

TRAFFIC IMPACT AND ACCESS STUDY

**112 AND 114 GREELEY STREET
Hudson, New Hampshire**

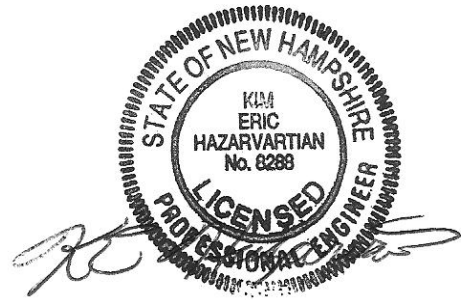
June 22, 2021

Prepared for Keach-Nordstrom Associates, Inc.

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TEPP LLC

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SUMMARY

PROJECT DESCRIPTION

Keach-Nordstrom Associates, Inc. (KNA) has retained TEPP LLC to prepare this traffic impact and access study (TIAS) for a proposed residential redevelopment in the Town of Hudson, New Hampshire.

The proposed redevelopment will:

- be at 112 and 114 Greeley Street
- replace one existing single-family-detached housing units with 47 proposed senior-adult-detached housing units
- have one driveway to the west side of Greeley Street

STUDY SCOPE

The TIAS study area includes the Greeley Street/proposed road intersection.

This TIAS analyzes the following conditions:

- 2021 existing
- 2022 and 2032 no-build, with background-traffic growth
- 2022 and 2032 build, with background-traffic growth and the proposed redevelopment

TRIP GENERATION

Calculated vehicle-trips due to the proposed redevelopment are:

- weekday daily, 201 (total of in and out)
- weekday AM-street-peak hour, 23 (8 in and 15 out)
- weekday PM-street-peak hour, 27 (16 in and 11 out)

CAPACITY ANALYSIS

Capacity analysis shows low delays at the Greeley Street/proposed driveway intersection.

TRAFFIC IMPACTS

Analysis indicates no significant area impact due to the proposed redevelopment.

INTRODUCTION

PROJECT DESCRIPTION

KNA has retained TEPP LLC to prepare this TIAS for a proposed residential redevelopment in the Town of Hudson, New Hampshire.

The proposed redevelopment will:

- be at 112 and 114 Greeley Street
- replace one existing single-family-detached housing units with 47 proposed senior-adult-detached housing units
- have one driveway to the west side of Greeley Street

Figure 1 shows site location. The project plan is in Appendix A.

STUDY APPROACH

This TIAS assesses traffic impacts and access for the proposed redevelopment.

The TIAS study area includes the Greeley Street/proposed road intersection.

This TIAS analyzes traffic operations for the following hours as applicable:

- weekday AM street-peak hour
- weekday PM street-peak hour

This TIAS analyzes the following conditions:

- 2021 existing
- 2022 and 2032 no-build, with background-traffic growth
- 2022 and 2032 build, with background-traffic growth and the proposed redevelopment



Figure 1. Site location.

EXISTING CONDITIONS

INTRODUCTION

Existing conditions include:

- physical conditions of the transportation network, roads, and intersections
- traffic volumes
- other relevant information

PHYSICAL CONDITIONS

Figure 1 shows the transportation network.

Greeley Street:

- is oriented approximately north-south
- functions as an arterial street
- to the south, connects with New Hampshire Route 111 (NH 111), an arterial highway, and the Town Center
- to the north, provides a connection to and from NH 102, an arterial highway
- has a horizontal alignment that is tangent at the proposed driveway location and includes a minor horizontal curve north of the proposed driveway location
- has a vertical alignment that includes a minor southbound downgrade near the proposed driveway location
- has a two-lane cross-section with one travel lane per direction
- has asphaltic-cement concrete (ACC) pavement in overall good condition
- includes utility poles along the east side
- has a posted speed limit of 30 miles per hour (mph)
- has nearby wooded land
- is under the jurisdiction of the Town

TRAFFIC VOLUMES

TRAFFIC COUNTS

TEPP LLC obtained an automatic traffic counter (ATR) count:

- on Greeley Street along the site frontage
- from Tuesday, April 13, to Wednesday, April 14, 2021

The ATR data are in Appendix B.

MONTHLY ADJUSTMENT

The April 2021 traffic volumes were adjusted considering NHDOT 2019 monthly traffic volumes for Group 4 (Urban Highways) averages in Appendix C.

Adjustments reflected:

- peak-month conditions
- an increase of 9 percent

RESULTS

Table 1 shows 2021 existing traffic volumes.

Table 1. 2021 existing traffic volumes.			
Location and Time Period	Vehicles ^a	K-factor ^b	Percent Direction
Greeley Street near Site Frontage			
Weekday Daily	4,589	---	---
Weekday AM-Street-Peak Hour	408	8.9	54 Southbound
Weekday PM-Street-Peak Hour	447	8.9	57 Northbound

^a Two-way-total volumes.

^b K = hour volume as a percent of daily volume.

Greeley Street along the site frontage showed about:

- 4,589 weekday-daily vehicles
- 408 vehicles during the weekday AM street-peak hour, predominantly southbound

- 447 vehicles during the weekday PM street-peak hour, predominantly northbound

TEPP LLC checked the 2021 existing weekday daily traffic volume against pre-pandemic conditions. NHDOT count station 82229084, on Greeley Street north of Highland Street, showed a weekday daily volume of 4,489 vehicles (total of both directions) for August 2018. August reflects peak-month conditions for Group 4 (Urban Highways).

VEHICLE SPEEDS

The ATR collected vehicle speeds:

- on Greeley Street along the site frontage
- from Tuesday, April 13, to Wednesday, April 14, 2021

The data are in Appendix D and are summarized in Table 2.

