



August 30, 2023

Town of Watertown  
Planning & Zoning Commission  
61 Echo Lake Road  
Watertown, CT 06795

**RE: Bunker Hill Road Planned Development District (BHRPDD) Application**  
**Bunker Hill Road & New Wood Road**  
**Watertown, CT 06795**  
**Project Number: 22102801**

Members of the Planning & Zoning Commission,

On behalf of the applicant, WPH Holdings, LLC, Solli is submitting this application in order to establish a Planned Development District (PDD) to develop the properties designated as Parcel ID 158 45 118A, 151 45 12 and 165 45 116, located along Bunker Hill Road and New Wood Road. The properties consist of approximately 195.83 acres and are currently undeveloped wooded land. The properties in their present condition are restricted to industrial uses or low-density residential developments consistent with rural environments in areas with limited public facilities and/or environmental constraints which would limit more intensive development.

The Application is seeking to establish an Overlay Zoning District that will allow for a mixed use consisting of multi-family residential and industrial uses. The Application, if approved, will give the applicant the ability to seek suitable tenants. Development will not begin until the Site Plan is approved by the Planning & Zoning Commission and a Site Plan cannot be developed until tenants have been secured.

With the Commission's approval, the Applicant will have the ability to develop these long-time vacant properties which will provide significant economic growth to Watertown.

Respectfully,

**Solli Engineering, LLC**

A handwritten signature in blue ink that reads "Luke Mauro".

Luke Mauro, P.E., PTOE  
Senior Project Manager

A handwritten signature in blue ink that reads "Kevin Solli".

Kevin Solli, P.E., PTOE  
President/CEO

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**501 Main Street, Suite 2A**  
**Monroe, CT 06468**  
**Office: (203) 880-5455**

[www.SolliEngineering.com](http://www.SolliEngineering.com)

**11 Vanderbilt Avenue, Suite 240**  
**Norwood, MA 02062**  
**Office: (781) 352-8491**



August 30, 2023

Town of Watertown  
Planning & Zoning Commission  
61 Echo Lake Road  
Watertown, CT 06795

**RE: Bunker Hill Road Planned Development District (BHRPDD) Application  
Reasoning for Proposed Text Amendment  
Bunker Hill Road & New Wood Road  
Watertown, CT 06795  
Project Number: 22102801**

Member of the Planning & Zoning Commission,

The following summarizes the reason for the proposed Text Amendment as required by Section 60.2.3 of the Town of Watertown Zoning Regulations:

A text amendment to the zoning regulations to create a Bunker Hill Road Planned Development District (BHRPDD) is intended to accommodate a transition from the single family residential (R-70) zone to the restricted industrial (IR-80) zone. This amendment will allow for lot assemblages of 15 acres or more to be developed, redeveloped, subdivided and improved with a mix of multifamily residential and industrial uses where the existing zoning district and regulations do not allow for such development.

The name and address of the Petitioners, per Section 60.2.4 of the Town of Watertown Zoning Regulations are as follows:

Solli Engineering, whose address is 501 Main Street, Monroe, CT 06468. The name of the property owner is Heritage Woods, LLC. The name of the interested party is William Hoadley, WPH Holdings, LLC, whose address is 831 Federal Road, Brookfield, CT 06804.

If you have any questions, please contact the undersigned.

Respectfully,

**Solli Engineering, LLC**

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Luke Mauro, P.E., PTOE  
Senior Project Manager

A handwritten signature in blue ink that reads "Kevin Solli".

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President/CEO

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Monroe, CT 06468  
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August 30, 2023

Town of Watertown  
Planning & Zoning Commission  
61 Echo Lake Road  
Watertown, CT 06795

**RE:           Bunker Hill Road Planned Development District (BHRPDD) Application**  
**Petition for Text Amendment – Environmental Impact Statement**  
**Bunker Hill Road & New Wood Road**  
**Watertown, CT 06795**  
**Project Number: 22102801**

Member of the Planning & Zoning Commission,

The following summarizes the potential environmental impacts of the proposed Text Amendment as required by Section 60.2.5 of the Town of Watertown Zoning Regulations:

**60.2.5(a)**      The likely impact of potential development resulting from the zoning amendment on the characteristics of the surrounding neighborhood, addressing such issues as congestion on public streets, harmony with surrounding development and effect on property values, and overall neighborhood stability.

**It is anticipated that the proposed industrial subdivision will have an overall positive impact on the area, bringing responsible economic growth in the form of development on currently vacant properties. The industrial subdivision is consistent with the properties on New Wood Road to the east. New Wood Road will act as the primary access point to the industrial portion of the development. This is a low-volume, dead-end road only used for access to local industrial businesses. We do not expect any significant increase in traffic congestion or significant adverse operating impacts on the area roadway network.**

**The multi-family residential portion of the project will be accessed from Bunker Hill Road. Considering the residential nature of the Bunker Hill Road corridor, the proposed multifamily use will be in harmony with the surrounding uses and will form a transition zone between the single-family residential uses to the north and west and the industrial uses to the east. We do not expect any significant increase in traffic congestion or significant adverse operating impacts on the area roadway network associated with multifamily development.**

**60.2.5(b)**      How the proposed amendment is consistent with the objectives of the Town Plan of Conservation and Development.

**The proposed development will result in economic benefits and growth for the Town. The development will be constructed with careful consideration for wetlands located on the site, the development will be designed to minimize impacts to any sensitive areas and preserve large open green spaces throughout the site.**

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The Future Land Use Plan presented within the Plan of Conservation and Development (POCD) identifies these parcels for both light industrial and village density residential, which includes multifamily homes. The POCD calls for expanded housing options within the town and recommends zoning regulations that are less restrictive for multi-family development. The Future Regional Form Map within the POCD also identifies the subject parcels as Growth Areas that can accommodate the bulk of future regional growth.

The POCD prioritizes development within areas serviced by public utilities. The parcels are located within the water and sewer authority service areas, making them prime locations for development from a utility perspective. Water and sewer service, along with other utility services, are available within nearby streets, allowing for future development on these properties without the need for large scale utility line extensions.

60.2.5(c)

The extent to which any sensitive environmental features may be disturbed and what measures shall be taken to mitigate these impacts. Consideration shall be given to steep slopes, (including erosion control), wetlands, drainage ways and vegetation, and any other land feature considered to be significant.

**Impacts to sensitive environmental features, such as wetlands, will be minimal and are generally limited to areas required for roadways and for access to the properties. The development will preserve and protect existing wetlands areas and will provide mitigation as necessary to offset any impacts.**

**The proposed soil erosion and sediment controls will be developed in accordance with the Town of Watertown Requirements as well as the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, prepared by the Connecticut Council on Soil and Water Conservation in cooperation with the Connecticut Department of Environmental Protection. The soil erosion and sediment control measures that will be proposed as part of this project include geotextile silt fences (with haybale backing when necessary), sediment traps, temporary diversion swales, construction entrance, dust control measures, stone check dams, and inlet protection for existing and proposed drainage features.**

**The project will be constructed with consideration for existing vegetation and will aim to minimize tree removal. New vegetation and plantings will be installed as part of the future development plans to ensure the design is aesthetically pleasing. Conceptual Landscaping plans have been submitted as part of the application materials.**

60.2.5(d)

The impact of the potential development resulting from the proposed amendment on the water supply, sanitary sewer, and storm drainage systems of the Town and an indication of improvements that may be required.

**The site will be serviced by public water and sanitary sewer. These utilities are available on New Wood Road and in Bunker Hill Road. Further coordination with local utility companies will be required as individual site plans are brought forward in the future; however, industrial development flows are typically minimal and we do not expect that the development will overtax the existing utility infrastructure within the area. As part of the individual site plan applications for each development, a detailed drainage analysis and system design will be performed to ensure water quality and runoff rates will not have an adverse impact on the on-site wetland systems. Conceptual Utility and Grading Plans have been submitted as part of the application materials.**

- 60.2.5(e) Analysis of vehicular and pedestrian traffic impact on the street system and proposed methods of handling situations where the street system is found to be inadequate.
- The overall development scheme is not expected to generate a significant increase in traffic volumes that would adversely impact the local roadway network. Generally, industrial and residential uses have a significantly lower trip generation, than a commercial development of a similar size. A detailed traffic impact study will be provided, if required, for the individual uses, as they come online; however, it is not expected that any off-site traffic mitigation will be required. A preliminary traffic assessment has been included as part of the application materials.**
- 60.2.5(f) Analysis of how the potential development resulting from the proposed amendment would affect various Town services such as police, fire, schools, and recreation.
- It is expected that there will be no adverse effects to the various Town services.**
- 60.2.5(g) Adverse impacts which cannot be avoided.
- There are no adverse impacts that cannot be avoided.**
- 60.2.5(h) Alternatives to the proposed action.
- There are no alternatives proposed for the parcels under consideration. Previous attempts to develop the properties in the past have not proceeded due to the extent of wetlands on-site and topographic issues. The current master plan before the Commission has been being designed with consideration of environmental impacts, topographic challenges and construction cost premiums.**
- 60.2.5(i) Mitigation proposed for adverse impacts.
- The development will be designed to minimize environmental impacts to greatest extent feasible. Any environmentally sensitive areas, such as wetlands, that are impacted from the development will be mitigated as needed. We do not anticipate the need for any traffic related off-site mitigation measures as part of the overall development plan, as the uses chosen will not generate a significant amount of additional traffic that will adversely impact the local roadway network.**

We look forward to working with you to review this application.

Respectfully,

Solli Engineering, LLC



Luke Mauro, P.E., PTOE  
Senior Project Manager



Kevin Solli, P.E., PTOE  
President/CEO

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Office: (781) 352-8491

## BUNKER HILL ROAD PLANNED DEVELOPMENT DISTRICT

**PURPOSE:** The Bunker Hill Road Planned Development District (BHRPDD) is intended to accommodate a mixture of residential multi-family dwellings and industrial uses, in order to promote sound development on previously undeveloped parcels along Bunker Hill Road and New Wood Road. The goal is to create a cohesive development to bring economic growth, jobs and housing to the town and promote responsible development of underutilized properties while maintaining or preserving the existing character of the area. THE BHRPDD will serve as a transition zone between the residential R-70 Zone and the industrial zone IR-80.

**PERMITTED USES:** The following uses may be permitted subject to the Site Plan approval and compliance with the qualifying standards and other provisions of the PDD Regulation.

- a. Multi-family residential uses.
- b. Manufacturing, processing or assembly of goods.
- c. Research or development facilities.
- d. Warehousing, wholesale or distribution businesses.
- e. Building contractors' businesses and storage yards.
- f. Lumber and building materials businesses.
- g. Freight and materials trucking terminals and businesses.
- h. Plants for processing, packaging and distribution of edible dairy products and the packaging and distribution of beverages.
- i. Painting, plumbing, electrical, sheet metal, carpentry, wood working, blacksmith, welding, and machine shops.
- j. Motor vehicle repair facilities accessory to another permitted use on the same lot.
- k. Establishments for the rental of automobiles, trucks, trailers, or farm equipment.
- l. Nurseries or garden supply facilities.
- m. Indoor or outdoor self-storage facilities
- n. Open space.
- o. Signs.
- p. Off-street parking facilities accessory to a permitted use.
- q. Outdoor storage of materials associated with a permitted use.
- r. Accessory uses and structures customary with and incidental to any permitted uses.

**SITE PLAN REVIEW:** At the time of Site Plan approval the overall site should include a complete vehicular circulation system.

- 1. Vehicular circulation that adequately serves all areas and components of the development
- 2. Separate development driveways for multi-family residential and industrial uses are encouraged to separate residential passenger car and industrial truck traffic

**ADDITIONAL STANDARDS:** In addition to the standards contained in the Plan Development District Regulation, the additional standards are applicable:

- a. The BHRPDD shall consist of an assemblage of lots totaling not less than 15 acres.
- b. Resubdivision of the existing lot assemblage shall be allowed as per the Watertown Subdivision Regulations, provided that the overall limits of the BHRPDD shall remain unchanged.
- c. Mixed-use site development shall be permitted but is not required.
- d. Multifamily residential shall be permitted at a maximum density of 12 units per acre, with a minimum requirement of 10% of the dwelling units as affordable housing as defined in CGS Section 8-30g.
- e. The maximum height of any building shall be 60 feet from the ground level to peak of roof line, not including non-inhabitable space such as attic, pitched roof or ornamental features such as a cupola.
- f. Open space shall be integrated into the project, but no internal screening or buffering shall be required between multiple pad sites.

- g. Phased development of a Site Plan shall be allowed.
- h. Front yard, side yard and rear yard setbacks shall be a minimum of 35 feet from any boundary.
- i. Screening, buffers and landscaping shall be provided for adjacent residential properties, so as to maximize areas of natural vegetation, visually screen undesirable sites features such as loading areas, and provide buffers to minimize the impact of potentially incompatible land uses.
- j. Parking for multifamily uses shall be provided at a minimum of 1.88 parking spaces per dwelling unit.
- k. Parking for all other uses shall be provided in accordance with Section 34.5 of the Zoning Regulations.

## **PROCEDURAL REQUIREMENTS**

**APPLICATION/SITE PLAN:** An application and Site Plan to develop within the BHRPDD shall be submitted to the Commission in writing and shall be signed by the Owner of any such parcel within the proposed district, and shall be accompanied by the following:

1. A written statement specifying the proposed uses of the area, special design considerations and features, and how the proposal is consistent with the purpose of the BHRPDD.
2. The Commission by a two-thirds vote of the entire Commission may waive the submission of any or all of the requirements of Section 8 or Section 60 of the Zoning Regulations, if it finds that the information is not necessary in order to decide the application for a PDD.



August 30, 2023

Town of Watertown  
Planning & Zoning Commission  
61 Echo Lake Road  
Watertown, CT 06795

**RE: Bunker Hill Road Planned Development District (BHRPDD) Application  
Justification for Proposed Residential Parking Requirement  
Bunker Hill Road & New Wood Road  
Watertown, CT 06795  
Project Number: 22102801**

Members of the Planning & Zoning Commission,

The amendment to the zoning regulations to create a Bunker Hill Road Planned Development District (BHRPDD) will modify the parking requirements for multifamily units within the BHRPDD to require 1.88 spaces per dwelling unit. This ratio has been established based on guidance provided by the Institute of Transportation Engineers (ITE) Parking Generation, 5<sup>th</sup> Edition, which utilizes empirical data to establish base parking ratios. The Institute of Transportation Engineers (ITE) Parking Generation manual establishes an average parking demand rate of 1.21 parking spaces per unit and 1.31 parking spaces per unit during the weekday and weekend peak-parking periods respectively for low-rise multi-family developments. Additionally, empirical data collected by ITE indicates an average parking supply ratio of 1.7 spaces per dwelling unit for general urban/suburban locations not within proximity of rail transit.

Given the market conditions, the attached ITE data and our experience with multifamily projects, 1.88 parking spaces per dwelling unit represents an appropriate parking ratio which minimizes the construction of excess parking that would otherwise be underutilized, representing an environmental friendly approach that reduces overall development footprint and reduces impervious coverage. With the Commission's approval, the Applicant will have the ability to develop these long-time vacant properties which will provide significant economic growth to Watertown.

Respectfully,

**Solli Engineering, LLC**

A handwritten signature in blue ink that reads "Luke Mauro".

Luke Mauro, P.E., PTOE  
Senior Project Manager

A handwritten signature in blue ink that reads "Kevin Solli".

Kevin Solli, P.E., PTOE  
President/CEO

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**501 Main Street, Suite 2A  
Monroe, CT 06468  
Office: (203) 880-5455**

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# Land Use: 220 Multifamily Housing (Low-Rise)

## Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and with one or two levels (floors) of residence. Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), and affordable housing (Land Use 223) are related land uses.

## Time of Day Distribution for Parking Demand

The following table presents a time-of-day distribution of parking demand (1) on a weekday (10 study sites) and a Saturday (11 study sites) in a general urban/suburban setting and (2) on a weekday (three study sites) and a Saturday (three study sites) in a dense multi-use urban setting.

