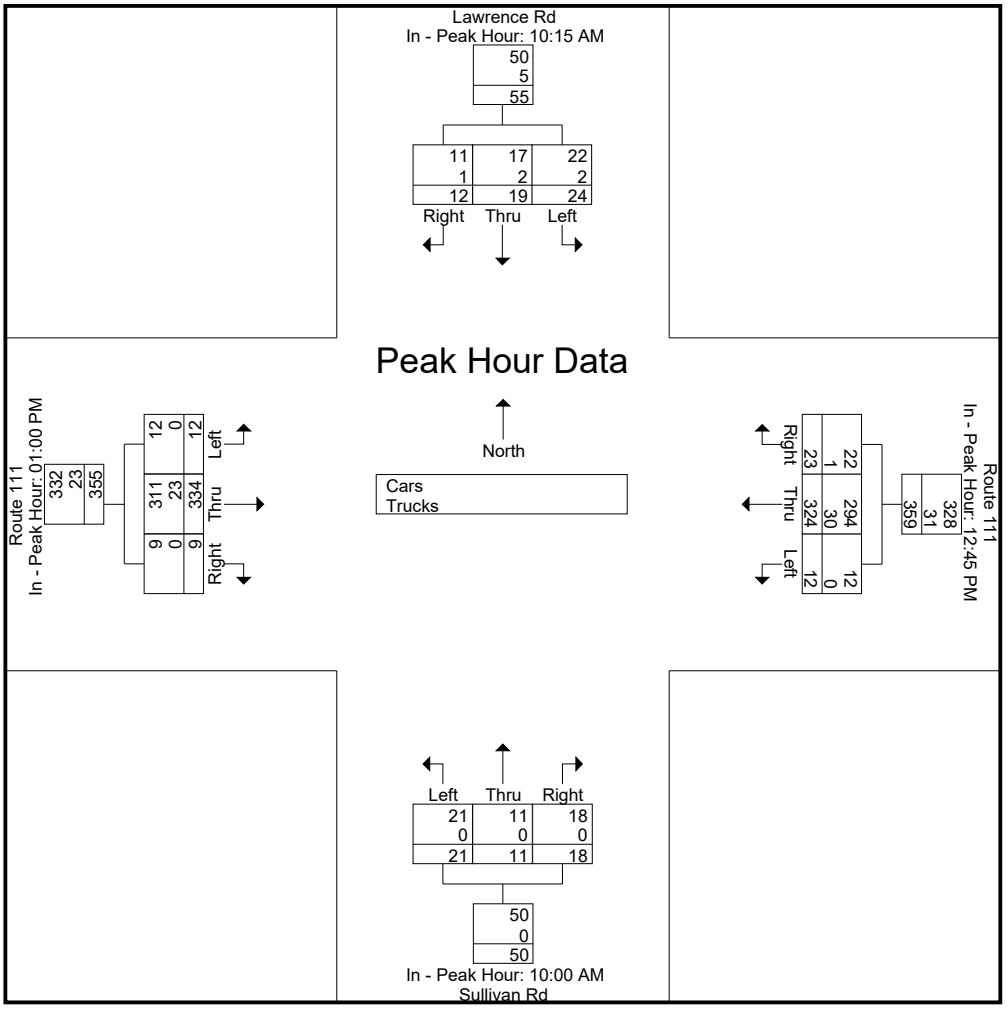


Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	10:15 AM				12:45 PM				10:00 AM				01:00 PM			
+0 mins.	**11**	1	**5**	**17**	4	78	6	88	4	2	**8**	14	3	82	2	87
+15 mins.	7	5	4	16	**6**	67	4	77	3	**6**	7	**16**	**4**	72	**4**	80
+30 mins.	2	**8**	3	13	0	87	**8**	95	**8**	0	1	9	2	84	1	87
+45 mins.	4	5	0	9	2	**92**	5	**99**	6	3	2	11	3	**96**	2	**101**
Total Volume	24	19	12	55	12	324	23	359	21	11	18	50	12	334	9	355
% App. Total	43.6	34.5	21.8		3.3	90.3	6.4		42	22	36		3.4	94.1	2.5	
PHF	.545	.594	.600	.809	.500	.880	.719	.907	.656	.458	.563	.781	.750	.870	.563	.879
Cars	22	17	11	50	12	294	22	328	21	11	18	50	12	311	9	332
% Cars	91.7	89.5	91.7	90.9	100	90.7	95.7	91.4	100	100	100	100	100	93.1	100	93.5
Trucks	2	2	1	5	0	30	1	31	0	0	0	0	0	23	0	23
% Trucks	8.3	10.5	8.3	9.1	0	9.3	4.3	8.6	0	0	0	0	0	6.9	0	6.5

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 6

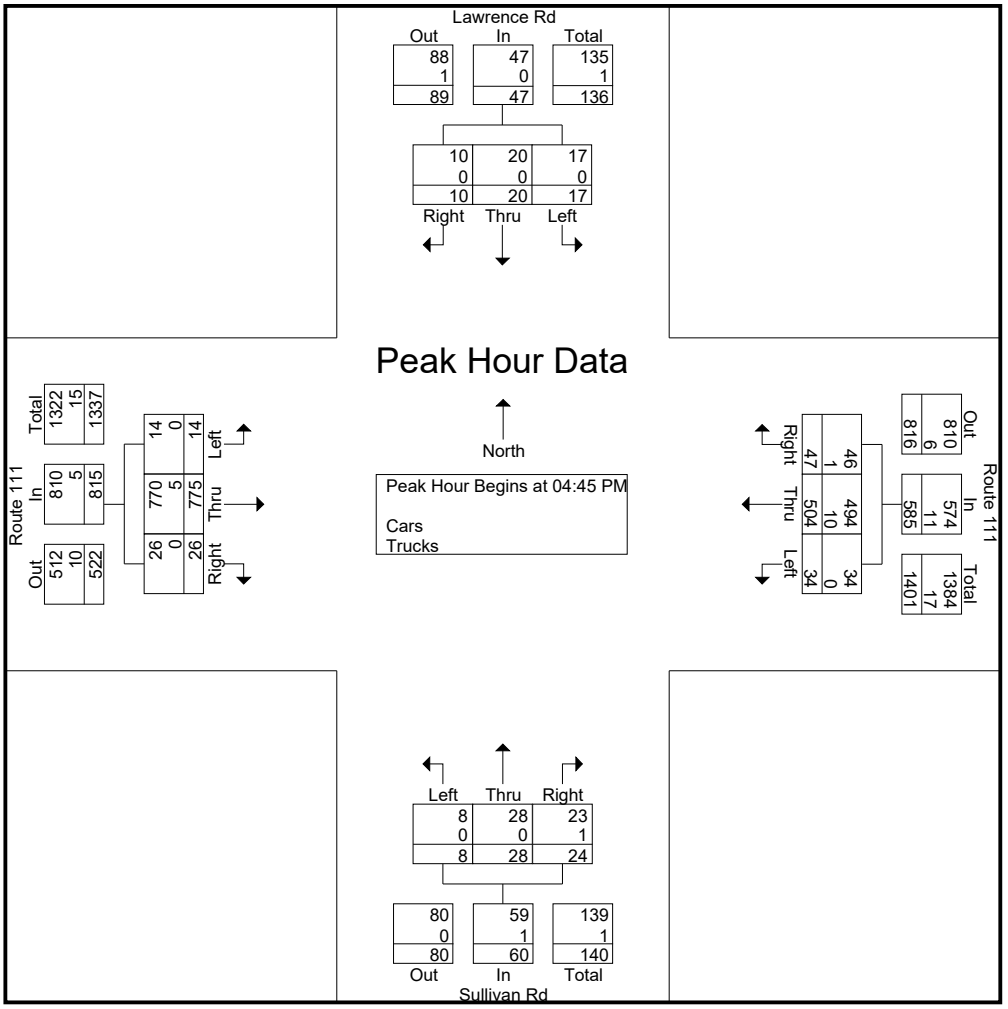


Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	3	**8**	**4**	15	5	132	10	147	2	**12**	6	**20**	**5**	**212**	**9**	**226**	**408**
05:00 PM	**6**	7	3	**16**	**10**	**133**	8	**151**	0	2	5	7	1	164	6	171	345
05:15 PM	4	5	1	10	9	129	13	151	2	9	4	15	4	211	5	220	396
05:30 PM	4	0	2	6	10	110	**16**	136	**4**	5	**9**	18	4	188	6	198	358
Total Volume	17	20	10	47	34	504	47	585	8	28	24	60	14	775	26	815	1507
% App. Total	36.2	42.6	21.3		5.8	86.2	8		13.3	46.7	40		1.7	95.1	3.2		
PHF	.708	.625	.625	.734	.850	.947	.734	.969	.500	.583	.667	.750	.700	.914	.722	.902	.923
Cars	17	20	10	47	34	494	46	574	8	28	23	59	14	770	26	810	1490
% Cars	100	100	100	100	100	98.0	97.9	98.1	100	100	95.8	98.3	100	99.4	100	99.4	98.9
Trucks	0	0	0	0	0	10	1	11	0	0	1	1	0	5	0	5	17
% Trucks	0	0	0	0	0	2.0	2.1	1.9	0	0	4.2	1.7	0	0.6	0	0.6	1.1

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 7

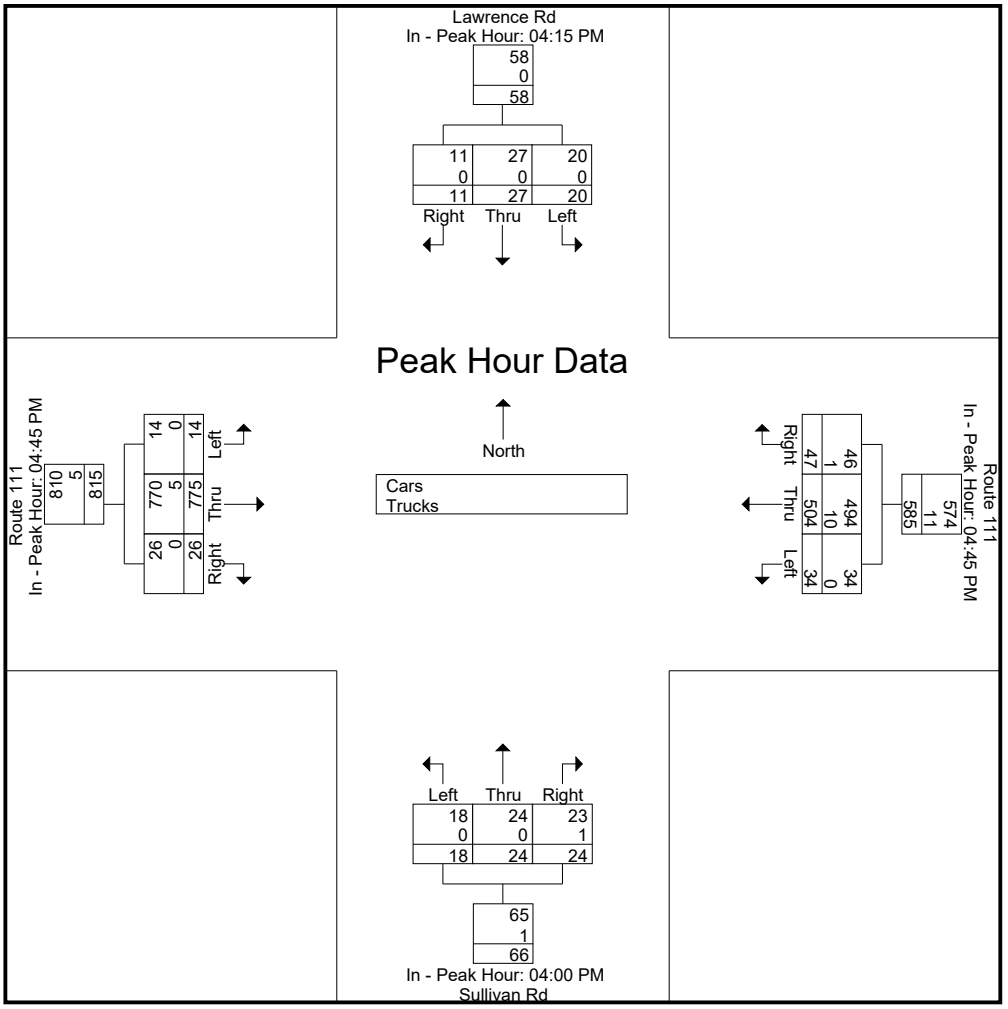


Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM				04:45 PM				04:00 PM				04:45 PM			
+0 mins.	**6**	5	1	12	5	132	10	147	5	6	6	17	**5**	**212**	**9**	**226**
+15 mins.	5	7	3	15	**10**	**133**	8	**151**	**7**	4	4	15	1	164	6	171
+30 mins.	3	**8**	**4**	15	9	129	13	151	4	2	**8**	14	4	211	5	220
+45 mins.	6	7	3	**16**	10	110	**16**	136	2	**12**	6	**20**	4	188	6	198
Total Volume	20	27	11	58	34	504	47	585	18	24	24	66	14	775	26	815
% App. Total	34.5	46.6	19		5.8	86.2	8		27.3	36.4	36.4		1.7	95.1	3.2	
PHF	.833	.844	.688	.906	.850	.947	.734	.969	.643	.500	.750	.825	.700	.914	.722	.902
Cars	20	27	11	58	34	494	46	574	18	24	23	65	14	770	26	810
% Cars	100	100	100	100	100	98	97.9	98.1	100	100	95.8	98.5	100	99.4	100	99.4
Trucks	0	0	0	0	0	10	1	11	0	0	1	1	0	5	0	5
% Trucks	0	0	0	0	0	2	2.1	1.9	0	0	4.2	1.5	0	0.6	0	0.6

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 8



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 9

Groups Printed- Cars

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	18	10	6	2	147	2	5	3	6	0	107	2	308
07:15 AM	8	4	7	2	153	2	3	9	4	0	117	3	312
07:30 AM	10	15	5	0	154	4	3	5	12	0	105	3	316
07:45 AM	10	10	6	1	156	7	4	5	3	5	123	1	331
Total	46	39	24	5	610	15	15	22	25	5	452	9	1267
08:00 AM	7	1	6	1	119	5	4	2	5	1	98	6	255
08:15 AM	9	8	4	3	105	2	4	4	8	0	107	3	257
08:30 AM	10	2	2	3	120	4	4	1	8	1	93	0	248
08:45 AM	5	2	5	5	128	6	2	4	7	2	74	4	244
Total	31	13	17	12	472	17	14	11	28	4	372	13	1004
09:00 AM	5	5	2	2	105	8	5	3	4	3	74	1	217
09:15 AM	5	1	1	4	85	2	3	2	2	2	69	1	177
09:30 AM	5	4	3	3	81	4	1	4	3	1	75	2	186
09:45 AM	4	4	0	3	93	3	2	6	2	0	71	4	192
Total	19	14	6	12	364	17	11	15	11	6	289	8	772
10:00 AM	4	1	2	4	72	2	4	2	8	1	79	3	182
10:15 AM	10	1	5	0	80	2	3	6	7	4	60	3	181
10:30 AM	7	4	4	4	68	0	8	0	1	1	65	1	163
10:45 AM	2	7	2	3	75	7	6	3	2	0	63	3	173
Total	23	13	13	11	295	11	21	11	18	6	267	10	699
11:00 AM	3	5	0	2	70	3	1	5	4	0	61	6	160
11:15 AM	5	3	1	2	87	2	2	0	1	4	63	4	174
11:30 AM	7	3	2	3	74	7	6	4	4	1	68	2	181
11:45 AM	1	4	2	4	68	6	2	1	4	1	73	2	168
Total	16	15	5	11	299	18	11	10	13	6	265	14	683
12:00 PM	3	2	3	1	58	4	1	1	4	1	71	3	152
12:15 PM	4	1	5	7	89	9	2	6	3	2	77	2	207
12:30 PM	5	1	1	3	62	8	7	5	4	0	84	3	183
12:45 PM	2	6	0	4	72	5	0	3	5	2	60	6	165
Total	14	10	9	15	281	26	10	15	16	5	292	14	707
01:00 PM	3	5	2	6	60	4	4	3	3	3	78	2	173
01:15 PM	4	2	1	0	81	8	4	7	2	4	63	4	180
01:30 PM	2	3	4	2	81	5	1	1	2	2	77	1	181
01:45 PM	5	1	3	3	62	5	1	1	3	3	93	2	182
Total	14	11	10	11	284	22	10	12	10	12	311	9	716
02:00 PM	3	3	3	5	73	5	4	1	6	1	105	2	211
02:15 PM	6	2	0	4	81	9	3	2	4	4	115	7	237
02:30 PM	3	4	2	4	107	10	1	3	3	2	107	8	254
02:45 PM	3	2	1	5	93	10	0	5	4	3	109	8	243
Total	15	11	6	18	354	34	8	11	17	10	436	25	945
03:00 PM	2	2	2	9	116	9	3	4	5	0	122	3	277
03:15 PM	3	3	0	11	109	17	3	6	6	0	138	3	299
03:30 PM	6	6	4	9	124	8	3	4	3	2	116	4	289
03:45 PM	7	2	4	8	114	10	3	1	2	4	148	4	307
Total	18	13	10	37	463	44	12	15	16	6	524	14	1172
04:00 PM	8	1	1	7	100	18	5	6	6	1	159	6	318
04:15 PM	6	5	1	7	103	11	7	4	4	0	186	5	339
04:30 PM	5	7	3	4	112	16	4	2	8	5	162	7	335
04:45 PM	3	8	4	5	130	9	2	12	5	5	211	9	403
Total	22	21	9	23	445	54	18	24	23	11	718	27	1395
05:00 PM	6	7	3	10	128	8	0	2	5	1	163	6	339
05:15 PM	4	5	1	9	126	13	2	9	4	4	208	5	390
05:30 PM	4	0	2	10	110	16	4	5	9	4	188	6	358
05:45 PM	3	0	4	10	100	10	4	9	2	0	130	6	278
Total	17	12	10	39	464	47	10	25	20	9	689	23	1365