Table 2 indicates that on Greeley Street:

Location and Direction	Speeds (mph)		
	Speed Limit	Mean ^a	85 th Percentile ^a
Greeley Street along Site Frontage			
Northbound	30	37.5	41.5
Southbound	30	37.5	41.5

^a From ATR conducted from Tuesday, April 13, to Wednesday, April 14, 2021

- the posted speed limit was 30 mph
- the northbound the mean speed was 37.5 mph and the 85th percentile speed was 41.5 mph
- for southbound the mean speed was 37.5 mph and the 85th percentile speed was 41.5 mph

SIGHT DISTANCES

The American Association of State Highway and Transportation Officials (AASHTO) has established authoritative policy for sight distances at unsignalized intersections¹ in terms of:

¹ AASHTO, *A Policy on Geometric Design of Highways and Streets*, 6th Edition (Washington, DC, 2011), pages 9-28 to 9-29.

- stopping sight distance (SSD)
- optional intersection sight distance (ISD)

SSD:²

- provides for safety
- enables a driver, on the major road, to perceive and react accordingly to a vehicle entering the major road from a minor road
- is conservative because it encompasses a wide range of brake-reaction times and deceleration rates

Optional ISD:³

- is ordinarily greater than SSD and may enhance traffic operations
- is not required for safety

Table 3 shows relevant available sight distances that are at least 400 ft, per NHDOT practice, and are adequate.

Table 3. Sight distances.				
Intersection, Movements, and View	Available Sight Distance (ft) ^a	Speeds (miles per hour)		
		Limit	SSD Provides For	ISD Provides For
Portland Street/Proposed Road for Proposed Road Movements				
Portland Street to/from South	400	30	45+	36+
Portland Street to/from North	400	30	45+	36+

^a With appropriate roadside and vegetation maintenance.

² AASHTO, pages 3-2 to 3-6.

³ AASHTO, pages 9-22 to 9-55.

FUTURE CONDITIONS

INTRODUCTION

Future conditions include:

- planned road improvements independent of the proposed redevelopment
- future no-build traffic volumes, with background-traffic growth and without the proposed redevelopment
- future build traffic volumes, with background-traffic growth and with the proposed redevelopment

PLANNED ROAD IMPROVEMENTS

TEPP LLC identified no significant planned road improvement in the study area independent of the project.

BACKGROUND-TRAFFIC GROWTH

Background-traffic growth:

- is independent of the proposed redevelopment
- is related to land development in the immediate area, population and economic development in the region and changes in travel patterns in the region
- typically considers two factors: a general traffic-growth rate and specific planned land developments in the immediate area

This TIAS uses a 1.0-percent annual growth rate. This yields about 11.6-percent growth between 2021 and 2031.

NO-BUILD TRAFFIC VOLUMES

The background-traffic growth described above was applied to 2021 existing traffic volumes. Table 4 shows 2022 and 2032 no-build traffic volumes.

Table 4. No-build traffic volumes.

Location, Condition, and Time Period	Vehicles Per Hour		
	Total	Northbound	Southbound
Greeley Street near Site Frontage, 2021 Existing			
Weekday AM-Street-Peak Hour	408	188	220
Weekday PM-Street-Peak Hour	447	257	190
Greeley Street near Site Frontage, 2022 No-Build			
Weekday AM-Street-Peak Hour	412	190	222
Weekday PM-Street-Peak Hour	451	259	192
Greeley Street near Site Frontage, 2032 No-Build			
Weekday AM-Street-Peak Hour	455	210	245
Weekday PM-Street-Peak Hour	499	287	212

SITE TRAFFIC

TRIP GENERATION

The Institute of Transportation Engineers (ITE) compiles and publishes trip-generation information for a variety of land uses in Trip Generation Manual.⁴ This authoritative guide for site traffic includes senior-adult-detached housing, land use 251, based on dwelling units.⁵

Table 5 shows calculated vehicle-trips due to the proposed redevelopment as:

Table 5. Calculated vehicle-trip generation

Time Period	Calculated Vehicle-Trips		
	Total	In	Out
Weekday Daily ^a	201	100	101
Weekday AM-Street-Peak Hour	23	8	15
Weekday PM-Street-Peak Hour	27	16	11

Based on ITE, *Trip Generation Manual*, senior-adult-detached housing, land use 251, 103 dwelling units.

⁴ ITE, *Trip Generation Manual*, 10th edition (Washington DC, September 2017).

⁵ ITE, *Trip Generation Manual*, Volume 2, Data, Residential (Land Uses 200-299), pages 337 to 351.

- weekday daily, 201 (total of in and out)
- weekday AM-street-peak hour, 23 (8 in and 15 out)
- weekday PM-street-peak hour, 27 (16 in and 11 out)

Table 5 conservatively does show deduction of trips related to the existing single-family-detached dwelling unit.

TRIP DISTRIBUTION AND NETWORK ASSIGNMENT

Trip distribution and network assignment of vehicle-trips to and from the site may consider such factors as existing site distribution, travel patterns, population, regional land development and site access. Trip distribution and network assignment for this TIAS considered the 2021 existing volumes.

Table 6 shows trip distribution and network assignment. Figure 2 shows site traffic volumes.

Table 6. Trip distribution and network assignment.	
Road and Direction (To/From)	Approximate Percent
Greeley Street to/from South	40
<u>Greeley Street to/from South</u>	<u>60</u>
Total	100

BUILD TRAFFIC VOLUMES

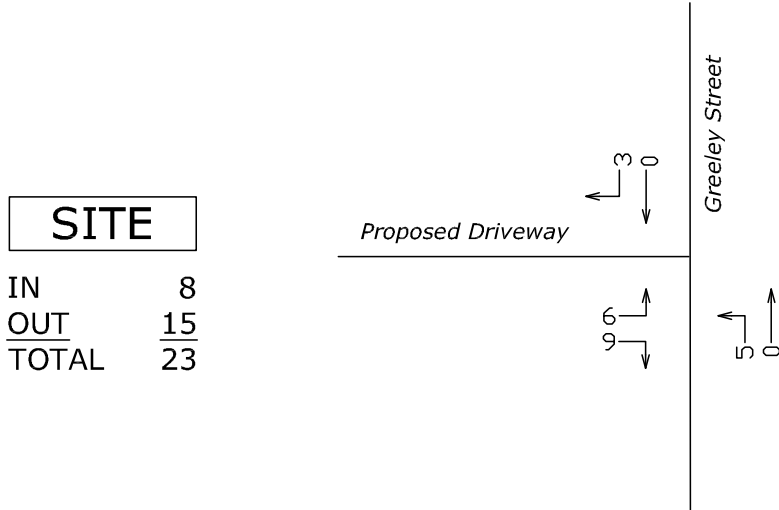
Site traffic volumes were superimposed on the no-build traffic volumes to estimate build traffic volumes. Figures 3 and 4 show the resulting 2022 and 2032 build traffic volumes.