Hour Beginning	Percent of Peak Parking Demand			
	General Urban/Suburban		Dense Multi-Use Urban	
Weekday	Saturday	Weekday	Saturday	
12:00–4:00 a.m.	100	93	86	100
5:00 a.m.	97	100	100	94
6:00 a.m.	90	98	94	91
7:00 a.m.	77	96	81	85
8:00 a.m.	56	92	58	79
9:00 a.m.	45	80	56	76
10:00 a.m.	40	78	53	71
11:00 a.m.	37	71	58	74
12:00 p.m.	36	68	56	68
1:00 p.m.	36	66	53	68
2:00 p.m.	37	65	47	68
3:00 p.m.	43	68	56	56
4:00 p.m.	45	70	53	59
5:00 p.m.	55	73	61	53
6:00 p.m.	66	77	81	50
7:00 p.m.	73	81	67	56
8:00 p.m.	77	82	61	65
9:00 p.m.	86	86	64	74
10:00 p.m.	92	87	75	85
11:00 p.m.	97	92	86	91

## Additional Data

In prior editions of *Parking Generation*, the low-rise multifamily housing sites were further divided into rental and condominium categories. An investigation of parking demand data found no clear differences in parking demand between the rental and condominium sites within the ITE database. As more data are compiled for future editions, this land use classification can be reinvestigated.

The average parking supply ratios for the study sites with parking supply information are shown in the table below.

Setting	Proximity to Rail Transit	Parking Supply Ratio	
		Per Dwelling Unit	Per Bedroom
Dense Multi-Use Urban	Within ½ mile of rail transit	0.6 (12 sites)	0.4 (10 sites)
	Not within ½ mile of rail transit	0.9 (18 sites)	0.6 (18 sites)
General Urban/ Suburban	Within ½ mile of rail transit	1.5 (10 sites)	0.9 (10 sites)
	Not within ½ mile of rail transit	1.7 (52 sites)	1.0 (52 sites)

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Colorado, District of Columbia, Maryland, Massachusetts, Oregon, Pennsylvania, Texas, Washington, and Wisconsin.

*It is expected that the number of bedrooms and number of residents are likely correlated to the parking demand generated by a residential site. Parking studies of multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e. number of units by number of bedrooms at the site complex). Future parking studies should also indicate the number of levels contained in the residential building.*

## Source Numbers

72, 124, 152, 154, 209, 215, 216, 218, 219, 255, 257, 314, 414, 419, 432, 437, 505, 512, 533, 535, 536, 537, 544, 545, 577, 578, 579, 580, 584, 585, 587

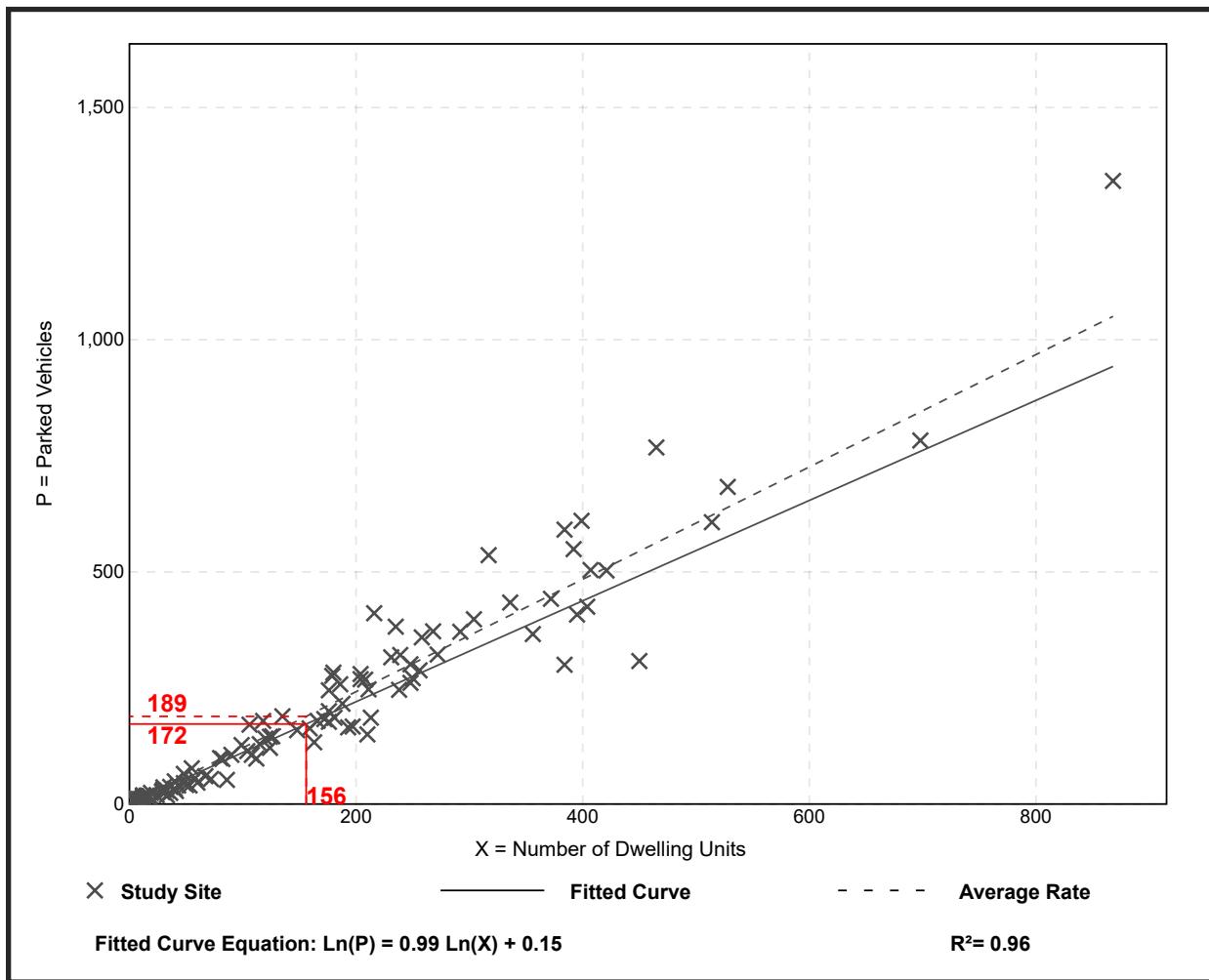
# Multifamily Housing (Low-Rise) (220)

**Peak Period Parking Demand vs:** Dwelling Units  
**On a:** Weekday (Monday - Friday)  
**Setting/Location:** General Urban/Suburban (no nearby rail transit)  
**Peak Period of Parking Demand:** 11:00 p.m. - 6:00 a.m.  
**Number of Studies:** 119  
**Avg. Num. of Dwelling Units:** 156

## Peak Period Parking Demand per Dwelling Unit

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.21	0.58 - 2.50	1.03 / 1.52	1.16 - 1.26	0.27 (22%)

## Data Plot and Equation



## Multifamily Housing (Low-Rise) (220)

**Peak Period Parking Demand vs:** Dwelling Units  
**On a:** Saturday  
**Setting/Location:** General Urban/Suburban (no nearby rail transit)  
**Peak Period of Parking Demand:** 11:00 p.m. - 7:00 a.m.  
**Number of Studies:** 6  
**Avg. Num. of Dwelling Units:** 247

### Peak Period Parking Demand per Dwelling Unit

Average Rate	Range of Rates	33rd / 85th Percentile	95% Confidence Interval	Standard Deviation (Coeff. of Variation)
1.31	1.05 - 1.62	1.18 / 1.61	***	0.23 (18%)

### Data Plot and Equation

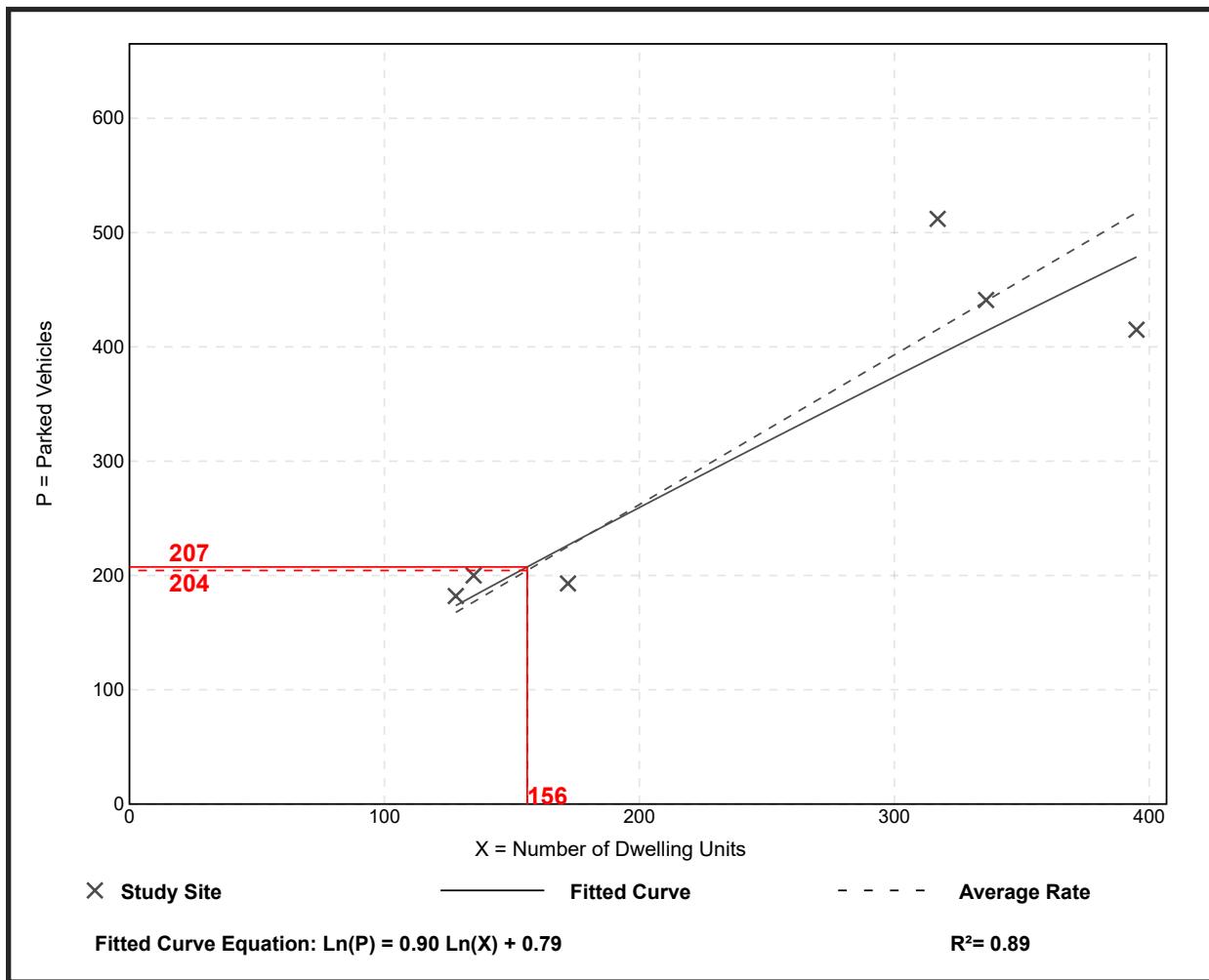




Image 1: Example Industrial Building



Image 2: Example Industrial Building



Image 3: Example Industrial Building



Image 4: Example Industrial Building



Image 5: Example Industrial Building



Image 6: Example Residential Building



Image 7: Example Residential Building

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# **PRELIMINARY TRAFFIC IMPACT STUDY:**

*For The Proposed:  
**DEVELOPMENT***

*Located At:  
Bunker Hill Road  
Watertown, Connecticut 06795*

*Prepared For:  
**WPH HOLDINGS, LLC***  
831 Federal Road  
Brookfield, CT 06804

**Project Number:** 22102801  
**Prepared:** August 30, 2023

  
\_\_\_\_\_  
Matt Baldino, Assistant Project Manager  
CT PE #36113

  
\_\_\_\_\_  
Kevin M. Solli, Principal  
CT PE #25759



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### **APPENDIX A:**

#### **FIGURES**

Site Location Map (Figure 1)  
2023 Existing Traffic Volumes (Figure 2)  
Residential Trip Distribution (Figure 3)  
Industrial Trip Distribution (Figure 4)  
Trip Assignment (Figure 5)  
2028 Background Traffic Volumes (Figure 6)  
2028 Build Traffic Volumes (Figure 7)  
Master Site Plan (Sheet 2.10)

### **APPENDIX B:**

#### **TRAFFIC ANALYSIS DATA**

Peak Hour Trip Generation Summary  
ITE Trip Generation Rate Sheets  
WATT-048 Count Station Data  
WATT-132 Count Station Data  
WATT-133 Count Station Data  
WATT-059 Count Station Data

### **APPENDIX C:**

#### **CAPACITY ANALYSIS WORKSHEETS**

Study Area Capacity Analysis Summary  
2023 Existing Traffic Condition  
2028 Background Traffic Condition  
2028 Build Traffic Condition

## **PROJECT KEY FACTS SUMMARY SHEET**

This summary sheet is provided as a reference to the various key pieces of information used throughout this study for the proposed project. This sheet is intended to be used as a guide for the reader although the full methodologies used in the analysis are included in the text of this study.

**APPLICANT:** WPH Holdings, LLC

**PROJECT SITE SIZE:** 195.9± acres

**PROJECT SIZE & TYPE:** Five (5) Warehousing/Distribution Buildings totaling 767,500± and six (6) Residential Apartment Buildings with a total of 156 units.

**BUILD ANALYSIS YEAR:** 2028

**ASSUMED BACKGROUND TRAFFIC GROWTH:** 3.0 percent per year

**PEAK HOURS ANALYZED:** Weekday AM Peak Hour, Weekday PM Peak Hour

**STUDY AREA INTERSECTIONS:**

Bunker Hill Road & Davis Street Extension  
Straits Turnpike (Route 63) & Bunker Hill Road  
Straits Turnpike (Route 63) & New Wood Road

**ANTICIPATED NEW NETWORK TRIP GENERATION:**

Weekday AM Peak Hour – 193 Total (115 Enter, 77 Exit)  
Weekday PM Peak Hour – 218 Total (89 Enter, 129 Exit)

**CAPACITY ANALYSIS:**

Methodology – Highway Capacity Manual, 6<sup>th</sup> Edition  
Software - Trafficware Synchro, Version 11

## EXECUTIVE SUMMARY

Solli Engineering prepared this Preliminary Traffic Impact Study to identify the potential impacts of the proposed development located on Bunker Hill Road in Watertown, Connecticut. The following summarizes our investigation.

The proposed site consists of three undeveloped parcels with a combined area of  $195.9\pm$  acres located on Bunker Hill Road and New Wood Road in Watertown, Connecticut. The proposed development includes the construction of a  $150,000\pm$  sf distribution center along with 229 parking spaces and 39 trailer parking spaces for a total of 268 parking spaces, a  $150,000\pm$  sf distribution center along with 200 parking spaces and 29 trailer parking spaces for a total of 229 parking spaces, a  $180,000\pm$  sf distribution center along with 255 parking spaces and 36 trailer parking spaces for a total of 284 parking spaces, a  $287,500\pm$  sf distribution center along with 384 parking spaces and 90 trailer parking spaces for a total of 474 parking spaces, and five 24-unit apartment buildings, one 36-unit apartment building, and one club house with a total of 294 parking spaces. Two (2) signalized and one (1) unsignalized intersections along the area roadway network were analyzed to evaluate the potential impacts of the proposed development on the adjacent roadway network and identify any recommended improvements as well as the proposed site driveway. To account for the increase in traffic associated with regional population growth in the area of the proposed development, a three percent (3.0%) per year growth rate was used to project traffic volumes over a five-year horizon. Based on our findings, the proposed development can be accommodated by the adjacent roadway network without any off-site improvements.

## INTRODUCTION

Solli Engineering has prepared this study to provide an evaluation of the potential traffic impacts associated with the proposed development located on Bunker Hill Road consisting of the parcels Tax Map 165, Block 45, Lot 116, Straits Turnpike (Route 63); Tax Map 158, Block 45, Lot 118A, Straits Turnpike (Route 63); and Tax Map 151, Block 45, Lot 12, Bunker Hill Road; in Watertown, Connecticut. This evaluation has been completed in accordance with the Town of Watertown requirements as well as standard traffic engineering methodology. The investigation indicates that the proposed development will not have an adverse impact on the traffic operations of the area roadway network.

## PROJECT DESCRIPTION

The project site is located in Watertown, Connecticut and is comprised of Lots 116 and 118A on Straits Turnpike and Lot 12 on Bunker Hill Road. The site totals approximately 195.9 acres and is bound by undeveloped and residential land as well as the Middlebury town line to the south, residential land along Middlebury Road to the west, undeveloped and residential land along Bunker Hill Road to the north, and commercial land along Commercial Street to the east. Refer to Figure 1, Site Location Map, provided in Appendix A of this study, for additional information regarding the project location.