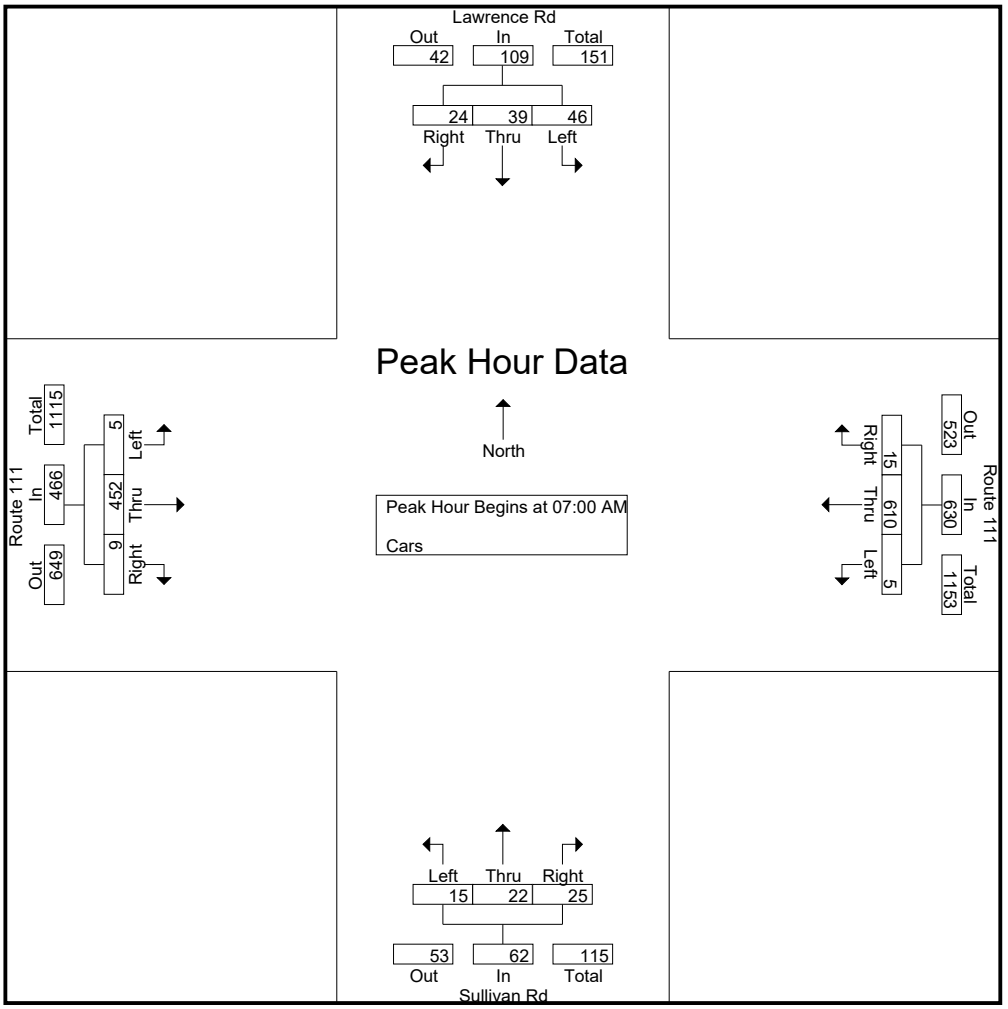
N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 10

Groups Printed- Cars

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
06:00 PM	4	3	3	8	95	15	1	6	6	2	100	7	250
06:15 PM	1	2	1	5	88	8	5	2	5	4	117	6	244
06:30 PM	4	3	1	6	77	13	5	1	6	4	88	6	214
06:45 PM	4	4	5	8	63	10	3	5	3	4	74	4	187
Total	13	12	10	27	323	46	14	14	20	14	379	23	895
Grand Total	248	184	129	221	4654	351	154	185	217	94	4994	189	11620
Apprch %	44.2	32.8	23	4.2	89.1	6.7	27.7	33.3	39	1.8	94.6	3.6	
Total %	2.1	1.6	1.1	1.9	40.1	3	1.3	1.6	1.9	0.8	43	1.6	

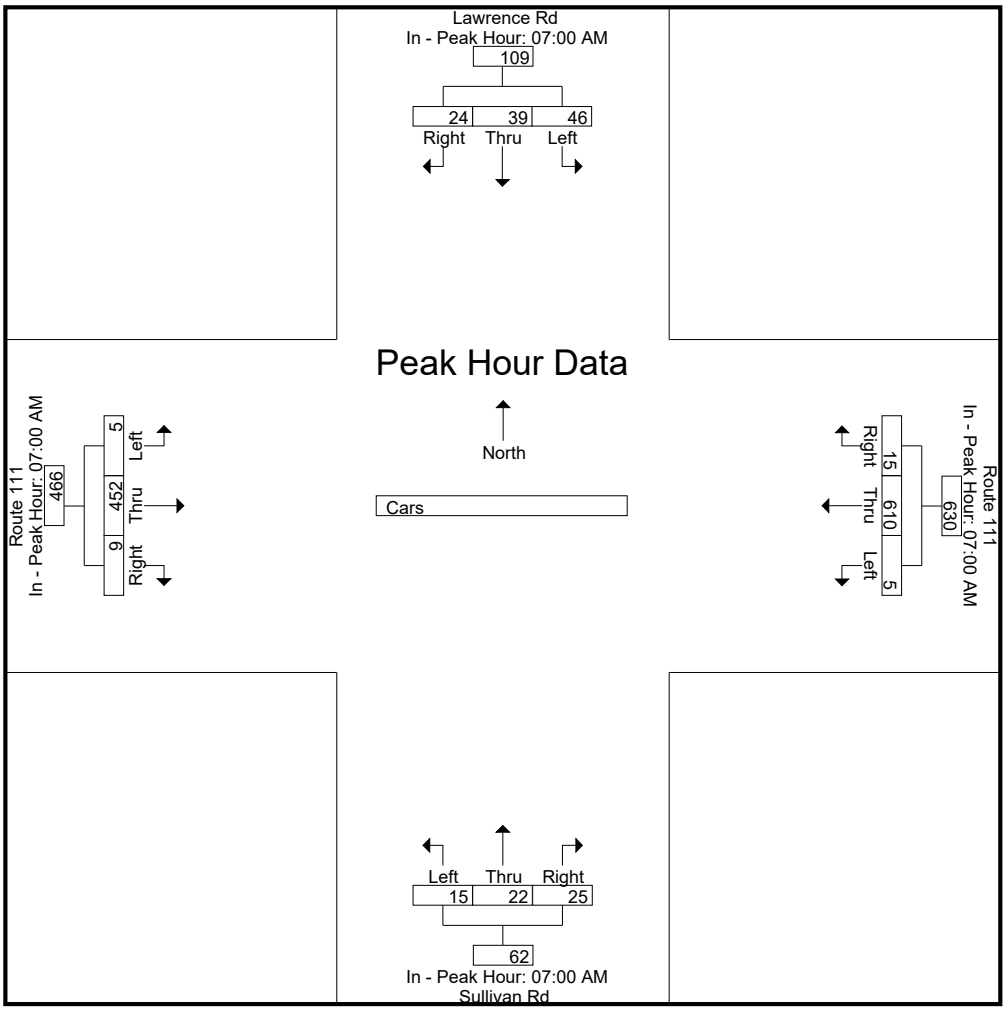
	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**18**	10	6	**34**	**2**	147	2	151	**5**	3	6	14	0	107	2	109	308
07:15 AM	8	4	**7**	19	2	153	2	157	3	**9**	4	16	0	117	**3**	120	312
07:30 AM	10	**15**	5	30	0	154	4	158	3	5	**12**	**20**	0	105	3	108	316
07:45 AM	10	10	6	26	1	**156**	**7**	**164**	4	5	3	12	**5**	**123**	1	**129**	**331**
Total Volume	46	39	24	109	5	610	15	630	15	22	25	62	5	452	9	466	1267
% App. Total	42.2	35.8	22		0.8	96.8	2.4		24.2	35.5	40.3		1.1	97	1.9		
PHF	.639	.650	.857	.801	.625	.978	.536	.960	.750	.611	.521	.775	.250	.919	.750	.903	.957



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 11

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	**18**	10	6	**34**	**2**	147	2	151	**5**	3	6	14	0	107	2	109	
+15 mins.	8	4	**7**	19	2	153	2	157	3	**9**	4	16	0	117	**3**	120	
+30 mins.	10	**15**	5	30	0	154	4	158	3	5	**12**	**20**	0	105	3	108	
+45 mins.	10	10	6	26	1	**156**	**7**	**164**	4	5	3	12	**5**	**123**	1	**129**	
Total Volume	46	39	24	109	5	610	15	630	15	22	25	62	5	452	9	466	
% App. Total	42.2	35.8	22		0.8	96.8	2.4		24.2	35.5	40.3		1.1	97	1.9		
PHF	.639	.650	.857	.801	.625	.978	.536	.960	.750	.611	.521	.775	.250	.919	.750	.903	

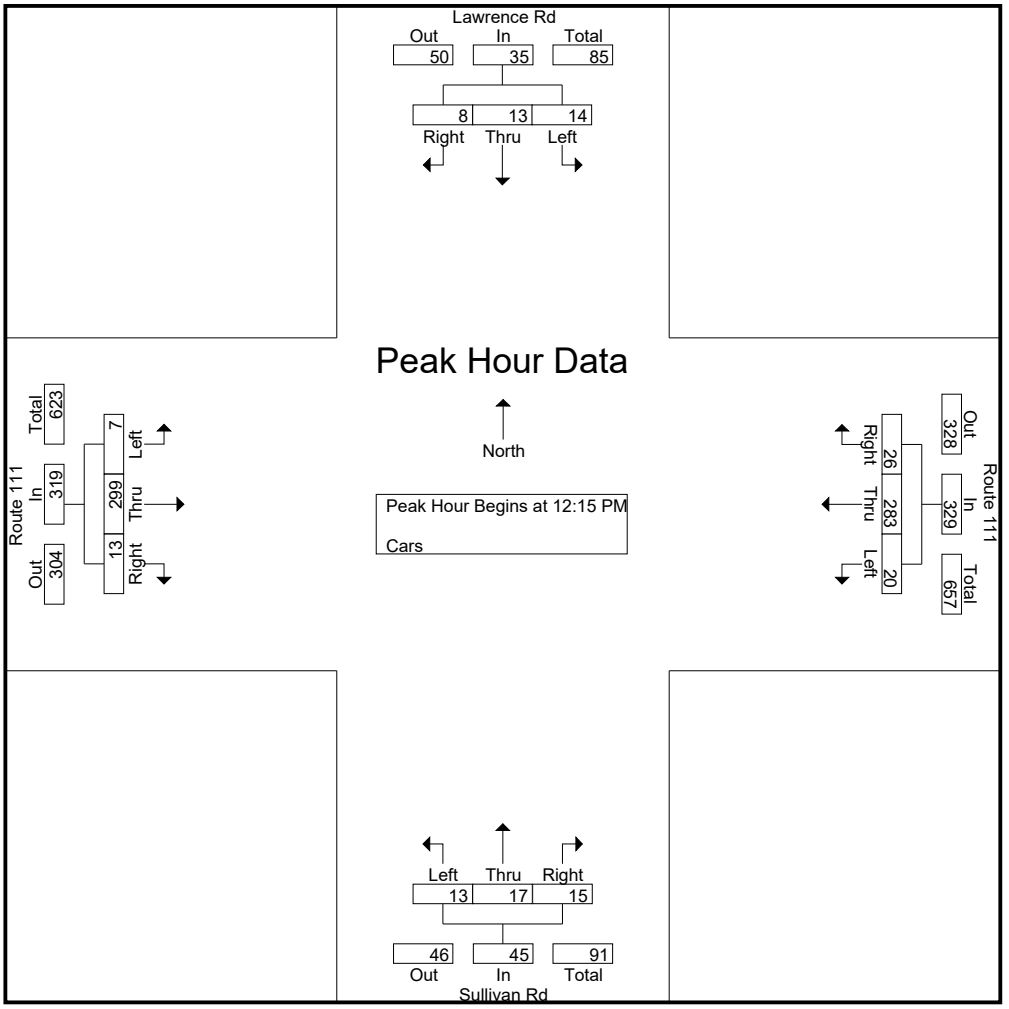


Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:15 PM

12:15 PM	4	1	**5**	**10**	**7**	**89**	**9**	**105**	2	**6**	3	11	2	77	2	81	**207**
12:30 PM	**5**	1	1	7	3	62	8	73	**7**	5	4	**16**	0	**84**	3	**87**	183
12:45 PM	2	**6**	0	8	4	72	5	81	0	3	**5**	8	2	60	**6**	68	165
01:00 PM	3	5	2	10	6	60	4	70	4	3	3	10	**3**	78	2	83	173
Total Volume	14	13	8	35	20	283	26	329	13	17	15	45	7	299	13	319	728
% App. Total	40	37.1	22.9		6.1	86	7.9		28.9	37.8	33.3		2.2	93.7	4.1		
PHF	.700	.542	.400	.875	.714	.795	.722	.783	.464	.708	.750	.703	.583	.890	.542	.917	.879

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 12



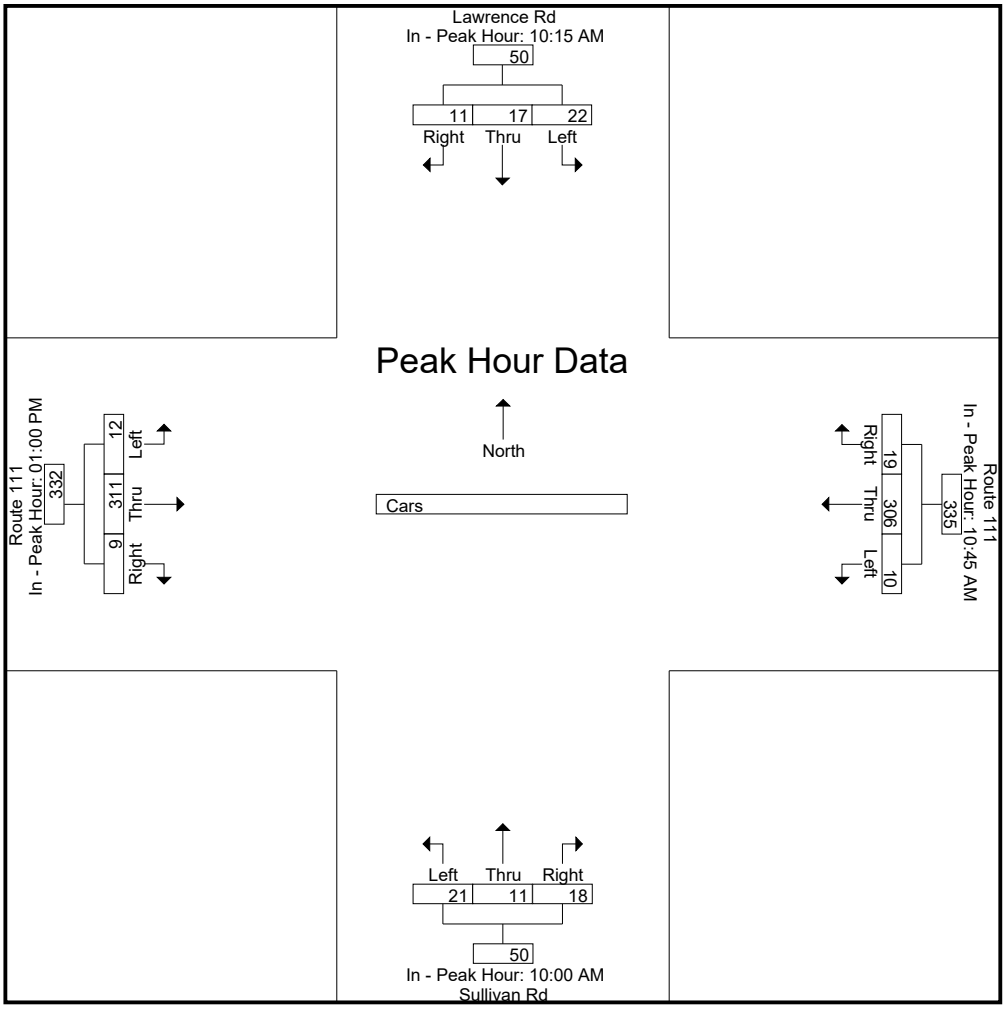
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	10:15 AM				10:45 AM				10:00 AM				01:00 PM			
+0 mins.	**10**	1	**5**	**16**	**3**	75	**7**	85	4	2	**8**	14	3	78	2	83
+15 mins.	7	4	4	15	2	70	3	75	3	**6**	7	**16**	**4**	63	**4**	71
+30 mins.	2	**7**	2	11	2	**87**	2	**91**	**8**	0	1	9	2	77	1	80
+45 mins.	3	5	0	8	3	74	7	84	6	3	2	11	3	**93**	2	**98**
Total Volume	22	17	11	50	10	306	19	335	21	11	18	50	12	311	9	332
% App. Total	44	34	22		3	91.3	5.7		42	22	36		3.6	93.7	2.7	
PHF	.550	.607	.550	.781	.833	.879	.679	.920	.656	.458	.563	.781	.750	.836	.563	.847

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 13

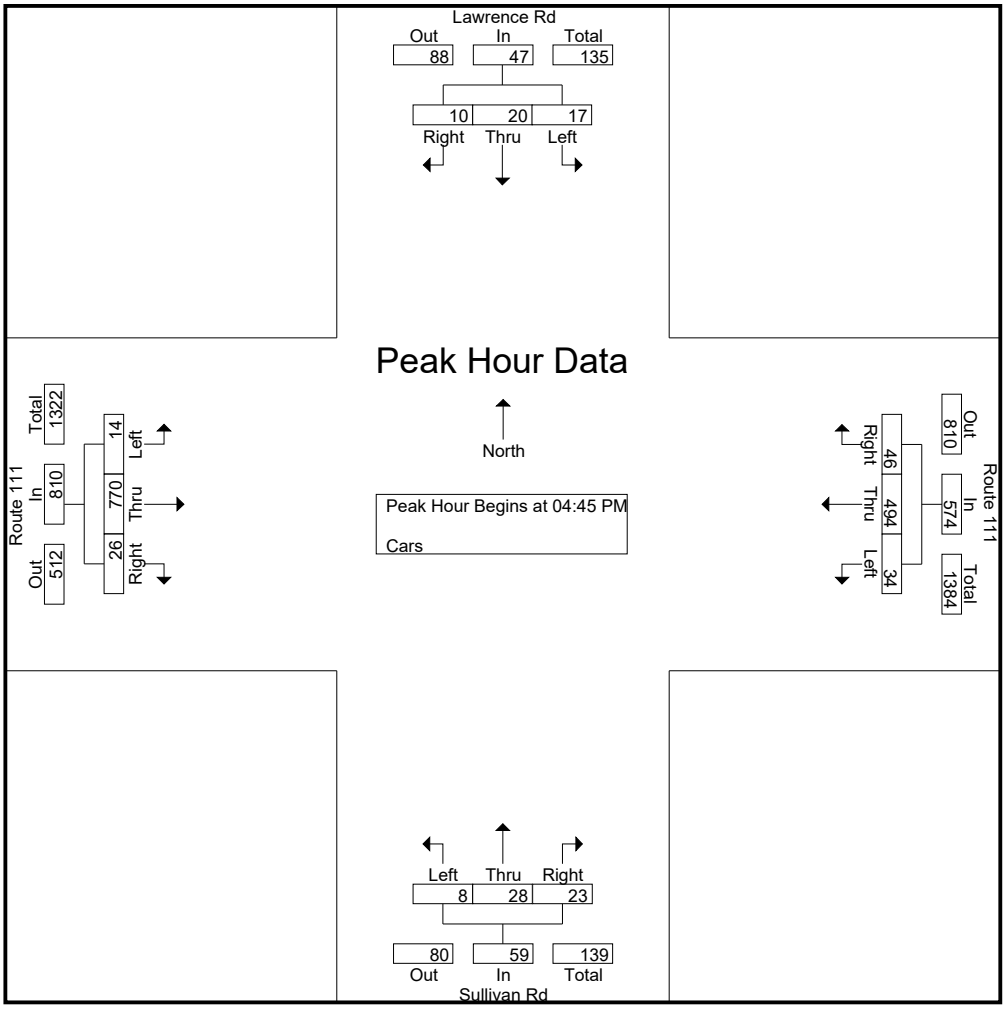


Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 04:45 PM

04:45 PM	3	**8**	**4**	15	5	**130**	9	144	2	**12**	5	**19**	**5**	**211**	**9**	**225**	**403**
05:00 PM	**6**	7	3	**16**	**10**	128	8	146	0	2	5	7	1	163	6	170	339
05:15 PM	4	5	1	10	9	126	13	**148**	2	9	4	15	4	208	5	217	390
05:30 PM	4	0	2	6	10	110	**16**	136	**4**	5	**9**	18	4	188	6	198	358
Total Volume	17	20	10	47	34	494	46	574	8	28	23	59	14	770	26	810	1490
% App. Total	36.2	42.6	21.3		5.9	86.1	8		13.6	47.5	39		1.7	95.1	3.2		
PHF	.708	.625	.625	.734	.850	.950	.719	.970	.500	.583	.639	.776	.700	.912	.722	.900	.924