TRAFFIC-VOLUME CHANGES

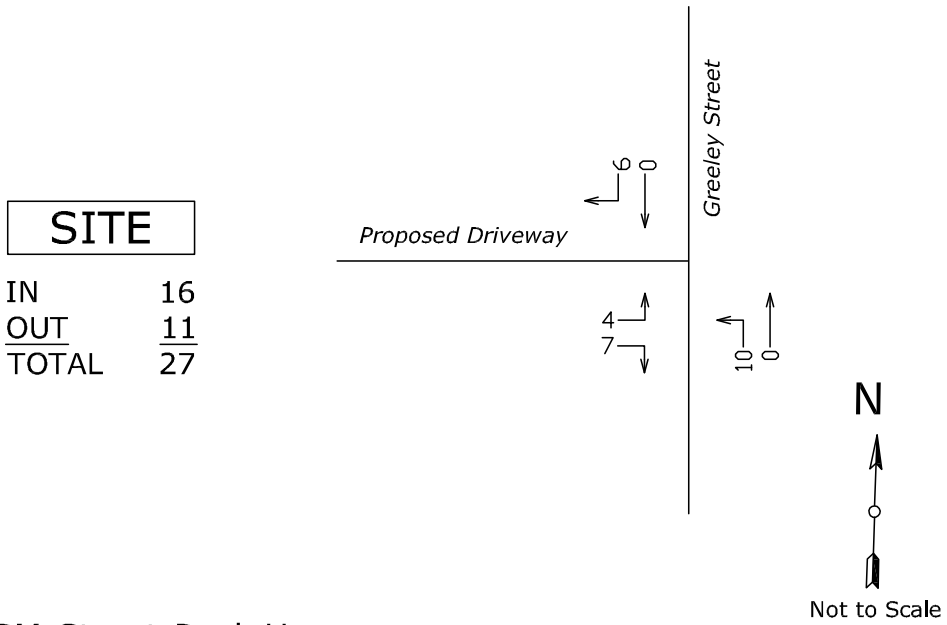
Table 7 presents calculated traffic-volume changes due to the proposed redevelopment for the:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

Table 7 shows peak-hour-traffic-volume increases:



Weekday AM-Street-Peak Hour



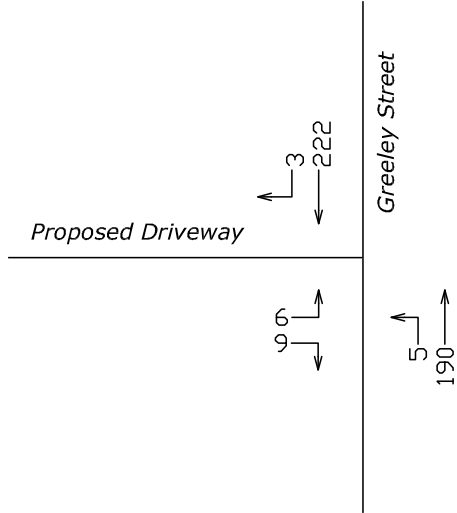
Weekday PM-Street-Peak Hour

Figure 2. Site traffic volumes.



SITE

IN	8
OUT	15
TOTAL	23

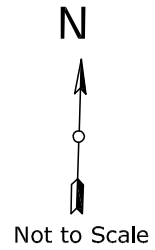
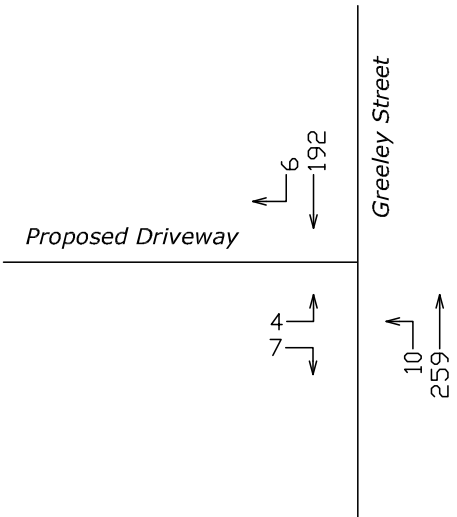


Weekday AM-Street-Peak Hour



SITE

IN	16
OUT	11
TOTAL	27



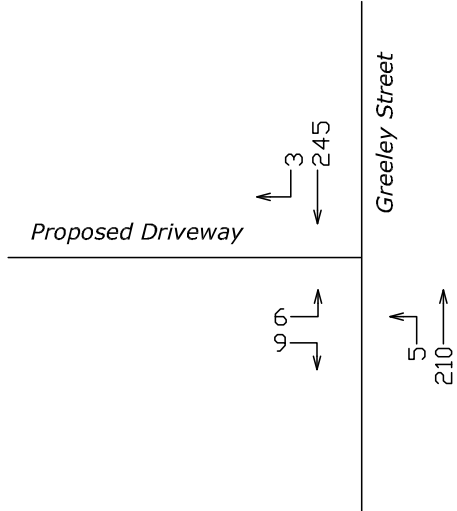
Weekday PM-Street-Peak Hour

Figure 4. 2022 build traffic volumes.



