

November 12, 2024

1721, LLC
49 Twin Lakes Drive
Waterford, CT 06385

Attn: Mr. Daniel DelGrosso

**RE: Traffic Impact Report
Roberts Village Housing
430 Mohegan Ave Parkway (Route 32)
Waterford, CT
Our File: 23186**

Public Hearing
Roberts Court 8-30(g)
PL-24-14
Exhibit 34

Dear Mr. DelGrosso:

Pursuant to your request our office has prepared this letter presenting a response to concerns raised by the Planning & Zoning Commission at the recent public hearing on October 22, 2024 and a response to the Peer Review report prepared by SLR dated November 8, 2024.

Commission Comments

Site Access

The site access is currently proposed to Roberts Court, an existing Town Roadway. The commission expressed concerns about the volume of site generated traffic and safety concerns on Robert's Court. The commission inquired about providing access to Old Norwich Road and/or to Route 32.

Roberts Court

In our report dated February 20, 2024 and revised through October 15, 2024 we presented that the proposed 24 housing units would have a trip generation of 271 trips daily, with peak hour volumes of 20 trips and 26 trips during the morning and afternoon peak hours, respectively. The capacity analysis presented in the report indicated that all approaches at the intersection of Senkow Drive and Roberts court will operate at a LOS A during peak hours.

To demonstrate how much excess capacity remains at the intersection of Senkow Drive and

Roberts Court, our office has conducted a capacity analysis of the intersection with the traffic for 200 residential units located on Roberts Court. The results indicate that all approaches at the intersection will operate at a LOS A during peak hours. The capacity analysis worksheets are attached for review.

The Town of Waterford Subdivision Regulations, Section 5.6.2 requires that a cul-de-sac have 50 feet of right of way and 22 to 24 feet of pavement. A Local Access Street requires 50 feet of right of way and 24 to 26 feet of pavement.

Field measurements and available right of way maps indicate that Roberts Court has 50 feet of right of way and approximately 32 feet of pavement. Therefore, the roadway complies with the Town Subdivision regulations for a local street, with respect to right of way and pavement width.

The Town of Waterford Subdivision Regulations, Section 5.6.4 reads as follows:

Sec 5.6.4 Street Access – All streets in a subdivision shall have access to one or more accepted streets or highways, except that any section of a subdivision which may contain more than thirty-five (35) lots may be required by the Commission to be accessible from at least two directions.

This indicates to me that the Commission has determined that residential roadways can safely accommodate the traffic volumes from up to 35 residential units. The subject development proposes a total of 24 residential units. When added the existing seven units with driveway access to Roberts Court, the total number of units is 31. This number is below the 35 units referred to in the subdivision regulations.

The Town of Waterford Subdivision Regulations, Section 5.6.2.5 reads as follows:

5.6.2.5 Sidewalks – Sidewalks shall be constructed in accordance with Town Standard Details, as amended, and shall be provided consistent with the design objectives listed in Subsection 5.6.1. At a minimum, a sidewalk shall be provided on one side of a collector street within five thousand (5,000) feet of an existing or proposed school, park, playground, or community facility or where shown in the POCD.

This regulation indicates that sidewalks are not required on cul-de-sac or local streets, but when they are provided they need to be constructed in accordance with the Town Standard Details. If sidewalks were required on all roadways, there would not be a reference to "at a minimum, sidewalks shall be provided on one side of a collector street....."

5.6.1.4 Streets shall incorporate design elements such as bike lanes and sidewalks to encourage these modes of circulation in those areas identified as nodes on the Town's POCD or where pedestrian or bicyclist demands are not being met.

Section 5.6.2.5 indicates that sidewalks are required at a minimum on one side of a collector street or within 5,000 feet of a school, park, playground or community facility. Roberts Court is listed in a Priority Pedestrian Area but is not located in a POCD node. Roberts Court is located approximately 5,400 feet from the sidewalk entrance to the Quaker Hill School. I am not aware of any parks, playgrounds, or community facilities within 5,000 of Roberts Court. Therefore, sidewalks are not required on Roberts Court, according to the Town of Waterford Subdivision regulations.

Old Norwich Road

The commission asked about the potential to provide site access directly to Old Norwich Road through the existing easement across 23B Old Norwich Road. Attorney Sweeney indicated that the easement configuration did not allow access to the subject site for vehicular traffic, only pedestrian access, and that without the agreement of all parties to the existing easement, that vehicular access was not an option. Attorney Sweeney has further indicated that, subsequent to the October 22, 2024 hearing, he contacted the the owner of the easement and they confirmed their objection to any modification of that easement or any access between the project and Old Norwich Road.

At the hearing I said that we had not considered access directly to Old Norwich Road in relation to this application, since the proposed access was through Roberts Court. I indicated that I had reviewed the potential for access to Old Norwich Road in relation to an earlier application on the parcel, and that it was my recollection that there was a limitation to the available sight distances at that location.

I have subsequently had the opportunity to review the situation in the field. My observations and measurements indicate that the available ISD's are 300 feet to the south and 435 feet to the north. I believe that it may be possible to extend the ISD to 600 feet looking to the north by clearing existing vegetation located within the right of way. The ISD to the south is limited by right of way and the grade on the east side of Old Norwich Road. It would be necessary to obtain a sight distance easement and temporary rights to grade, and then to clear the existing vegetation and regrade the area to obtain the minimum required sight distance. Attorney Sweeney has indicated that the same property owner that has objected to any access to Old Norwich Road holds title to the property where that easement and rights would need to be acquired.

A review of recent ConnDOT speed data indicates that 85% speeds are 46 miles per hour in both the northbound and southbound directions. The minimum required ISD for 46 miles per hour is 510 feet.

Route 32

Our office has been in contact with the ConnDOT District II office to determine if direct access to Route 32 would be allowed. The DOT response was as follows:

The Division of Traffic Engineering has completed the review of the submitted documents for the proposed development and based on the preliminary and limited documents submitted. We do not oppose granting access to the proposed development from Route 32, however additional investigation is necessary to ensure that, if access is granted from Route 32, the proposed driveway would not adversely affect the State highway system.

Please ask the designer to submit the followings:

- The proposed development impacts at the signalized:
 - Intersection No. 152-235 – Route 32 at Benham Ave
 - Intersection No. 152-240 – Route 32 at Fitzgerald Ave
 - Any need for NTOR restrictions, longer turn lane storage, queuing, timing and phasing revisions, etc.
 - Any operation deficiencies, speeds and crash patterns for existing and future conditions

- Design of a right-turn lane or deceleration lane on Route 32 for the proposed development driveway if warranted per the Highway Design Manual
- Design of an acceleration lane on Route 32 for the proposed development driveway if warranted per the Highway Design Manual
- Crash analyses
- Sightlines

In response to the DOT response the applicant has moved forward with a design that incorporates a one way exit only driveway to Route 32. The driveway would be a 12 foot wide driveway. The driveway approach to route 32 would operate under stop sign control. Since Route 32 is a divided highway, all vehicles would exit via a right turn. To construct the driveway, it will be necessary to break through the existing guiderail on the west side of Route 32. The guiderail would need to be replaced.

Preliminary cost estimates for the driveway indicate the cost to be approximately \$250,000. This cost appears excessive compared to the potential benefits of including the driveway as part of the proposed development and would undermine the affordability of the development.

SLR Report

Outlined below is a response to each of the SLR Review Comments.

Comment 1. We concur that Roberts Court is an existing cul-de-sac roadway. We note however, that the cul-de-sac extends to the subject property, indicating that it was anticipated at the time of construction of Roberts Court, that access to the subject parcel was to be provided from Roberts Court.

In our review of the Town Subdivision Regulations, Zoning Regulations and the Plan of Conservation and Development we find no reference to cul-de-sacs being intended for use by children and residents to play and congregate. In addition, we have reviewed the websites of both the Federal Highway Administration and the Institute of Transportation Engineers. The pages related to Traffic Calming were reviewed. The ITE website includes a list of eighteen measures for traffic calming. Cul-de-sacs are not included in that list.

It is true that in an established neighborhood involving numerous roadways that connect two collector roadways, that closing off an existing through street, (i.e. a roadway closure or cul-de-sac) will reduce through traffic volumes on that roadway. That is not the case in this situation. The applicant is not proposing to create a through roadway, only to connect to an existing local residential street to provide access to residential properties. This is consistent with the current use of the roadway.

SLR refers to the conversion of Roberts Court from a cul-de-sac to a through street. The current proposal is to provide a private driveway access to the end of Roberts Court. That private driveway would be constructed as a loop. There is no proposed through access to another local roadway in the original plan set. We are of the opinion that the access point is not necessary.

Roberts Court has a current daily traffic volume of 87 trips with peak hour volumes of 7 trips and 8 trips, respectively. The proposed 24 units are projected to generate 271 trips with peak hour volumes of 20 trips and 26 trips, respectively. These volumes represent an increase on Roberts Court of 311%, 286% and 325%, respectively. These increases appear large until you consider that the background volumes are so low. We note that even with this volume of traffic all movements at the intersection operate at a LOS A during peak hours.