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 14

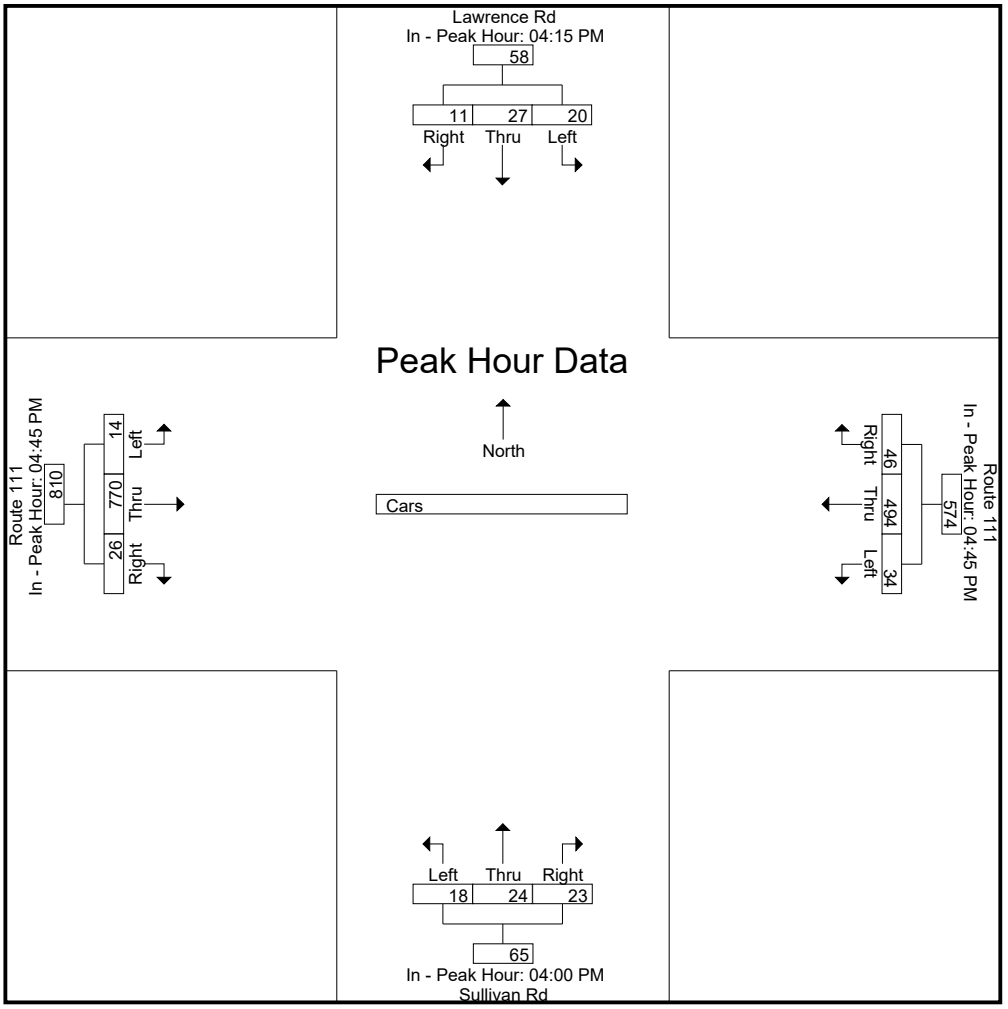


Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM				04:45 PM				04:00 PM				04:45 PM			
+0 mins.	**6**	5	1	12	5	**130**	9	144	5	6	6	17	**5**	**211**	**9**	**225**
+15 mins.	5	7	3	15	**10**	128	8	146	**7**	4	4	15	1	163	6	170
+30 mins.	3	**8**	**4**	15	9	126	13	**148**	4	2	**8**	14	4	208	5	217
+45 mins.	6	7	3	**16**	10	110	**16**	136	2	**12**	5	**19**	4	188	6	198
Total Volume	20	27	11	58	34	494	46	574	18	24	23	65	14	770	26	810
% App. Total	34.5	46.6	19		5.9	86.1	8		27.7	36.9	35.4		1.7	95.1	3.2	
PHF	.833	.844	.688	.906	.850	.950	.719	.970	.643	.500	.719	.855	.700	.912	.722	.900

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 15



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 16

Groups Printed- Trucks

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	1	0	0	1	1	0	0	0	1	4	0	8
07:15 AM	0	0	0	0	5	0	1	0	0	0	4	0	10
07:30 AM	0	0	0	0	4	0	0	0	0	0	8	0	12
07:45 AM	0	0	0	0	7	1	0	0	1	0	6	0	15
Total	0	1	0	0	17	2	1	0	1	1	22	0	45
08:00 AM	0	1	0	0	3	0	0	0	1	0	6	1	12
08:15 AM	0	1	0	0	5	0	0	0	0	0	5	2	13
08:30 AM	0	0	0	0	4	1	0	0	1	0	2	0	8
08:45 AM	0	1	0	0	5	0	0	0	0	0	3	0	9
Total	0	3	0	0	17	1	0	0	2	0	16	3	42
09:00 AM	0	1	0	0	3	0	1	0	0	0	5	0	10
09:15 AM	0	0	0	0	6	0	0	0	0	0	3	0	9
09:30 AM	0	0	0	0	2	0	0	0	0	0	4	0	6
09:45 AM	1	1	0	0	8	0	0	1	0	0	3	0	14
Total	1	2	0	0	19	0	1	1	0	0	15	0	39
10:00 AM	0	0	0	0	4	0	0	0	0	0	5	1	10
10:15 AM	1	0	0	0	3	0	0	0	0	0	5	0	9
10:30 AM	0	1	0	0	4	1	0	0	0	0	4	0	10
10:45 AM	0	1	1	0	4	1	0	0	0	0	6	0	13
Total	1	2	1	0	15	2	0	0	0	0	20	1	42
11:00 AM	1	0	0	0	8	2	0	0	0	0	2	0	13
11:15 AM	0	0	0	0	3	1	0	0	0	0	3	1	8
11:30 AM	1	0	0	0	4	0	0	0	0	0	3	0	8
11:45 AM	0	0	0	1	5	1	0	0	0	0	6	0	13
Total	2	0	0	1	20	4	0	0	0	0	14	1	42
12:00 PM	0	0	0	0	8	1	0	0	0	0	1	0	10
12:15 PM	0	0	0	0	6	0	0	0	0	0	4	0	10
12:30 PM	0	0	0	0	7	1	0	0	0	0	4	1	13
12:45 PM	0	0	0	0	6	1	1	0	0	1	5	0	14
Total	0	0	0	0	27	3	1	0	0	1	14	1	47
01:00 PM	0	0	0	0	7	0	0	0	0	0	4	0	11
01:15 PM	1	0	0	0	6	0	0	1	0	0	9	0	17
01:30 PM	0	0	0	0	11	0	0	0	0	0	7	0	18
01:45 PM	0	0	1	0	9	1	0	0	0	0	3	0	14
Total	1	0	1	0	33	1	0	1	0	0	23	0	60
02:00 PM	0	0	0	0	4	0	0	0	0	0	6	0	10
02:15 PM	0	0	0	0	5	0	0	0	0	0	6	0	11
02:30 PM	0	1	0	0	3	1	0	0	1	0	3	0	9
02:45 PM	0	1	0	0	6	2	1	1	0	0	7	0	18
Total	0	2	0	0	18	3	1	1	1	0	22	0	48
03:00 PM	0	0	0	1	7	0	0	0	0	0	5	1	14
03:15 PM	0	0	0	0	10	0	0	2	0	0	2	0	14
03:30 PM	0	0	0	0	4	0	0	0	0	1	6	0	11
03:45 PM	0	1	0	0	7	0	0	0	1	0	2	0	11
Total	0	1	0	1	28	0	0	2	1	1	15	1	50
04:00 PM	0	0	0	0	3	0	0	0	0	0	1	1	5
04:15 PM	0	0	0	1	3	1	0	0	0	0	4	0	9
04:30 PM	0	0	0	0	2	0	0	0	0	0	2	0	4
04:45 PM	0	0	0	0	2	1	0	0	1	0	1	0	5
Total	0	0	0	1	10	2	0	0	1	0	8	1	23
05:00 PM	0	0	0	0	5	0	0	0	0	0	1	0	6
05:15 PM	0	0	0	0	3	0	0	0	0	0	3	0	6
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	6	0	0	0	0	0	0	0	6
Total	0	0	0	0	14	0	0	0	0	0	4	0	18

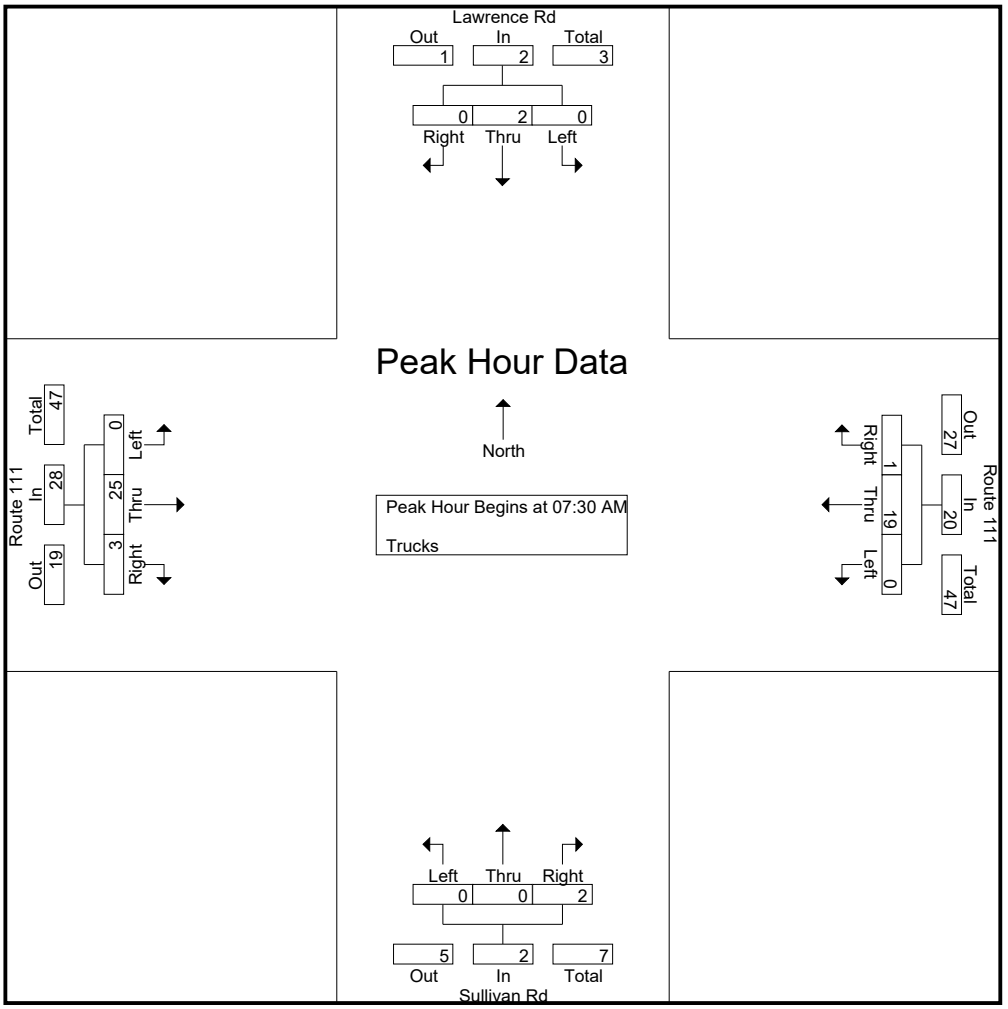
N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 17

Groups Printed- Trucks

	Lawrence Rd From North			Route 111 From East			Sullivan Rd From South			Route 111 From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	2	0	0	0	0	0	1	0	3
06:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
06:45 PM	0	0	0	0	2	0	0	0	0	0	0	0	2
Total	0	0	0	0	5	0	0	0	0	0	1	0	6
Grand Total	5	11	2	3	223	18	4	5	6	3	174	8	462
Apprch %	27.8	61.1	11.1	1.2	91.4	7.4	26.7	33.3	40	1.6	94.1	4.3	
Total %	1.1	2.4	0.4	0.6	48.3	3.9	0.9	1.1	1.3	0.6	37.7	1.7	

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	4	0	4	0	0	0	0	0	**8**	0	**8**	12
07:45 AM	0	0	0	0	0	**7**	**1**	**8**	0	0	**1**	**1**	0	6	0	6	**15**
08:00 AM	0	**1**	0	**1**	0	3	0	3	0	0	1	1	0	6	1	7	12
08:15 AM	0	1	0	1	0	5	0	5	0	0	0	0	0	5	**2**	7	13
Total Volume	0	2	0	2	0	19	1	20	0	0	2	2	0	25	3	28	52
% App. Total	0	100	0		0	95	5		0	0	100		0	89.3	10.7		
PHF	.000	.500	.000	.500	.000	.679	.250	.625	.000	.000	.500	.500	.000	.781	.375	.875	.867



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
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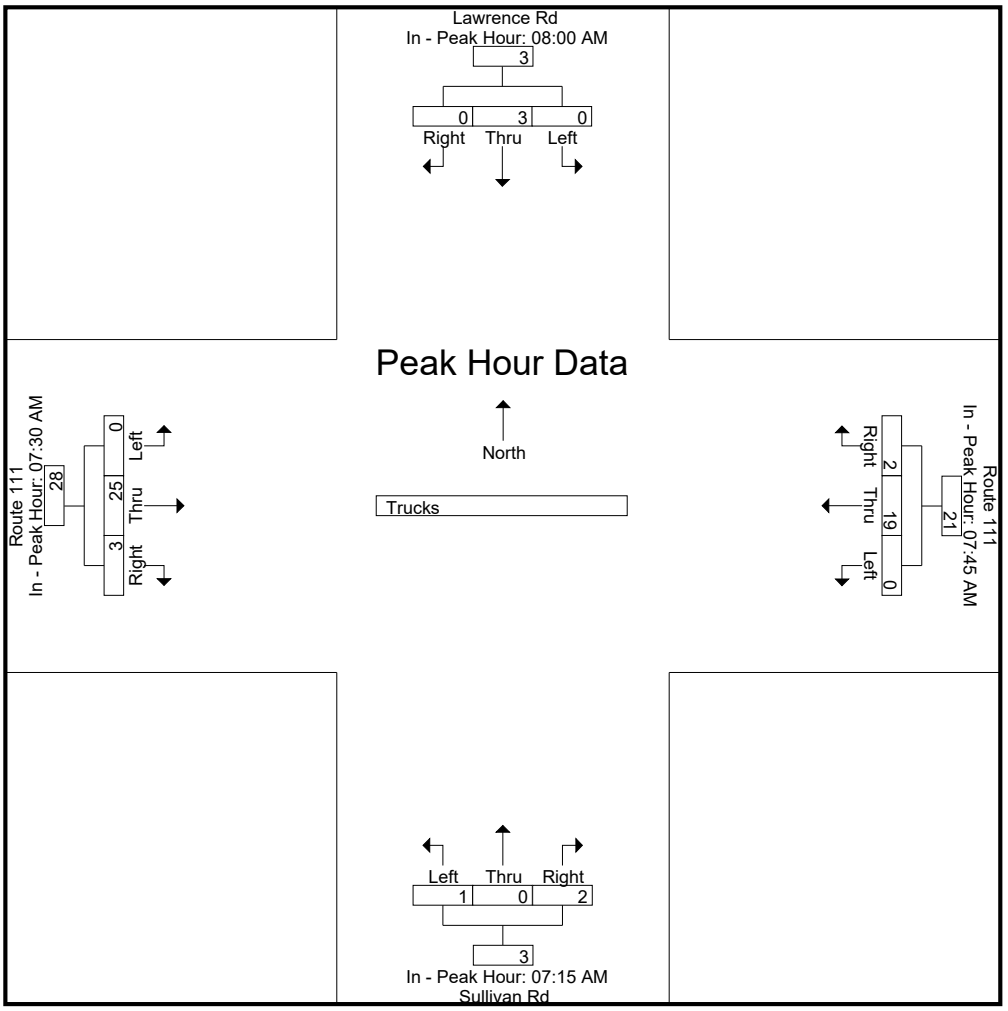
	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	08:00 AM				07:45 AM				07:15 AM				07:30 AM				
+0 mins.	0	**1**	0	**1**	0	**7**	**1**	**8**	**1**	0	0	**1**	0	**8**	0	**8**	
+15 mins.	0	1	0	1	0	3	0	3	0	0	0	0	0	6	0	6	
+30 mins.	0	0	0	0	0	5	0	5	0	0	**1**	1	0	6	1	7	
+45 mins.	0	1	0	1	0	4	1	5	0	0	1	1	0	5	**2**	7	
Total Volume	0	3	0	3	0	19	2	21	1	0	2	3	0	25	3	28	
% App. Total	0	100	0		0	90.5	9.5		33.3	0	66.7		0	89.3	10.7		
PHF	.000	.750	.000	.750	.000	.679	.500	.656	.250	.000	.500	.750	.000	.781	.375	.875	



Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 12:45 PM

12:45 PM	0	0	0	0	0	6	**1**	7	**1**	0	0	**1**	**1**	5	0	6	14
01:00 PM	0	0	0	0	0	7	0	7	0	0	0	0	0	4	0	4	11
01:15 PM	**1**	0	0	**1**	0	6	0	6	0	**1**	0	1	0	**9**	0	**9**	17
01:30 PM	0	0	0	0	0	**11**	0	**11**	0	0	0	0	0	7	0	7	**18**
Total Volume	1	0	0	1	0	30	1	31	1	1	0	2	1	25	0	26	60
% App. Total	100	0	0		0	96.8	3.2		50	50	0		3.8	96.2	0		
PHF	.250	.000	.000	.250	.000	.682	.250	.705	.250	.250	.000	.500	.250	.694	.000	.722	.833