SITE

IN	8
OUT	15
TOTAL	23

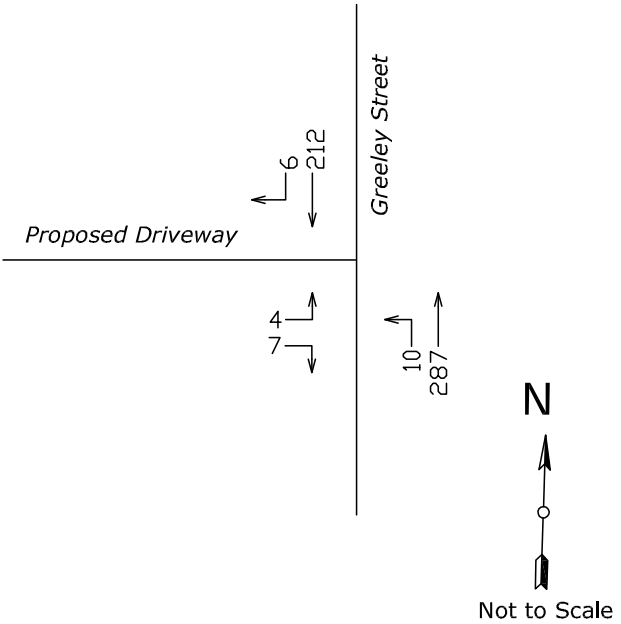


Weekday AM-Street-Peak Hour



SITE

IN	16
OUT	11
TOTAL	27



Weekday PM-Street-Peak Hour

Figure 5. 2032 build traffic volumes.

Table 7. Traffic-volume changes.

Location and Time Period	2022 Traffic Volumes (vph) ^a			2032 Traffic Volumes (vph)		
	No-Build	Build	Change	No-Build	Build	Change
Greeley Street North of Proposed Driveway						
Weekday AM-Street-Peak Hour	412	421	9	455	464	9
Weekday PM-Street-Peak Hour	451	461	10	499	509	10
Greeley Street South of Proposed Driveway						
Weekday AM-Street-Peak Hour	412	426	14	455	469	14
Weekday PM-Street-Peak Hour	451	468	17	499	516	17

^a Two-way total volumes.

- of 9 to 17 vehicle-trips
- constituting about one vehicle-trip per three to seven minutes
- that are further split by northbound and southbound direction on Greeley Street

CAPACITY ANALYSIS

INTRODUCTION

This TIAS has quantified existing, future-no-build and future-build traffic volumes. Capacity analysis models the quality of traffic operations. Comparing build conditions to the no-build conditions indicates impacts of the proposed redevelopment on quality of traffic operations.

METHODS

Capacity analysis calculates LOS for transportation facilities. LOS indicates the quality of traffic operations based on delay and other measures. The six LOS are designated A to F. LOS A represents the best or highest operating conditions. LOS F is the lowest, but does not necessarily connote failure.

LOS is a function of traffic volumes and traffic control. Because these volumes can vary, LOS of a transportation facility can differ by time of day, day of the week, or month. For example, a transportation facility with a low LOS during peak hours may have a high LOS during other hours. The operational analysis methods of the Transportation Research Board (TRB)⁶ models LOS for intersections based on calculated delay per vehicle, as shown in Table 8. Synchro analysis software was used.

Method inputs include:

- intersection geometry
- traffic control, such as YIELD sign, two-way STOP sign, all-way STOP sign, roundabout, or signal (including phasing, timing, and progression)
- traffic volumes
- vehicle composition, such as passenger cars and trucks

The methods are all approximate. In particular, the method for two-way STOP-sign control can be conservative, with observed delays and queuing shorter than those modeled.

⁶ TRB, *Highway Capacity Manual 2000* (Washington DC 2000) and *Highway Capacity Manual 2010* (Washington DC, 2010).

Table 8. Level-of-service criteria for intersections.

Level of Service	Control Delay (seconds/vehicle)	
	Unsignalized Intersections ^a	Signalized Intersections
A	≤10.0	≤10.0
B	>10.0 and ≤15.0	>10.0 and ≤20.0
C	>15.0 and ≤25.0	>20.0 and ≤35.0
D	>25.0 and ≤35.0	>35.0 and ≤55.0
E	>35.0 and ≤50.0	>55.0 and ≤80.0
F	>50	>80

From Transportation Research Board, *Highway Capacity Manual 2010* (Washington D.C., 2010).

^a For YIELD sign, two-way STOP sign or all-way STOP sign, control delay defines LOS. For roundabout approaches and overall intersection, control delay defines LOS. For roundabout lanes with volume/capacity ratio ≤1.0, control delay defines LOS. For roundabout lanes with volume/capacity ratio > 1.0, LOS is F regardless of control delay.

RESULTS

Table 9 shows computed LOS, delays, and queues at study-area intersections for the:

- weekday AM-street-peak hour
- weekday PM-street-peak hour

The analysis is under the following conditions:

- 2021 existing
- 2022 and 2032 no build
- 2022 and 2032 build

Capacity-analysis worksheets that give detail and explanation are in Appendix E.

Table 9 shows low delays at Greeley Street/proposed driveway intersection.

Table 9. Capacity-analysis summary.

Intersection, Control, Hour and Movement	2022 Build				2032 Build			
	LOS ^a	Delay ^b	V/C ^c	Queue ^d	LOS	Delay	V/C	Queue
Greeley Street/Proposed Driveway Intersection, Weekday AM-Street-Peak Hour								
Greeley Street NB L	A	7.7	0.004	0.0	A	7.8	0.004	0.0
Proposed Driveway EB LR	B	10.5	0.025	0.1	B	10.8	0.026	0.1
Greeley Street/Proposed Driveway Intersection, Weekday PM-Street-Peak Hour								
Greeley Street NB L	A	7.7	0.008	0.0	A	7.7	0.008	0.0
Proposed Driveway EB LR	B	10.5	0.018	0.1	B	10.8	0.019	0.1

^a LOS = level of service.

^b Delay = average delay in seconds per vehicle.

^c V/C = volume/capacity ratio.

^d 95th percentile queue in vehicles.

EB = eastbound, WB = westbound, SB = southbound, NB = northbound, L = left, T = through, R = right.