The project proposes two  $150,000\pm$  sf warehouses/distribution centers, one  $180,000\pm$  sf warehouse/distribution center, one  $287,500\pm$  sf warehouse/distribution center, five 24-unit apartment buildings, one 36-unit apartment building, and one club house. The project includes appurtenant car parking, trailer parking, loading docks, site driveways, utilities, and drainage features. The northern residential section of the project site proposes access via a full movement stop controlled site driveway on Bunker Hill Road while the southern industrial section of the project site proposes access via a proposed public roadway which extends from New Wood Road. The northern portion of the project site falls in the Residential (R-70) zoning district, while the southeastern section of the site falls in the Restricted Industrial (IR-80) zoning district within the Town of Watertown.

## STUDY AREA

The following study area intersections were analyzed for this study:

- Bunker Hill Road & Site Driveway
- Bunker Hill Road & Davis Street Extension
- Straits Turnpike (Route 63) & Bunker Hill Road
- Straits Turnpike (Route 63) & New Wood Road

## AREA ROADWAY NETWORK

Bunker Hill Road is an east-west roadway located north of the development site with a posted speed limit of 25 miles per hour across the property frontage. Bunker Hill Road is classified as a major collector west of the intersection of Bunker Hill Road and Straits Turnpike (Route 63) and a minor arterial east of the intersection of Bunker Hill Road and Straits Turnpike (Route 63) by the Connecticut Department of Transportation and provides local access to residential and commercial land uses. Throughout the majority of the study area, Bunker Hill Road is a two (2) lane, bi-directional roadway with 12-foot wide lanes and no marked shoulders with widening at the signalized intersection with Straits Turnpike (Route 63) to provide exclusive turn lanes. There are no sidewalks or dedicated bicycle lanes along Bunker Hill Road in the vicinity of the development site. The bi-directional annual average daily traffic reported by CTDOT on Bunker Hill Road was 6,900 vehicles (Count Station WATT-132) in 2023.

Straits Turnpike (Route 63) is a north-south roadway located east of the development site with a posted speed limit of 45 miles per hour northbound and 35 miles per hour southbound across the access to the property frontage via New Wood Road. Straits Turnpike (Route 63) is classified as a principal arterial by the Connecticut Department of Transportation and provides local access to residential and commercial land uses. Throughout the majority of the study area, Straits Turnpike (Route 63) is a two (2) lane, bi-directional roadway with 12-foot wide lanes and approximately 6-foot wide shoulders. At the intersection with Bunker Hill Road, Straits Turnpike (Route 63) widens to provide exclusive turn lanes northbound and southbound. At the intersection with New Wood Road, Straits Turnpike (Route 63) widens to provide an exclusive turn lane northbound and an exclusive left turn lane southbound. There are sidewalks along the northbound side of the roadway beginning approximately 300 feet south of the Stop & Shop Driveway that continue north to Bunker Hill Road. There are no sidewalks along the southbound side of the roadway with the exception of two short segments at the southwest corner of the Straits Turnpike (Route 63) and Bunker Hill Road intersection as well as the northwest corner of the Straits Turnpike (Route 63) and New Wood Road/Stop & Shop Driveway intersection. There are no dedicated bicycle lanes along Bunker Hill Road in the vicinity of the development site. The bi-directional annual average daily traffic reported by CTDOT on Bunker Hill Road was 18,700 (Count Station WATT-048, south of Bunker Hill intersection) and 16,500 (Count Station WATT-059 at the Middlebury Townline) vehicles in 2023.

Davis Street Extension is a one-way westbound roadway located north of the development site with a posted speed limit of 25 miles per hour. Davis Street Extension is classified as a major collector road by the Connecticut Department of Transportation and provides access to residential development and serves as a bypass of the Straits Turnpike (Route 63) and Bunker Hill Road intersection to continue west on Bunker Hill Road. Throughout the study area, Davis Street Extension is a 20-foot wide one-way roadway with no lane striping or marked shoulders. There are no sidewalks or dedicated bicycle lanes along Davis Street Extension in the vicinity of the development site. The one-way westbound annual average daily traffic reported by CTDOT on Davis Street Extension was 850 vehicles (Count Station WATT-080) in 2023.

New Wood Road is an east-west roadway located east of the development site with no posted speed limit. New Wood Road is classified as a local road by the Connecticut Department of Transportation and provides access to commercial land uses. Throughout the study area, New Wood Road is approximately 44-feet wide bi-directional roadway with intermittent lane striping and no marked shoulders. There are no sidewalks present on New Wood Road, with the exception of a segment along the westbound travel lane from its intersection with Straits Turnpike to its intersection with Commercial Street. There are no dedicated bicycle lanes along New Wood Road in the vicinity of the development site.

There are currently no vehicular exclusions identified for any of the area roadway network which would limit trucks from utilizing the existing roadway network.

## STUDY INTERSECTIONS

Straits Turnpike (Route 63) forms a four-way intersection with Bunker Hill Road northeast of the project site with the following geometry:

- The northbound approach of Straits Turnpike (Route 63) at the intersection is signalized with advanced “Left Turn Only, Thru Only, Right Turn Only” signage as well as “Left Turn Only” signage on the span wire.
- The southbound approach of Straits Turnpike (Route 63) at the intersection is signalized with advanced “Left Turn Only, Thru Only, Right Turn Only” signage as well as “Left Turn Only” and “No Turn on Red” signage on the span wire.

- The eastbound approach of Bunker Hill Road at the intersection is signalized with advanced “Left Turn Only, Thru Only, Right Turn Only” signage.
- The westbound approach of Bunker Hill Road at the intersection is signalized with advanced “Left Turn Only, Thru Only, Right Turn Only” signage as well as “Left Turn Only” signage on the span wire.

Straits Turnpike (Route 63) forms a four-way intersection with New Wood Road/Stop & Shop Driveway east of the project site with the following geometry:

- The northbound approach of Straits Turnpike (Route 63) at the intersection is signalized with advanced “Left Turn Only, Thru Only, Right Turn Only” signage.
- The southbound approach of Straits Turnpike (Route 63) at the intersection is signalized with advanced “Left Turn Only, Thru/Right Turn” signage.
- The eastbound approach of New Wood Road at the intersection is signalized with no additional signage.
- The westbound approach of Stop & Shop Driveway at the intersection is signalized with advanced “Left Turn Only, Thru/Right Turn” signage. A center median with appropriate signage is present on the Stop & Shop Driveway beginning approximately 200 feet away from the intersection.

Bunker Hill Road forms a three-way intersection with Davis Street Extension north of the project site with the following geometry:

- The southbound approach of Davis Street Extension is stop-controlled with advanced “Stop Sign Ahead” signage.
- The eastbound approach of Bunker Hill Road is free flowing with no advanced signage, however “One Way”, “Wrong Way”, and “Do Not Enter” signage can be seen approaching the intersection to prevent vehicles from turning left onto Davis Street Extension.
- The westbound approach of Bunker Hill Road is free flowing with no advanced signage, however “One Way” signage can be seen approaching the intersection to prevent vehicles from turning right onto Davis Street Extension.

## **EXISTING TRAFFIC**

Manual turning movement count data was collected during August 2023 at the study area intersections. The weekday AM and weekday PM peak hours of the study area intersections were identified from this data. The 2023 existing peak hour turning movement volumes are illustrated on Figure 2 in Appendix A of this study. Minimal multimodal traffic data was observed in the vicinity of the proposed development as a result of the existing characteristics of the surrounding roadway network. Sidewalks are provided along portions of the roadway segments analyzed. There are no bike lanes provided throughout the study area.

## **BACKGROUND TRAFFIC**

Background traffic growth is estimated to account for the traffic increase as a result of regional population and economic growth in the study area, in addition to proposed developments. The annualized bi-directional ADT collected along Straits Turnpike (Route 63) at count station WATT-048, just south of Bunker Hill Road was reported as 15,400 and 18,700 in 2020 and 2023, respectively, representing an annual growth of 6.7% per year from 2020 to 2023. The annualized bi-directional ADT collected along Straits Turnpike (Route 63) at count station WATT-059, at the Watertown-Middlebury Townline was reported as 16,100 and 16,500 in 2020 and 2023, respectively, representing an annual growth rate of 0.8%. Upon review of the available data, it was determined that an annual growth rate of 3.0% per year will be used to project the existing 2023 traffic count data to the 2028 design year. The 2028 background traffic volumes are illustrated

in Figure 6 in Appendix A of this study. Supporting documentation pertaining to the background growth rate selection is included in Appendix B of this study.

Based on preliminary review of published data from the Connecticut Department of Transportation Office of State Traffic Authority no ongoing or proposed developments were identified which were approved but not yet constructed or under review which may impact the analysis.

## PROPOSED DEVELOPMENT

The development proposes a total of  $767,500 \pm$  square-feet of warehousing/distribution use and 156 apartment units with appurtenant car parking, loading docks, trailer parking, site driveways, utility, and drainage features. The residential portion of the development is proposed to be accessed via a full movement stop controlled intersection along Bunker Hill Road. The industrial portion of the development will be accessed via an extension of New Wood Road which ultimately connects to Straits Turnpike (Route 63) at a signalized intersection.

The anticipated number of vehicle trips that will be generated by the proposed development was estimated using data from the Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition. The vehicle trip generation for industrial development is based on an independent variable of square footage and the average rate for the Land Use Code (LUC) 150 – Warehousing. The vehicle trip generation for the residential development is based on an independent variable of units and the average rate for the Land Use Code (LUC) 220 – Multifamily Housing (Low-Rise). The trip generation was calculated for the weekday AM and weekday PM peak hours based on the proposed land use, as these are the peak periods with the greatest potential for impact on the adjacent street traffic. LUC 150 – Warehousing is defined by ITE as a facility primarily devoted to the storage of materials, but it may also include office and maintenance areas. LUC 220 – Multifamily Housing (Low Rise) is defined by ITE as multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors.

The proposed development is expected to generate 193 (115 entering, 77 exiting) new trips during the weekday AM peak hour and 218 (89 entering, 129 exiting) new trips during the weekday PM peak hour. Table 1 below illustrates the anticipated trips to be generated by the proposed development during the weekday AM and weekday PM peak hours. The ITE Trip Generation Rate Sheets, and a detailed trip generation calculation, are provided in Appendix B of this study.

TABLE 1  
PEAK HOUR TRIP GENERATION SUMMARY

LAND USE	AM PEAK HOUR			PM PEAK HOUR		
	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
LUC 150- Warehousing $767,500 \pm$ sf	100	30	130	39	99	138
LUC 220- Multifamily Housing (Low-Rise) 156 Units	15	47	62	50	30	80
Total New Trips	115	77	193	89	129	218

The anticipated distribution of new car traffic associated with the residential development was developed based on area populations, existing traffic patterns, and layout of the adjacent roadway network. The following distributions were applied to the site generated trips:

- 20% to/from the west via Bunker Hill Road
- 30% to/from the east via Bunker Hill Road
- 30% to/from the south via Straits Turnpike (Route 63)
- 20% to/from the north via Straits Turnpike (Route 63)

The anticipated percent distribution of the new site generated trips associated with the residential development is illustrated in Figure 3. The new site generated residential trips were assigned to the roadway network based on the anticipated percent distributions illustrated in Figure 3 and combined with the resultant trip assignment from the industrial development to establish the total development trip assignment which is illustrated in Figure 5. Figure 3 and Figure 5 are provided in Appendix A of this study.

The anticipated distributions of the traffic associated with the industrial development was developed based on regional access and layout of the adjacent roadway network. The following distributions were applied to the site generated trips:

- 5% to/from the west via Bunker Hill Road
- 10% to/from the east via Bunker Hill Road
- 60% to/from the south via Straits Turnpike (Route 63)
- 25% to/from the north via Straits Turnpike (Route 63)

The anticipated percent distribution of the new site generated trips associated with the industrial development is illustrated in Figure 4. The new site generated trips were assigned to the roadway network based on the anticipated percent distributions illustrated in Figure 3 and combined with the resultant trip assignment from the residential development to establish the total development trip assignment which is illustrated in Figure 5. Figure 4 and Figure 5 are provided in Appendix A of this study.

No credit was taken which would further reduce the vehicle trips associated with the proposed development based on the use of multimodal transit to/from the development, resulting in a conservative analysis. Sidewalks are provided intermittently throughout the study area however it is not anticipated that a significant number of residents or employees with access the development via multimodal travel.

The trip assignment volumes illustrated in Figure 5 were combined with the 2028 background volumes in Figure 6 to develop the build traffic volumes. Figure 7 illustrates the 2028 build traffic volumes for the proposed development, provided in Appendix A of this study.

## CAPACITY ANALYSIS

To determine the impact of the proposed development on the operating conditions of the roadway network, the study area intersections were analyzed using the Synchro 11 capacity analysis software for the 2023 existing, 2028 background, and 2028 build peak hour conditions during the weekday AM and weekday PM peak hours, as these are the periods which have the greatest potential for impact by the proposed development.

The results of the Synchro analysis describe the traffic impact in terms of Level of Service (LOS). LOS describes the operational condition of intersections in terms of delay (in seconds per vehicle) and is expressed on a scale of A through F with LOS A being the best and LOS F being the worst LOS A reflects intersection operations with little to no vehicle delay (less than 10 seconds per vehicle) and LOS F reflects

intersection conditions that are over capacity and experience long delays (more than 80 seconds per vehicle at signalized intersections and more than 50 seconds of delay per vehicle at unsignalized intersections).

To determine the traffic impact associated with the proposed development, the existing roadway network was first analyzed to determine operating conditions of each study area intersection as they exist today. The background conditions were analyzed to determine the operating conditions that would exist in 2028 without the proposed development but with the background growth. The build condition was then analyzed to determine the operating conditions that would exist if the proposed development were constructed in addition to the background growth. The results of the background conditions analysis were compared to the analysis of the build condition to determine any changes to the operating conditions of the area roadway network associated with the proposed development. Table 2 below summarizes the results of the analysis for the existing, background, and build scenarios. Capacity Analysis Summary Tables which provide additional detail regarding individual movements and approaches is provided in Appendix C of this study.

**TABLE 2 – INTERSECTION PEAK HOUR LEVEL OF SERVICE SUMMARY**  
**AM/PM**  
**LOS (Delay)**

INTERSECTION	2023 Existing	2028 Background	2028 Build
<b>Bunker Hill Road &amp; Davis Street Ext.</b>	- - - A(9.7)/B(11.2)	- - - A(9.9)/B(12.1)	- - - B(10.1)/B(12.7)
<b>Straits Turnpike (Route 63) &amp; Bunker Hill Road</b>	<b>B(18.9)/C(22.0)</b>	<b>C(21.2)/C(25.0)</b>	<b>C(22.4)/C(26.1)</b>
	Bunker Hill Road – Eastbound Bunker Hill Road – Westbound Davis Street Ext. – Southbound	B(17.7)/C(23.2) B(17.3)/C(22.3) B(16.4)/B(19.6) C(22.5)/C(24.2)	B(19.7)/C(26.1) B(19.3)/C(25.2) B(17.4)/C(22.7) C(26.1)/C(27.2)
<b>Straits Turnpike (Route 63) &amp; New Wood Road/Stop &amp; Shop Driveway</b>	<b>B(11.2)/B(16.7)</b>	<b>B(11.6)/C(26.1)</b>	<b>B(12.7)/C(32.8)</b>
	New Wood Road – Eastbound Stop & Shop Driveway – Westbound Straits Turnpike (Route 63) – Northbound Straits Turnpike (Route 63) – Southbound	B(12.1)/B(16.2) A(8.0)/B(15.3) A(9.8)/B(19.4) B(12.5)/B(12.2)	B(12.9)/B(16.2) A(8.7)/B(15.3) B(10.0)/D(35.8) B(13.0)/B(13.2)
<b>Bunker Hill Road &amp; Site Driveway</b>	- - - -	- - - -	- - - B(10.8)/C(15.6)

Based on the results of the capacity analysis, the overall intersections will operate at acceptable levels of services under the build conditions and all intersections approaches maintain the same LOS in the build condition as the background condition with a few minor exceptions. At the intersection of Bunker Hill Road and Davis Street Ext. the southbound stop-controlled approach will change in operation from a LOS A with 9.9 seconds of delay in the background condition compared to a LOS B with 10.1 seconds of delay during the weekday morning peak hour, representing a minor increase of 0.3 seconds of delay. At the intersection of Straits Turnpike (Route 63) and Bunker Hill Road the westbound approach will change in operation from a LOS B with 19.3 seconds of delay to a LOS C with 20.8 representing a minor increase in delay of 1.5 seconds. The proposed site driveway to the residential portion of the development is expected to operate at a LOS B and LOS C during the weekday morning and evening peak hours respectively, which is consistent with a stop-controlled approach onto a major collector during the peak hours. Overall, the roadway network

will operate at similar conditions under the 2028 build condition as the 2028 background condition.