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
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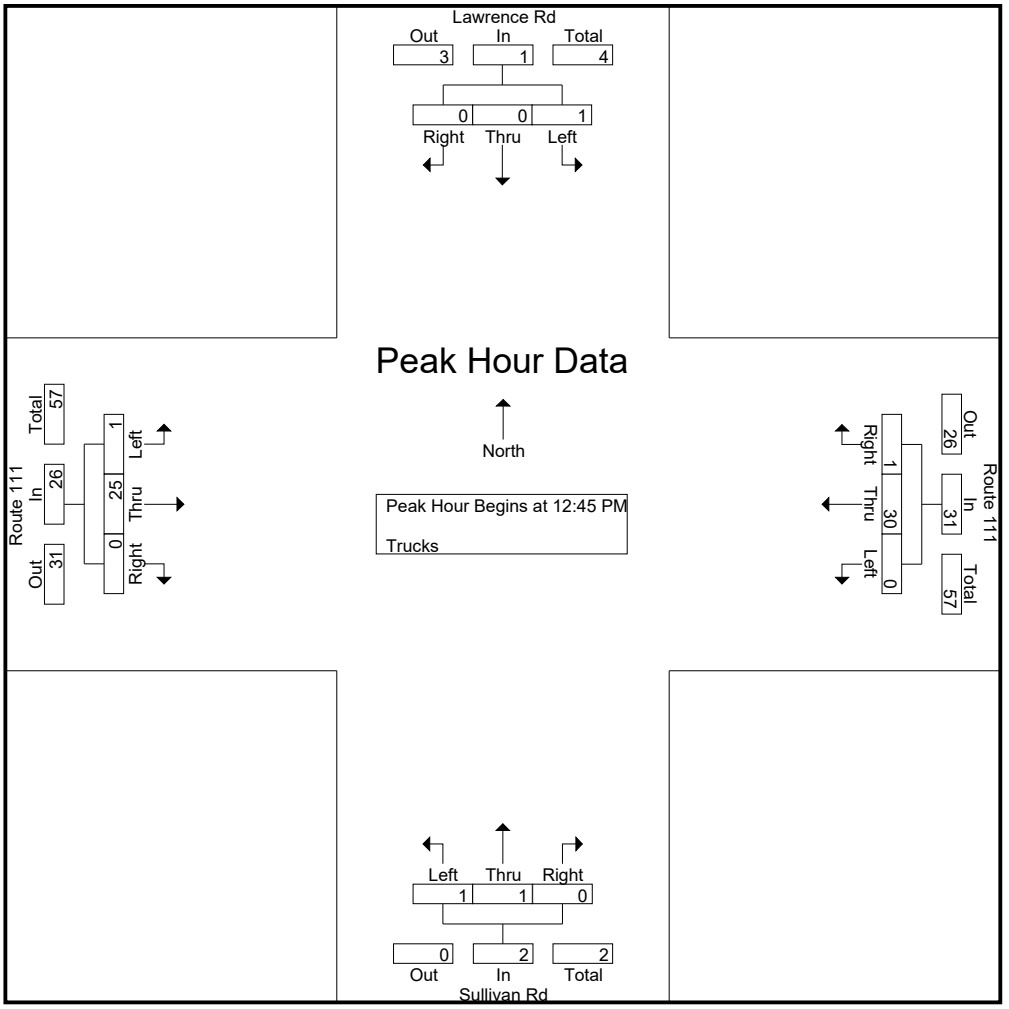
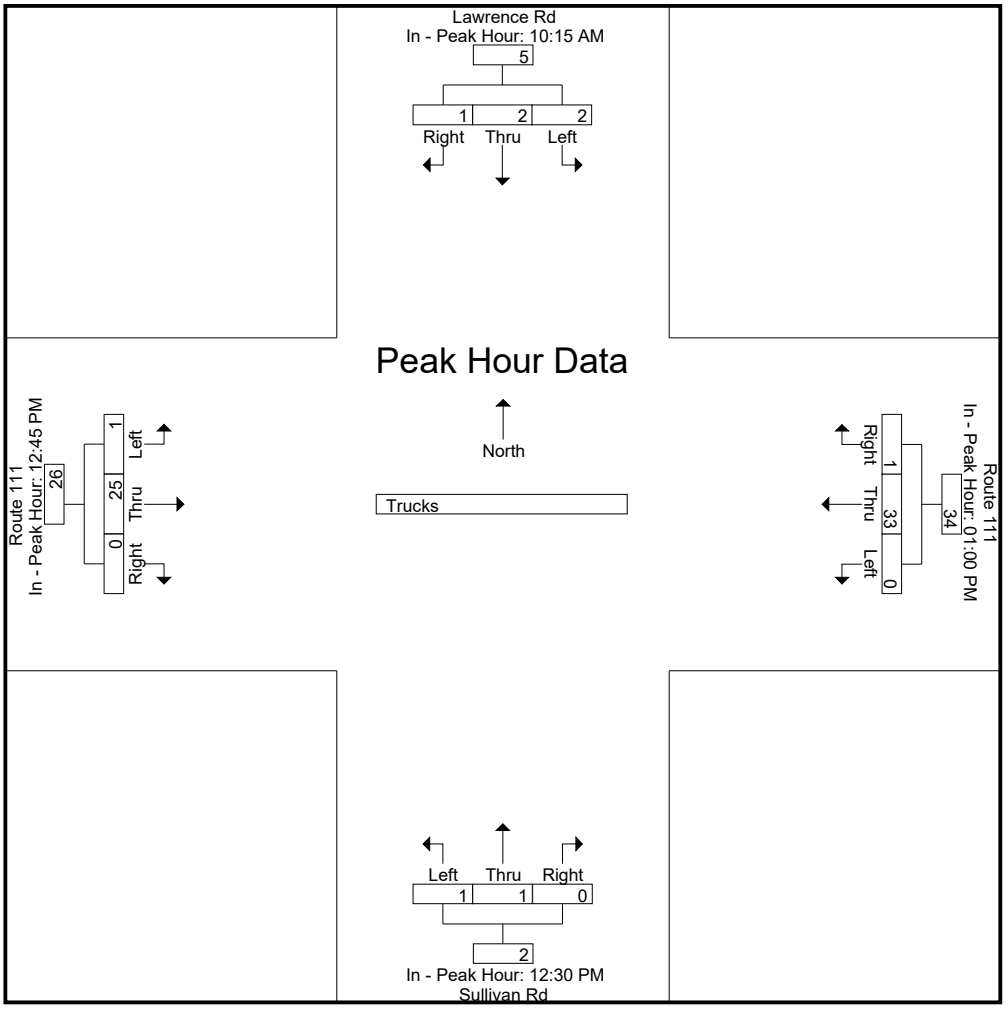


Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	10:15 AM				01:00 PM				12:30 PM				12:45 PM			
+0 mins.	**1**	0	0	1	0	7	0	7	0	0	0	0	**1**	5	0	6
+15 mins.	0	**1**	0	1	0	6	0	6	**1**	0	0	**1**	0	4	0	4
+30 mins.	0	1	**1**	**2**	0	**11**	0	**11**	0	0	0	0	0	**9**	0	**9**
+45 mins.	1	0	0	1	0	9	**1**	10	0	**1**	0	1	0	7	0	7
Total Volume	2	2	1	5	0	33	1	34	1	1	0	2	1	25	0	26
% App. Total	40	40	20		0	97.1	2.9		50	50	0		3.8	96.2	0	
PHF	.500	.500	.250	.625	.000	.750	.250	.773	.250	.250	.000	.500	.250	.694	.000	.722

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 20

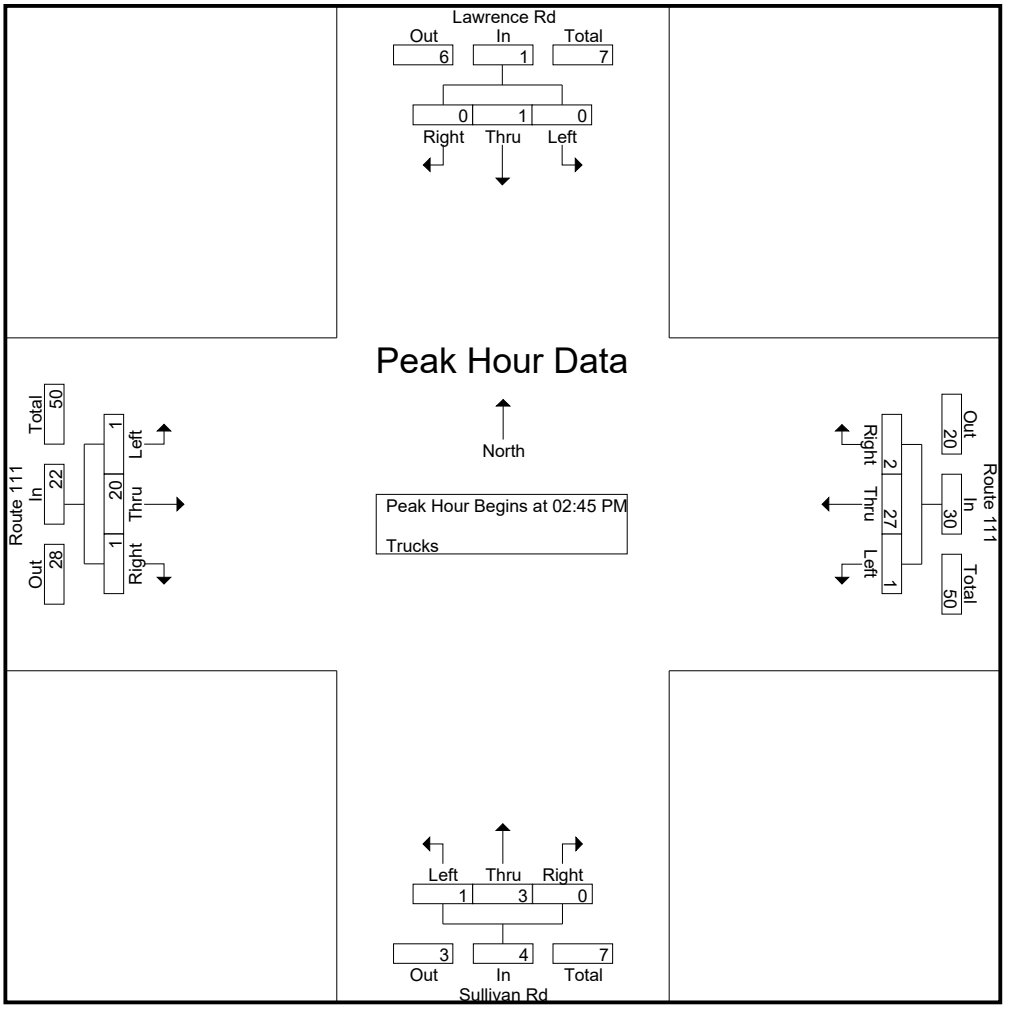


Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 02:45 PM

02:45 PM	0	**1**	0	**1**	0	6	**2**	8	**1**	1	0	**2**	0	**7**	0	**7**	**18**
03:00 PM	0	0	0	0	**1**	7	0	8	0	0	0	0	0	5	**1**	6	14
03:15 PM	0	0	0	0	0	**10**	0	**10**	0	**2**	0	2	0	2	0	2	14
03:30 PM	0	0	0	0	0	4	0	4	0	0	0	0	**1**	6	0	7	11
Total Volume	0	1	0	1	1	27	2	30	1	3	0	4	1	20	1	22	57
% App. Total	0	100	0		3.3	90	6.7		25	75	0		4.5	90.9	4.5		
PHF	.000	.250	.000	.250	.250	.675	.250	.750	.250	.375	.000	.500	.250	.714	.250	.786	.792

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 21



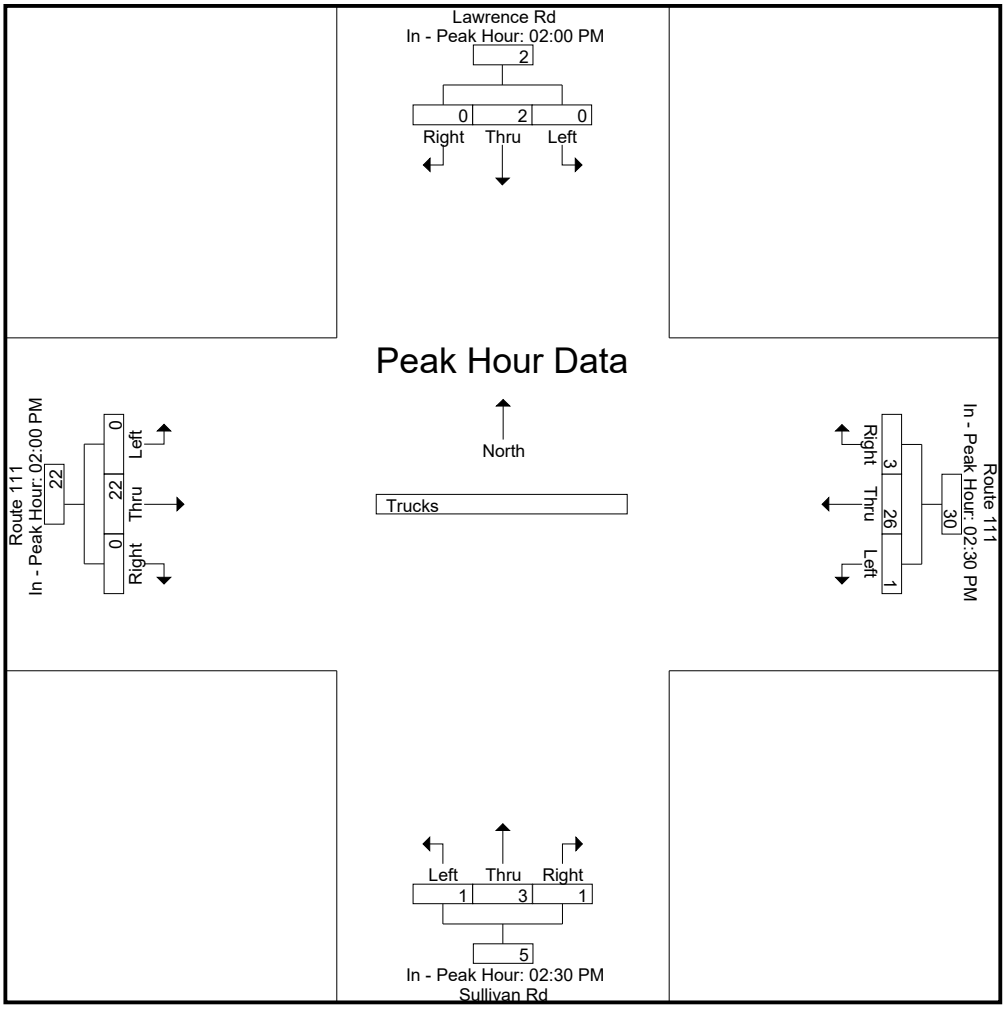
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:00 PM				02:30 PM				02:30 PM				02:00 PM			
+0 mins.	0	0	0	0	0	3	1	4	0	0	**1**	1	0	6	0	6
+15 mins.	0	0	0	0	0	6	**2**	8	**1**	1	0	**2**	0	6	0	6
+30 mins.	0	**1**	0	**1**	**1**	7	0	8	0	0	0	0	0	3	0	3
+45 mins.	0	1	0	1	0	**10**	0	**10**	0	**2**	0	2	0	**7**	0	**7**
Total Volume	0	2	0	2	1	26	3	30	1	3	1	5	0	22	0	22
% App. Total	0	100	0		3.3	86.7	10		20	60	20		0	100	0	
PHF	.000	.500	.000	.500	.250	.650	.375	.750	.250	.375	.250	.625	.000	.786	.000	.786

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 22



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 23

Groups Printed- Bikes Peds

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	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	0	0	0	0	0	0
Total	0	0	0	0	0	0	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	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

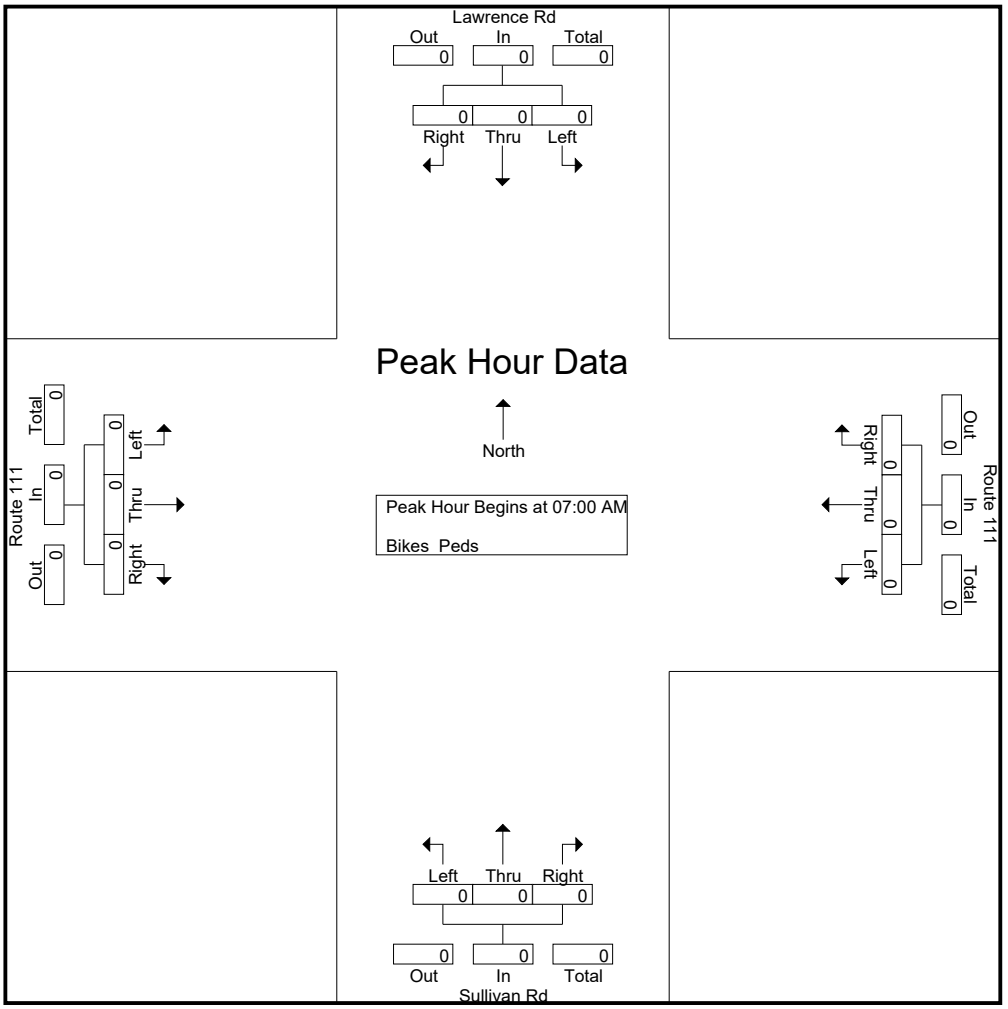
N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 24