CONCLUSION

PROJECT DESCRIPTION

The proposed redevelopment will:

- be at 112 and 114 Greeley Street
- replace one existing single-family-detached housing units with 47 proposed senior-adult-detached housing units
- have one driveway to the west side of Greeley Street

TRIP GENERATION

Calculated vehicle-trips due to the proposed redevelopment are:

- weekday daily, 201 (total of in and out)
- weekday AM-street-peak hour, 23 (8 in and 15 out)
- weekday PM-street-peak hour, 27 (16 in and 11 out)

CAPACITY ANALYSIS

Capacity analysis shows low delays at the Greeley Street/proposed driveway intersection.

TRAFFIC IMPACTS

Analysis indicates no significant area impact due to the proposed redevelopment.

APPENDIX

Appendix A: Project Plan

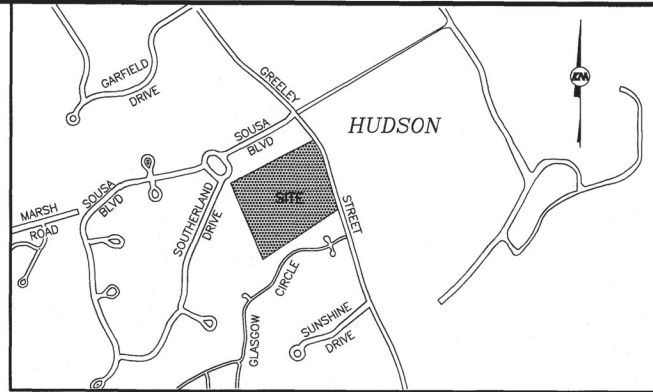
LEGEND

- GB-F GRANITE BOUND FOUND
- IPIN-F IRON PIN FOUND
- DH-F DRILL HOLE FOUND
- IPP-F IRON PIPE FOUND
- RRS-F RAILROAD SPIKE FOUND
- UTILITY POLE SIGN
- LIGHT
- ASBUTTER LINE
- PROPERTY LINE
- STREAM
- WETLAND
- SWALE
- OVERHEAD UTILITIES
- EDGE OF PAVEMENT
- VERTICAL GRANITE CURB
- 10' CONTOUR
- 2' CONTOUR
- STONEWALL
- SCS SOIL LINE
- BUILDING SETBACK
- EASEMENT
- PROPOSED SIGN
- PROPOSED LIGHT
- PROPOSED SEWER MANHOLE
- PROPOSED DRAINAGE MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED PROPERTY LINE
- PROPOSED CHAIN LINK FENCE
- PROPOSED GUARDRAIL
- PROPOSED OVERHEAD UTILITIES
- UGU PROPOSED UNDERGROUND UTILITIES
- G PROPOSED GAS LINE
- W PROPOSED WATER LINE
- S PROPOSED SEWER LINE
- PROPOSED DRAINAGE LINE
- PROPOSED TREELINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED VERTICAL GRANITE CURB
- PROPOSED 2' CONTOUR
- PROPOSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED STONEWALL
- EASEMENT



REFERENCE PLANS:

1. "PLAN OF LAND IN HUDSON, N.H." SCALE: 1"=200'. DATED: 1967. PREPARED BY: DAVID M. HAMILTON. H.C.R.D. PLAN #3605
2. "SURVEY OF OLD ORIGINAL LAND SUBDIVISION, A & W SAND & GRAVEL CORP." SCALE 1"=200'. DATED: DECEMBER 15, 1972. PREPARED BY: ROLAND P. THERRIEN. H.C.R.D. PLAN #14653
3. "CONSOLIDATION & SUBDIVISION PLAN, HIGHLAND ACRES." SCALE: 1"=100'. DATED: JUNE, 1977. PREPARED BY: A.E. MAYNARD CIVIL ENGINEER. H.C.R.D. PLAN #10317
4. "POND VIEW ESTATES LOT LINE RELOCATION & CONSOLIDATION PLAN." SCALE: 1"=100'. DATED: FEBRUARY 26, 1996. PREPARED BY: HAYNER/SWANSON, INC. H.C.R.D. PLAN #28726



VICINITY MAP
SCALE: 1" = 1,000'