The capacity analysis indicates that the anticipated increase in traffic volume associated with the proposed development can be accommodated without adverse impact on the operating conditions of the adjacent roadway network. Copies of the Synchro analysis reports are provided in Appendix C of this study.

## **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

This study identifies the potential traffic impacts associated with the proposed development consisting of 767,500± sf warehousing/distribution land use and 156 multifamily residential units along Bunker Hill Road in Watertown, Connecticut. This study determined that the proposed development is expected to generate 193 (115 entering, 77 exiting) new trips during the weekday AM peak hour and 218 (89 entering, 129 exiting) trips during the weekday PM peak hour.

The capacity analysis indicates that the study area intersections will operate at generally similar levels of service when comparing the background conditions to build conditions during the weekday morning and evening peak hours. All study area intersections are anticipated to operate at acceptable levels of service under the 2028 build conditions.

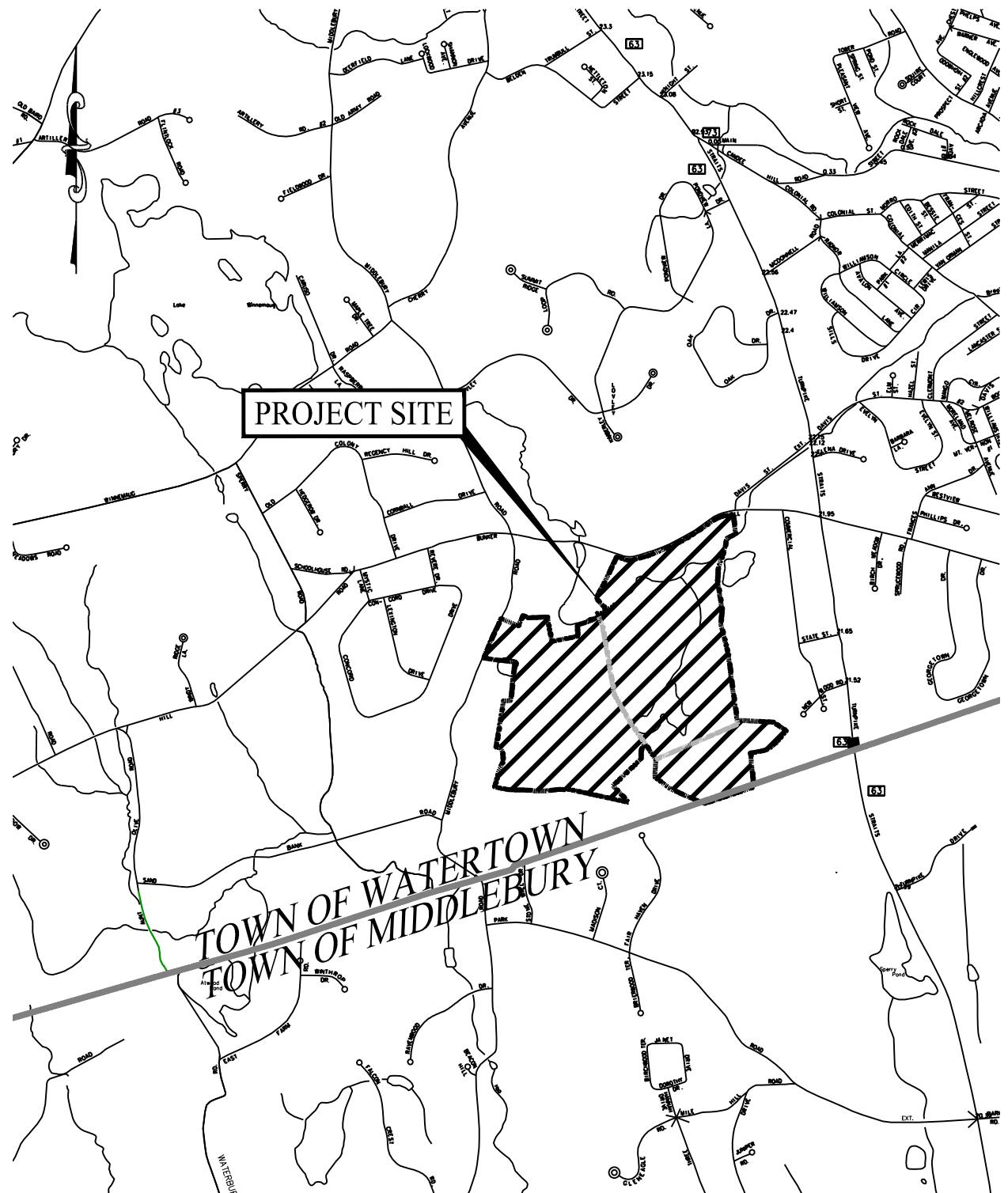
It is the professional opinion of Solli Engineering that the traffic anticipated to be generated by the proposed development can be accommodated by the surrounding roadway network.



## **Appendix A**

### **Figures**

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NOTE: BASE MAP INFORMATION TAKEN  
FROM CT TRU MAP NUMBERS 80 & 153.

2,000      0      1,000      2,000

**SOLLI**  
ENGINEERING  
501 Main Street, Monroe, CT 06468  
T: (203) 880-5455 F: (203) 880-9695

**SITE LOCATION MAP**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

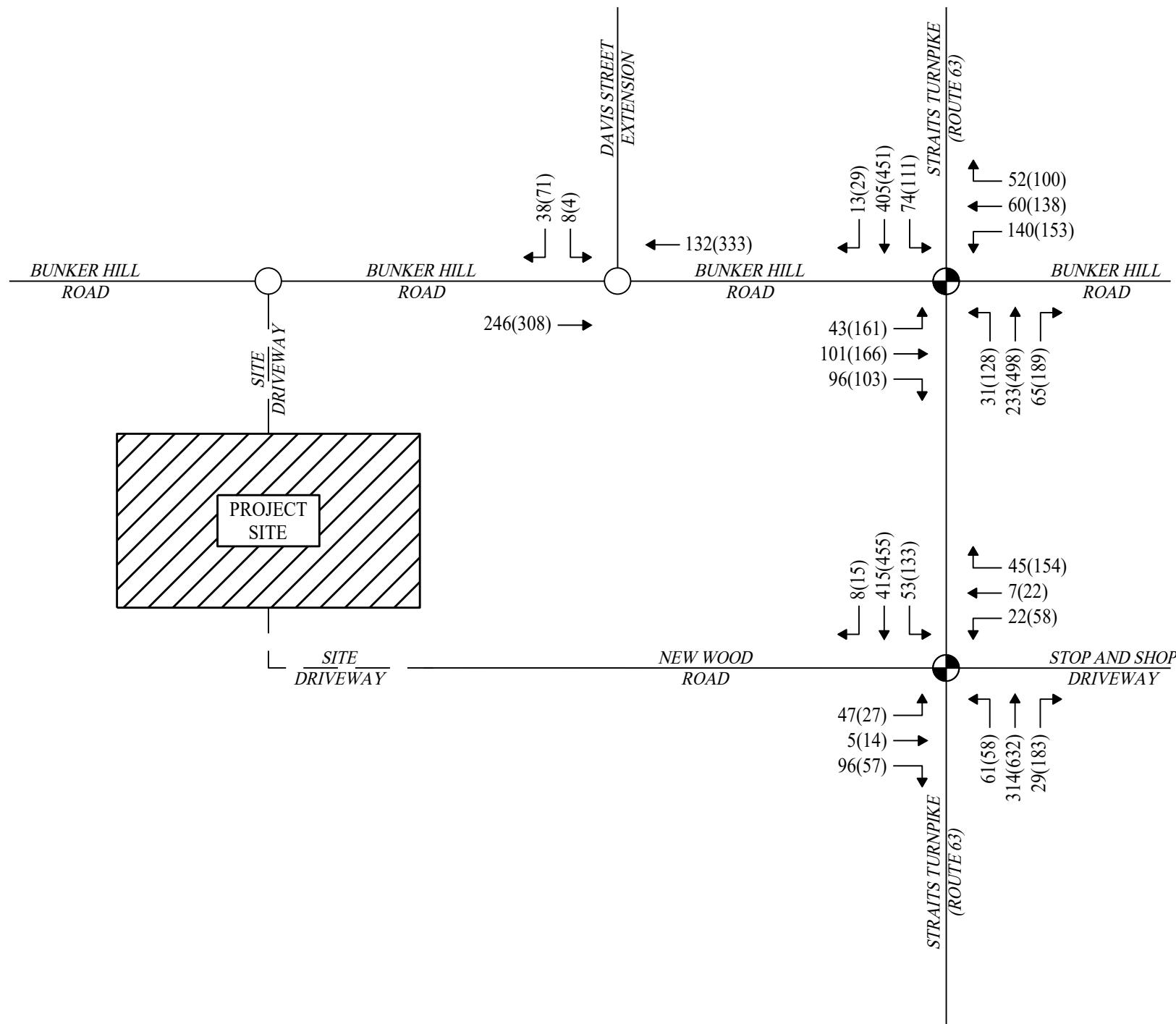
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Plan Date:	08/30/23
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Figure:

1

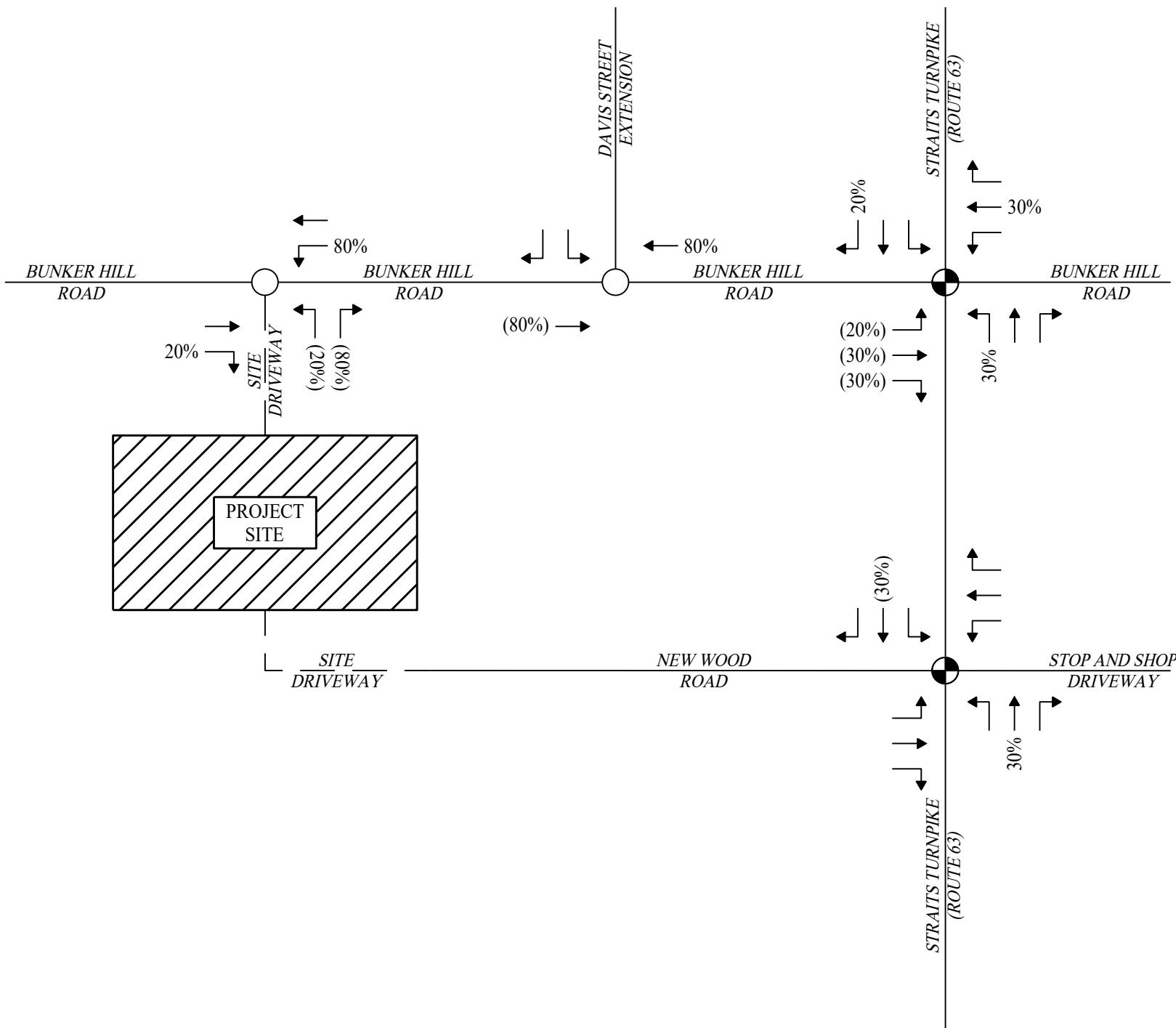
## LEGEND

-  SIGNALIZED INTERSECTION
-  UNSIGNALIZED INTERSECTION
-  EXISTING ROADWAY
-  PROPOSED ROADWAY
-  AM(PM)



## LEGEND

	SIGNALIZED INTERSECTION
	UN SIGNALIZED INTERSECTION
	EXISTING ROADWAY
	PROPOSED ROADWAY
	ENTER(EXIT)



Rev. #:	Date	Description
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**SOLLI**  
ENGINEERING  
501 Main Street, Monroe, CT 06468  
T: (203) 880-5455 | F: (203) 880-9695

Drawn By: CJS  
Checked By: KMS  
Project #: 22102801  
Plan Date: 08/30/23  
Scale: NTS

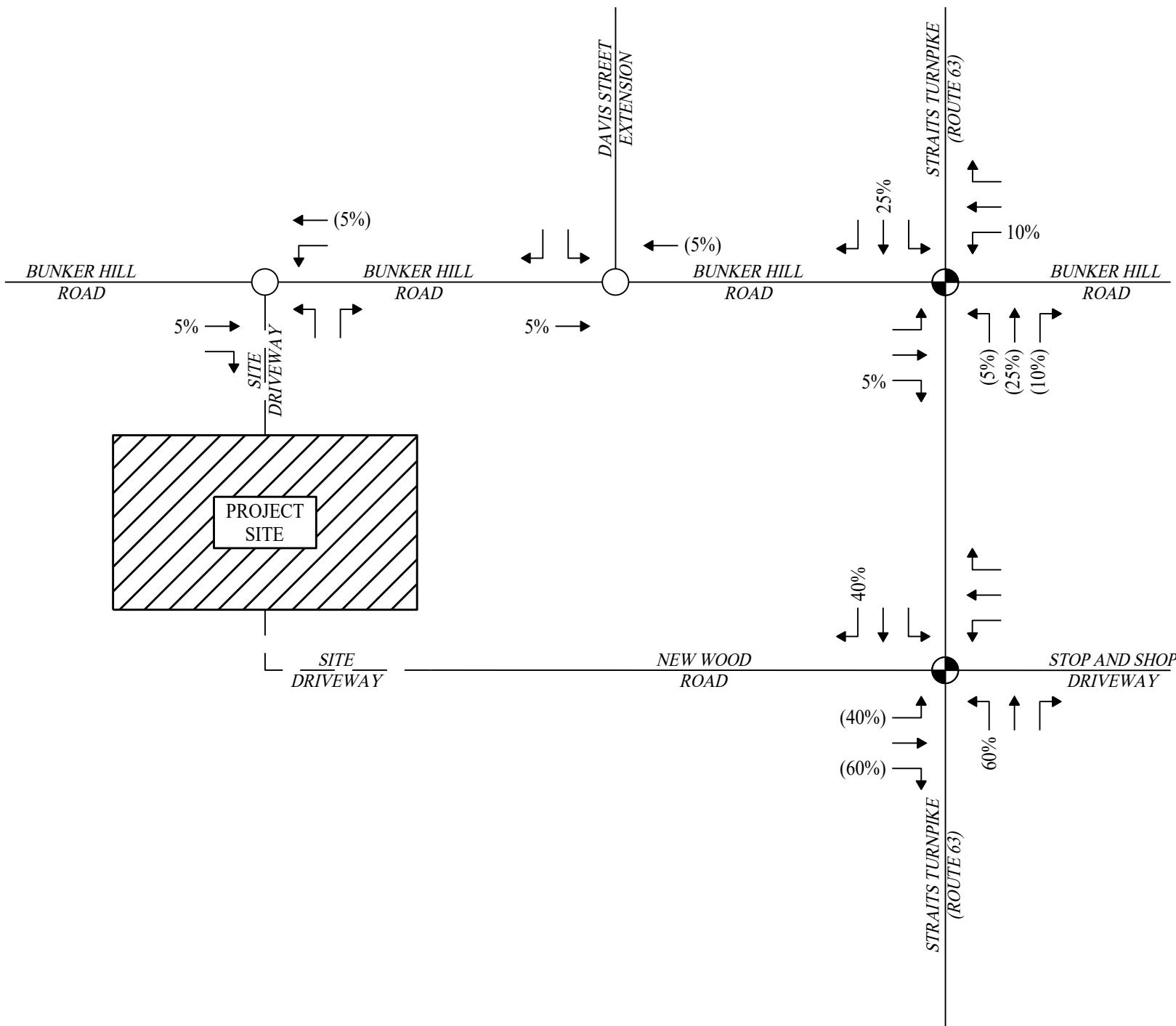
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**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:  
**RESIDENTIAL TRIP  
DISTRIBUTION**