Groups Printed- Bikes Peds

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	0	0	

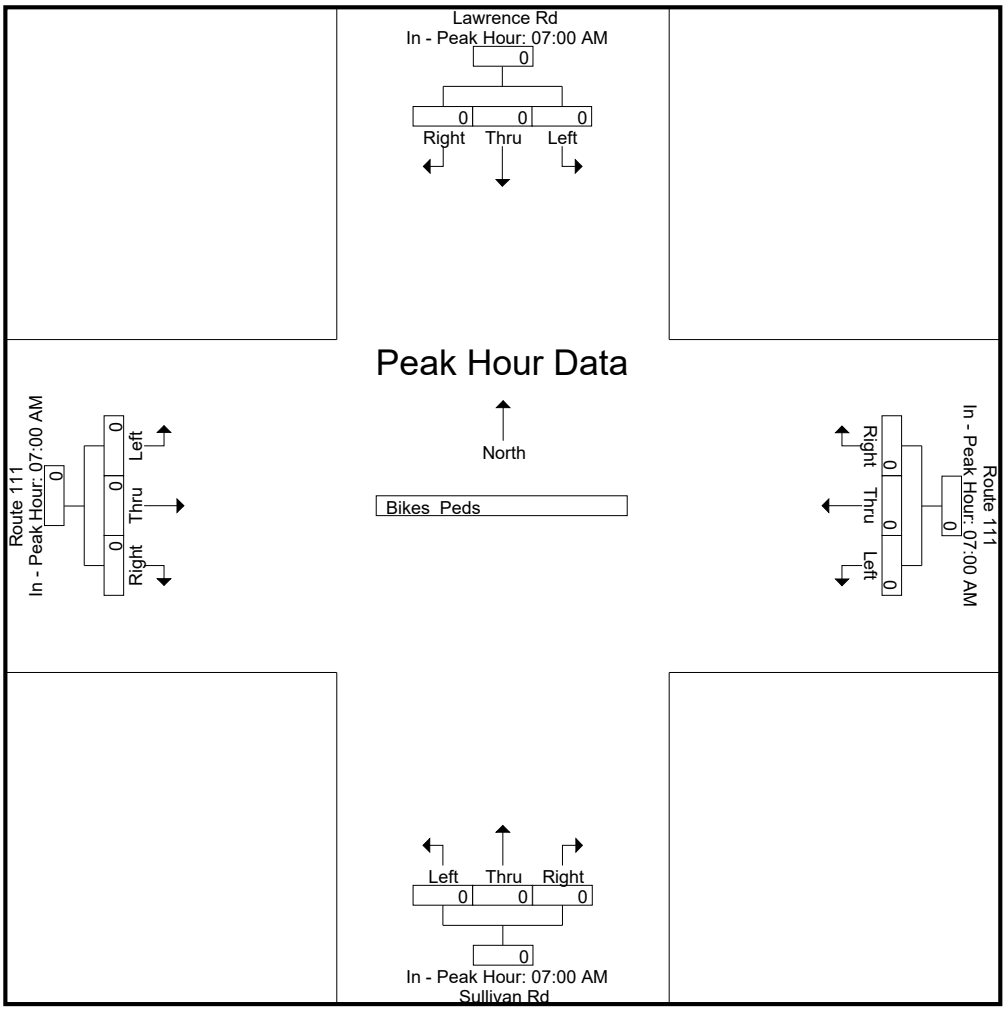
	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	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	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 25

	Lawrence Rd From North				Route 111 From East				Sullivan Rd From South				Route 111 From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	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	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

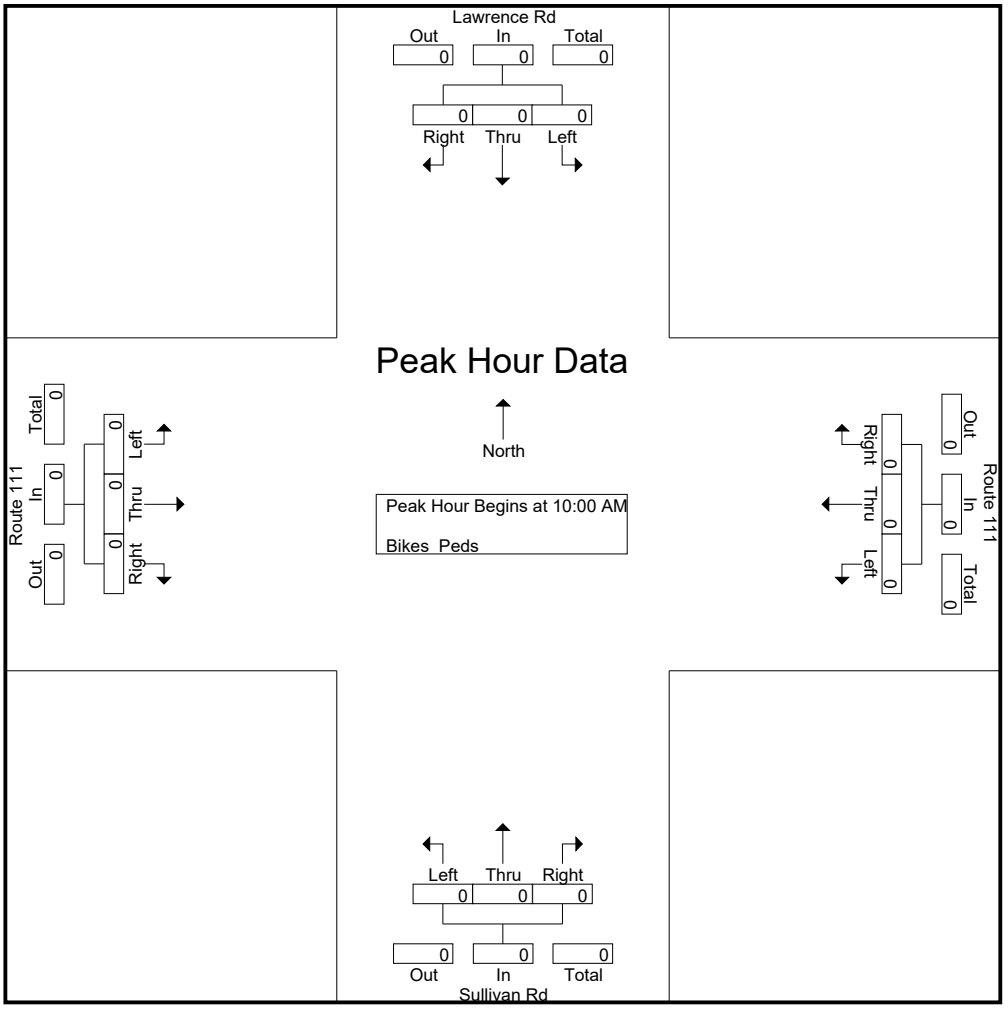


Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 10:00 AM

10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	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	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 26



Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	10:00 AM				10:00 AM				10:00 AM				10:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	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	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
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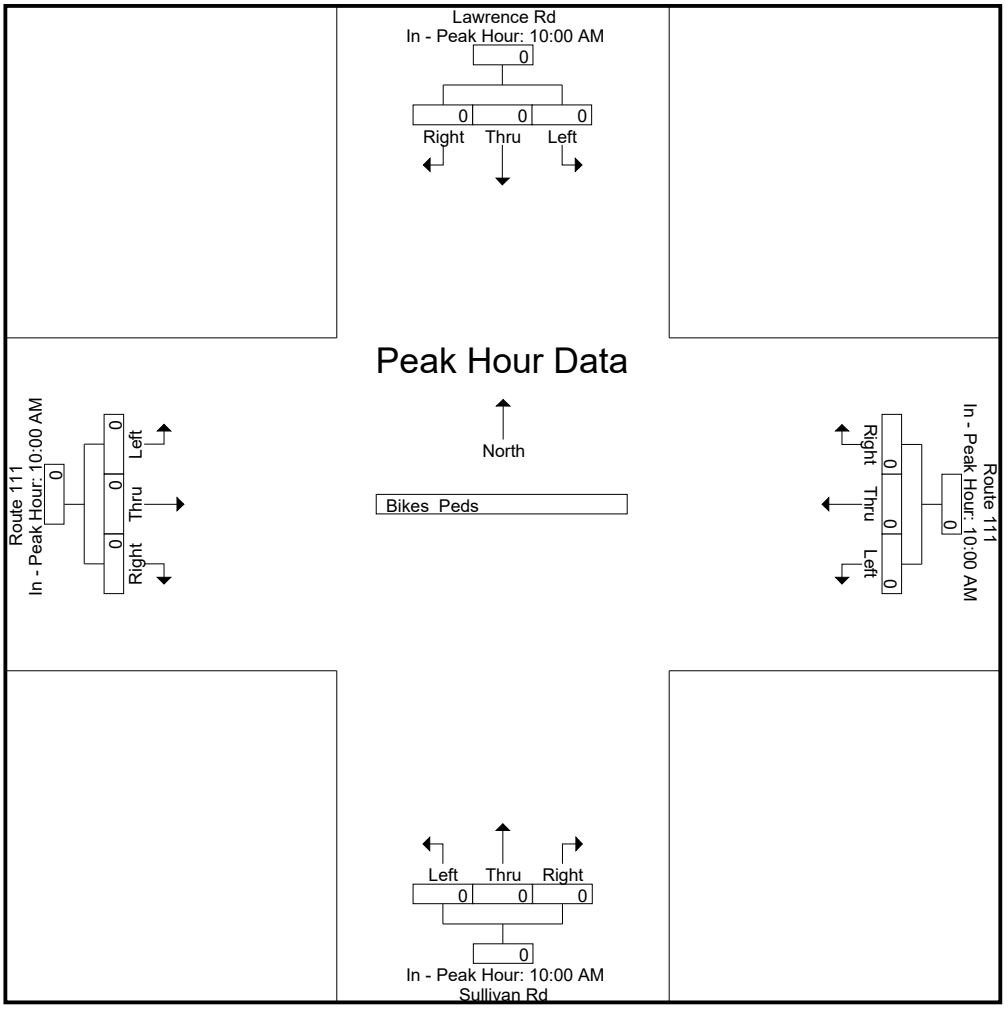
File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 27



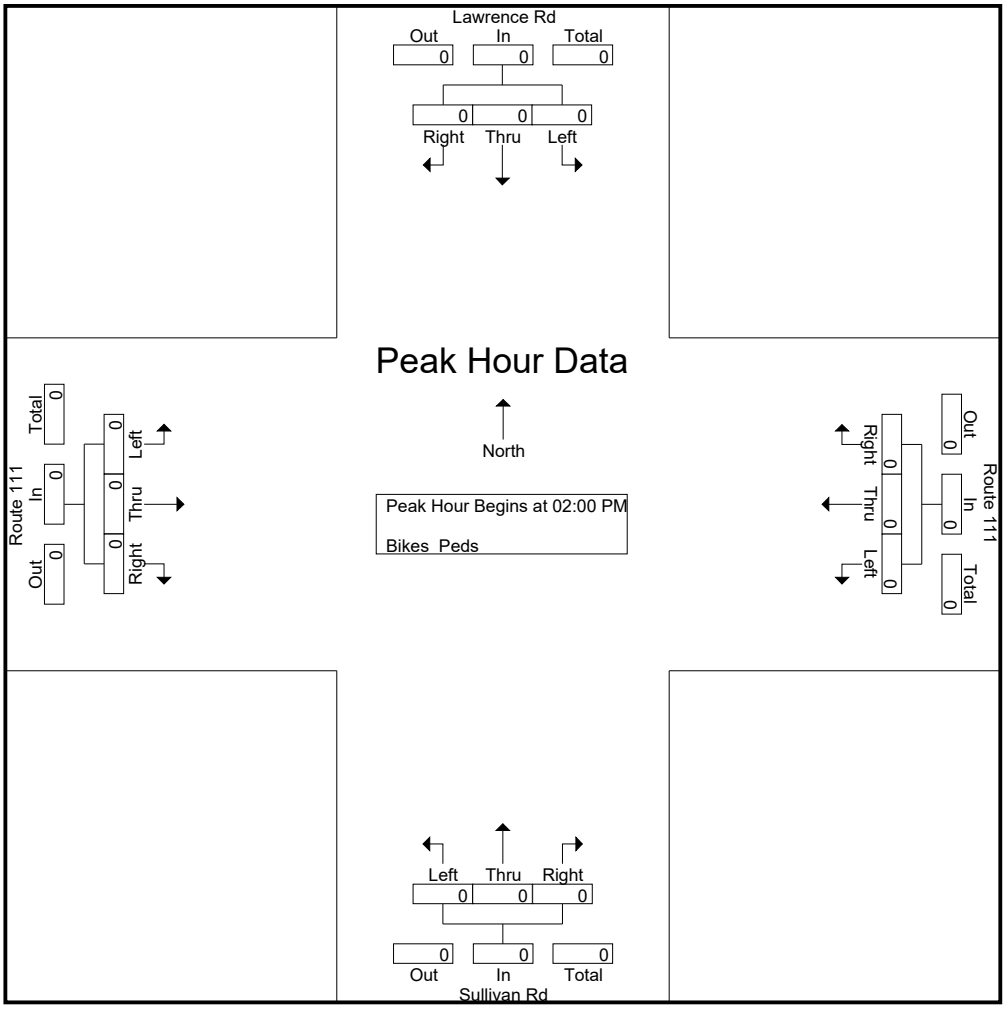
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 02:00 PM

02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	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	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 28



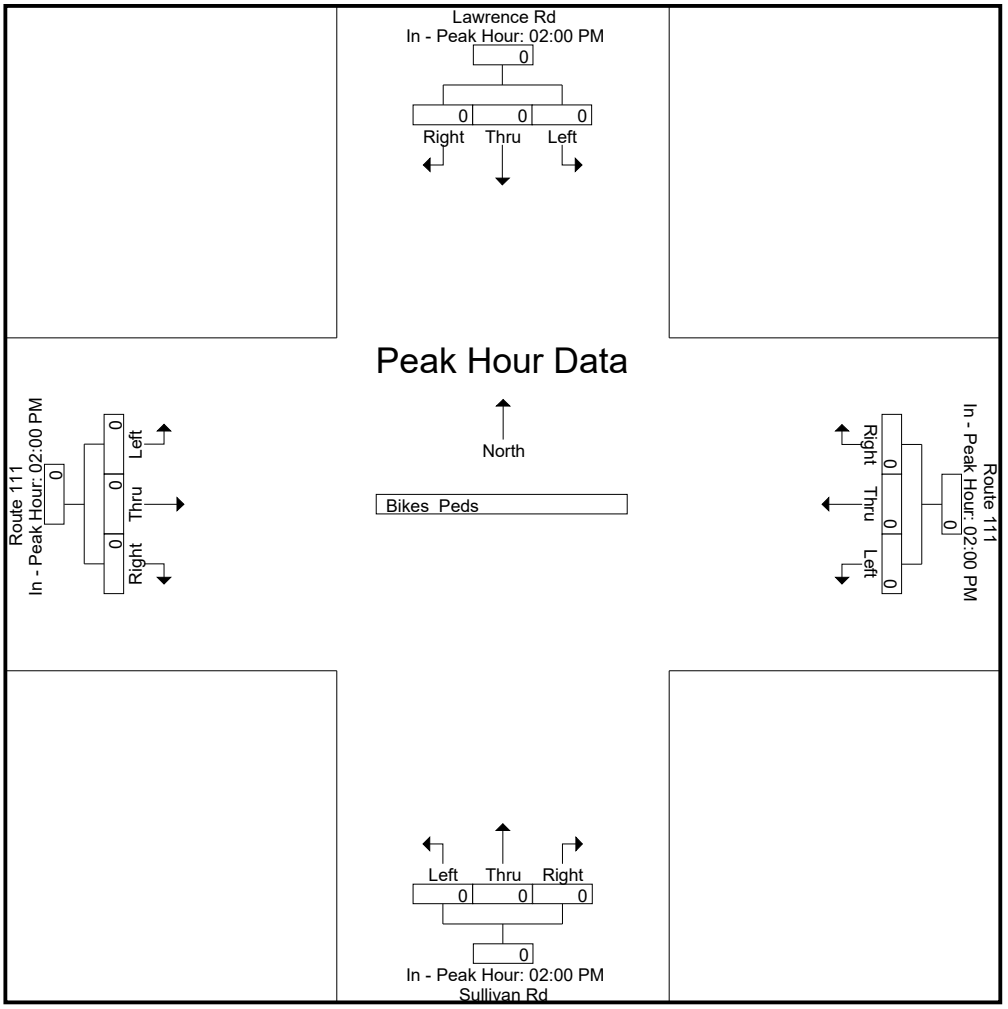
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:00 PM				02:00 PM				02:00 PM				02:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	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	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Accurate Counts
978-664-2565

N/S Street : Lawrence Rd / Sullivan Rd
E/W Street : Route 111
City/State : Hudson, NH
Weather : Cloudy

File Name : 95170001
Site Code : 95170001
Start Date : 1/24/2023
Page No : 29



Warrants Analysis

File Name:	TSWA 2023 Existing with Ave Month Asjustments.xsw
Analyst:	SWT
Agency:	VAI
Date Performed:	1/31/2023
Time Analyzed:	7AM to 7PM
Jurisdiction:	
Analysis Year:	2023 Existing with Average Month Adjustments
Project Description:	9517 Hundson NH
Units:	U.S. Customary

General

Major Street Direction: East-West	Population <10,000: No
Starting Time Interval: 7	Coordinated Signal System: No
Median Type: Undivided	Crashes Per Year: 0
Major Street Speed (mi/h): 50	Adequate Trials of Crash Experience Alternatives: No
Nearest Signal (ft): 0	

School Crossing and Roadway Network

Number of Students in Highest Hour: 0	Two or More Major Routes: No
Number of Adequate Gaps in Period: 0	Weekend Count: No
Number of Minutes in Period: 0	5-year Growth Factor (%): 0

Railroad Crossing

Grade Crossing Approach: None	Rail Traffic (trains/day): 4
Highest Volume Hour with Trains: Unknown	High Occupancy Buses (%): 0
Distance to Stop Line (ft): -	Tractor-Trailer Trucks (%): 10

Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	

Traffic Volumes (veh/h)

	Eastbound			Westbound			Northbound			Southbound		
Hour	L	T	R	L	T	R	L	T	R	L	T	R
07 - 08	6	502	10	5	665	18	17	23	28	49	42	25
08 - 09	4	411	17	13	518	19	15	12	32	33	17	18
09 - 10	6	322	8	13	406	18	13	17	12	21	17	6
10 - 11	6	304	12	12	329	14	22	12	19	25	16	15
11 - 12	6	296	16	13	338	23	12	11	14	19	16	5
12 - 13	6	324	16	16	326	31	12	16	17	15	11	10
13 - 14	13	354	10	12	336	24	11	14	11	16	12	12
14 - 15	11	485	27	19	394	39	10	13	19	16	14	6
15 - 16	7	571	16	40	520	47	13	18	18	19	15	11
16 - 17	12	770	30	25	482	59	19	25	25	23	22	10
17 - 18	10	724	26	41	507	50	11	27	21	18	13	11
18 - 19	15	403	24	29	348	49	15	15	21	14	13	11

Pedestrian Volumes and Gaps (Per Hour)

	Eastbound		Westbound		Northbound		Southbound	
	Gaps	Volume	Gaps	Volume	Gaps	Volume	Gaps	Volume
Hour								
07 - 08	0	0	0	0	0	0	0	0
08 - 09	0	0	0	0	0	0	0	0
09 - 10	0	0	0	0	0	0	0	0
10 - 11	0	0	0	0	0	0	0	0
11 - 12	0	0	0	0	0	0	0	0
12 - 13	0	0	0	0	0	0	0	0
13 - 14	0	0	0	0	0	0	0	0
14 - 15	0	0	0	0	0	0	0	0
15 - 16	0	0	0	0	0	0	0	0
16 - 17	0	0	0	0	0	0	0	0
17 - 18	0	0	0	0	0	0	0	0
18 - 19	0	0	0	0	0	0	0	0