Comment No. 2 The traffic impact report is dated February 20, 2024. It was submitted to the Town for review in August of 2024. Based on those dates the data presented in the report is appropriate. We have reviewed the UCONN Crash Data Repository and we have found that there have been five accidents in the study area between October 1, 2023 and November 11, 2024. All five accidents occurred on Rote 32. There were no accidents reported on Old Norwich Road, Senkow Drive or Roberts Court. A list of those five accidents is attached.

Comment No. 3 As outlined above, the Subdivision regulations allow for up to 35 residential units within a subdivision without the need for a second point of access.

Comment No. 4 The applicant has considered a layout for a one way egress only driveway for the consideration of the commission. The driveway would provide 12 feet of pavement for

exiting vehicles from the development. The intersection of the site driveway with Route 32 would be designed through consultation with the ConnDOT District II Office. Appropriate driveway widths and radii could be provided to accommodate emergency vehicles. However, the cost of this egress driveway is excessive and would undermine the affordability of the development.

Comment No. 5 The traffic impact report was submitted to the Town for review in August 2024. Since the project, as originally proposed did not require review or approval from ConnDOT, we did not consult with the Bureau of Policy and Planning. Town staff would certainly be aware of any recently approved developments that would add traffic to the study area. To date we have not been made aware of any such developments. Since background traffic volumes have declined between 2011 and 2023, there is no need for the use of a growth rate for background traffic volumes. Level of service calculations indicate more than acceptable levels of service at all intersections located within the study area. A growth rate of a few percentage points would not significantly alter the outcome of the analyses.

Comment No. 6 The proposed development has a very low peak hour generation. The proposed 24 single family housing units have a peak hour generation of 20 trips and 26 trips, for the morning and afternoon peak hours, respectively. Because Route 32 is a divided highway, it is necessary for vehicles exiting the site to the north, or approaching the site from the south, to either execute a u-turn at a nearby signalized intersection on Route 32, or to utilize Old Norwich Road, to gain access to a signalized intersection to execute a left turn. Because we are not certain which route would be most desirable to drivers, and to ensure that we have reviewed a worst-case scenario, we have assumed that all drivers will execute a u-turn and that all drivers will utilize Old Norwich Road. Therefore, the site generated traffic was assumed to be 140% of the ITE projected volumes. Even with this overestimation of the site generated traffic, the Levels of Service of nearby intersections remains unchanged. We therefore respectfully suggest that revised movement diagrams are not necessary.

Existing Residential Developments

We would like to note that there are several existing residential developments in the Town of Waterford that have more residential development than that being proposed by this applicant.

Some have only one point of access, some have two, but all have more units per access point, and therefore higher traffic volumes, than Roberts Court with the proposed development. None of the developments provide sidewalks or other traffic calming devices.

- The Milton Road, Dunbar Road, Rainbow Drive development has a total of 68 units and two access points to Old Norwich Road. In addition, the neighborhood provides access to the Church of Jesus Christ of Latter Day Saints. The church has a total of approximately 60 parking spaces.
- The Watergreen Avenue development has a total of 39 units and one access point to Old Norwich Road.
- The Meadow Drive development has a total of 35 units and one access point to Vauxhall Street Extension.
- The Millstone Road East development has a total of 108 units and one access point to Gardiners Wood Road.
- The West Neck Road and Westwood Drive development has a total of 29 units and one access point to Great Neck Road.
- Pepperbox Road has a total of approximately 42 units and one access point to Braman Road.
- The Trumbull Road neighborhood has a total of 109 units on a total of nine roadways and one access point to Great Neck Road.
- The Twin Lakes Drive, Pond Edge Drive neighborhood has a total of 78 units and two points of access.
- The end of Scotch Cap Road provides access to 10 single family homes and an 87 unit apartment complex, with one point of access.
- The Upper Bartlett Road neighborhood provides access to 63 single family homes with one point of access to Lathrop Road.

The record indicates that the Planning Commission has granted approval to numerous residential developments of significantly more units than the current proposal with similar access to the current proposal, without a determination that the traffic volumes represent an unsafe condition.

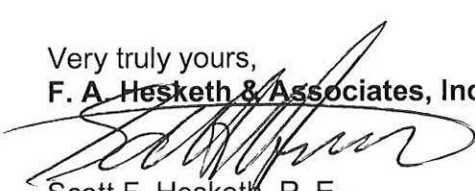
Conclusion

After a review of the evidence, it is my professional opinion that the best access for the proposed development is to Roberts Court. Roberts Court meets the Town's minimum design requirements for not only a cul-de-sac, but a local street. Based on the level of service results, Roberts Court is more than capable of safely accommodating the anticipated volume of traffic from the proposed development. Providing access through Roberts Court will allow residents of the development the option to access Route 32 either by Senkow drive or by way of the signalized intersections at Benham Avenue or Fitzgerald Avenue, via Old Norwich Road.

Access directly to Old Norwich Road is not possible due to the restrictions on the existing easement across 23B Old Norwich Road. It is also unlikely that it will be possible to obtain the necessary easements and grading rights to provide the minimum ISD looking to the south. Direct access to Route 32, although possible, is impracticable due to the cost of construction and does not appear to offer much relief from a volume standpoint.

We appreciate the opportunity to provide this information to you. If you require any additional information, please do not hesitate to contact our office.

Very truly yours,
F. A. Hesketh & Associates, Inc.



Scott F. Hesketh, P. E.
Manager of Transportation Engineering

cc: Mr. Joe Wren, Indigo Design, LLC
Attorney William Sweeney, Tobin, Carberry, et.al.

Waterford Subdivision Regulations
And
2012 Plan of Preservation, Conservation and Development



WATERFORD

2012 Plan of Preservation, Conservation and Development

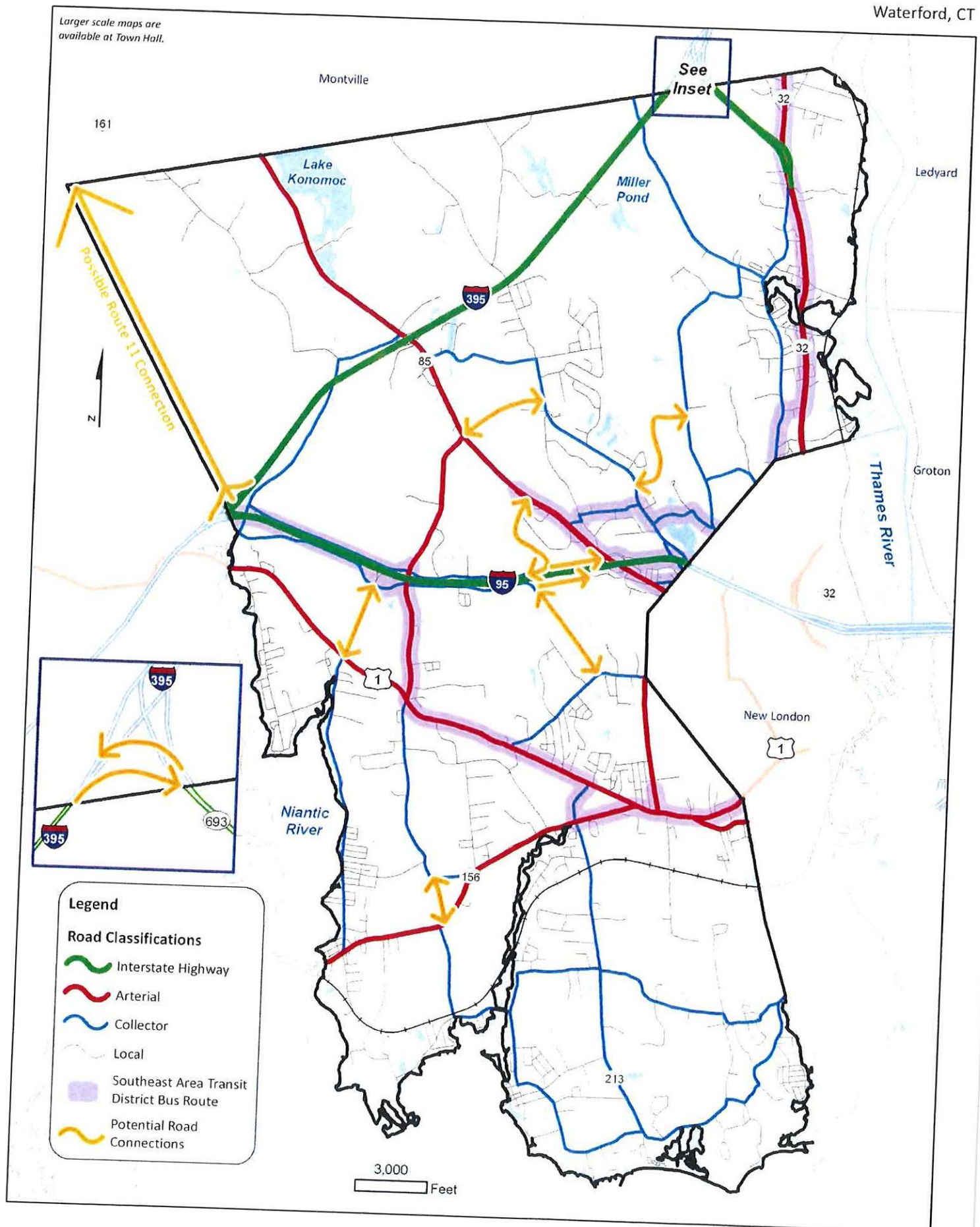
Part 1 - Policy Element

Effective- January 1, 2012

Transportation Plan

Waterford, CT

Larger scale maps are
available at Town Hall.