- NOTES:**
1. THE PURPOSE OF THIS PLAN IS TO CONSOLIDATE LOTS 2 & 3 AND DEPICT AN OVERVIEW OF A PROPOSED 62 AND OLDER HOUSING DEVELOPMENT ON ASSESSORS MAP 140 LOTS 2 & 3 AT 112 & 114 GREELEY STREET IN HUDSON, NEW HAMPSHIRE AS SHOWN HEREON AND NO OTHER PURPOSE.
 2. EXISTING AREA OF PARCELS IS, LOT 2: 418,552 SF, OR 9.608 ACRES. LOT 3: 319,200 SF, OR 7.323 ACRES.
 3. OWNER OF RECORD: K&M DEVELOPERS, LLC 46 LOWELL ROAD HUDSON, N.H. 03051
 4. THE SUBJECT PARCELS ARE SITUATED ENTIRELY WITHIN THE GENERAL (G) ZONING DISTRICT AND ARE SUBJECT TO THE FOLLOWING DIMENSIONAL REQUIREMENTS: MINIMUM BUILDING SETBACKS: FRONT 50 FT, SIDE 15 FT, REAR 15 FT. USE: AGE RESTRICTED 62 AND OLDER HOUSING. SUBJECT PARCEL WILL BE SERVICED BY MUNICIPAL WATER AND SEWER. BOUNDARY AND TOPOGRAPHIC INFORMATION SHOWN HEREON IS BASED ON A FIELD SURVEY PERFORMED BY THIS OFFICE IN OCTOBER OF 2020. HORIZONTAL DATUM IS NAD83. VERTICAL DATUM IS NAVD88 FROM GPS SURVEY METHODS.
 5. EXAMINATION OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR THE TOWN OF HUDSON, NEW HAMPSHIRE, HILLSBOROUGH COUNTY, MAP NUMBER 33011C0516D, PANEL NUMBER 516 OF 701, EFFECTIVE DATE: SEPTEMBER 25, 2009 INDICATES THAT NO PORTION OF THE SUBJECT PARCEL IS LOCATED WITHIN A DESIGNATED FLOOD HAZARD AREA.
 6. THE LOCATION OF ANY UNDERGROUND UTILITY INFORMATION SHOWN ON THIS PLAN IS APPROXIMATE. KEACH-NORDSTROM ASSOCIATES, INC. MAKES NO CLAIM TO THE ACCURACY OR COMPLETENESS OF UTILITIES SHOWN. PRIOR TO ANY EXCAVATION ON SITE THE OWNER OR CONTRACTOR SHALL CONTACT DIG SAFE AT 811.
 7. EASEMENTS, RIGHTS AND RESTRICTIONS SHOWN OR IDENTIFIED HEREON ARE THOSE FOUND DURING RESEARCH AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS. OTHER EASEMENTS, RIGHTS AND RESTRICTIONS MAY EXIST WHICH A TITLE EXAMINATION OF THE SUBJECT PREMISES MAY DETERMINE.
 8. PROPER EROSION AND SEDIMENT CONTROLS SHALL BE INSTALLED (IE. HAY BALES, SILT FENCES, ETC.) PRIOR TO CLEARING AND EXCAVATION. THE CONTROLS SHALL BE MAINTAINED IN GOOD WORKING ORDER UNTIL COMPLETION OF CONSTRUCTION. THE TOWN OF HUDSON RESERVES THE RIGHT TO REQUIRE ADDITIONAL EROSION CONTROL MEASURES DURING CONSTRUCTION, IF NECESSARY.
 9. ALLOWABLE DENSITY:

NOTES (CONTINUED):

14. STATE PERMITS REQUIRED:
 - AOT PERMIT
 - SEWER CONNECTION PERMIT
15. CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE HOURS BETWEEN 7:00 AM AND 7:00 PM, MONDAY THROUGH SATURDAY. CONSTRUCTION ACTIVITIES SHALL BE PROHIBITED ON SUNDAYS.
16. IF LOT DEVELOPMENT INVOLVES BLASTING AND/OR RAMMING OF BEDROCK MATERIALS, SAID ACTIVITIES SHALL BE LIMITED TO THE HOURS BETWEEN 7:00 AM AND 5:00 PM MONDAY THROUGH FRIDAY ONLY. SAID BLASTING/RAMMING ACTIVITIES ARE PROHIBITED ON SATURDAY AND SUNDAY.
17. THE ROAD NAME SHALL BE POSTED AT THE BEGINNING OF THE ROAD FOR CERTIFICATION OF OCCUPANCY SIGN BY THE HUDSON FIRE DEPARTMENT.
18. OPEN SPACE:
 - REQUIRED = 40%
 - PROVIDED = 74%
19. BUILDING COVERAGE:
 - REQUIRED=20%
 - PROVIDED: TOTAL BUILDING COVERAGE SF = 95,685 SF
 - TOTAL BUILDING COVERAGE =13%
20. ALL SITE IDENTIFICATION SIGNS SHALL BE INSTALLED IN ACCORDANCE WITH ARTICLE XII OF THE HUDSON ZONING ORDINANCE.
21. AFTER THE ISSUANCE OF THE FOUNDATION PERMIT FOR EACH OF THE STRUCTURES INCLUDED IN THIS SITE PLAN AND PRIOR TO THE FOUNDATION "AS-BUILT" PLANS ON A TRANSPARENCY AND TO THE SAME SCALE AS THE APPROVED SITE PLAN. EACH FOUNDATION "AS-BUILT" PLAN SHALL INCLUDE ALL STRUCTURAL DIMENSIONS AND LOT LINE SETBACK MEASUREMENTS TO THE FOUNDATION AND BE STAMPED BY A LICENSE LAND SURVEYOR. ANY DISCREPANCY BETWEEN THE APPROVED SITE PLAN AND FOUNDATION "AS-BUILT" PLAN SHALL BE DOCUMENTED BY THE APPLICANT AND BE PART OF THE FOUNDATION "AS-BUILT" SUBMISSION.
22. PRIOR TO THE ISSUANCE OF A FINAL CERTIFICATE OF OCCUPANCY, A L.L.S. CERTIFIED "AS-BUILT" SITE PLAN SHALL BE PROVIDED TO THE TOWN OF HUDSON COMMUNITY DEVELOPMENT DEPARTMENT, CONFIRMING THAT THE SITE CONFORMS WITH THE RECORD SITE PLAN.
23. THE PROPOSED PROJECT HAS BEEN DESIGNED TO MEET THE 2018 AND 2019 M54 REQUIREMENTS.

NPDES NOTE

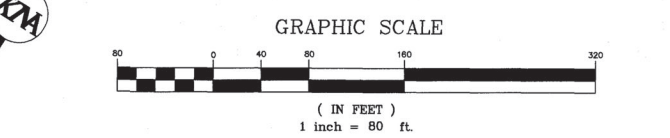
THIS PROJECT DISTURBS IN EXCESS OF 1-ACRE OF LAND. THEREFORE IT WILL BE REQUIRED TO OBTAIN NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT COVERAGE AS ISSUED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA). THE OWNER/DEVELOPER AND "OPERATOR" (GENERAL CONTRACTOR) SHALL EACH BE REQUIRED TO PREPARE AND SUBMIT A NOTICE OF INTENT (NOI) TO THE EPA PRIOR TO THE START OF CONSTRUCTION AND SHALL BE RESPONSIBLE FOR THE PREPARATION AND IMPLEMENTATION OF A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) MEETING THE REQUIREMENTS OF THE CURRENT CONSTRUCTION GENERAL PERMIT.