Delay

Hour	Eastbound secs/veh	Eastbound veh-hrs	Westbound secs/veh	Westbound veh-hrs	Northbound secs/veh	Northbound veh-hrs	Southbound secs/veh	Southbound veh-hrs
07 - 08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08 - 09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09 - 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 - 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 - 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 - 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 - 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 - 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 - 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 - 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17 - 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 - 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Summary

Hour	Major Volume	Minor Volume	Total Volume	1A 70%	1A 56%	1B 70%	1B 56%	2 70%	3A 70%	3B 56%	4A 70%	4B 56%
07 - 08	1206	116	1390	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
08 - 09	982	68	1109	No	No	Yes	Yes	Yes	No	No	No	No
09 - 10	773	44	859	No	No	No	Yes	No	No	No	No	No
10 - 11	677	56	786	No	No	Yes	Yes	No	No	No	No	No
11 - 12	692	40	769	No	No	No	No	No	No	No	No	No
12 - 13	719	45	800	No	No	No	Yes	No	No	No	No	No
13 - 14	749	40	825	No	No	No	No	No	No	No	No	No
14 - 15	975	42	1053	No	No	No	Yes	No	No	No	No	No
15 - 16	1201	49	1295	No	No	No	Yes	No	No	No	No	No
16 - 17	1378	69	1502	No	No	Yes	Yes	Yes	No	No	No	No
17 - 18	1358	59	1459	No	No	Yes	Yes	No	No	No	No	No
18 - 19	868	51	957	No	No	No	Yes	No	No	No	No	No
Total	11578	679	12804	1	1	5	10	3	0	1	0	0

Results

Warrant 1: Eight-Hour Vehicular Volume [ ]
A. Minimum Vehicular Volumes [ ]
B. Interruption of Continuous Traffic [ ]
56% Vehicular --and-- Interruption Volumes [ ]

Warrant 2: Four-Hour Vehicular Volume [ ]
Four-Hour Vehicular Volumes [ ]

Warrant 3: Peak Hour [X]
A. Peak-Hour Conditions [ ]
B. Peak-Hour Vehicular Volume Hours Met [X]

Warrant 4: Pedestrian Volume [ ]
A. Four Hour Volumes [ ]
B. One-Hour Volumes [ ]

Warrant 5: School Crossing [ ]
Gaps Same Period [ ]
Student Volumes [ ]
Nearest Traffic Control Signal [ ]

Warrant 6: Coordinated Signal System [ ]
Degree of Platooning [ ]

Warrant 7: Crash Experience [ ]
A. Adequate Trials of Alternatives [ ]
B. Reported Crashes [ ]
C. 56% Volumes for Warrants 1A, 1B --or-- 4 [X]

Warrant 8: Roadway Network [ ]
A. Weekday Volume [ ]
B. Weekend Volume [ ]

Warrant 9: Grade Crossing	[ ]
A. Grade Crossing within 140 ft --and--	[ ]
B. Peak-Hour Vehicular Volumes	[ ]

This text report was created in HCS™ Warrants Version 2022 on 3/21/2023 1:39:15 PM

Signal Warrants Analysis

File Name:	TSWA 2034 Build with Ave Month Asjustments.xsw
Analyst:	DIR/SWT
Agency:	VAI
Date Performed:	3/21/2023
Time Analyzed:	7AM to 7PM
Jurisdiction:	
Analysis Year:	2034 Build with Average Month Adjustments
Project Description:	9517 Hundson NH
Units:	U.S. Customary

General

Major Street Direction: East-West	Population <10,000: No
Starting Time Interval: 7	Coordinated Signal System: No
Median Type: Undivided	Crashes Per Year: 0
Major Street Speed (mi/h): 50	Adequate Trials of Crash Experience Alternatives: No
Nearest Signal (ft): 0	

School Crossing and Roadway Network

Number of Students in Highest Hour: 0	Two or More Major Routes: No
Number of Adequate Gaps in Period: 0	Weekend Count: No
Number of Minutes in Period: 0	5-year Growth Factor (%): 0

Railroad Crossing

Grade Crossing Approach: None	Rail Traffic (trains/day): 4
Highest Volume Hour with Trains: Unknown	High Occupancy Buses (%): 0
Distance to Stop Line (ft):	Tractor-Trailer Trucks (%): 10

Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	

Traffic Volumes (veh/h)

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Hour												
07 - 08	7	560	15	11	742	20	22	26	33	55	47	28
08 - 09	4	459	23	20	578	21	21	13	40	37	19	20
09 - 10	7	359	14	20	453	20	20	19	17	23	19	7
10 - 11	7	339	17	18	367	16	30	13	25	28	18	17
11 - 12	7	330	22	21	377	26	18	12	20	21	18	6
12 - 13	7	361	23	23	364	35	19	18	23	17	12	11
13 - 14	15	395	15	19	375	27	18	16	16	18	13	13
14 - 15	12	541	33	26	440	44	16	15	25	18	16	7
15 - 16	8	637	21	50	580	52	21	20	25	21	17	12
16 - 17	13	859	37	32	538	66	26	28	33	26	25	11
17 - 18	11	808	29	48	566	56	16	30	25	20	15	12
18 - 19	17	450	27	33	388	55	18	17	24	16	15	12

Pedestrian Volumes and Gaps (Per Hour)

	Eastbound		Westbound		Northbound		Southbound	
	Gaps	Volume	Gaps	Volume	Gaps	Volume	Gaps	Volume
Hour								
07 - 08	0	0	0	0	0	0	0	0
08 - 09	0	0	0	0	0	0	0	0
09 - 10	0	0	0	0	0	0	0	0
10 - 11	0	0	0	0	0	0	0	0
11 - 12	0	0	0	0	0	0	0	0
12 - 13	0	0	0	0	0	0	0	0
13 - 14	0	0	0	0	0	0	0	0
14 - 15	0	0	0	0	0	0	0	0
15 - 16	0	0	0	0	0	0	0	0
16 - 17	0	0	0	0	0	0	0	0
17 - 18	0	0	0	0	0	0	0	0
18 - 19	0	0	0	0	0	0	0	0

Delay

Hour	Eastbound secs/veh	Eastbound veh-hrs	Westbound secs/veh	Westbound veh-hrs	Northbound secs/veh	Northbound veh-hrs	Southbound secs/veh	Southbound veh-hrs
07 - 08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08 - 09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09 - 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 - 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 - 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 - 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 - 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 - 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 - 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 - 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17 - 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 - 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Summary

Hour	Major Volume	Minor Volume	Total Volume	1A 70%	1A 56%	1B 70%	1B 56%	2 70%	3A 70%	3B 70%	4A 70%	4B 70%
07 - 08	1355	130	1566	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
08 - 09	1105	76	1255	No	No	Yes	Yes	Yes	No	Yes	No	No
09 - 10	873	56	978	No	No	Yes	Yes	No	No	No	No	No
10 - 11	764	68	895	No	No	Yes	Yes	Yes	No	No	No	No
11 - 12	783	50	878	No	No	No	Yes	No	No	No	No	No
12 - 13	813	60	913	No	No	Yes	Yes	No	No	No	No	No
13 - 14	846	50	940	No	No	No	Yes	No	No	No	No	No
14 - 15	1096	56	1193	No	No	Yes	Yes	No	No	No	No	No
15 - 16	1348	66	1464	No	No	Yes	Yes	Yes	No	No	No	No
16 - 17	1545	87	1694	No	Yes	Yes	Yes	Yes	No	Yes	No	No
17 - 18	1518	71	1636	No	No	Yes	Yes	Yes	No	No	No	No
18 - 19	970	59	1072	No	No	Yes	Yes	No	No	No	No	No
Total	13016	829	14484	1	2	10	12	6	0	3	0	0

Results

Warrant 1: Eight-Hour Vehicular Volume	[X]
A. Minimum Vehicular Volumes	[ ]
B. Interruption of Continuous Traffic	[X]
56% Vehicular --and-- Interruption Volumes	[ ]
Warrant 2: Four-Hour Vehicular Volume	[X]
Four-Hour Vehicular Volumes	[X]
Warrant 3: Peak Hour	[X]
A. Peak-Hour Conditions	[ ]
B. Peak-Hour Vehicular Volume Hours Met	[X]
Warrant 4: Pedestrian Volume	[ ]
A. Four Hour Volumes	[ ]
B. One-Hour Volumes	[ ]
Warrant 5: School Crossing	[ ]
Gaps Same Period	[ ]
Student Volumes	[ ]
Nearest Traffic Control Signal	[ ]
Warrant 6: Coordinated Signal System	[ ]
Degree of Platooning	[ ]
Warrant 7: Crash Experience	[ ]
A. Adequate Trials of Alternatives	[ ]
B. Reported Crashes	[ ]
C. 56% Volumes for Warrants 1A, 1B --or-- 4	[X]
Warrant 8: Roadway Network	[ ]
A. Weekday Volume	[ ]
B. Weekend Volume	[ ]

Warrant 9: Grade Crossing	[ ]
A. Grade Crossing within 140 ft --and--	[ ]
B. Peak-Hour Vehicular Volumes	[ ]

This text report was created in HCS™ Signal Warrants Version 7.9 on 3/21/2023 6:15:55 PM

Warrants Analysis

File Name:	TSWA 2034 No-Build with Ave Month Asjustments.xsw
Analyst:	DIR
Agency:	VAI
Date Performed:	3/21/2023
Time Analyzed:	7AM to 7PM
Jurisdiction:	
Analysis Year:	2034 No-Build with Average Month Adjustments
Project Description:	9517 Hundson NH
Units:	U.S. Customary

General

Major Street Direction: East-West	Population <10,000: No
Starting Time Interval: 7	Coordinated Signal System: No
Median Type: Undivided	Crashes Per Year: 0
Major Street Speed (mi/h): 50	Adequate Trials of Crash Experience Alternatives: No
Nearest Signal (ft): 0	

School Crossing and Roadway Network

Number of Students in Highest Hour: 0	Two or More Major Routes: No
Number of Adequate Gaps in Period: 0	Weekend Count: No
Number of Minutes in Period: 0	5-year Growth Factor (%): 0

Railroad Crossing

Grade Crossing Approach: None	Rail Traffic (trains/day): 4
Highest Volume Hour with Trains: Unknown	High Occupancy Buses (%): 0
Distance to Stop Line (ft): -	Tractor-Trailer Trucks (%): 10

Geometry and Traffic

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Lane Usage		LTR			LTR			LTR			LTR	

Traffic Volumes (veh/h)

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Hour												
07 - 08	7	560	11	6	742	20	19	26	31	55	47	28
08 - 09	4	459	19	15	578	21	17	13	36	37	19	20
09 - 10	7	359	9	15	453	20	15	19	13	23	19	7
10 - 11	7	339	13	13	367	16	25	13	21	28	18	17
11 - 12	7	330	18	15	377	26	13	12	16	21	18	6
12 - 13	7	361	18	18	364	35	13	18	19	17	12	11
13 - 14	15	395	11	13	375	27	12	16	12	18	13	13
14 - 15	12	541	30	21	440	44	11	15	21	18	16	7
15 - 16	8	637	18	45	580	52	15	20	20	21	17	12
16 - 17	13	859	33	28	538	66	21	28	28	26	25	11
17 - 18	11	808	27	46	566	56	12	30	23	20	15	12
18 - 19	17	450	27	32	388	55	17	17	23	16	15	12

Pedestrian Volumes and Gaps (Per Hour)

	Eastbound		Westbound		Northbound		Southbound	
	Gaps	Volume	Gaps	Volume	Gaps	Volume	Gaps	Volume
Hour								
07 - 08	0	0	0	0	0	0	0	0
08 - 09	0	0	0	0	0	0	0	0
09 - 10	0	0	0	0	0	0	0	0
10 - 11	0	0	0	0	0	0	0	0
11 - 12	0	0	0	0	0	0	0	0
12 - 13	0	0	0	0	0	0	0	0
13 - 14	0	0	0	0	0	0	0	0
14 - 15	0	0	0	0	0	0	0	0
15 - 16	0	0	0	0	0	0	0	0
16 - 17	0	0	0	0	0	0	0	0
17 - 18	0	0	0	0	0	0	0	0
18 - 19	0	0	0	0	0	0	0	0

Delay

Hour	Eastbound secs/veh	Eastbound veh-hrs	Westbound secs/veh	Westbound veh-hrs	Northbound secs/veh	Northbound veh-hrs	Southbound secs/veh	Southbound veh-hrs
07 - 08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08 - 09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09 - 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 - 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 - 12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 - 13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 - 14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 - 15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 - 16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 - 17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17 - 18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 - 19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Summary

Hour	Major Volume	Minor Volume	Total Volume	1A 70%	1A 56%	1B 70%	1B 56%	2 70%	3A 70%	3B 56%	4A 70%	4B 56%
07 - 08	1346	130	1552	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
08 - 09	1096	76	1238	No	No	Yes	Yes	Yes	No	Yes	No	No
09 - 10	863	49	959	No	No	No	Yes	No	No	No	No	No
10 - 11	755	63	877	No	No	Yes	Yes	Yes	No	No	No	No
11 - 12	773	45	859	No	No	No	Yes	No	No	No	No	No
12 - 13	803	50	893	No	No	No	Yes	No	No	No	No	No
13 - 14	836	44	920	No	No	No	Yes	No	No	No	No	No
14 - 15	1088	47	1176	No	No	No	Yes	No	No	No	No	No
15 - 16	1340	55	1445	No	No	Yes	Yes	No	No	No	No	No
16 - 17	1537	77	1676	No	No	Yes	Yes	Yes	No	Yes	No	No
17 - 18	1514	65	1626	No	No	Yes	Yes	Yes	No	No	No	No
18 - 19	969	57	1069	No	No	Yes	Yes	No	No	No	No	No
Total	12920	758	14290	1	1	7	12	5	0	3	0	0

Results

Warrant 1: Eight-Hour Vehicular Volume	[ ]
A. Minimum Vehicular Volumes	[ ]
B. Interruption of Continuous Traffic	[ ]
56% Vehicular --and-- Interruption Volumes	[ ]
Warrant 2: Four-Hour Vehicular Volume	[X]
Four-Hour Vehicular Volumes	[X]
Warrant 3: Peak Hour	[X]
A. Peak-Hour Conditions	[ ]
B. Peak-Hour Vehicular Volume Hours Met	[X]
Warrant 4: Pedestrian Volume	[ ]
A. Four Hour Volumes	[ ]
B. One-Hour Volumes	[ ]
Warrant 5: School Crossing	[ ]
Gaps Same Period	[ ]
Student Volumes	[ ]
Nearest Traffic Control Signal	[ ]
Warrant 6: Coordinated Signal System	[ ]
Degree of Platooning	[ ]
Warrant 7: Crash Experience	[ ]
A. Adequate Trials of Alternatives	[ ]
B. Reported Crashes	[ ]
C. 56% Volumes for Warrants 1A, 1B --or-- 4	[X]
Warrant 8: Roadway Network	[ ]
A. Weekday Volume	[ ]
B. Weekend Volume	[ ]

Warrant 9: Grade Crossing	[ ]
A. Grade Crossing within 140 ft --and--	[ ]
B. Peak-Hour Vehicular Volumes	[ ]

This text report was created in HCS™ Warrants Version 2022 on 3/21/2023 3:45:12 PM

NCE TECHNICAL MEMO 2023-021

Environmental Noise Survey and Noise Impact Predictions for Proposed 84 Lumber Site, Hudson, NH

Revision 1

Ben Bonnice
Tyler Cameron
Zachary Weiss

04/07/2023

NCE Job No. 23515.01

Prepared for:
84 Lumber Company
1019 Route 519, Building 5
Eighty Four, PA 15330
Attention: *Mr. James Zaunick*

Prepared by:
Noise Control Engineering, LLC
85 Rangeway Rd.
Building 2, Floor 2
Billerica, MA 01862
978-670-5339
978-667-7047 (fax)
noise-control.com

REVISION HISTORY

Rev	Date	Summary of Changes
0	03/21/2023	Original Issue
1	04/7/2023	Addition of Truck Noise Source, Modeling Refinements

TABLE OF CONTENTS

0.0 EXECUTIVE SUMMARY

An application for a permit has been requested for the construction and operation of an 84 Lumber facility at the corner of Sullivan Road and Central Street (Route 111) in Hudson, NH. As part of the permit, a noise study is required to determine if the operations of the proposed facility will meet the required noise ordinances. Noise Control Engineering, LLC (NCE) has been retained by the 84 Lumber Company to conduct an environmental noise survey quantifying existing noise levels, as well as to evaluate potential noise impacts to the community from the proposed site through acoustic predictions. The primary noise sources from the proposed development are expected to be forklifts operating around the facility, trucks pulling in and out of the facility, and the building HVAC systems. The forklifts and are only expected to be operating while workers are onsite between 0600 and 1800 hours. During these hours, it is understood that no more five trucks will arrive in the morning period, and no more than five trucks will arrive in the evening period. The HVAC systems are expected to be operating continuously. This report presents the results of background noise measurements taken on the proposed site and predicted noise levels for the site once operational.

This effort is intended to evaluate compliance with the noise regulations for the Town of Hudson. Primarily, the noise at the abutting property lines cannot exceed 10 dB above the background noise level or the noise levels in Table 1, whichever is lower. Based on the long-term noise measurements, this limits noise from the site to between 53 and 55 dB(A), depending on location, during working hours (0600 to 1800) and 40-44 dB(A) for continually operating equipment (1800 to 0600).

Noise predictions were performed using the environmental noise modeling software CadnaA configured with international standard ISO 9613-2. Sources for this site consisted of forklifts operating during working hours, trucks moving around the yard and HVAC operating continuously. The noise from these sources were predicted at 37 discrete locations corresponding to residences near the proposed facility and across the study area through the computation of noise contour sets.

All noise levels are predicted to comply with the Town of Hudson noise ordinance for the proposed 84 Lumber site. The highest noise level predicted during operating hours was 53 dB(A) at 8 Sullivan Dr due to the forklifts and trucks The noise level predicted at the house for this location is 49 dB(A).

Noise levels at 15 Sullivan Dr, where a noise barrier has been requested, were found to be 46 dB(A) at the property line and 44 dB(A) at the house. Predictions have shown that this location would meet without a noise barrier.

The highest noise levels predicted from the HVAC was 32 dB(A) at 63 Lawrence Rd. This level is well below the required 40-44 dB(A) during evening, non-working hours.

0.1 Abbreviations

DAQC	Division of Air Quality Control
dB	Decibel
dB(A)	A-Weighted Decibel
FHWA	Federal Highway Administration
NHGIS	New Hampshire Geographic Information
NCE	Noise Control Engineering, LLC
NCHRP	National Cooperative Highway Research Program
NIST	National Institute of Standards and Technology
HVAC	Heating Ventilation and Air Conditioning

1.0 INTRODUCTION

An application for a permit has been requested for the construction and operation of an 84 Lumber facility at the corner of Sullivan Road and Central Street (Route 111) in Hudson, NH. As part of the permit, a noise study is required to determine if the operations of the proposed facility will meet the required noise ordinances. Noise Control Engineering, LLC (NCE) has been retained by the 84 Lumber Company to conduct an environmental noise survey quantifying existing noise levels, as well as to evaluate potential noise impacts to the community from the proposed site through acoustic predictions. The primary noise sources from the proposed development are expected to be forklifts operating around the facility, trucks moving around the yard and HVAC. The forklifts and trucks are only expected to be operating while workers are onsite between 0600 and 1800 hours. The HVAC systems are expected to be operating continuously. This report presents the results of background noise measurements taken on the proposed site and predicted noise levels for the site once operational.