TOWN OF WATERFORD

CONNECTICUT

SUBDIVISION REGULATIONS

Revised Through Effective Date: April 5, 2018

Last Comprehensive Review of the Subdivision Regulations: April 5, 2018

First Subdivision Regulations Effective: May 4, 1948

The Town of Waterford Zoning Commission was created on June 3, 1939

The Planning & Zoning Commission was created on November 15, 1951

The Planning and Zoning Commission

Joseph Bunkley, Chairman

Susan Stott, Secretary

John Bashaw

Gregory Massad

Joseph DiBuono

Alternates:

Edwin J. Maguire

Staff

Abby Piersall, AICP Planning Director

Mark Wujtewicz Planner

Maureen FitzGerald Environmental Planner

Thomas Lane Zoning Official

Dawn Choisy Recording Secretary

SOIL EROSION AND SEDIMENT CONTROL PLAN shall mean a scheme that minimizes soil erosion and sedimentation resulting from development and includes, but is not limited to, a map and narrative and conforms to the Connecticut General Statutes and the Waterford Zoning Regulations.

STORMWATER shall mean water resulting from rain or snowmelt that runs off surfaces such as rooftops, paved streets, highways, parking lots and landscapes.

STORMWATER MANAGEMENT FACILITY shall mean a structural or landscaped component of any system designed to control or manage the path, storage, or rate of release of stormwater runoff and/or provide water quality treatment for stormwater.

STREET, ARTERIAL shall mean a major thoroughfare whose main function is to carry large volumes of traffic between major points. Arterials are designated in the Community Facilities Element of the Plan of Preservation, Conservation and Development.

STREET, COLLECTOR shall mean a street whose primary function is to carry moderate traffic volumes between local streets and arterial streets. It may also provide access to abutting properties. Collectors are designated in the Community Facilities Element of the Plan of Preservation, Conservation and Development.

STREET, LOCAL ACCESS shall mean a street whose primary function is to provide access to abutting properties. For the purpose of these Regulations, a local access street is any street other than an arterial or collector street as defined above, and includes cul-de-sacs.

STREETS shall include roads, avenues, boulevards, lanes or other vehicular ways, unless specifically specified as a Local Access Street, a Collector Street, or an Arterial Street as defined in this section. It shall mean a public way accepted by the Town of Waterford or the State of Connecticut, or a street in an approved subdivision, but shall not include private rights of way.

STREET RIGHT OF WAY shall mean that portion of land between property lines over which a public road is built and the adjacent area reserved for future widening and improvements.

STRUCTURE shall mean anything constructed or erected, the use of which requires i) location on, in, or under the ground or water; or ii) attachment to something having location on the ground or water including, but not necessarily limited to, buildings and other structures, fabric covered frame enclosures, swimming pools, tennis courts, towers, paddle or platform tennis courts, docks, balconies, open entries, porches, decks, handicap ramps, signs, permanent awnings, gas or liquid storage tanks that are principally above ground, ground-mounted antennas, ground-mounted solar panels or satellite dishes, and fences or walls more than six feet in height.

SUBDIVISION shall mean the division of a tract or parcel of land into three or more parcels or lots for the purpose, whether immediate or future, of sale or building development, expressly

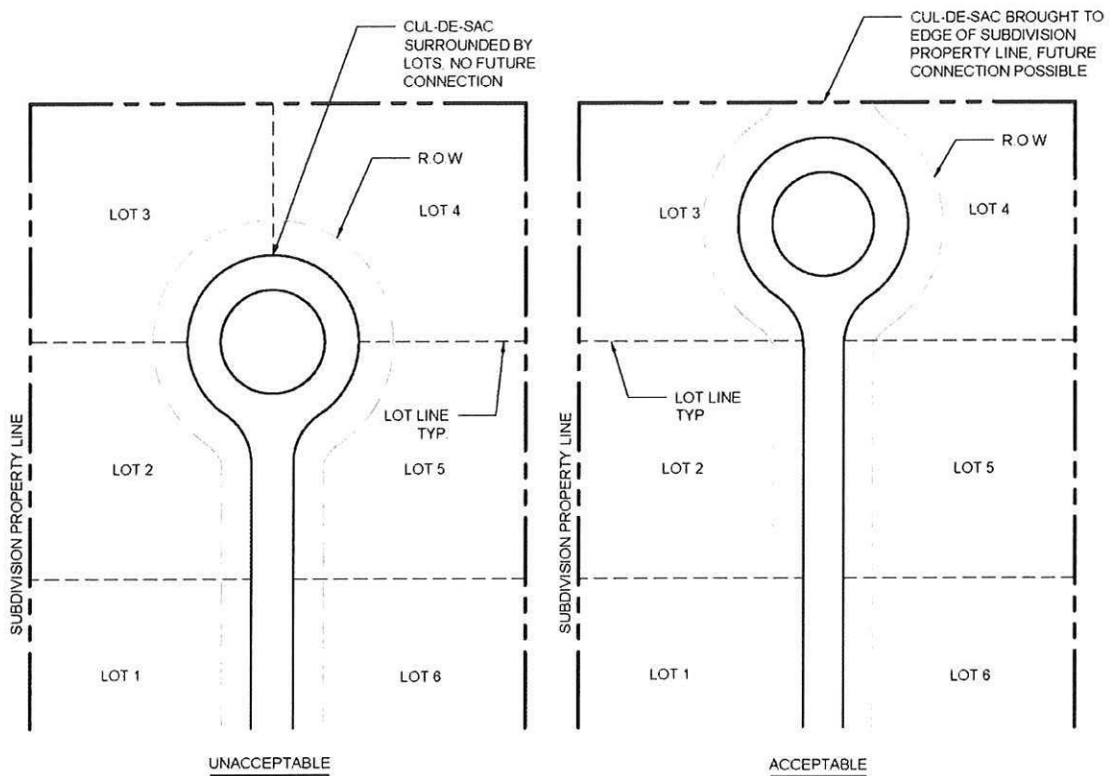
5.6.1.6 The elevations of proposed streets within Areas of Special Flood Hazard shall be at a minimum of 1 foot above the Base Flood Elevation (BFE).

5.6.2 Street Design Standards – Applicants shall design streets using the elements shown within the Town’s Roadway Cross-Section Details (Appendix F). The purpose of these details is to illustrate how elements within the street right of way (e.g., sidewalks, swales, travel lanes, curbing, etc.) may be assembled to meet the design objectives in Subsection 5.6.1. Applicants may propose a cross-section as it is depicted in the Town’s details, or may propose a different assembly of elements that better meet the design objectives in the context of existing site conditions. A summary of pavement width and street right of way width standards is provided in the table below and serves as a supplement to the Town’s Roadway Cross-Section Details.

	<u>Street Right of Way</u>	<u>Paved Width</u>
Cul-de-Sac	50'	22' – 24'
Turn-around Area	58' radius	50' radius
Local Access	50'	24' – 26'
Collector	60'	32'
Arterial	60' – 100'	40'

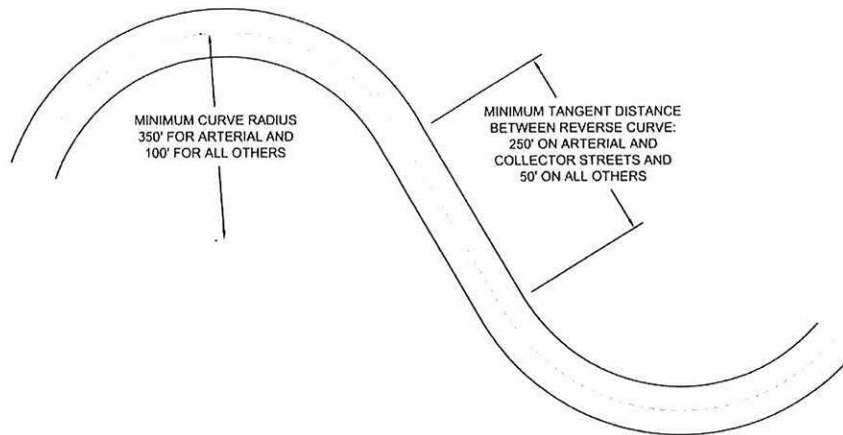
In addition to the street design standards provided above, the following shall apply:

5.6.2.1 Cul-de-Sac Length – A cul-de-sac shall not exceed eight hundred (800) feet in length unless it is of a temporary nature and is planned for extension and can reasonably be expected to connect with an existing or proposed road on adjoining land. For temporary cul-de-sacs, the pavement shall extend to the property line, and the turnaround at the end of the cul-de-sac shall include a temporary right of way for the area outside of the required street right of way width, which temporary right of way shall be released by the Town when the street is extended.