TOTAL LOT AREA	WETLAND AREA	AREA >25% SLOPE	BUILDABLE AREA	FRONTAGE
737,572 SF OR 16.931 AC	40,050 SF OR 0.919 AC	0 SF OR 0 AC	697,522 SF OR 16.013 AC	434.78 FT

MAXIMUM DENSITY OF HOMES = 1 BEDROOM/7,500 SF OF BUILDABLE LAND = 737,572SF/7,500SF = 98.3 BEDROOMS = 98.3 BEDROOMS/2 BEDROOMS PER HOME = 49.17 HOMES

PROPOSED DENSITY OF HOMES = 47 HOMES (2 BEDROOMS EACH)



MASTER PLAN
HERITAGE LANDING
MAP 140 LOTS 2 & 3
112 & 114 GREELEY STREET
HUDSON, NEW HAMPSHIRE
HILLSBOROUGH COUNTY

OWNER/APPLICANT:
K&M DEVELOPERS, LLC
46 LOWELL ROAD
HUDSON, N.H. 03051

KEACH-NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627-2881

REVISIONS

No.	DATE	DESCRIPTION	BY

DATE: JUNE 1, 2021 SCALE: 1"=80'
PROJECT NO: 20-1001-1 SHEET 1 OF 29

PURSUANT TO THE REGULATIONS OF THE HUDSON PLANNING BOARD, THE SITE PLAN APPROVAL GRANTED HEREIN EXPIRES TWO YEARS FROM DATE OF APPROVAL

APPROVED BY THE HUDSON, NH PLANNING BOARD
DATE OF MEETING: _____
SIGNATURE: _____ DATE: _____

SITE PLANS ARE VALID FOR TWO YEARS FROM THE DATE OF PLANNING BOARD MEETING FINAL APPROVAL COMMENCES AT THE PLANNING BOARD MEETING DATE AT WHICH THE PLAN RECEIVES FINAL APPROVAL.

UTILITY NOTE

THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN DRAWN FROM FIELD SURVEY INFORMATION AND OR PLOTTED FROM EXISTING DRAWINGS. KEACH-NORDSTROM ASSOCIATES, INC. MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, KEACH-NORDSTROM ASSOCIATES, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. KEACH-NORDSTROM ASSOCIATES, INC. HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTIONS OF THE UTILITIES.

WETLAND SCIENTIST'S CERTIFICATION:

JOSHUA BRIEN, CERTIFIED WETLAND SCIENTIST #256 OF KEACH-NORDSTROM ASSOCIATES, INC. OF BEDFORD, NH PERFORMED THE DELINEATION OF JURISDICTIONAL WETLANDS IN OCTOBER OF 2020 USING THE TECHNICAL CRITERIA IN THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL (TECHNICAL REPORT Y-87-1, JANUARY 1987).

CERTIFIED WETLAND SCIENTIST DATE _____

CERTIFICATION:

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR THOSE UNDER MY DIRECT SUPERVISION. FURTHER, THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY MADE ON THE GROUND BY THIS OFFICE DURING OCTOBER OF 2020. SAID SURVEY HAS AN ERROR OF CLOSURE BETTER THAN ONE PART IN TEN THOUSAND (1:10,000).

DATE: 6/29/21
LICENSED LAND SURVEYOR

THE SITE-SPECIFIC SOIL MAPPING WAS PERFORMED IN DECEMBER 2009 BY JAMES GOVE, CERTIFIED SOIL SCIENTIST #4 OF GOVE ENVIRONMENTAL SERVICES INC. IN EXETER, NEW HAMPSHIRE. THIS MAPPING WAS PERFORMED ACCORDING TO THE STANDARDS OF THE "SITE-SPECIFIC SOIL MAPPING STANDARDS OF NEW HAMPSHIRE AND VERMONT," VERSION 4.0, FEBRUARY 2011, PUBLISHED BY THE SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND, SPECIAL PUBLICATION NO. 3.

OWNER OF MAP 140 LOTS 2 & 3

SIGNATURE: _____
DATE: _____



Appendix B: Traffic Counts

Appendix C: Monthly Traffic Volumes

Year 2019 Monthly Data

Group 4 Averages: Urban Highways

<u>Month</u>	<u>ADT</u>	<u>Adjustment to Average</u>	<u>Adjustment to Peak</u>
January	11,431	1.12	1.23
February	11,848	1.08	1.18
March	12,141	1.06	1.15
April	12,860	1.00	1.09
May	13,551	0.95	1.03
June	13,785	0.93	1.02
July	13,942	0.92	1.01
August	14,016	0.92	1.00
September	13,379	0.96	1.05
October	13,339	0.96	1.05
November	12,265	1.05	1.14
December	11,496	1.12	1.22
Average ADT:	12,838		
Peak ADT:	14,016		

Appendix D: Vehicle Speeds

Accurate Counts
978-664-2565

15490001

Location : Greeley Street
Location : Near 112-114 Greeley St
City/State: Hudson, NH
Direction: NB,

4/13/2021	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	0	1	1	3	0	0	0	0	0	0	0	5
1:00	0	0	0	0	0	1	0	0	0	0	0	0	0	1
2:00	0	0	0	1	0	2	1	2	0	0	0	0	0	6
3:00	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4:00	0	0	0	1	1	7	2	0	0	0	0	0	0	11
5:00	0	0	0	0	4	16	9	3	0	0	0	0	0	32
6:00	0	0	0	2	17	37	25	4	1	0	0	0	0	86
7:00	0	0	0	5	33	83	41	8	0	1	0	0	0	171
8:00	0	0	1	20	33	45	26	3	1	0	0	0	0	129
9:00	0	0	0	5	16	35	19	1	0	0	0	0	0	76
10:00	0	0	2	5	25	32	16	2	1	0	0	0	0	83
11:00	0	0	0	4	22	45	17	2	0	0	0	0	0	90
12:00 PM	0	0	0	2	38	54	29	10	0	0	0	0	0	133
1:00	0	0	0	3	27	49	27	7	1	0	0	0	0	114
2:00	0	0	0	2	46	71	33	4	0	0	0	0	0	156
3:00	0	0	0	10	38	110	48	12	1	0	0	2	0	221
4:00	0	0	0	4	32	120	58	5	0	0	0	0	0	219
5:00	0	0	0	3	48	89	47	3	0	0	0	0	0	190
6:00	0	0	0	2	18	69	37	8	2	0	0	0	0	136
7:00	0	0	0	5	20	37	17	3	0	0	0	0	0	82
8:00	0	0	1	3	20	30	5	0	0	0	0	0	0	59
9:00	0	0	0	2	7	20	3	0	1	0	0	0	0	33
10:00	0	0	0	1	4	9	6	2	1	0	0	0	0	23
11:00	0	0	0	2	2	7	0	0	0	0	0	0	0	11
Total	0	0	4	84	452	971	466	79	9	1	0	2	0	2068