This effort is intended to predict compliance with the noise regulations for the state of New Hampshire and the Town of Hudson, NH. Section 2 presents the criteria from these regulations, Section 3 details the site, Section 4 details the ambient measurements, Section 5 details the noise modeling process, Section 6 presents the predicted levels from the noise model, and Section 7 includes the conclusion from the results. Appendix A provides full results tables for the noise predictions.

2.0 NOISE CRITERIA

2.1 New Hampshire

The State of New Hampshire has not established regulations that set community noise exposure criteria. It is up to each individual community to establish noise regulations through community by-laws.

2.2 Hudson Noise Ordinance

Noise in the Town of Hudson, NH is regulated under Chapter 249 Noise in the Town's general code. All criteria from this chapter are copied below, including both quantitative and qualitative criteria, with NCE comments in square brackets. Analysis will focus on the quantitative criteria given in Noise Limits 2 to 6.

§ 249-4. Prohibited noise emissions and conditions.

No person or persons owning, leasing or controlling the operations of any source or sources of noise shall willfully, negligently or through failure to provide necessary equipment or facilities or through failure to take necessary precautions make or permit the emission of noise levels or conditions exceeding the following noise limits for the applicable land use:

§ 249-4-A. Noise Limit 1: General prohibition of noise emissions

No person or persons owning, leasing or controlling the operation of any source or sources of noise shall willfully, negligently or through failure to provide necessary equipment or facilities or to take necessary precautions permit the establishment of a condition or conditions constituting noise pollution, as defined in § 249-2 of this chapter.

§ 249-2 defines noise pollution as "The presence of that amount of acoustic energy for that amount of time necessary to cause one or more of the following effects:

A. Temporary or permanent hearing loss in persons exposed.
B. Injury to or tendency to injure, on the basis of current information, the public health or welfare.
C. Nuisance
D. Interference with the comfortable and reasonable enjoyment of life and property, or interference with the conduct of business.
E. Exceeding the limits or restrictions established herein or pursuant to the granting of any permit by the Town governing body.

§ 249-4-B. Noise Limit 2: Continuous sound-level limits

No person shall cause the continuous sound level to exceed the following limits, as measured at the applicable locations in accordance with the provisions of § 249-3D(5) of the regulation (which defines the necessary steps in taking sound-level measurements):

Table 1: Continuous Sound Level Limits Leq (dB(A), 1-Hour[3])

Receptor Land Use Category	Daytime	Nighttime
Residential/rural/institutional[1]	55	50
Business/recreational[2]	65	55
Industrial	75	75

Notes:

[1] Hospitals, schools, places of worship, libraries, public parklands, etc.

[2] Public playgrounds, swimming pools, athletic fields, golf courses, etc.

[3] Where the offending source of noise is nearly constant over a one-hour period, a measurement sampling period of less than one hour, but no less than five minutes, is permitted. This measurement shall be made with the sound-level meter set to slow A-weighting responses.

§ 249-4-C. Noise Limit 3: Impulsive sound-level limits

No person shall cause an impulsive sound level that exceeds the following limits, as measured at the applicable locations in accordance with the provisions of § 249-3D(5) of [the regulation]:

Table 2: Continuous Sound Level Limits (dB(C), Fast Time Weighting)

Receptor Land Use Category	Daytime	Nighttime
Residential/rural/institutional[1]	55	50
Business/recreational[2]	65	55
Industrial	75	75

Notes:

[1] Hospitals, schools, places of worship, libraries, public parklands, etc.

[2] Public playgrounds, swimming pools, athletic fields, golf courses, etc.

§ 249-4-D. Noise Limit 4: Background referenced sound level

No person shall cause the background noise level, as defined in § 249-2 of this chapter, to increase by more than 10 dBA in any receptor area at any time of day.

§ 249-4-E. Noise Limit 5: Pure-tone conditions

No person shall produce a pure-tone condition at the nearest receptor buildings or activity areas in rural/residential/-institutional or business/recreational/industrial zoned property. [Pure-tones are defined as the sound pressure level in any octave band from exceeding the sound pressure level in the two adjacent octave bands by 3 dB or more.]

§ 249-4-F. Noise Limit 6: High noise-level areas

In areas where the ambient sound level is already as high as or higher than three dB below the sound-level limits of Noise Limit 2, no person shall cause the noise level in any area to increase by more than three dB. This limit is in lieu of Noise Limit 2 but shall not supersede any other noise limit as defined in this chapter.

2.3 Noise Criteria for Site

Based on the Town of Hudson's noise ordinance [1], the noise at the abutting property lines cannot exceed 10 dB above the background noise level or the noise levels in Table 1, whichever is lower. The exception to this rule is if the background noise level is below the levels shown in Table 1 by less than 3 dB. Then the noise at the abutting property lines cannot increase the background by more than 3 dB. Background noise level is defined in section 249-2 of the Town of Hudson's noise ordinance as the highest A-weighted sound-pressure level which exceeded 90% of the time period. This is also the definition of an L_{90}.

NCE has interpreted this ordinance this to mean sources that are constantly operating such as HVAC will be compared against the lowest average hourly A-weighted L_{90} of the entire day while operations that are limited to working hours[1] such as forklifts will be compared with the lowest average hourly A-weighted L_{90} during those hours.

[1] Working hours are defined as 0600-1800

3.0 SITE LOCATION

The Proposed Site is located at the corner of Sullivan Road and Central Street (Route 111) in Hudson, NH. The general location of the facility is shown in Figure 1 by the red and white hash marks. A site plan of the facility is shown in Figure 2.

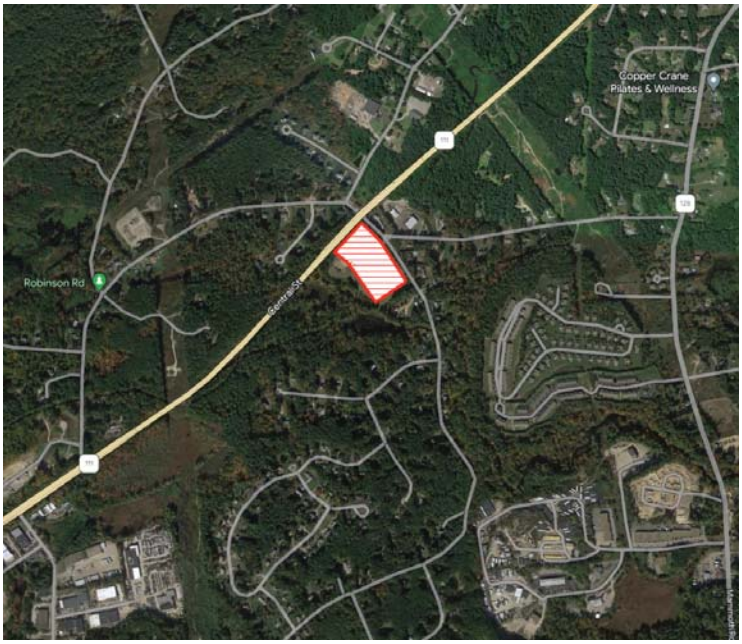


Figure 1. General location of the facility

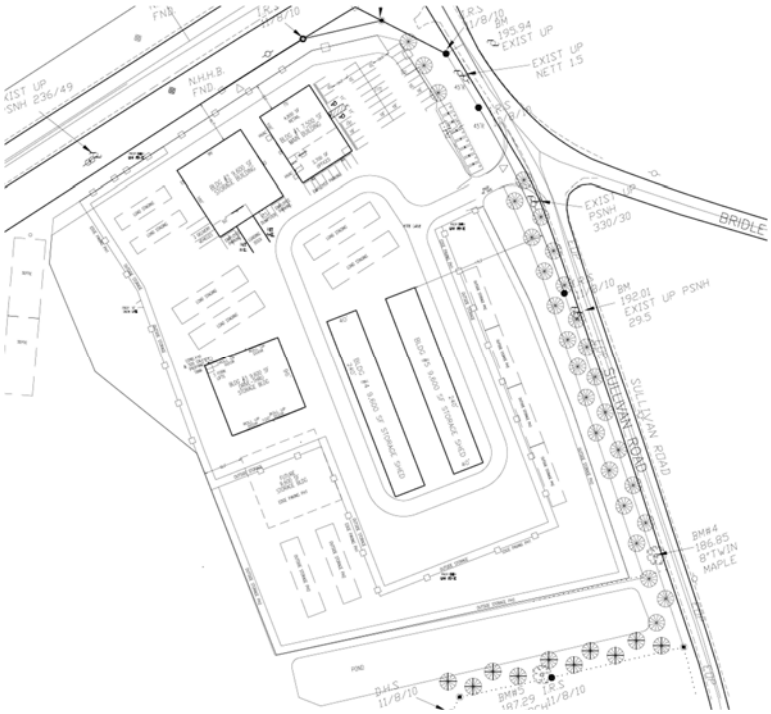


Figure 2. Site Plan

4.0 AMBIENT NOISE MEASUREMENTS

4.1 Methodology

Long-term unattended noise monitoring was performed at residences near the proposed facility at two locations over a period of seven days from February 16 to 23 to quantify the existing background noise in the community at all hours of the day. Locations of both monitors are shown in Figure 3.

The two unattended monitors (Locations 1 and 2) consisted of Larson Davis Type 831 sound level meters with PCB model 377B20 ½" microphones and PCB model PRM831 preamplifiers. This equipment was situated within weatherproof cases and installed at ground level. The microphones were affixed to tripods about 5 feet above ground level and covered with waterproof windscreens to minimize noise from wind gusts. The meters were configured to average sound pressure levels continuously in both 1-second and 5-minute intervals for the duration of the monitoring period. Data was collected at these intervals in overall dB(A), A-weighted L_{90}, and one-third octave-band formats. The meters were field calibrated using a Larson Davis CAL200 both prior to installation and during their retrieval.

Temperature and humidity data during the monitoring period was measured onsite using a Kestrel DROP D3 Data Logger, while wind and rainfall data was retrieved from World Weather Online for the Town of Hudson. The last day of the monitoring was the only day with significant precipitation and was excluded from the data set in the calculation of the background noise. All instrumentation used for the long-term measurements was laboratory calibrated traceable to NIST standards within the previous 12 months.

Figure 3: Long-Term Unattended Measurement Locations

4.2 Background

The 5-minute L_{eq} and L_{90} from locations 1 and 2 for the entire measurement period are shown in Figure 2 and 3 below. Daily fluctuation of noise levels were seen to be fairly consistent throughout the measurement period.

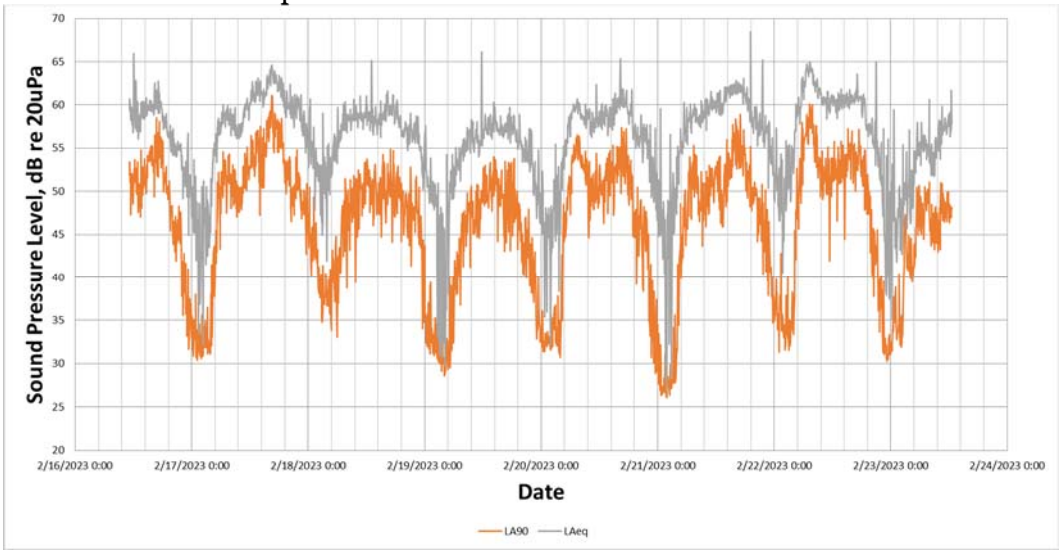


Figure 2. Location 1 5-minite L_{eq} and L_{90}.

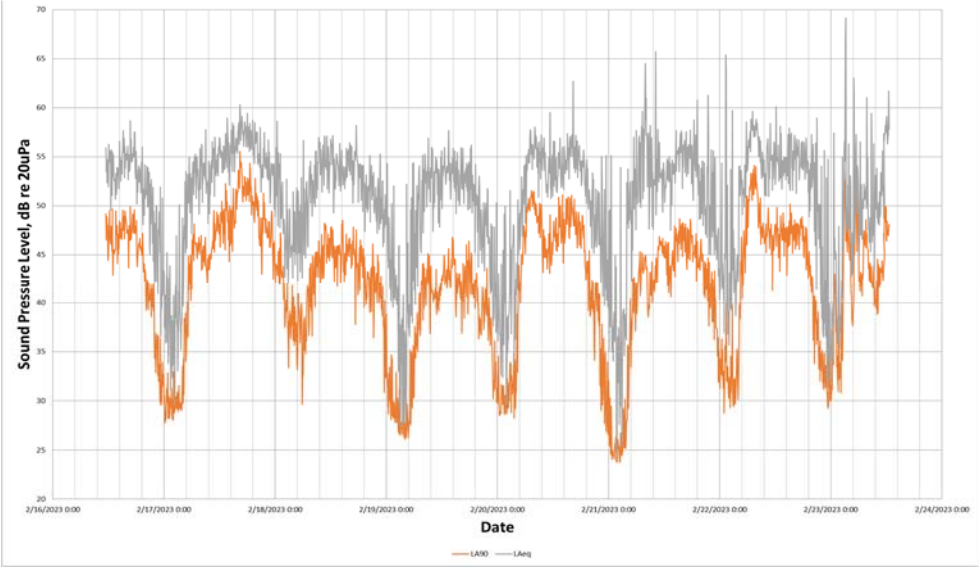


Figure 3. Location 2 5-minite L_{eq} and L_{90}.

Figure 4 presents the average hourly A-weighted L_{90} sound levels for each of the 24 hours of the day at the two monitoring locations. These levels were derived from the 1-second interval data gathered throughout the monitoring period. The shaded area of Figure 4 is excluded from the background calculation for noise sources that are only present during working hours. Location 1, which is closer to Central St (Route 111) was typically louder than location 2. During the hours of operation of the proposed site, 0600 to 1800, levels were on average 6 dB louder at location 1 than 2. This is likely due to the proximity of Location 1 to Central St.

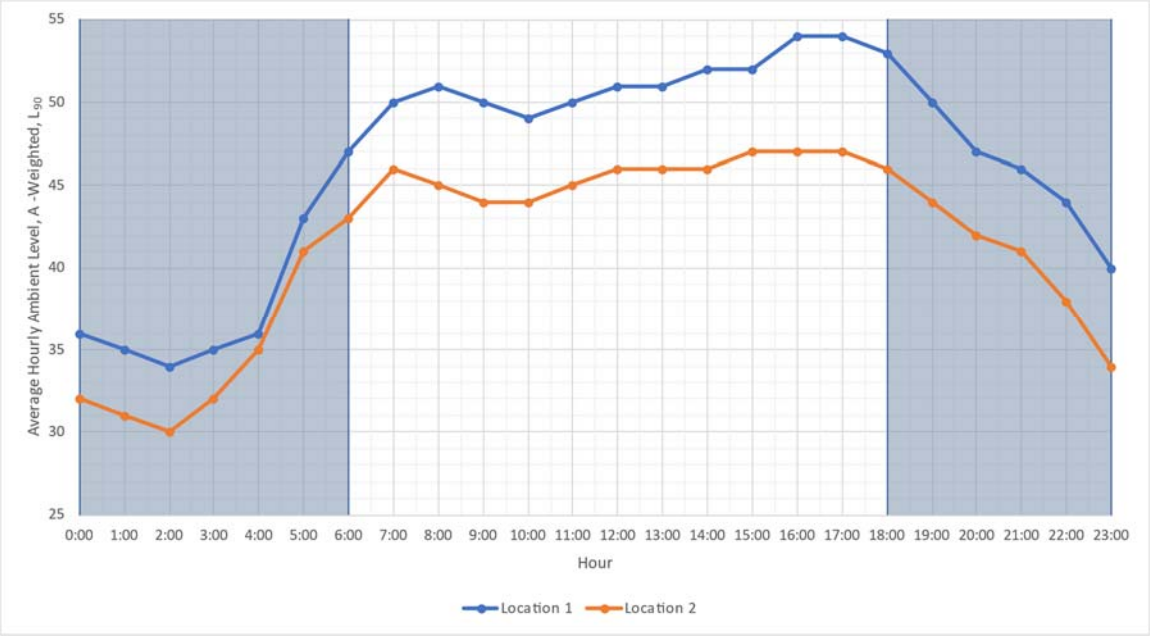


Figure 4: Average Hourly Ambient Levels Derived from Noise Monitoring Data (A-Weighted L_{90})

Between the two meters, average hourly levels during operation hours ranged from 43 dB(A) (Location 2 at 0600) to 54 dB(A) (Location 1 at 1700). There is a peak in the average hourly levels around 0800 at Location 1 and then a steady rise in average hourly levels from 1000 until

1700. The peak in the morning and evening is likely due to traffic noise on central street from commuting. The noise at Location 2 seems to also be controlled by the noise from Central Street. The lower level is due to being further from the street. After 1700, levels decreased steadily each hour until 0200, after which they increased steadily until 0700. This pattern with the quietest period around 0200 is common for similar locations.

Based on the long term measurements, compliance with Town of Hudson's noise ordinance for operational noise will be assessed based on the lowest average hourly levels during working hours, shown in Table 3, and continues operation will be assessed based on the lowest average hourly levels, show in Table 4.

Table 3. Working Hours Noise Limit

Location	Limit, dB(A)	Justification
Residences along Route 111	55	Background Levels during working hours are less than 10 dB below the limit but more the 3 dB below limit
Residences along Sullivan Rd and Cheney Rd	53	Average Background quietest hour is 43 dB(A). Level cannot exceed 10 dB from this level

Table 4. Continuously Operating Noise Limit

Location	Limit, dB(A)	Justification
Residences that are along Route 111	44	Average Background quietest hour is 34 dB(A). Level cannot exceed 10 dB from this level
Residences along Sullivan Rd and Cheney Rd	40	Average Background quietest hour is 30 dB(A). Level cannot exceed 10 dB from this level

5.0 NOISE PREDICTION

Noise predictions were performed using the environmental noise modeling software CadnaA to predict sound pressure levels from the proposed facility at nearby residences. CadnaA was configured to use the international standard ISO 9613-2 [2] to calculate sound propagation using spherical spreading, reflection off hard surfaces, acoustic shielding, and ground effects. Foliage was not included as there are not enough trees near the project site to be acoustically significant. The general layout of the proposed facility was taken from the site plan shown in Site Development Plan Rev D [3]. Elevation contours and building polygons of the properties surrounding the proposed site were retrieved from the New Hampshire Geodata Portal (NHGIS) [4]. The elevation contours and building information for the proposed site itself were provided by 84 Lumber Company. A barrier was located between the site and 15 Sullivan Rd and assumed in the baseline model.