CUL-DE-SAC LAYOUT FOR FUTURE CONNECTION
NOT TO SCALE

- 5.6.2.2 Curves – The tangent distance between reverse curves shall not be less than two hundred fifty (250) feet on collector streets and fifty (50) feet on cul-de-sacs and local access streets. Except for intersections and turn-arounds on cul-de-sacs, no local access street curve shall have a radius of less than one hundred (100) feet and no collector street curve shall have a radius of less than three hundred fifty (350) feet, as measured radial to the center line. Curves greater than 8 degrees on collector roads may be super-elevated. Horizontal and vertical sight distances, horizontal and vertical rates of curvature, and super elevation shall satisfy the requirements of the Connecticut Department of Transportation Geometric Highway Design Standards (See illustration).



- 5.6.2.3 Intersections – Except where impractical because of topography or other conditions, cul-de-sacs and local access streets shall be perpendicular to intersections for a distance of at least one hundred (100) feet and collector streets shall be perpendicular to intersections for at least one hundred fifty (150) feet. Corners shall be rounded with a radius of not less than twenty-five (25) feet. Center lines of alternate side streets shall not be closer than one hundred twenty five (125) feet, measured along the center line. Wherever a cul-de-sac or local access road intersects with a collector or arterial road, a minimum sight distance of two hundred fifty (250) feet shall be required in each direction along the major road.
- 5.6.2.4 Grades – Street grades shall have a maximum allowable grade of eight percent (8%) on arterial and collector streets and ten percent (10%) for a distance of up to 500 feet on all other streets and a minimum allowable grade of one percent (1%). Whenever possible, grades shall be no greater than two percent (2%) within one hundred (100) feet of an intersection.
- 5.6.2.5 Sidewalks – Sidewalks shall be constructed in accordance with Town Standard Details, as amended, and shall be provided consistent with the design objectives listed in Subsection 5.6.1. At a minimum, a sidewalk shall be provided on one side of a collector street within five thousand (5,000) feet of an existing or proposed school, park, playground, or community facility or where shown in the POCD.
- 5.6.2.6 Street Trees – Trees shall be planted at fifty (50) foot intervals along the sides of every street abutting lots of the proposed subdivision except where, in the opinion of the Commission, existing trees are to be retained by the developer in sufficient number and location to meet the intent of this section. Where existing trees will be retained, snow fencing shall be installed prior to the start of construction to prevent disturbance of roots.

Street trees shall be planted at least twelve (12) feet from any underground utility. Where street trees are required in the vicinity of existing overhead utilities, street trees shall be placed at a distance at least equal to the average height of the selected species at maturity from overhead utilities. Determination of precise locations for trees shall consider future possible locations of driveways and utility connections. Street trees shall be installed in accordance with section 6.11 and appendix D of these regulations. The developer may request a waiver of street tree provisions where site conditions prohibit strict conformance with this section.

- 5.6.3 Future Street Connections – Streets shall be laid out to provide connections with existing streets on adjacent properties, where appropriate. Consideration shall be given to connecting with future streets on adjacent property where future subdivision appears probable. Where rights-of-way for future streets are to be deeded to the Town, easements shall be provided on abutting lots for sloping rights. Such easements shall be at least 10' wide, although a greater width may be required by the Commission upon recommendation of the Public Works Director where physical conditions make such additional width desirable.
- 5.6.4 Street Access – All streets in a subdivision shall have access to one or more accepted streets or highways, except that any section of a subdivision which may contain more than thirty-five (35) lots may be required by the Commission to be accessible from at least two directions.
- 5.6.5 Arterial Streets – Where a tract to be subdivided occurs in the vicinity of a proposed arterial street as shown on the Town POCD, the applicant shall build the appropriate paved road, but may be required to set drainage lines to accommodate a larger road in the future.
- 5.6.6 Street Names – No duplication of street names already in use shall be permitted unless they are joined or are in alignment with each other. Names that may be confused with ones already in use shall be avoided. All street names are subject to Commission approval.
- 5.6.7 Street Lights – An executed agreement for the installation and operation of street lights shall be provided to the Commission at the time of request for street acceptance. Street lights shall be approved in number, location, and type by the Director of Public Works during the final approval process.
- 5.6.8 Marking Proposed Streets – The developer will have his/her engineer place stakes at the even hundred foot stations on center lines of proposed streets before the subdivision plan is submitted for approval.

ITE Trip Generation Worksheets

Existing Roberts Court

7 Single Family Units



Graph Look Up

1/10

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE:
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

INDEPENDENT VARIABLE (IV):
Dwelling Units

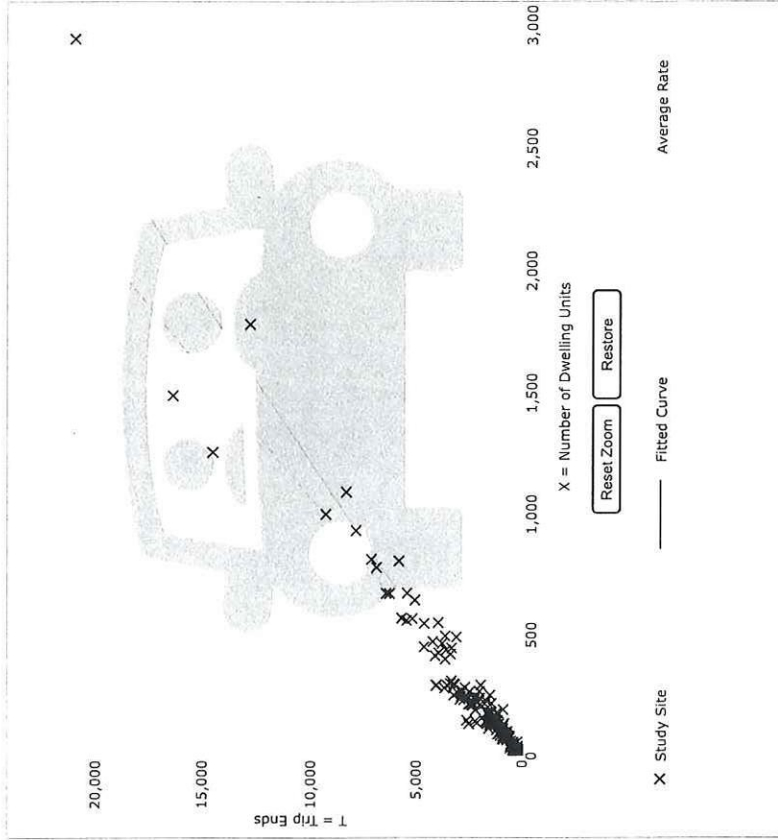
TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
7

Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210). Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
174

Avg. Num. of Dwelling Units:
246

Average Rate:
9.43

Range of Rates:
4.45 - 22.61

Standard Deviation:
2.13

Fitted Curve Equation:
 $\text{Ln}(T) = 0.92 \text{Ln}(X) + 2.68$

R^2 :
0.95

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 66 (Total), 33 (Entry), 33 (Exit)
Fitted Curve: 87 (Total), 44 (Entry), 43 (Exit)



1.042

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 210

LAND USE GROUP: (200-299) Residential

LAND USE: 210 - Single-Family Detached Housing

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

INDEPENDENT VARIABLE (IV): Dwelling Units

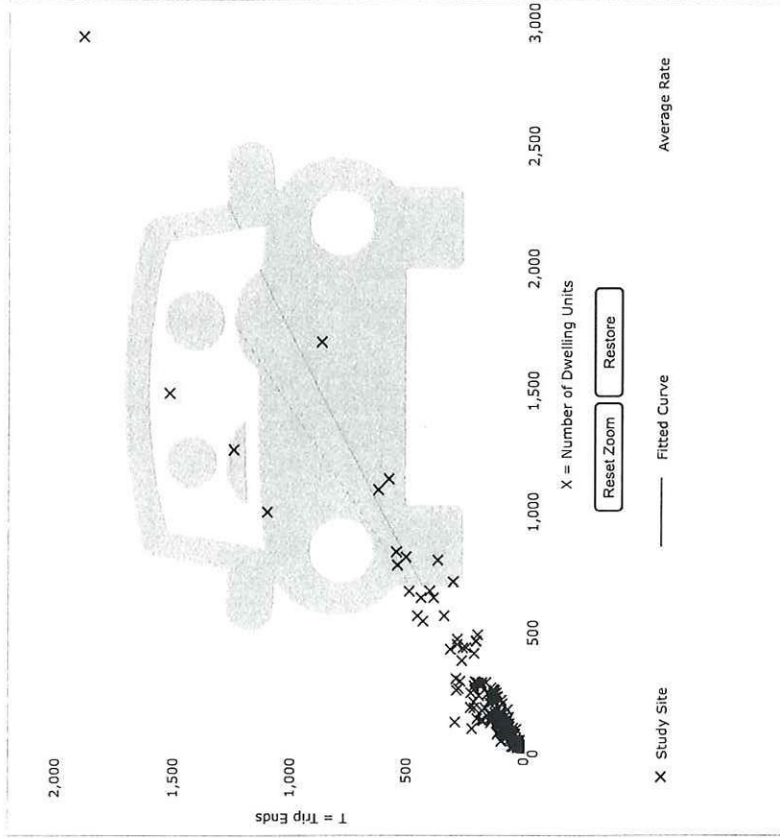
TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 7

Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use: Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable: Dwelling Units

Time Period: Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Trip Type: Vehicle

Number of Studies: 192

Avg. Num. of Dwelling Units: 226

Average Rate: 0.70

Range of Rates: 0.27 - 2.27

Standard Deviation: 0.24

Fitted Curve Equation: $\ln(T) = 0.91 \ln(X) + 0.12$

R^2 : 0.90

Directional Distribution: 25% entering, 75% exiting

Calculated Trip Ends: Average Rate: 5 (Total), 1 (Entry), 4 (Exit)
Fitted Curve: 7 (Total), 2 (Entry), 5 (Exit)



Graph Look Up



Data Plot and Equation

DATA SOURCE: Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE: 210

LAND USE GROUP: (200-299) Residential

LAND USE: 210 - Single-Family Detached Housing

LAND USE SUBCATEGORY: All Sites

SETTING/LOCATION: General Urban/Suburban

INDEPENDENT VARIABLE (IV): Dwelling Units

TIME PERIOD: Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE: Vehicle

ENTER IV VALUE TO CALCULATE TRIPS: 7

Calculate

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
208

Avg. Num. of Dwelling Units:
248

Average Rate:
0.94

Range of Rates:
0.35 - 2.98

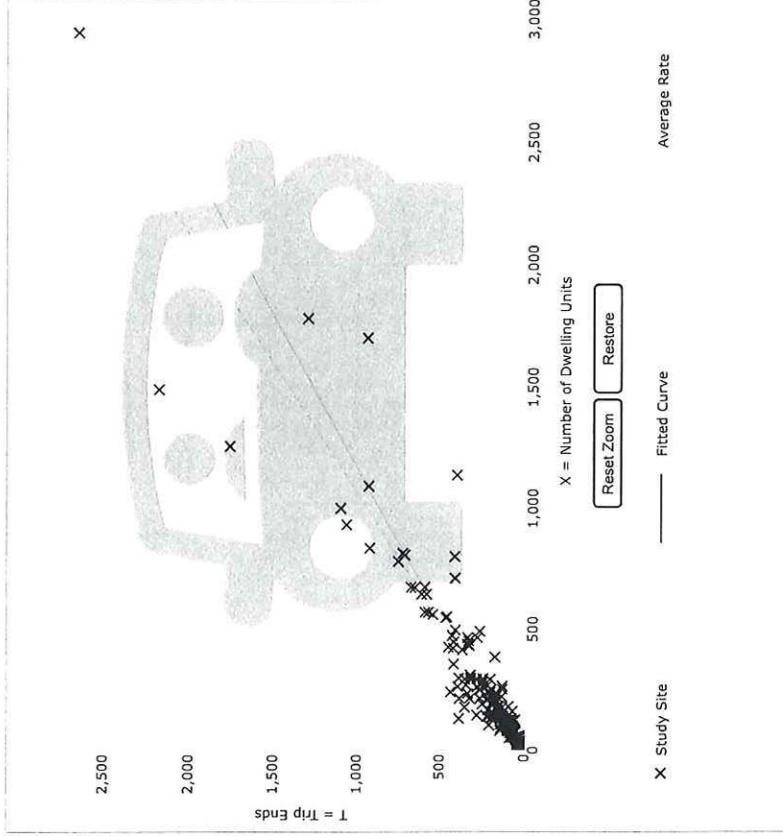
Standard Deviation:
0.31

Fitted Curve Equation:
 $\ln(T) = 0.94 \ln(X) - 0.27$

R²:
0.92

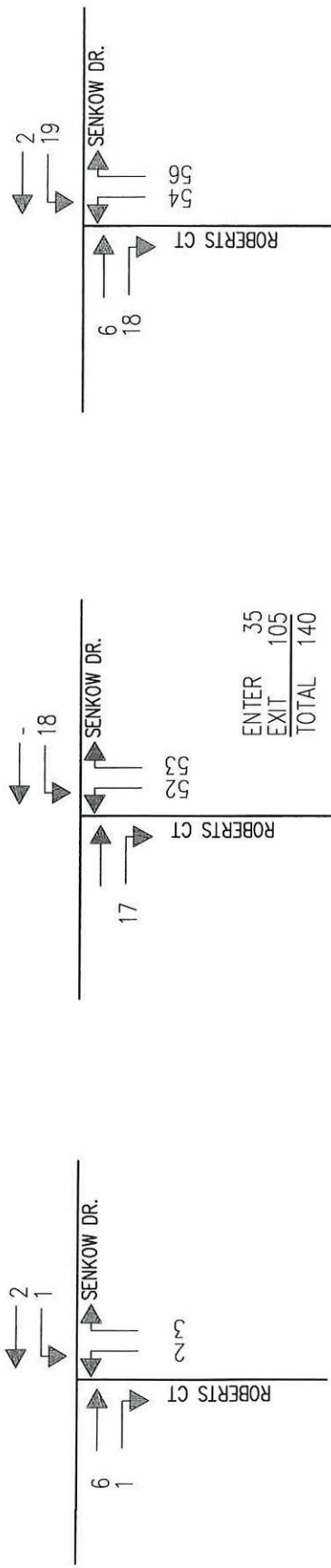
Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 7 (Total), 4 (Entry), 3 (Exit)
Fitted Curve: 8 (Total), 5 (Entry), 3 (Exit)



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

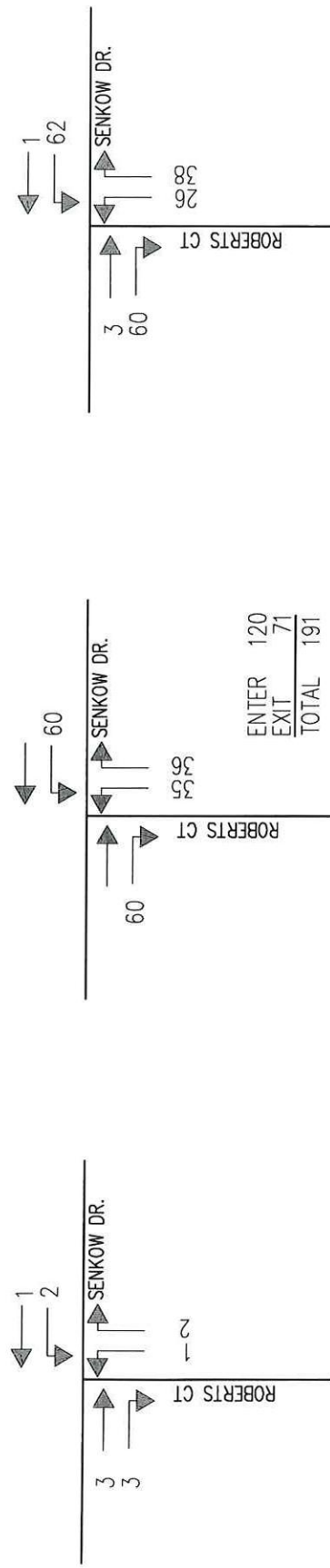
ITE Trip Generation Worksheets
200 Single Family Units
SHNCHRO Capacity Analyses



BACKGROUND

SITE GENERATED
A.M. PEAK HOUR

COMBINED



BACKGROUND

SITE GENERATED
P.M. PEAK HOUR

COMBINED

FIGURE A

11-12-2024

BACKGROUND, SITE GENERATED
AND COMBINED TRAFFIC
200 RESIDENTIAL UNITS

ROBERT'S VILLAGE
430 MOHEGAN AVE PARKWAY (RT 32)
WATERFORD, CONNECTICUT

F. A. Hesketh & Associates, Inc.
6 CREAMERY BROOK, EAST GRANBY, CT 06026

FAH

TRAFFIC
PLANNING
ENGINEERING
DESIGN

NOT TO SCALE



Data Plot and Equation

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE:
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
200