SHEET #:  
**FIGURE 3**

## LEGEND

-  SIGNALIZED INTERSECTION
-  UNSIGNALIZED INTERSECTION
-  EXISTING ROADWAY
-  PROPOSED ROADWAY
-  ENTER(EXIT)



Rev. #:	Date	Description
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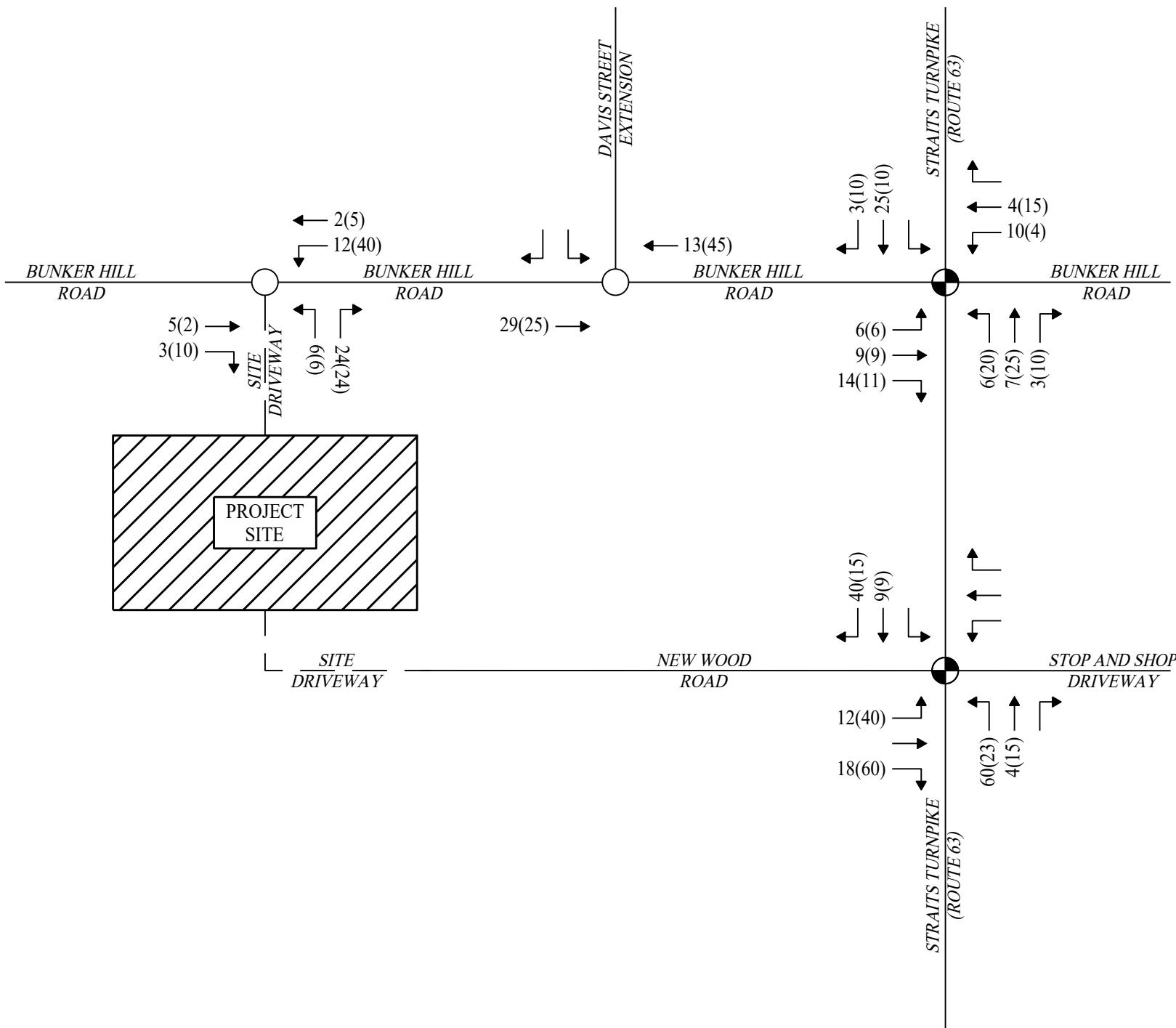
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**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:  
**INDUSTRIAL TRIP DISTRIBUTION**

SHEET #:  
**FIGURE 4**

## LEGEND

	SIGNALIZED INTERSECTION
	UN SIGNALIZED INTERSECTION
	EXISTING ROADWAY
	PROPOSED ROADWAY
	AM(PM)



Rev. #:	Date	Description
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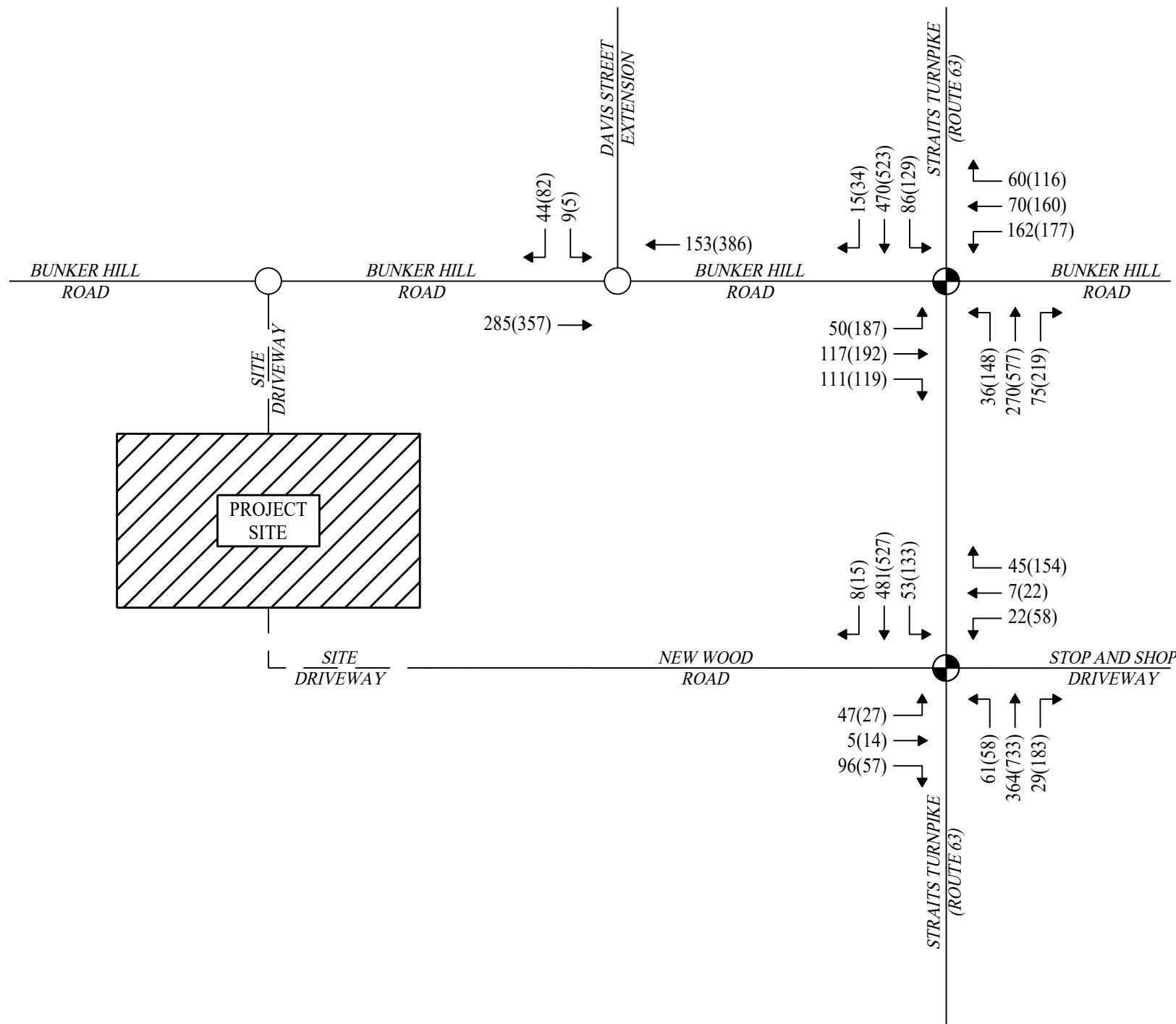
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**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:  
**TRIP ASSIGNMENT**

SHEET #:  
**FIGURE 5**

## LEGEND

-  SIGNALIZED INTERSECTION
-  UNSIGNALIZED INTERSECTION
-  EXISTING ROADWAY
-  PROPOSED ROADWAY
-  AM(PM)



Rev. #:	Date	Description

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Checked By: KMS  
Project #: 22102801  
Plan Date: 08/30/23  
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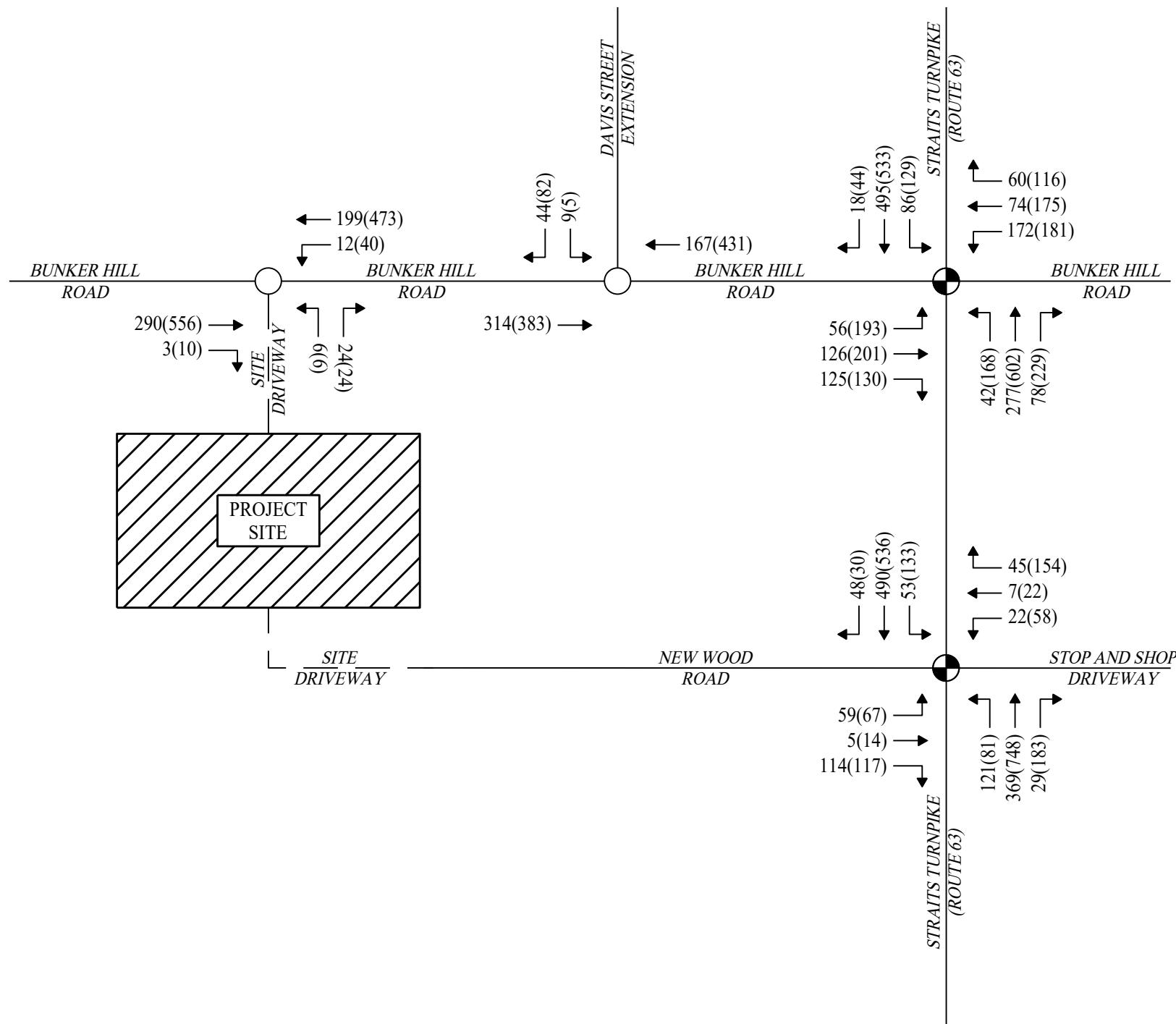
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**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:  
**2028 BACKGROUND TRAFFIC VOLUMES**

SHEET #:  
**FIGURE 6**

## LEGEND

	SIGNALIZED INTERSECTION
	UNSIGNALED INTERSECTION
	EXISTING ROADWAY
	PROPOSED ROADWAY
	AM(PM)



Rev. #:	Date	Description
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Checked By: KMS  
Project #: 22102801  
Plan Date: 08/30/23  
Scale: NTS

Project:  
**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:  
**2028 BUILD TRAFFIC VOLUMES**

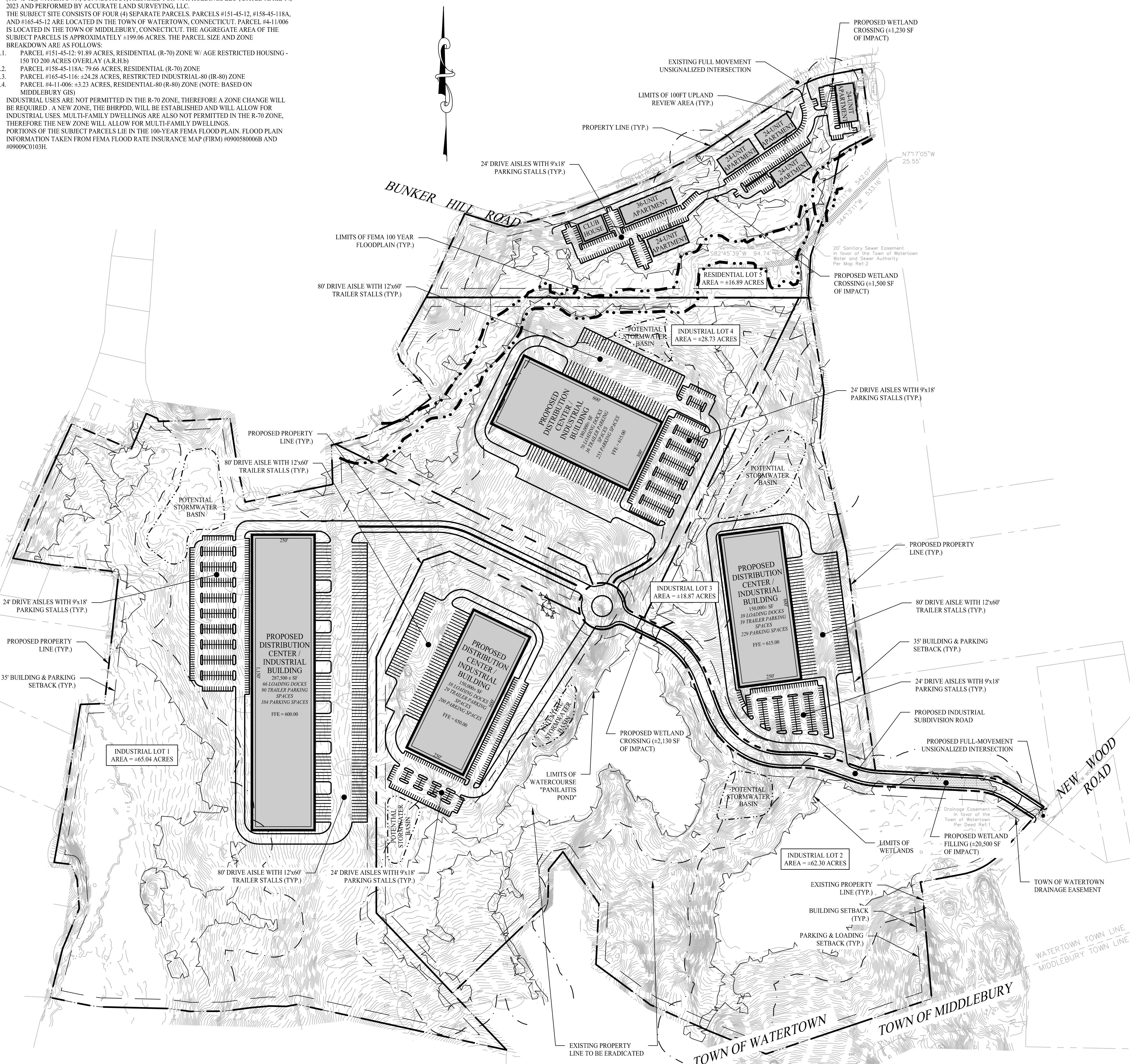
SHEET #:  
**FIGURE 7**

## GENERAL NOTES

- EXISTING INFORMATION TAKEN FROM BASEMAP ENTITLED "PROPERTY SURVEY OF 0 BUNKER HILL ROAD (151-45-12), 0 STRAITS TURNPIKE (158-45-118A) & 0 STRAITS TURNPIKE (161-45-118A), WATERTOWN, CONNECTICUT, PREPARED FOR WPH HOLDINGS LLC", DATED APRIL 14, 2023 AND PERFORMED BY ACCURATE LAND SURVEYING, LLC.
- THE SUBJECT PARCELS CONSIST OF FOUR (4) SEPARATE PARCELS. PARCEL #151-45-12, #158-45-118A, AND #161-45-118A ARE LOCATED IN THE TOWN OF WATERTOWN, CONNECTICUT. THE AGGREGATE AREA OF THE SUBJECT PARCELS IS APPROXIMATELY 19.06 ACRES. THE PARCEL SIZE AND ZONE BREAKDOWN ARE AS FOLLOWS:

  - PARCEL #151-45-12: 91.89 ACRES, RESIDENTIAL (R-70) ZONE W/ AGE RESTRICTED HOUSING - 150 TO 200 ACRES OVERLAY (A.R.H.D.)
  - PARCEL #158-45-118A: 79.66 ACRES, RESIDENTIAL (R-70) ZONE
  - PARCEL #161-45-118A: 24.28 ACRES, RESTRICTED INDUSTRIAL-80 (IR-80) ZONE
  - PARCEL #44-11-006: 3.23 ACRES, RESIDENTIAL-80 (R-80) ZONE (NOTE: BASED ON MIDDLEBURY GIS)

- INDUSTRIAL USES ARE NOT PERMITTED IN THE R-70 ZONE, THEREFORE A ZONE CHANGE WILL BE REQUIRED. A NEW ZONE, THE BHRPD, WILL BE ESTABLISHED AND WILL ALLOW FOR INDUSTRIAL USES. 1-FAMILY RESIDENTIAL USES ARE ALREADY PERMITTED IN THE R-70 ZONE, THEREFORE THE NEW ZONE WILL ALLOW FOR MULTI-FAMILY DWELLINGS.
- PORTIONS OF THE SUBJECT PARCELS LIE IN THE 100-YEAR FEMA FLOOD PLAIN. FLOOD PLAIN INFORMATION TAKEN FROM FEMA FLOOD RATE INSURANCE MAP (FIRM) #0900580060B AND #09009C0103H.



PROPOSED PARKING COMPLIANCE TABLE				
	UNIT	REQUIREMENT	REQUIRED	PROVIDED
PROPOSED DISTRIBUTION FACILITY/INDUSTRIAL BUILDING (LOT 1)	287,500+ SF	1 SPACES/ 750 SF GFA	384	384
PROPOSED DISTRIBUTION FACILITY/INDUSTRIAL BUILDING (LOT 2)	150,000+ SF	1 SPACES/ 750 SF GFA	200	200
PROPOSED DISTRIBUTION FACILITY/INDUSTRIAL BUILDING (LOT 3)	150,000+ SF	1 SPACES/ 750 SF GFA	200	229
PROPOSED DISTRIBUTION FACILITY/INDUSTRIAL BUILDING (LOT 4)	180,000+ SF	1 SPACE / 750 SF GFA	240	254
MULTI-FAMILY RESIDENTIAL* (LOT 5)	156	1.88 SPACES/UNIT	294	294

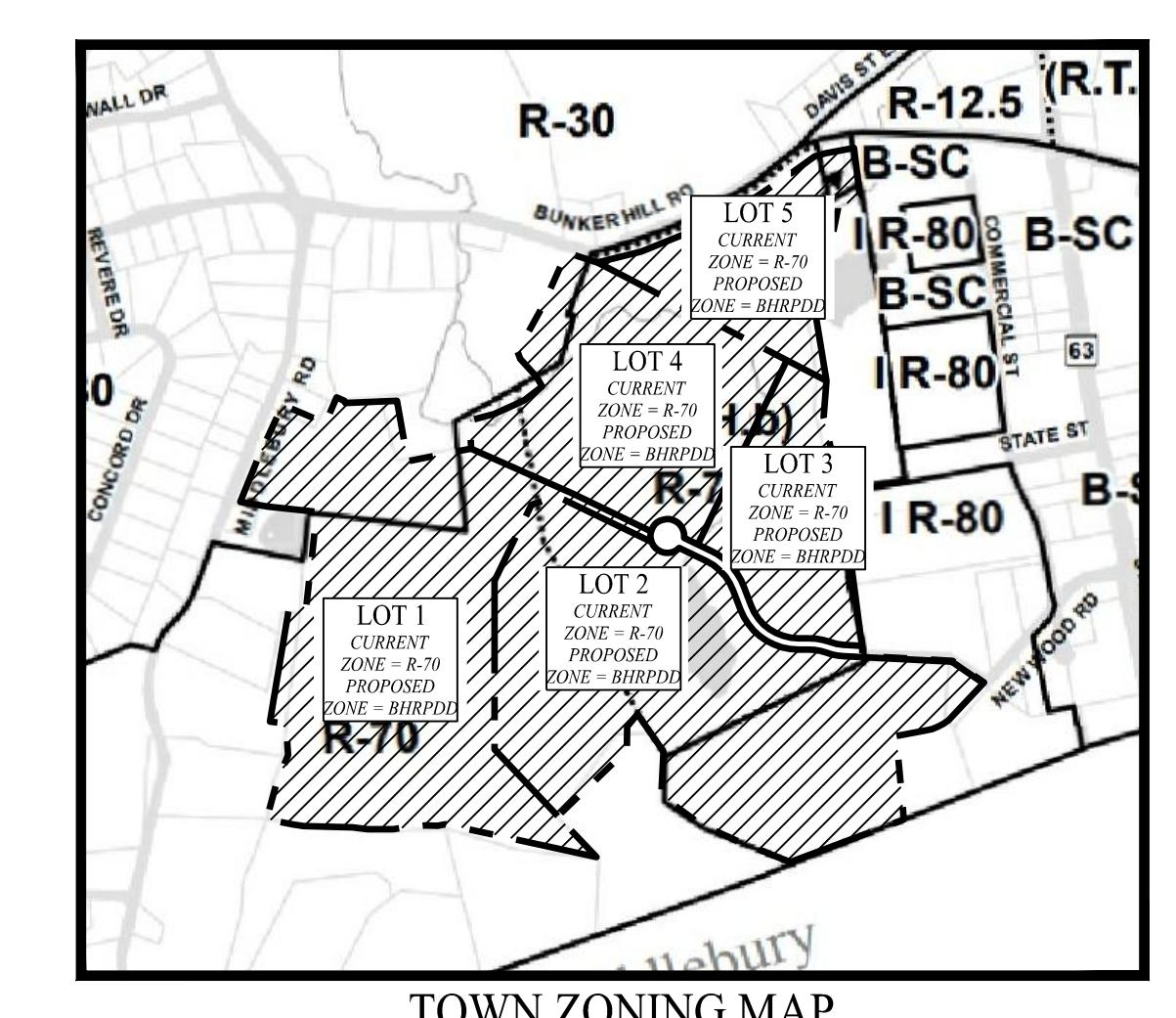
\*PRELIMINARY CONVERSATIONS WITH THE TOWN OF WATERTOWN PLANNER HAVE INDICATED THAT THE REQUIREMENT OF PROVIDING (1) GARAGE PARKING SPACE PER DWELLING UNIT (SECTION 48.6.C) CAN BE WAIVED FOR THE PROPOSED DEVELOPMENT

## LEGEND

PROPERTY LINE	
RIGHT-OF-WAY LINE	
ADJOINING LOT LINE	
ZONE LINE	
TOWN BOUNDARY	
BUILDING SETBACK	
LANDSCAPE BUFFER	
STORMWATER BASIN/RAIN GARDEN AREA	
LIMIT OF WETLANDS	
UPLAND REVIEW AREA - 100 FT BUFFER	

## PROPOSED PDD ZONING COMPLIANCE TABLE

ZONE: BHRPD			
	ZONING REQUIREMENT	ZONING STANDARD	PROPOSED CONDITIONS
LOT 1			
MINIMUM LOT AREA	15 AC	65.04 AC	
MINIMUM YARD	35 FT	124.4 FT	
MAXIMUM BUILDING HEIGHT	60 FT	< 60 FT	
MINIMUM PARKING/LOADING SETBACK	35 FT	35.0 FT	
LOT 2			
MINIMUM LOT AREA	15 AC	62.3 AC	
MINIMUM YARD	35 FT	112.0 FT	
MAXIMUM BUILDING HEIGHT	60 FT	< 60 FT	
MINIMUM PARKING/LOADING SETBACK	35 FT	35.0 FT	
LOT 3			
MINIMUM LOT AREA	15 AC	18.87 AC	
MINIMUM YARD	35 FT	94.3 FT	
MAXIMUM BUILDING HEIGHT	60 FT	< 60 FT	
MINIMUM PARKING/LOADING SETBACK	35 FT	35.9 FT	
LOT 4			
MINIMUM LOT AREA	15 AC	28.73 AC	
MINIMUM YARD	35 FT	249.2 FT	
MAXIMUM BUILDING HEIGHT	60 FT	< 60 FT	
MINIMUM PARKING/LOADING SETBACK	35 FT	37.5 FT	
LOT 5			
MINIMUM LOT AREA	15 AC	16.89 AC	
MINIMUM YARD	35 FT	38.7 FT	
MAXIMUM BUILDING HEIGHT	60 FT	< 60 FT	
MAXIMUM RESIDENTIAL DENSITY	12 UNITS / ACRE	9.23 UNITS / ACRE	



Map Code	Residential Districts
R-90	Residential R-90
R-70	Residential R-70
R-30	Residential R-30
R-20	Residential R-20
R-12.5	Residential R-12.5
R-10	Residential R-10
R-9	General Residence
R-70	Residential R-70
R-80	Residential R-80
R-200	Residential R-200

Map Code	Industrial Districts
IG-20	General Industrial 20
IG-80	General Industrial 80
IR-80	Restricted Industrial 80
IR-200	Restricted Industrial 200

Map Code	Overlay/Floating Districts
APZ	Aquifer Protection
FPA	Development in Flood Prone Areas
AR1a	Age Restricted Housing (40+ acres)
AR1b	Age Restricted Housing (150-200 acres)

Map Code	Commercial Districts
B-C	Oakville Central Business
B-MG	Medical and General Business
B-SC	Shopping Center Business
B-G1	General Business 1
B-D	Downtown Central Business
B-O	Office Business
B-G2	General Business 2

Rev. #: VER  
 Checked by: LAM  
 Approved by: KMS  
 Project #: 22102801  
 Plan Date: 08/30/23  
 Scale: 1" = 200'  
 Project:  
**SOLLI ENGINEERING**  
 501 Main Street, Monroe, CT 06468 | T: (203) 880-5455 | F: (203) 880-9695  
 11 Vanderbilt Ave, Norwood, MA 02062 | T: (781) 352-8491 | F: (203) 880-9695

Sheet Title: MASTER SITE PLAN | Sheet #: 2.10  
 Aug 30, 2023 - 10:56pm  
 C:\Users\jason\Pictures\Project\2022\2102801 - Bunker Hill Road - Watertown, CT\Add Data\2102801-Waterford

**PROPOSED DEVELOPMENT**  
 BUNKER HILL ROAD  
 WATERTOWN, CONNECTICUT



## **Appendix B**

### Traffic Analysis Data

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Peak Hour Trip Generation Summary								
Proposed Development, Bunker Hill Road, Watertown, Connecticut								
	Variable	LUC	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
Warehousing	767.50	150	100	30	130	39	99	138
Appartment Buildings	156.00	220	15	47	62	50	30	80
<b>Total New Trips</b>			<b>115</b>	<b>77</b>	<b>193</b>	<b>89</b>	<b>129</b>	<b>218</b>

Source: ITE Trip Generation, 11th Edition

Land Use	Time Period	Avg		
		Rate	Entering	Exiting
LUC 150 - Warehousing	AM	0.17	77%	23%
	PM	0.18	28%	72%
LUC 220 - Multifamily Housing (Low-Rise)	AM	0.40	24%	76%
	PM	0.51	63%	37%