Two primary conditions were modeled: (1) the HVAC systems operating alone during non-working hours, and (2) trucks and forklifts operating around the facility during working hours plus HVAC systems. Figure 4 shows the location of the sources. The HVAC units were modeled as point sources. The Forklifts were modeled as an area source over the entire site, with levels

adjusted upwards to reflect 3 forklifts operating. The area source was conservatively biased to the property lines on Central St, Sullivan Rd and the 15 Sullivan Rd property. Trucks were modeled as a line source moving around buildings #4 and #5 as they enter the site and drive around to get loaded. The HVAC systems were evaluated as a separate condition to ensure that they do not violate the noise ordinance outside of working hours.

Source noise levels for each piece of equipment were determined and provided to the software as sound power levels in octave bands from 31.5 Hz to 8000 Hz.

Results were predicted at 37 discrete locations corresponding to property lines and houses nearby the proposed facility. Locations along Route 111, Sullivan Road, Bridle Bridge Road and Cheney Drive. All of the receiver locations are shown in Figure 4.

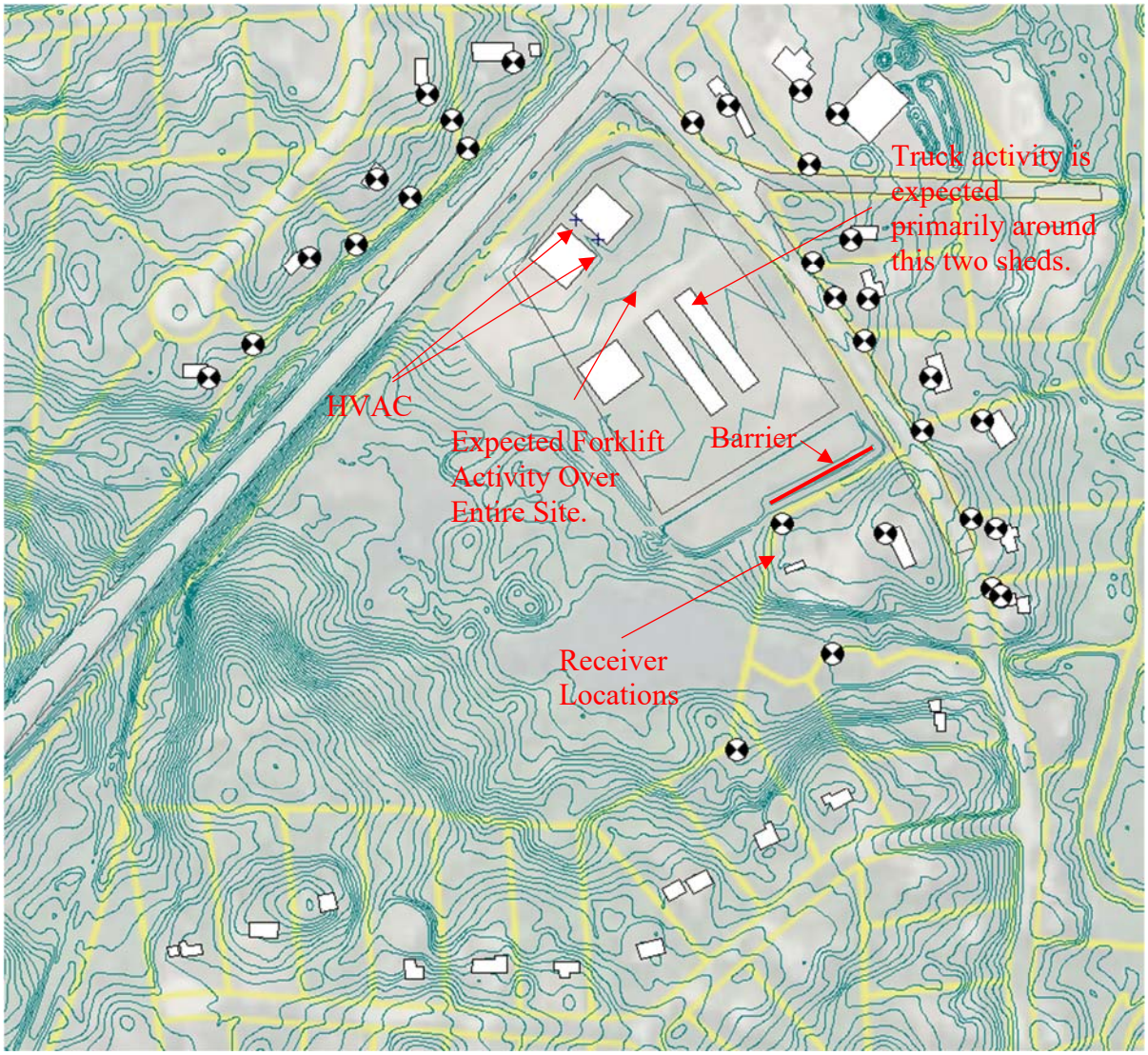


Figure 4: Location of Noise Sources and receivers in the CadnaA Model

5.1 Model Geometry

The site plan drawing was imported into the software, scaled to the correct physical dimensions, and georeferenced. Ground topography for the modeled area was included in the model using

elevation three (3) meter elevation contours acquired from NHGIS [4]. A soft ground surface was used throughout the study area (ground factor of 1), with the exception of the proposed facility site and neighborhood roadways, which were modeled as hard ground (ground factor of 0). Foliage was not included as there are not enough trees near the project site to be acoustically significant.

5.2 Noise Sources

The sound power levels for the primary noise sources onsite are presented in Table 5. The HVAC systems are comprised of a Trane 5-ton and 10-ton unit. Overall sound power levels were provided by the manufacturer. NCE estimated the spectrum sound power level based on spectra of similar units. These units are continually operating on the site and were evaluated against the limits shown in Table 4.

Forklifts are expected to be operating during working hours between 0600 and 1800 hours. The forklift sound power source levels are based on measured levels by Spectrum Acoustical Consulting of a diesel forklift [5], with levels adjusted upwards to reflect 3 forklifts operating. Forklifts were biased to be near the edge of the site for a more conservative prediction. The levels in Table 5 represent the forklift before this adjustment. The Forklifts were evaluated against the limits shown in Table 3.

This site is expected to operate propane forklifts which are generally quieter. Forklifts were assumed to be operating using white noise back up alarms that automatically adjust to background noise. This will prevent the units from violating the tonal requirements of the Town of Hudson noise ordinance and bothering the surrounding neighbors.

As this site is an active lumber yard, the occasional truck will be present on site to be loaded or unloaded. The client has estimated that the site will have on average 5 trucks during morning hours and 5 trucks during evening hours. Standardized source levels for heavy trucks were developed from the Federal Highway Administration Traffic Noise Model Version 3.1 Reference Energy Mean Emission Levels for a truck operating at 5 mph [6]. For conservative prediction purposes, five trucks were assumed to arrive and depart within a one-hour period. These trucks were assumed to enter the facility and drive around buildings 4 and 5. Given a 5 mph speed and the length of the truck loop, this corresponds to modeling a truck under motor for about 12 minutes of the hourly period. Per New Hampshire regulations trucks need to be shut down if they will be sitting onsite for more than 5 minutes, which excluded extended truck idling from consideration as a noise source.

Table 5: Source Levels, dB re: 1pW

Source	Octave Band Center Frequency (Hz)								
	31.5	63	125	250	500	1000	2000	4000	8000
Forklift, Diesel	109	109	106	93	88	88	87	80	71
Truck, 5 mph Upper, Lower*	105, 101	106, 104	109, 106	109, 105	109, 101	93, 93	93, 92	96, 93	93, 91
HVAC, Trane 5 Ton	59	65	69	81	78	74	69	64	62
HVAC, Trane 10 Ton	60	66	70	82	79	75	70	65	63

*Trucks were modeled with upper and lower sub-sources, per [6]

6.0 RESULTS

The following sections present the predicted levels for HVAC and operation noise. The full predictions for all 37 modeled receivers are provided in Appendix A.

6.1 HVAC Noise Prediction

The results of the HVAC prediction at the surrounding property lines are presented in Table 6. Predicted noise levels are between 32 and 8 dB from the HVAC units. The highest predicted level is 32 dB(A) at 63 Lawrence Rd. The four most affected properties, 63 Lawrence Rd and 2-6 Hudson Hill Dr, were across Central St. This is due to the barrier effect the site buildings have on the units. Even if the building provided no barrier effect predicted levels would still meet the noise limits from Table 4. Figure 5 shows the noise contour lines for the HVAC predicted levels.

Table 6. Predicted Level

Location	Predicted Level dB(A)	Limit, dB(A)	Excesses, dB
63 Lawrence Rd	32	44	-
2 Hudson Hill Dr	29	44	-
4 Hudson Hill Dr	26	44	-
6 Hudson Hill Dr	23	44	-
15 Sullivan Rd	19	40	-
10 Sullivan Rd	18	40	-
8 Sullivan Rd	16	40	-
1 Bridle Bridge Rd	15	40	-
12 Hudson Hill Dr	13	44	-
16 Sullivan Rd	12	40	-
18 Sullivan Rd	12	40	-
2 Sullivan Rd	11	44	-
4 Bridle Bridge Rd	11	40	-
5 Cheney Dr	11	40	-
19 Sullivan Rd	8	40	-
12 Sullivan Rd	6	40	-

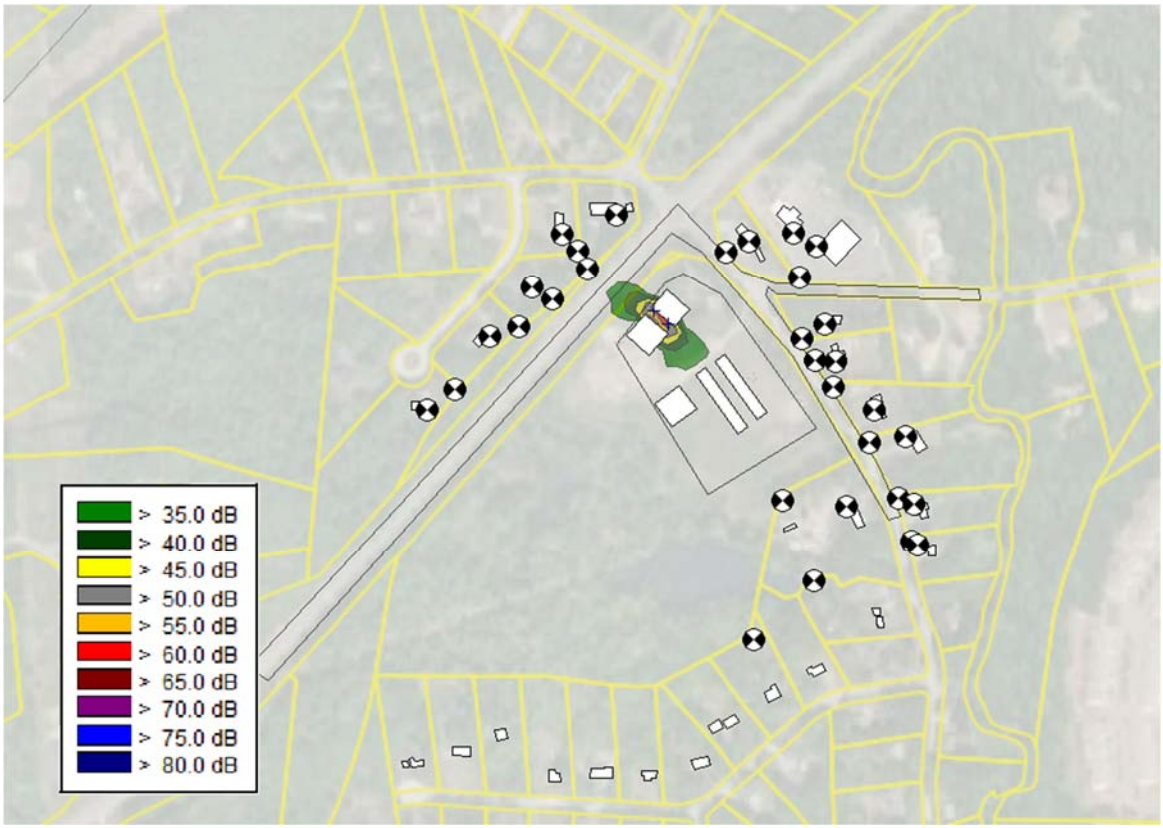


Figure 5. Noise Control Map of the HVAC Noise.

6.2 Operation Noise Prediction

The results of the operating prediction at the surrounding property lines are presented in Table 7. These include 3 forklifts, 5 trucks within an hour, and the HVAC systems operating. The forklift source was biased near property lines.

Noise levels were predicted between 40 and 53 dB(A). The highest predicted level was 53 dB(A) at 8 Sullivan Dr. This is at the noise limit from Table 3. As stated above, this level would be achieved rarely as it would only happen when the forklift was operating in close proximity to Sullivan Dr directly across from the 8 Sullivan Dr property. Noise Levels at the house on the 8 Sullivan Dr property are predicted to be 49 dB(A) for this same condition.

The Town of Hudson requested that an acoustic barrier be placed between 15 Sullivan Rd and the site in addition to the berm that is already planned. The noise prediction shows that the site will meet the noise limits without any additional mitigation. The noise at the house is predicted to be 48 dB(A). Figure 6 shows the noise contour lines for the forklift and truck noise predicted levels.

Table 7. Predicted Level

Location	Predicted Level dB(A)	Limit, dB(A)	Excesses, dB
8 Sullivan Rd	53	53	-
63 Lawrence Rd	47	55	-
4 Hudson Hill Dr	46	55	-
1 Bridle Bridge Rd	51	53	-
10 Sullivan Rd	51	53	-
2 Hudson Hill Dr	45	55	-
15 Sullivan Rd	46	53	-
6 Hudson Hill Dr	44	55	-
2 Sullivan Rd	47	55	-
4 Bridle Bridge Rd	45	53	-
12 Sullivan Dr	44	53	-
12 Hudson Hill Rd	40	55	-
16 Sullivan Dr	41	53	-
5 Cheney Dr	38	53	-
18 Sullivan Rd	37	53	-
19 Sullivan Rd	35	53	-

Figure 6. Noise Control Map of the Operation Noise

7.0 CONCLUSION

Noise limits of 53 and 55 dB(A) for operational noise during business hours (0600 to 1800) and 40 and 44 dB (A) for HVAC were established for the site based on the background noise levels measured during the February 16-23 noise monitoring in accordance with the Town of Hudson Noise Ordinance. These limits were compared with the predicted levels from the forklifts and truck noise for operational noise and the two Trane units for the HVAC.

Predictions level for both the continuously operating HVAC, and the operation noise during business hours met the Town of Hudson Noise Ordinance. While 8 Sullivan Rd is predicted to be at the limit this is only during the most conservative scenarios. No mitigation is recommended currently.

8.0 REFERENCES

1. Township of Hudson, New Hampshire, The Code Part II General Legislation Chapter 249 Noise
2. "ISO 9613-2:1996 - Acoustics -- Attenuation of Sound during Propagation Outdoors -- Part 2: General Method of Calculation." ISO - International Organization for Standardization
3. Fieldstone Land Consultants, “Site Development Plans 84 Lumber Company, Hudson New Hampshire,” prepared for 84 Lumber Company, dated 3/8/23
4. NH Grant, New Hampshire’s Statewide GIS Clearinghouse, Web <https://granit.unh.edu/>.
5. Spectrum Acoustical Consultants, “Appendix 18.11: Site operational noise assumptions and calculation procedure,” dated 2/6/2007
6. Hastings, Aaron, “Technical Manual, Traffic Noise Model 3.1,” U.S. Department of Transportation Federal Highway Administration, FHWA-HEP-21-041, dated September 2021

APPENDIX A: PREDICTED LEVELS

Table A-1. Predicted Levels Due to HVAC Systems

Location	dB(A)	Limit, dB(A)	Excess, dB
12 Hudson Hills Dr Property Line	13	44	-
12 Hudson Hills Dr	11	44	-
6 Hudson Hills Dr Property Line	23	44	-
6 Hudson Hills Dr Drive	21	44	-
4 Hudson Hills Dr Property Line	26	44	-
4 Hudon Hills Dr	24	44	-
2 Hudson Hills Dr Property Line	29	44	-
2 Hudson Hills Dr	27	44	-
63 Lawrence Rd Property Line	32	44	-
63 Lawrence Rd	17	44	-
2 Sullivan Rd Property Line	11	40	-
2 Sullivan Rd	8	40	-
4 Bridle Bridge Rd Property Line	11	40	-
4 Bridle Bridge Rd	6	40	-
1 Bridle Bridge Rd Property Line	15	40	-
1 Bridle Bridge Rd	11	40	-
8 Sullivan Rd Property Line	16	40	-
8 Sullivan Rd	14	40	-
10 Sullivan Rd Property Line	18	40	-
10 Sullivan Rd	15	40	-
12 Sullivan Rd Property Line	6	40	-
12 Sullivan Rd	14	40	-
16 Sullivan Rd Property Line	12	40	-
16 Sullivan Rd	11	40	-
15 Sullivan Rd Property Line	19	40	-
15 Sullivan Rd	20	40	-
18 Sullivan Rd Property Line	12	40	-
18 Sullivan Rd	12	40	-
19 Sullivan Rd Property Line	8	40	-
5 Cheney Dr	13	40	-
5 Cheney Dr Property Line	11	40	-

Table A-2. Predicted Levels Due to Operation Noise

Location	dB(A)	Limit, dB(A)	Excess, dB
12 Hudson Hills Dr Property Line	40	55	-
12 Hudson Hills Dr	37	55	-
6 Hudson Hills Dr Property Line	44	55	-
6 Hudson Hills Dr Drive	43	55	-
4 Hudson Hills Dr Property Line	46	55	-
4 Hudson Hills Dr	45	55	-
2 Hudson Hills Dr Property Line	45	55	-
2 Hudson Hills Dr	45	55	-
63 Lawrence Rd Property Line	47	55	-
63 Lawrence Rd	44	55	-
2 Sullivan Rd Property Line	47	53	-
2 Sullivan Rd	46	53	-
4 Bridle Bridge Rd Property Line	45	53	-
4 Bridle Bridge Rd	42	53	-
1 Bridle Bridge Rd Property Line	41	53	-
1 Bridle Bridge Rd	51	53	-
8 Sullivan Rd Property Line	47	53	-
8 Sullivan Rd	53	53	-
10 Sullivan Rd Property Line	49	53	-
10 Sullivan Rd	51	53	-
12 Sullivan Rd Property Line	45	53	-
12 Sullivan Rd	44	53	-
16 Sullivan Rd Property Line	42	53	-
16 Sullivan Rd	41	53	-
15 Sullivan Rd Property Line	41	53	-
15 Sullivan Rd	46	53	-
18 Sullivan Rd Property Line	44	53	-
18 Sullivan Rd	37	53	-
19 Sullivan Rd Property Line	38	53	-
5 Cheney Dr	35	53	-
5 Cheney Dr Property Line	38	53	-