Calculate

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
192

Avg. Num. of Dwelling Units:
226

Average Rate:
0.70

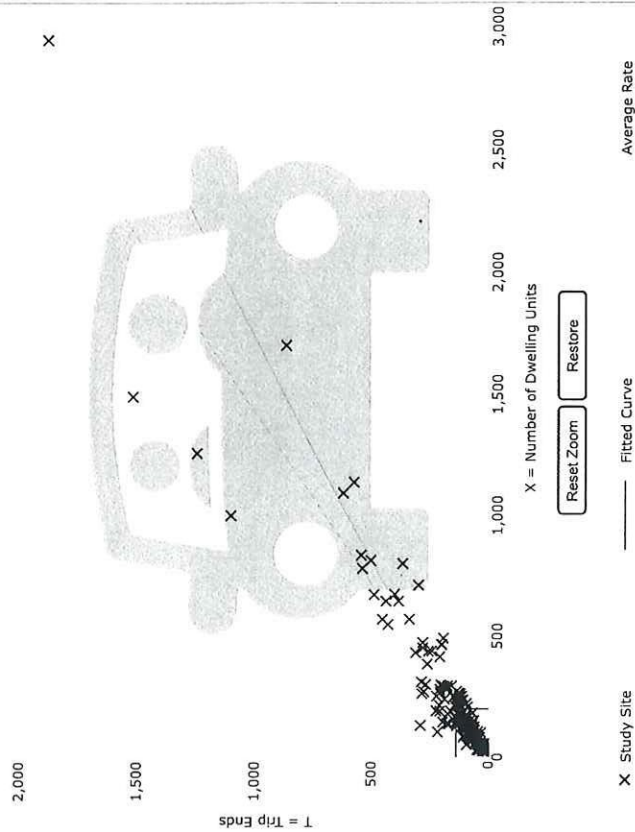
Range of Rates:
0.27 - 2.27

Standard Deviation:
0.24

Fitted Curve Equation:
 $\ln(T) = 0.91 \ln(X) + 0.12$
 $R^2 = 0.90$

Directional Distribution:
25% entering, 75% exiting

Calculated Trip Ends:
Average Rate: 140 (Total), 35 (Entry), 105 (Exit)
Fitted Curve: 140 (Total), 35 (Entry), 105 (Exit)



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.



Graph Look Up



DATA SOURCE

Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:

210

LAND USE GROUP:

(200-299) Residential

LAND USE:

210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:

All Sites

SETTING/LOCATION:

General Urban/Suburban

INDEPENDENT VARIABLE (IV):

Dwelling Units

TIME PERIOD:

Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:

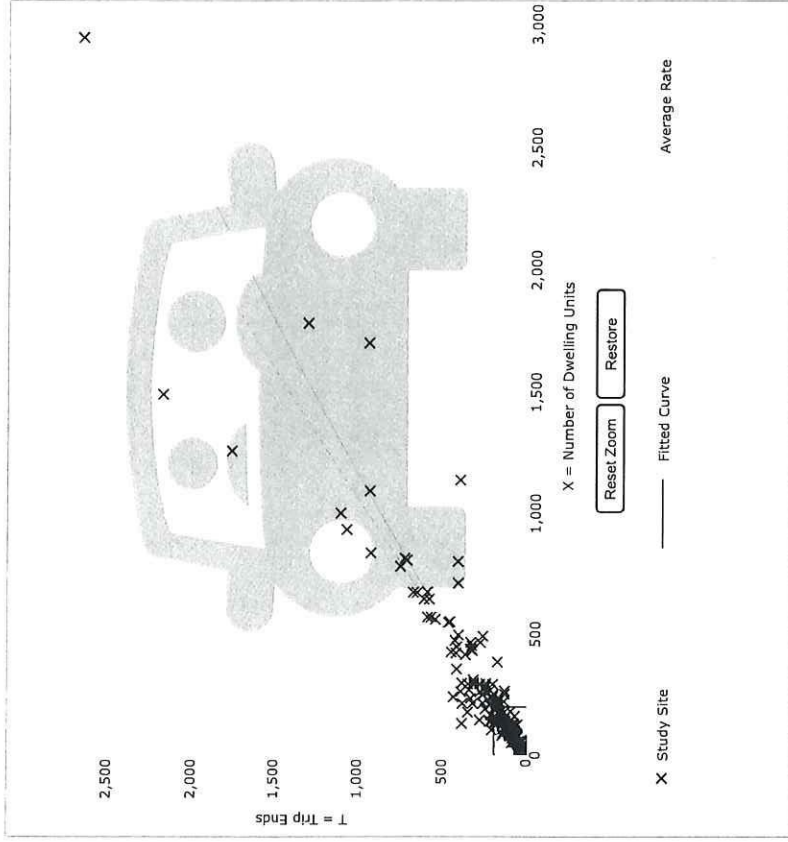
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:

200

Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use: Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:

Dwelling Units

Time Period:

Weekday

Peak Hour of Adjacent Street Traffic

One Hour Between 4 and 6 p.m.

Setting/Location:

General Urban/Suburban

Trip Type:

Vehicle

Number of Studies:

208

Avg. Num. of Dwelling Units:

248

Average Rate:

0.94

Range of Rates:

0.35 - 2.98

Standard Deviation:

0.31

Fitted Curve Equation:

$\ln(T) = 0.94 \ln(X) + 0.27$

R²:

0.92

Directional Distribution:

63% entering, 37% exiting

Calculated Trip Ends:

Average Rate: 188 (Total), 118 (Entry), 70 (Exit)

Fitted Curve: 191 (Total), 120 (Entry), 71 (Exit)

HCM Unsignalized Intersection Capacity Analysis

Combined - 200 Units

AM Peak Hour

3:

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶	↷
Traffic Volume (veh/h)	6	18	19	2	54	56
Future Volume (Veh/h)	6	18	19	2	54	56
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	20	21	2	59	61
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			27		61	17
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			27		61	17
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		94	94
cM capacity (veh/h)			1587		933	1062
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	27	23	120			
Volume Left	0	21	59			
Volume Right	20	0	61			
cSH	1700	1587	994			
Volume to Capacity	0.02	0.01	0.12			
Queue Length 95th (ft)	0	1	10			
Control Delay (s)	0.0	6.7	9.1			
Lane LOS		A	A			
Approach Delay (s)	0.0	6.7	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay		7.3				
Intersection Capacity Utilization		20.9%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

Combined - 200 Units
PM Peak Hour

3:

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↑	↑
Traffic Volume (veh/h)	3	63	62	1	36	38
Future Volume (Veh/h)	3	63	62	1	36	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	68	67	1	39	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			71		172	37
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			71		172	37
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		95	96
cM capacity (veh/h)			1529		782	1035
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	71	68	80			
Volume Left	0	67	39			
Volume Right	68	0	41			
cSH	1700	1529	894			
Volume to Capacity	0.04	0.04	0.09			
Queue Length 95th (ft)	0	3	7			
Control Delay (s)	0.0	7.4	9.4			
Lane LOS		A	A			
Approach Delay (s)	0.0	7.4	9.4			
Approach LOS			A			
Intersection Summary						
Average Delay			5.7			
Intersection Capacity Utilization			21.1%	ICU Level of Service		A
Analysis Period (min)			15			