# 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,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 36

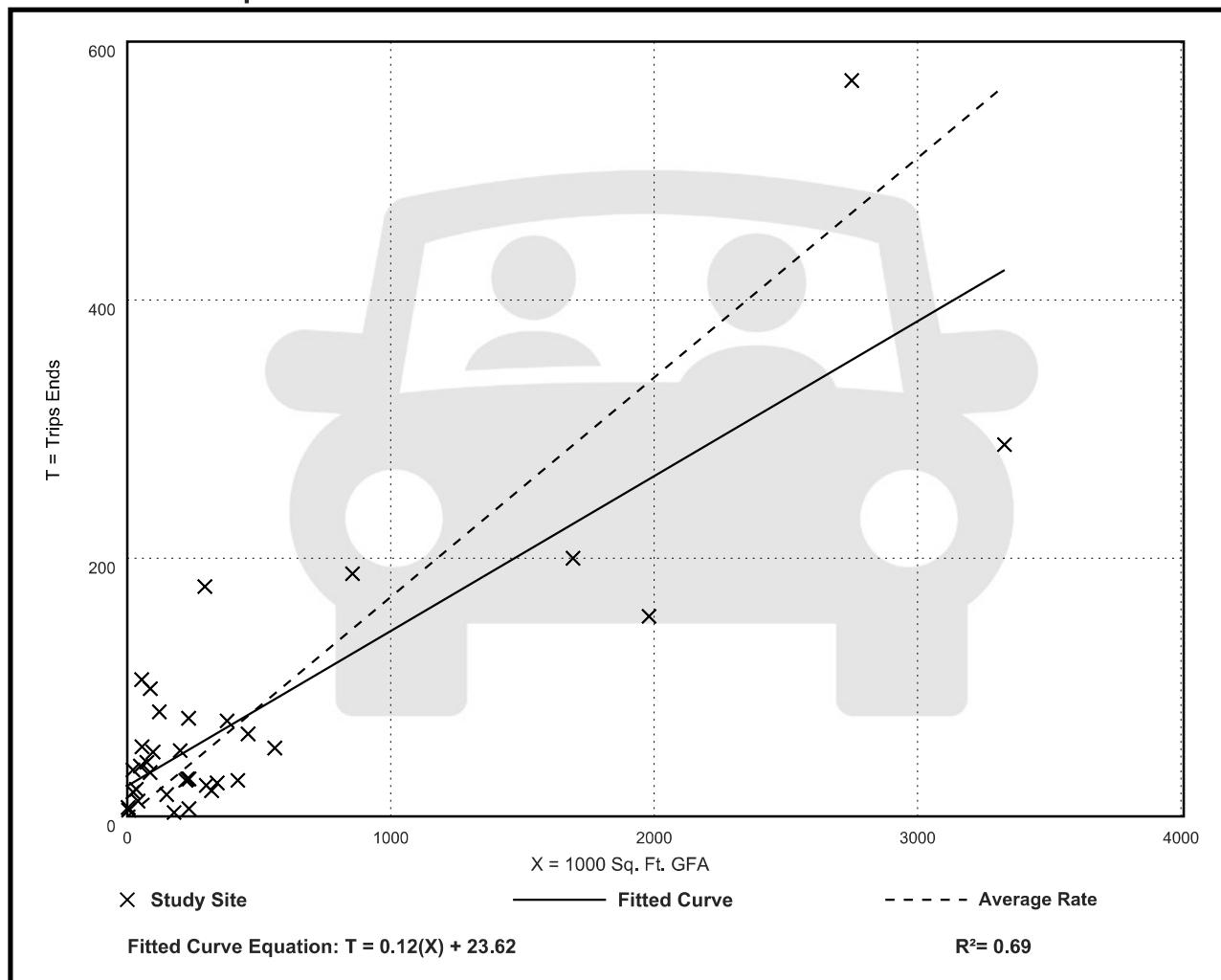
Avg. 1000 Sq. Ft. GFA: 448

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

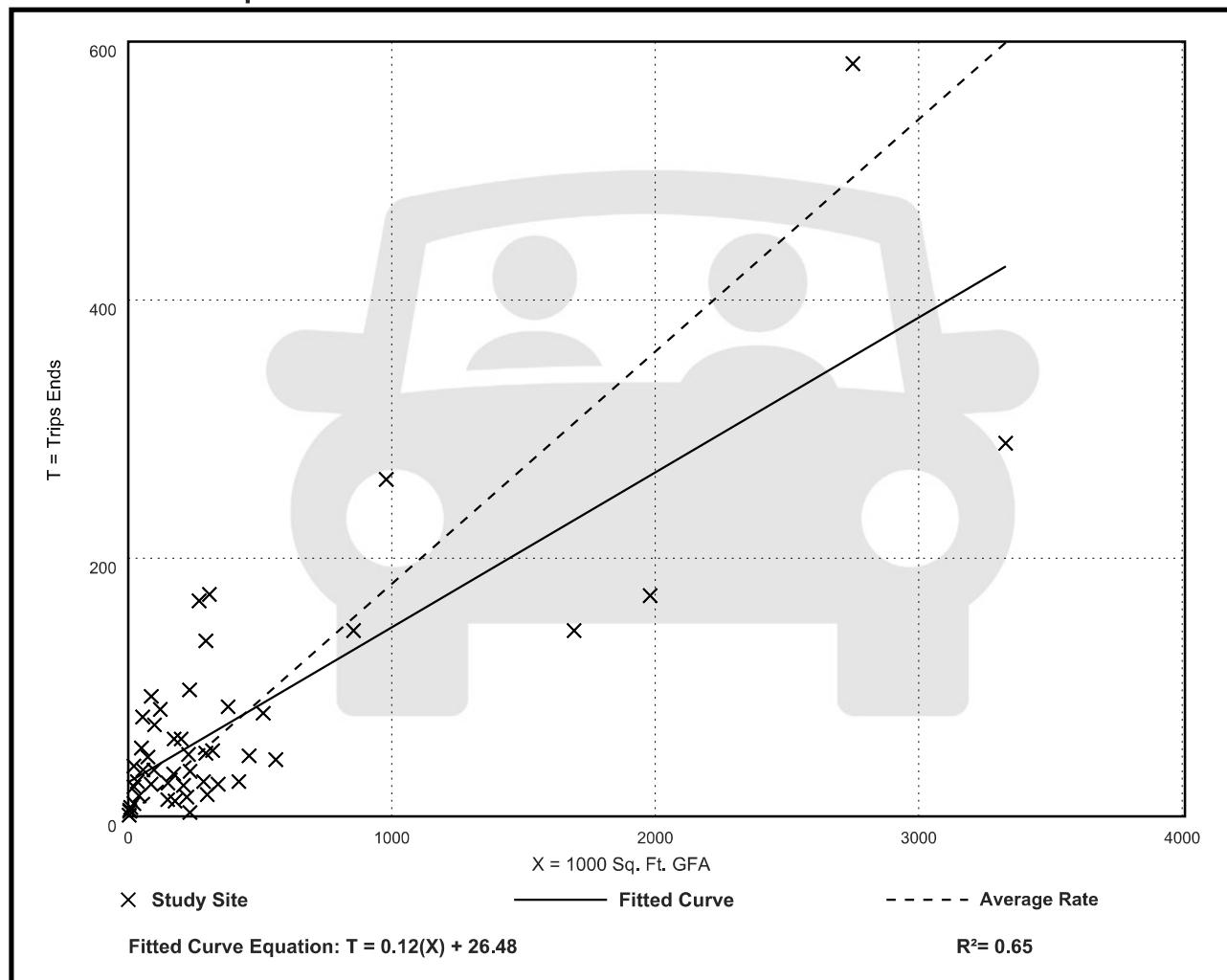
Avg. 1000 Sq. Ft. GFA: 400

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



# Land Use: 220

## Multifamily Housing (Low-Rise)

---

### Description

Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have two or three floors (levels). Various configurations fit this description, including walkup apartment, mansion apartment, and stacked townhouse.

- A walkup apartment typically is two or three floors in height with dwelling units that are accessed by a single or multiple entrances with stairways and hallways.
- A mansion apartment is a single structure that contains several apartments within what appears to be a single-family dwelling unit.
- A fourplex is a single two-story structure with two matching dwelling units on the ground and second floors. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.
- A stacked townhouse is designed to match the external appearance of a townhouse. But, unlike a townhouse dwelling unit that only shares walls with an adjoining unit, the stacked townhouse units share both floors and walls. Access to the individual units is typically internal to the structure and provided through a central entry and stairway.

Multifamily housing (mid-rise) (Land Use 221), multifamily housing (high-rise) (Land Use 222), affordable housing (Land Use 223), and off-campus student apartment (low-rise) (Land Use 225) are related land uses.

### Land Use Subcategory

Data are presented for two subcategories for this land use: (1) not close to rail transit and (2) close to rail transit. A site is considered close to rail transit if the walking distance between the residential site entrance and the closest rail transit station entrance is  $\frac{1}{2}$  mile or less.

### Additional Data

For the three sites for which both the number of residents and the number of occupied dwelling units were available, there were an average of 2.72 residents per occupied dwelling unit.

For the two sites for which the numbers of both total dwelling units and occupied dwelling units were available, an average of 96.2 percent of the total dwelling units were occupied.

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/>).

For the three sites for which data were provided for both occupied dwelling units and residents, there was an average of 2.72 residents per occupied dwelling unit.

***It is expected that the number of bedrooms and number of residents are likely correlated to the trips generated by a residential site. To assist in future analysis, trip generation studies of all multifamily housing should attempt to obtain information on occupancy rate and on the mix of residential unit sizes (i.e., number of units by number of bedrooms at the site complex).***

The sites were surveyed in the 1980s, the 1990s, the 2000s, the 2010s, and the 2020s in British Columbia (CAN), California, Delaware, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, and Washington.

## **Source Numbers**

188, 204, 237, 300, 305, 306, 320, 321, 357, 390, 412, 525, 530, 579, 583, 638, 864, 866, 896, 901, 903, 904, 936, 939, 944, 946, 947, 948, 963, 964, 966, 967, 1012, 1013, 1014, 1036, 1047, 1056, 1071, 1076

# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

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: 49

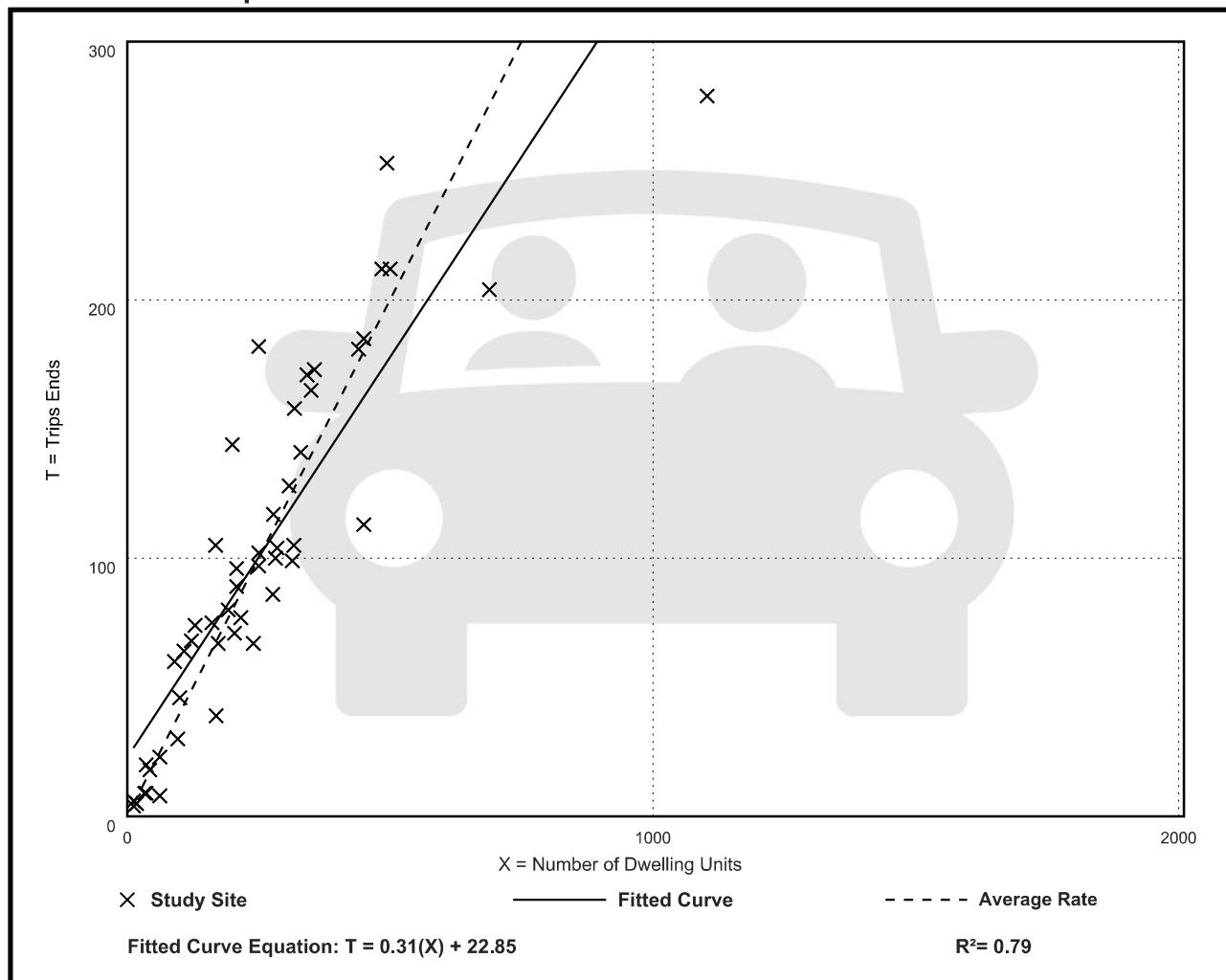
Avg. Num. of Dwelling Units: 249

Directional Distribution: 24% entering, 76% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.40	0.13 - 0.73	0.12

## Data Plot and Equation



# Multifamily Housing (Low-Rise) Not Close to Rail Transit (220)

Vehicle Trip Ends vs: Dwelling Units

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: 59

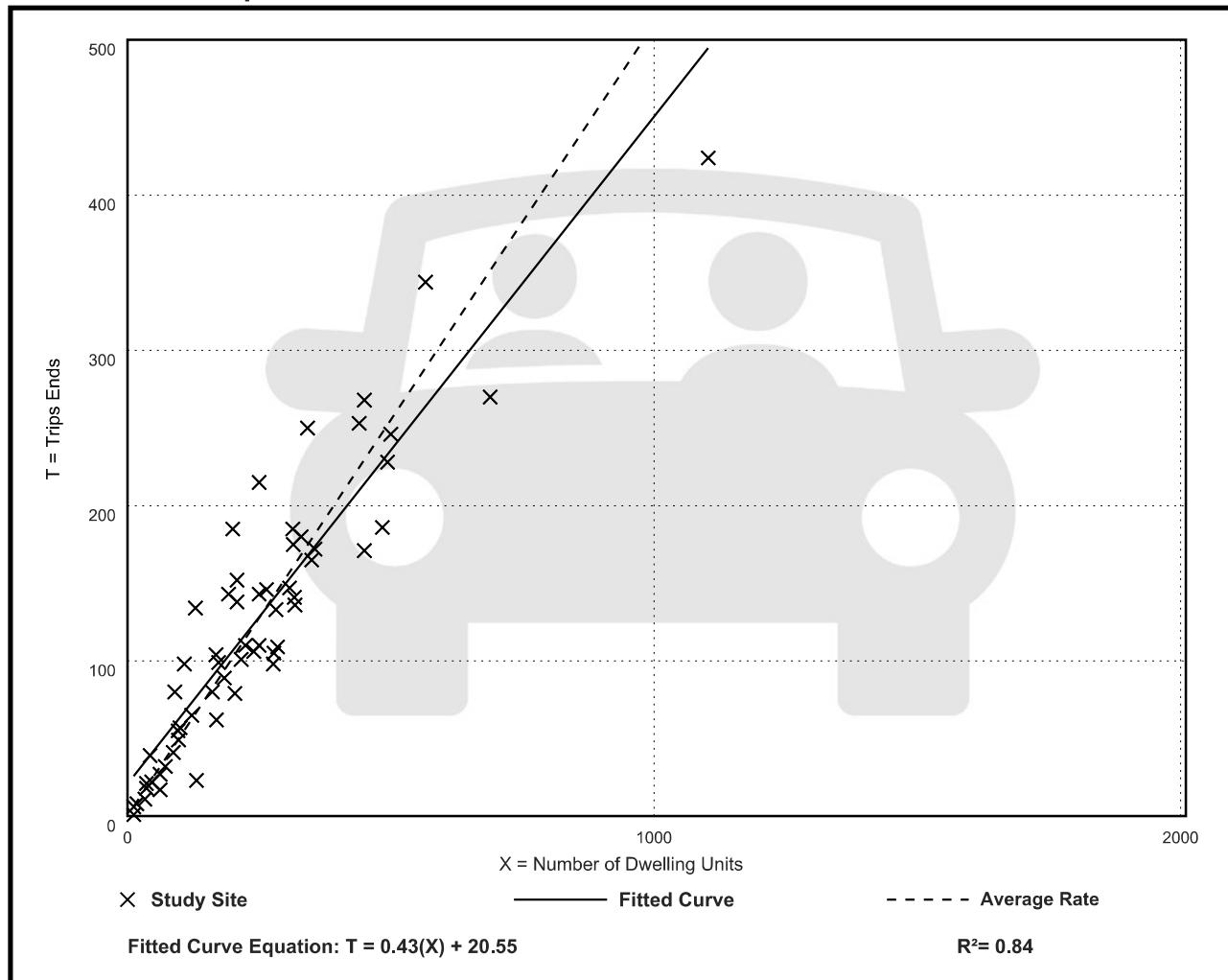
Avg. Num. of Dwelling Units: 241

Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.51	0.08 - 1.04	0.15

## Data Plot and Equation



Status: OK North Combined South Class Speed

**WATT-048 - Combined - n/s**

Route 63 - 21.93 mi South of Bunker Hill Road

		02-Mar	03-Mar	04-Mar
		Mon	Tue	Wed
Internal: Low ADT				
Town.....	Watertown	12:00am		
Station.....	48	01:00am		
Location.....	41.576921,-73.100278	02:00am		
Posted Speed Limit.....	35 MPH	03:00am		
2015-Principal Arterial - Other 3...2015-Urban		04:00am		
Start Report.....	02-Mar-2020 10:00AM	05:00am		
End Report.....	04-Mar-2020 08:00AM	06:00am		
Annualized ADT.....	15400	07:00am		
24-Hour Count.....	15919 * G4(0.97) = 15441.4	08:00am	x	960 x
Day 1.....	+15744 * G4(0.97) = 30713.1	09:00am	x	1048
UnRounded AADT.....	30713.1 / 2 = 15356.6	10:00am	1014	1058
OK 2023 Tue 14-Feb .....	18700	11:00am	1146	1160
OK 2020 Mon 02-Mar -this report-.....	15400	12:00pm	1159	1136
OK 2017 Thu 25-May .....	17500	01:00pm	1141	1141
OK 2014 Mon 15-Sep .....	17000	02:00pm	1254	1268
OK 2011 Mon 17-Oct .....	17800	03:00pm	1294	1271
OK 2008 Wed 01-Oct .....	18200	04:00pm	1382	1271
Dataset Details.....	2	05:00pm	1176	1113
		06:00pm	984	915
		07:00pm	629	640
		08:00pm	456	472
		09:00pm	250	267
		10:00pm	145	149
		11:00pm	90	84
		Totals	12120	15744
				1824