Percentile	15th	50th	85th	95th
Speed	33.5	37.2	41.5	44.6
Mean Speed (Average)	37.6			
10 MPH Pace Speed	35-44			
Number in Pace	1437			
Percent in Pace	69.5%			
Number > 45 MPH	91			
Percent > 45 MPH	4.4%			

Accurate Counts
978-664-2565

Location : Greeley Street
Location : Near 112-114 Greeley St
City/State: Hudson, NH
Direction: SB,

15490001

4/13/2021	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	Total
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	
12:00 AM	0	0	0	0	1	4	2	1	0	0	0	0	0	8
1:00	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	2	0	0	0	0	0	0	0	2
4:00	0	0	0	1	3	6	4	3	1	0	0	0	0	18
5:00	0	0	0	2	12	23	10	3	0	0	0	0	0	50
6:00	0	0	1	0	12	45	30	7	3	0	0	0	0	98
7:00	1	0	2	9	41	102	49	12	0	0	0	0	0	216
8:00	0	0	3	4	35	67	34	5	0	0	0	0	0	148
9:00	0	0	0	4	31	37	26	4	1	0	0	0	0	103
10:00	1	0	2	4	41	34	12	2	0	0	0	0	0	96
11:00	0	1	2	2	27	41	8	3	1	0	0	0	0	85
12:00 PM	0	1	0	0	24	58	30	8	1	0	0	0	0	122
1:00	0	3	0	1	26	44	25	9	0	0	0	0	0	108
2:00	0	0	3	12	40	81	28	8	0	0	0	0	0	172
3:00	0	0	2	1	26	105	47	6	1	0	0	0	0	188
4:00	0	0	0	2	29	72	49	9	1	1	0	0	0	163
5:00	0	0	0	0	53	76	45	5	1	0	0	0	0	180
6:00	0	1	0	2	13	51	28	11	1	0	0	0	0	107
7:00	0	0	0	4	9	39	15	5	0	0	0	0	0	72
8:00	0	0	0	2	14	34	15	1	0	0	0	0	0	66
9:00	0	0	0	2	6	16	6	2	0	0	0	0	0	32
10:00	1	0	0	0	7	6	7	0	0	0	0	0	0	21
11:00	0	0	0	0	2	1	4	0	0	0	0	0	0	7
Total	3	6	15	52	452	944	475	104	11	1	0	0	0	2063

Percentile	15th	50th	85th	95th
Speed	33.5	37.2	42.2	45.3
Mean Speed (Average)	37.7			
10 MPH Pace Speed	35-44			
Number in Pace	1419			
Percent in Pace	68.8%			
Number > 45 MPH	116			
Percent > 45 MPH	5.6%			

Appendix E: Capacity-Analysis Worksheets

HCM 6th TWSC
 3: Greeley Street & Proposed Driveway

06/22/2021

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	6	9	5	190	222	3
Future Vol, veh/h	6	9	5	190	222	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	10	6	211	247	3

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	472	249	250	0	-	0
Stage 1	249	-	-	-	-	-
Stage 2	223	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	551	790	1316	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	814	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	548	790	1316	-	-	-
Mov Cap-2 Maneuver	548	-	-	-	-	-
Stage 1	788	-	-	-	-	-
Stage 2	814	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1316	-	671	-	-
HCM Lane V/C Ratio	0.004	-	0.025	-	-
HCM Control Delay (s)	7.7	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 6th TWSC
 3: Greeley Street & Proposed Driveway

06/22/2021

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	4	7	10	259	192	6
Future Vol, veh/h	4	7	10	259	192	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	8	11	288	213	7

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	527	217	220	0	-	0
Stage 1	217	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	512	823	1349	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	744	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	507	823	1349	-	-	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	811	-	-	-	-	-
Stage 2	744	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1349	-	671	-	-
HCM Lane V/C Ratio	0.008	-	0.018	-	-
HCM Control Delay (s)	7.7	0	10.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 6th TWSC
 3: Greeley Street & Proposed Driveway

06/22/2021

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	9	5	210	245	3
Future Vol, veh/h	6	9	5	210	245	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	10	6	233	272	3

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	519	274	275	0	-	0
Stage 1	274	-	-	-	-	-
Stage 2	245	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	517	765	1288	-	-	-
Stage 1	772	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	514	765	1288	-	-	-
Mov Cap-2 Maneuver	514	-	-	-	-	-
Stage 1	768	-	-	-	-	-
Stage 2	796	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1288	-	640	-	-
HCM Lane V/C Ratio	0.004	-	0.026	-	-
HCM Control Delay (s)	7.8	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

HCM 6th TWSC
 3: Greeley Street & Proposed Driveway

06/22/2021

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	4	7	10	287	212	6
Future Vol, veh/h	4	7	10	287	212	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	8	11	319	236	7

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	581	240	243	0	-	0
Stage 1	240	-	-	-	-	-
Stage 2	341	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	476	799	1323	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	720	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	471	799	1323	-	-	-
Mov Cap-2 Maneuver	471	-	-	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	720	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.8	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1323	-	638	-	-
HCM Lane V/C Ratio	0.008	-	0.019	-	-
HCM Control Delay (s)	7.7	0	10.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-