**Other Residential Developments
In Waterford**

Name, Address, Parcel ID

Millstone Rd 102 Houses
+ 4 at entry

Identify
Layers
About



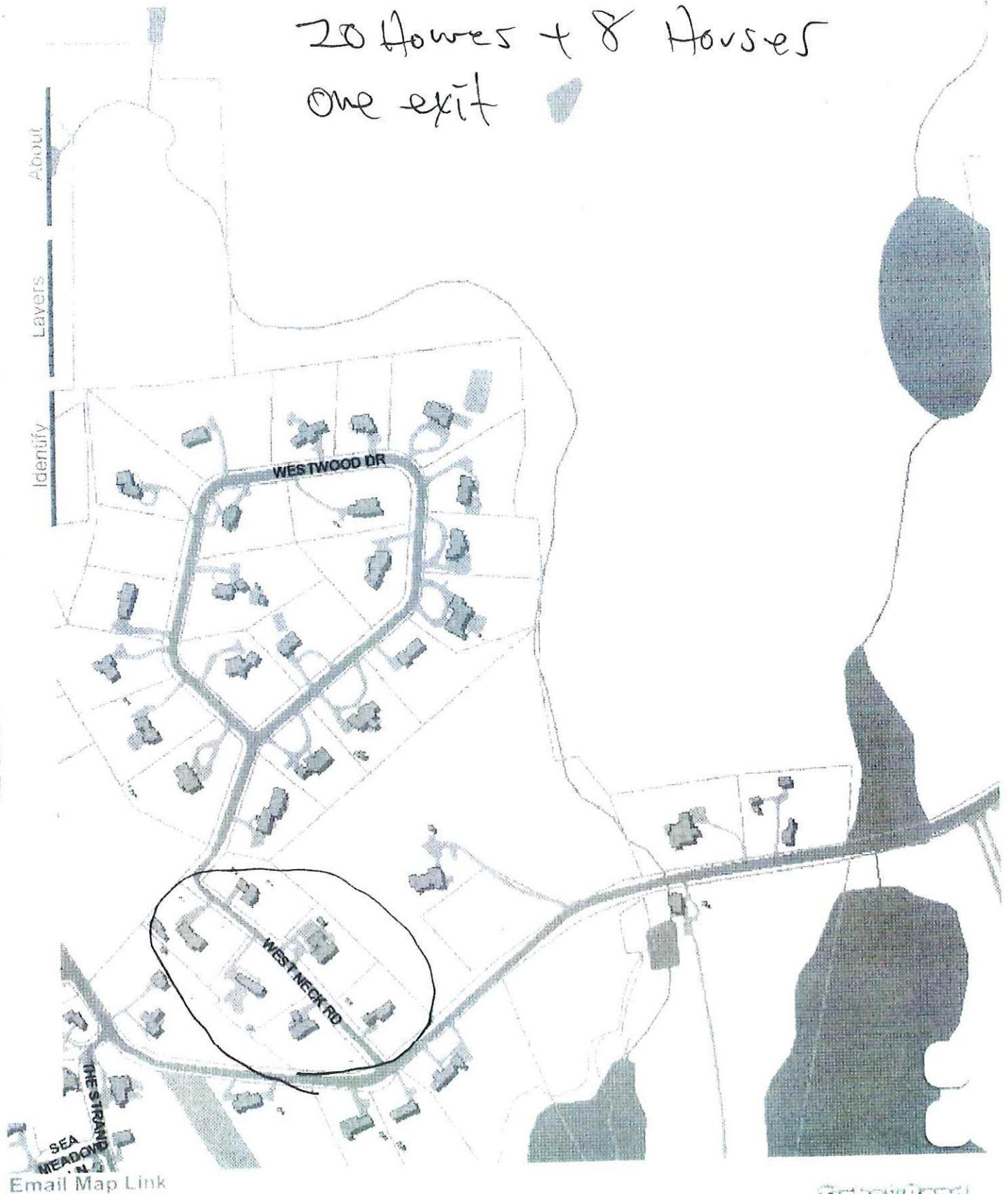
Email Map Link

lat=41.3132, long=-72.1361

Tighe+Bond

Name, Address, Parcel ID

20 Houses + 8 Houses
one exit



lat:41.3075, long:-72.1222

Tighe+Bond

Name, Address, Parcel ID

Pepperbox

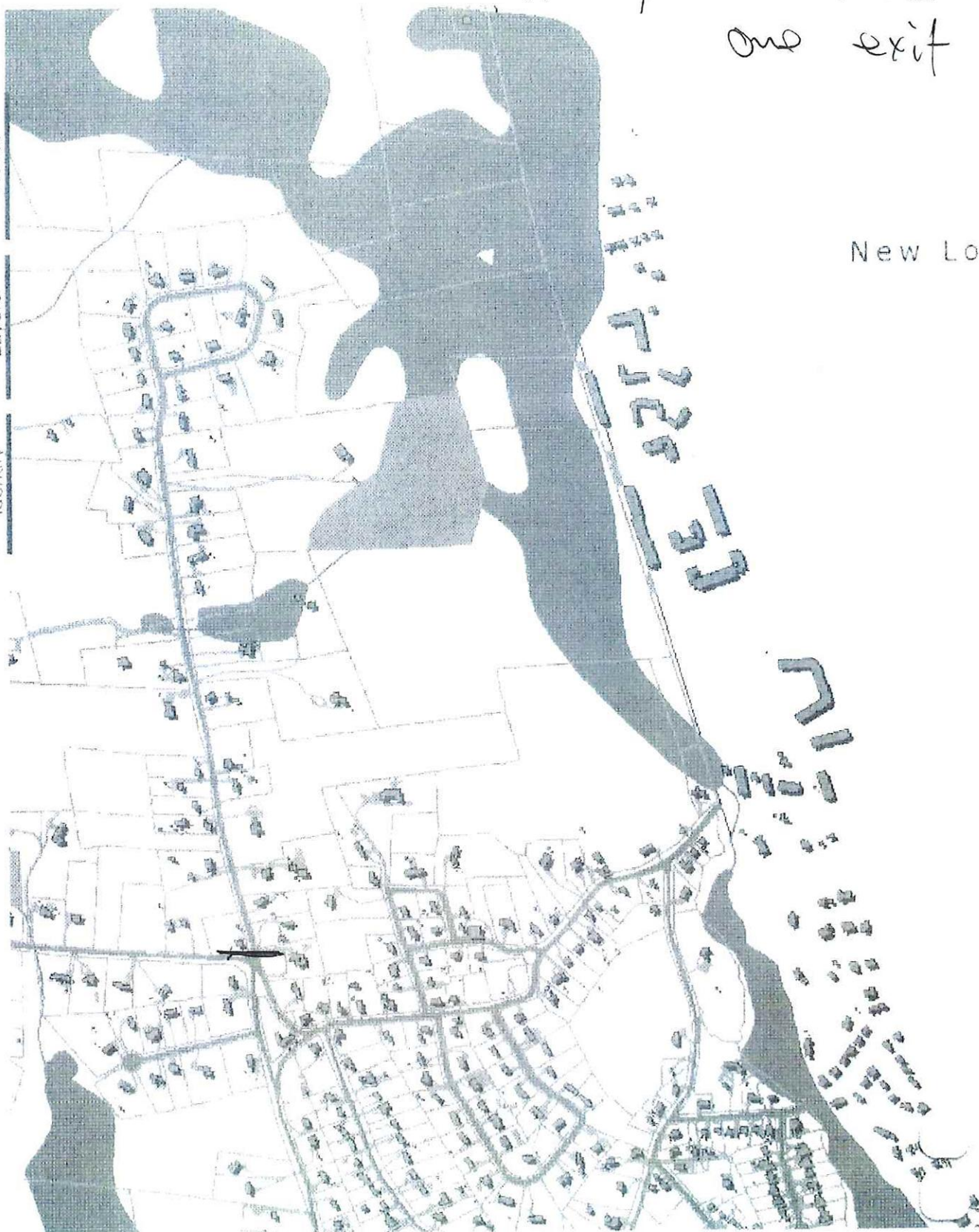
42 Houses
one exit

About

Layers

Identify

New Lon



Email Map Link

lat:41.3228, long:-72.0976

Tighe+Bond

Name, Address, Parcel ID

102 Houses + 7

one entry



Email Map Link

lat:41.3916, long:-72.1287

Tighe+Bond

Name, Address, Parcel ID



39 Houses



lat:41.3880, long:-72.1418

HIGH-BOND

Name, Address, Parcel ID

35 Houses

GIS Maps

Welcome to the Town of Waterford's Interactive Geographic Information System.

Quick Tips

Disclaimer

This website provides access to town maps and geographically referenced property information.

While every reasonable effort has been made to produce high-quality map data, the Town of Waterford provides this information with the understanding that it is not guaranteed to be accurate, correct, or complete, and conclusions drawn from such information are the responsibility of the user. The Town of Waterford assumes no responsibility for actual or consequential damage incurred as a result of any user's reliance on this data or information herein, even if The Town of Waterford is advised of the possibility of such damage. These data do not constitute a Land survey and are not legally recorded, and are not intended to be used as such. Users are requested to notify the Town of Waterford of any errors or discrepancies found in using the data. The Town of Waterford is providing the data "as is", without any guarantee of technical support.

Data Status

The parcel data was updated through 10/1/2024

Ownership information was last updated on 10/16/2024

Contact Us

Email Map Link



lat:41.3780, long:-72.1270

Tighe & Bond

Name, Address, Parcel ID

78 houses = 39 Houses per
exit +
Village traffic

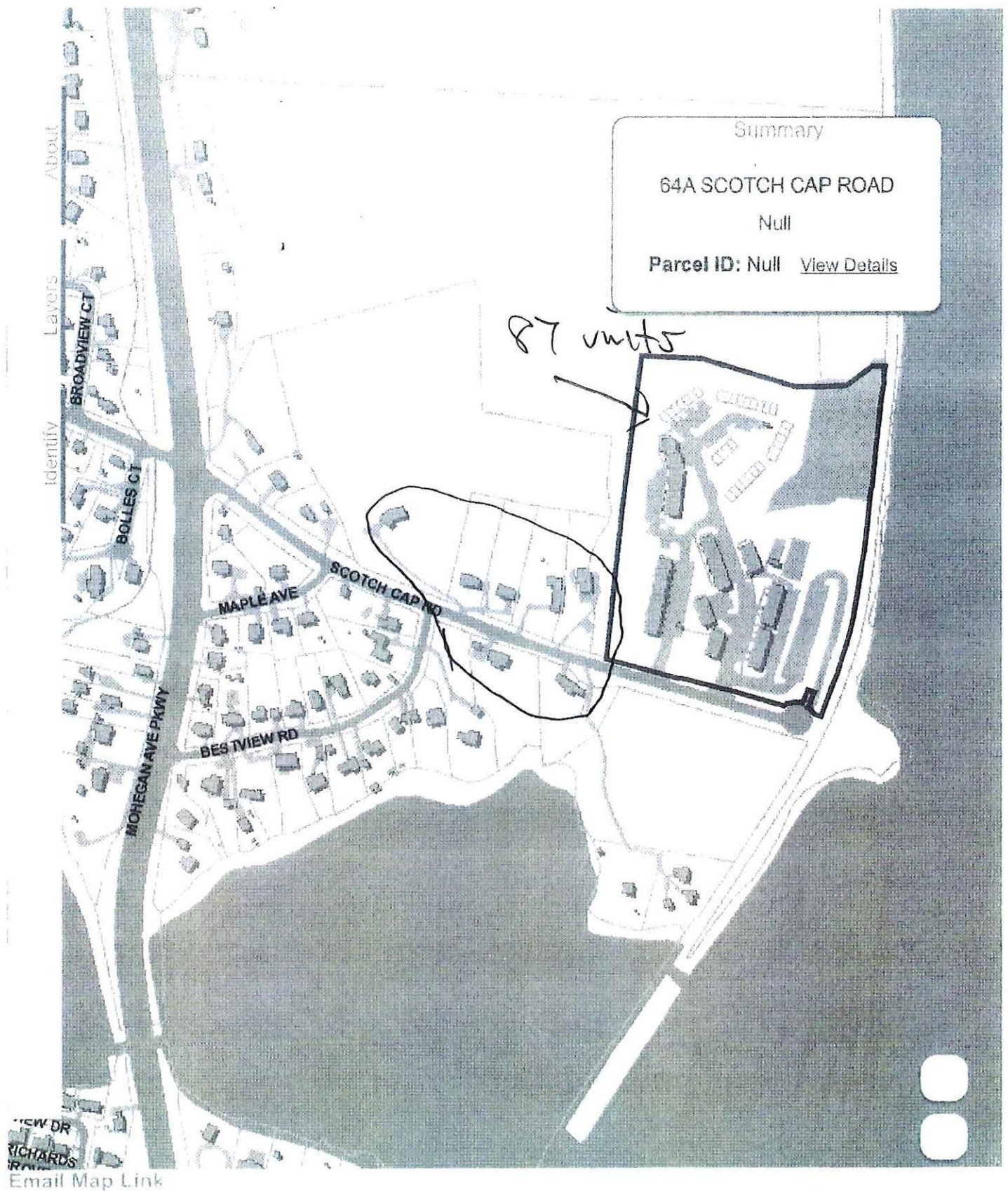


Email Map Link

lat:41.3857 long:-72.1250

Tighe+Bond

Name, Address, Parcel ID



Summary

64A SCOTCH CAP ROAD

Null

Parcel ID: Null [View Details](#)

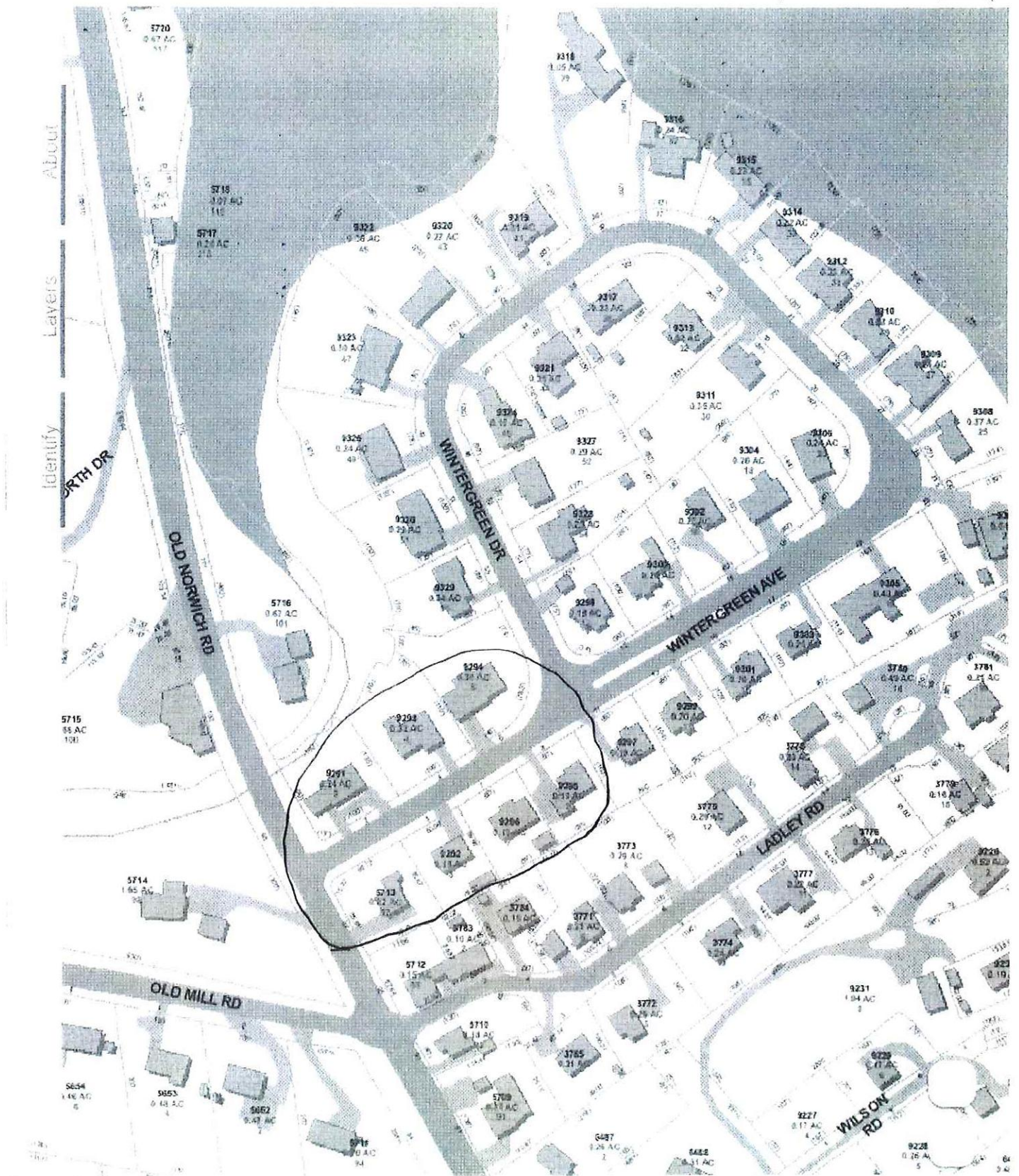
87 units

Tighe & Bond

lat:41.4043, long:-72.0815

Name, Address, Parcel ID

32 Houses + 7 = 39 total



Email Map Link

lat:41.4095, long: -72.1059

TIGHEBOND

Name, Address, Parcel ID



1
55 Homes
+ 8 at entry

63 Total
GB

Email Map Link

lat:41.4210, long:-72.0971

Tighebond

UCONN Crash Repository

Accident data

October 1, 2023 thru November 11, 2024

Route 32, Old Norwich Road, Senkow Drive

& Roberts Court

Accident Data

Town of Waterford

October 1, 2023 Thru November 11, 2024

Route 32

Mile Marker 1.96 thru 2.60

	CrashID	Date	Day of Week	Time	Crash Severity	Number Of		Milemarker	Roadway Name	Intersecting Roadway	Distance	Unit	Direction	First Harmful Event	Manner of Crash	Loc of First Event	Weather Cond	Light Condition	Road Surface Cond
						Motor Vehicles	Non-Motorist												
1	1105158	11/17/2023	Friday	8:03:00	Prop Dam Only	2	0	2.22	32-S	Senkow DR	100	Feet	S	Other Vehicle	SS SD	On Roadway	Clear	Daylight	Dry
2	1139540	3/6/2024	Wednesday	21:37:00	Prop Dam Only	1	0	1.96	32-S	BENHAM AV	35	Feet	S	Guardrail End	Not Applicable	On Roadway	Rain	Dark-Not Lighted	Wet
3	1165703	6/7/2024	Friday	19:36:00	Prop Dam Only	2	0	1.97	32-N	Benham Avenue	107	Feet	S	Other Vehicle	SS SD	On Roadway	Clear	Dusk	Dry
4	1187716	7/31/2024	Wednesday	7:34:00	Prop Dam Only	1	0	2.56	32-S	Fitzgerald Ave	943	Feet	S	Other Fixed Object	Not Applicable	On Roadway	Rain	Daylight	Wet
5	1204830	10/1/2024	Tuesday	9:11:00	Poss Injury	2	0	2.17	32-N	Benham ST	943	Feet	N	Other Vehicle	Front to rear	On Roadway	Clear	Daylight	Dry