Status: OK North Combined South Class Speed

**WATT-048 - Combined - n/s**

Route 63 - 21.93 mi South of Bunker Hill Road

Town.....	Watertown	14-Feb	15-Feb	16-Feb
Station.....	48	Tue	Wed	Thu
Location.....	41.576921, -73.100278	12:00am	56	46
Posted Speed Limit.....	35 MPH	01:00am	18	24
2015-Principal Arterial - Other 3...2015-Urban		02:00am	11	10
Start Report.....	14-Feb-2023 02:00PM	03:00am	23	24
End Report.....	16-Feb-2023 11:00AM	04:00am	69	72
Annualized ADT.....	18700	05:00am	216	225
24-Hour Count.....	17037 * G4(1.11) = 18911.1	06:00am	535	501
Day 1.....	+16569 * G4(1.11) = 37302.7	07:00am	951	969
UnRounded AADT.....	37302.7 / 2 = 18651.3	08:00am	968	1041
OK 2023 Tue 14-Feb -this report-	18700	09:00am	907	1041
OK 2020 Mon 02-Mar	15400	10:00am	1005	1033
OK 2017 Thu 25-May	17500	11:00am	1131	
OK 2014 Mon 15-Sep	17000	12:00pm	1259	
OK 2011 Mon 17-Oct	17800	01:00pm	x	1158
OK 2008 Wed 01-Oct	18200	02:00pm	1332	1308
Dataset Details.....	2	03:00pm	1437	1270
		04:00pm	1516	1416
		05:00pm	1444	1386
		06:00pm	1152	1073
		07:00pm	728	715
		08:00pm	519	524
		09:00pm	317	315
		10:00pm	187	164
		11:00pm	98	91
		Totals	8730	16569
				4986

Status: OK

 
**WATT-080 - West**

[387]-Davis St Ext - .07 mi (1W WB) SW of Route 63

	Watertown	02-Mar Mon	03-Mar Tue	04-Mar Wed	05-Mar Thu
Town.....	Watertown				
Station.....	80	12:00am	1	3	1
Location.....	41.579536, -73.10174	01:00am	1	3	0
A.K.A.....	2080	02:00am	1	1	1
2015-Major Collector	5.....2015-Urban	03:00am	0	0	0
HPMS Section ID.....		04:00am	2	1	1
Start Report.....	02-Mar-2020 11:00AM	05:00am	13	11	12
End Report.....	05-Mar-2020 08:00AM	06:00am	22	23	22
Annualized ADT.....	750	07:00am	40	45	46
24-Hour Count...	733 * G4(0.97) = 711.0	08:00am	53	29	x
Day 1.....+	763 * G4(0.97) = 1451.1	09:00am	29	32	
Day 2.....+	764 * G4(0.97) = 2192.2	10:00am	x	34	33
UnRounded AADT.....	2192.2 / 3 = 730.7	11:00am	35	46	41
OK 2023 Wed 22-Feb .....	850	12:00pm	44	52	39
OK 2020 Mon 02-Mar -this report-	750	01:00pm	53	58	55
OK 2014 Mon 15-Sep .....	850	02:00pm	61	68	60
OK 2011 Mon 17-Oct .....	750	03:00pm	71	69	75
OK 2008 Mon 29-Sep .....	900	04:00pm	67	75	75
Dataset Details.....	1	05:00pm	72	59	69
		06:00pm	54	33	59
		07:00pm	26	39	45
		08:00pm	31	37	31
		09:00pm	15	17	22
		10:00pm	6	11	10
		11:00pm	2	3	2
		Totals	537	763	764
					83

Status: OK

 
**WATT-080 - West**

[387]-Davis St Ext - .07 mi (1W WB) SW of Route 63

	Watertown	22-Feb Wed	23-Feb Thu	24-Feb Fri
Town.....	Watertown			
Station.....	80	12:00am	4	3
Location.....	41.579536, -73.10174	01:00am	0	1
A.K.A.....	2080	02:00am	0	0
2015-Major Collector	5.....2015-Urban	03:00am	1	2
HPMS Section ID.....		04:00am	2	3
Start Report.....	22-Feb-2023 12:00PM	05:00am	7	9
End Report.....	24-Feb-2023 01:00PM	06:00am	18	34
Annualized ADT.....	850	07:00am	49	53
24-Hour Count...	769 * G4(1.11) = 853.6	08:00am	52	42
Day 1.....+	748 * G4(1.11) = 1683.9	09:00am	25	41
UnRounded AADT.....	1683.9 / 2 = 841.9	10:00am	30	47
OK 2023 Wed 22-Feb -this report-	850	11:00am	x	46
OK 2020 Mon 02-Mar .....	750	12:00pm	58	34
OK 2014 Mon 15-Sep .....	850	01:00pm	38	48
OK 2011 Mon 17-Oct .....	750	02:00pm	88	x
OK 2008 Mon 29-Sep .....	900	03:00pm	82	83
Dataset Details.....	1	04:00pm	74	86
		05:00pm	58	61
		06:00pm	41	53
		07:00pm	43	31
		08:00pm	25	21
		09:00pm	19	19
		10:00pm	10	9
		11:00pm	4	3
		Totals	540	748
				316

Status: OK

 
**WATT-132 - Combined - e/w**

[31]-Bunker Hill Road - 2.69 mi West of Route 63

	Watertown	02-Mar Mon	03-Mar Tue	04-Mar Wed
Town.....	Watertown			
Station.....	132	12:00am	15	19
Location.....	41.577508,-73.101168	01:00am	7	8
2015-Minor Arterial	4.....2015-Urban	02:00am	9	5
Start Report.....	02-Mar-2020 11:00AM	03:00am	6	9
End Report.....	04-Mar-2020 10:00AM	04:00am	35	29
Annualized ADT.....	5700	05:00am	88	106
24-Hour Count...	5979 * G4(0.97) = 5799.6	06:00am	234	253
Day 1.....+	5855 * G4(0.97) = 11479.0	07:00am	412	431
UnRounded AADT.....	11479.0 / 2 = 5739.5	08:00am	384	394
OK 2023 Tue 14-Feb .....	6900	09:00am	323	282
OK 2020 Mon 02-Mar -this report-....	5700	10:00am	x	324
OK 2017 Thu 25-May .....	6500	11:00am	347	323
OK 2011 Mon 17-Oct .....	7100	12:00pm	376	368
OK 2008 Wed 01-Oct .....	7500	01:00pm	369	377
Dataset Details.....	1	02:00pm	428	402
		03:00pm	504	484
		04:00pm	552	560
		05:00pm	524	543
		06:00pm	380	363
		07:00pm	276	207
		08:00pm	188	183
		09:00pm	96	116
		10:00pm	59	62
		11:00pm	43	30
		Totals	4142	5855
				1536

Status: OK

[East](#)[Combined](#)[West](#)[Class](#)[Speed](#)**WATT-132 - Combined - e/w**

[31]-Bunker Hill Road - 2.69 mi    West of Route 63

	Watertown	14-Feb Tue	15-Feb Wed	16-Feb Thu
Town.....	Watertown			
Station.....	132	12:00am	28	20
Location.....	41.577508,-73.101168	01:00am	8	8
2015-Minor Arterial	4.....2015-Urban	02:00am	7	7
Start Report.....	14-Feb-2023 01:00PM	03:00am	16	16
End Report.....	16-Feb-2023 11:00AM	04:00am	35	31
Annualized ADT.....	6900	05:00am	89	99
24-Hour Count...	6248 * G4(1.11) = 6935.3	06:00am	235	231
Day 1.....+	6125 * G4(1.11) = 13734.0	07:00am	398	399
UnRounded AADT.....	13734.0 / 2 = 6867.0	08:00am	385	351
OK 2023 Tue 14-Feb -this report-	....6900	09:00am	317	339
OK 2020 Mon 02-Mar .....	5700	10:00am	315	368
OK 2017 Thu 25-May .....	6500	11:00am	396	x
OK 2011 Mon 17-Oct .....	7100	12:00pm	x	407
OK 2008 Wed 01-Oct .....	7500	01:00pm	377	402
Dataset Details.....	1	02:00pm	467	442
		03:00pm	558	557
		04:00pm	583	587
		05:00pm	586	544
		06:00pm	396	379
		07:00pm	240	217
		08:00pm	173	160
		09:00pm	101	99
		10:00pm	75	60
		11:00pm	56	42
		Totals	3612	6125
				1869

Status: OK

[East](#)[Combined](#)[West](#)[Class](#)[Speed](#)**WATT-133 - Combined - e/w**

[31]-Bunker Hill Road - 2.65 mi    East of Route 63

	Watertown	02-Mar Mon	03-Mar Tue	04-Mar Wed
Town.....	Watertown			
Station.....	133	12:00am	38	40
Location.....	41.577291,-73.099774	01:00am	20	22
2015-Minor Arterial	4.....2015-Urban	02:00am	13	7
Start Report.....	02-Mar-2020 10:00AM	03:00am	9	11
End Report.....	04-Mar-2020 09:00AM	04:00am	55	36
Annualized ADT.....	8600	05:00am	110	145
24-Hour Count...	8918 * G4(0.97) = 8650.5	06:00am	347	352
Day 1.....+	8867 * G4(0.97) = 17251.4	07:00am	485	514
UnRounded AADT.....	17251.4 / 2 = 8625.7	08:00am	565	518
OK 2023 Wed 22-Feb .....	9500	09:00am	x	487
OK 2020 Mon 02-Mar -this report-....	8600	10:00am	470	507
OK 2017 Thu 27-Apr .....	9000	11:00am	563	575
OK 2011 Mon 17-Oct .....	9500	12:00pm	573	574
OK 2008 Wed 01-Oct .....	9500	01:00pm	580	582
Dataset Details.....	1	02:00pm	674	652
		03:00pm	778	761
		04:00pm	816	772
		05:00pm	748	764
		06:00pm	541	579
		07:00pm	396	347
		08:00pm	272	254
		09:00pm	164	188
		10:00pm	116	119
		11:00pm	98	64
		Totals	6789	8867
				1645

Status: OK

[East](#)[Combined](#)[West](#)[Class](#)[Speed](#)**WATT-133 - Combined - e/w**

[31]-Bunker Hill Road - 2.65 mi    East of Route 63

	22-Feb Wed	23-Feb Thu	24-Feb Fri
Town.....Watertown			
Station.....133	12:00am	29	47
Location.....41.577291,-73.099774	01:00am	20	17
2015-Minor Arterial 4.....2015-Urban	02:00am	10	18
Start Report.....22-Feb-2023 12:00PM	03:00am	20	21
End Report.....24-Feb-2023 10:00AM	04:00am	42	28
Annualized ADT.....9500	05:00am	129	113
24-Hour Count... 8483 * G4(1.11) = 9416.1	06:00am	267	294
Day 1.....+ 8589 * G4(1.11) = 18949.9	07:00am	450	465
UnRounded AADT.....18949.9 / 2 = 9475.0	08:00am	517	547
OK 2023 Wed 22-Feb -this report-....9500	09:00am	482	489
OK 2020 Mon 02-Mar .....8600	10:00am	476	x
OK 2017 Thu 27-Apr .....9000	11:00am	x	502
OK 2011 Mon 17-Oct .....9500	12:00pm	619	533
OK 2008 Wed 01-Oct .....9500	01:00pm	595	568
Dataset Details.....1	02:00pm	724	602
	03:00pm	762	759
	04:00pm	810	796
	05:00pm	735	789
	06:00pm	469	547
	07:00pm	298	376
	08:00pm	236	278
	09:00pm	136	201
	10:00pm	102	122
	11:00pm	53	74
	Totals	5539	8589
			2039

Status: OK

[North](#)[Combined](#)[South](#)[Class](#)[Speed](#)**WATT-059 - Combined - n/s**

Route 63 - 21.38 mi At Middlebury TL

	26-Feb Wed	27-Feb Thu	28-Feb Fri
Town.....Watertown			
Station.....59	12:00am	57	49
Location.....41.569385, -73.098637	01:00am	31	28
Posted Speed Limit.....35 MPH	02:00am	20	17
2015-Principal Arterial - Other 3...2015-Urban	03:00am	17	19
Start Report.....26-Feb-2020 02:00PM	04:00am	58	68
End Report.....28-Feb-2020 10:00AM	05:00am	216	229
Annualized ADT.....16100	06:00am	530	560
24-Hour Count.....15491 * G4(1.03) = 15955.7	07:00am	978	989
Day 1.....+15683 * G4(1.03) = 32109.2	08:00am	864	1065
UnRounded AADT.....32109.2 / 2 = 16054.6	09:00am	960	999
OK 2023 Wed 22-Feb .....16500	10:00am	899	x
OK 2020 Wed 26-Feb -this report-.....16100	11:00am	979	
OK 2017 Thu 25-May .....13800	12:00pm	1133	
OK 2014 Mon 15-Sep .....15900	01:00pm	x	1124
OK 2011 Mon 17-Oct .....15800	02:00pm	1132	1163
OK 2008 Wed 01-Oct .....16100	03:00pm	1164	1283
Dataset Details.....2	04:00pm	1375	1362
	05:00pm	1314	1403
	06:00pm	909	972
	07:00pm	658	616
	08:00pm	498	466
	09:00pm	288	300
	10:00pm	192	163
	11:00pm	95	89
	Totals	7625	15683 4023

Status: OK

[North](#)[Combined](#)[South](#)[Class](#)[Speed](#)**WATT-059 - Combined - n/s**

Route 63 - 21.38 mi At Middlebury TL

	Watertown	22-Feb Wed	23-Feb Thu	24-Feb Fri
Town.....	Watertown			
Station.....	59	12:00am	47	63
Location.....	41.569385, -73.098637	01:00am	18	23
Posted Speed Limit.....	35 MPH	02:00am	20	18
2015-Principal Arterial - Other 3...2015-Urban		03:00am	23	18
Start Report.....	22-Feb-2023 01:00PM	04:00am	55	67
End Report.....	24-Feb-2023 10:00AM	05:00am	211	199
Annualized ADT.....	16500	06:00am	453	516
24-Hour Count.....	14687 * G4(1.11) = 16302.6	07:00am	846	976
Day 1.....	+15080 * G4(1.11) = 33041.4	08:00am	955	990
UnRounded AADT.....	33041.4 / 2 = 16520.7	09:00am	951	1013
OK 2023 Wed 22-Feb -this report-	16500	10:00am	954	x
OK 2020 Wed 26-Feb .....	16100	11:00am	967	
OK 2017 Thu 25-May .....	13800	12:00pm	x	1049
OK 2014 Mon 15-Sep .....	15900	01:00pm	1166	1025
OK 2011 Mon 17-Oct .....	15800	02:00pm	1226	1136
OK 2008 Wed 01-Oct .....	16100	03:00pm	1276	1269
Dataset Details.....	2	04:00pm	1335	1341
		05:00pm	1223	1300
		06:00pm	751	884
		07:00pm	457	601
		08:00pm	316	451
		09:00pm	184	270
		10:00pm	143	169
		11:00pm	61	85
		Totals	8138	15080
				3883



## **Appendix C**

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Capacity Analysis Worksheets

Weekday AM Peak Hour Capacity Analysis Summary Proposed Development - Bunker Hill Road, Watertown												
Lane Use	2023 Existing				2028 Background				2028 Build			
	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th
<b>Bunker Hill Road &amp; Davis Street Extension</b>												
Bunker Hill Road			-	-			-	-			-	-
EB-THRU			-	-			-	-			-	-
<b>Overall EB Approach</b>												
WB-THRU			-	-			-	-			-	-
<b>Overall WB Approach</b>												
Davis Street Extension												
SB-LEFT/RIGHT	A/9.7	0.063	-	0.2***	A/9.9	0.076	-	0.2***	B/10.1	0.079	-	0.3***
<b>Overall SB Approach</b>	<b>A/9.7</b>				<b>A/9.9</b>				<b>B/10.1</b>			
<b>Overall Intersection</b>												
<b>Straits Turnpike (Route 63) &amp; Bunker Hill Road</b>												
Bunker Hill Road												
EB-LEFT	B/16.9	0.13	11	39	B/18.9	0.14	15	48	B/19.8	0.16	18	53
EB-THRU	C/29.8	0.35	39	97	C/33.6	0.43	51	118	D/35.5	0.48	57	127
EB-RIGHT	A/5.3	0.19	0	31	A/5.4	0.20	0	36	A/5.2	0.23	0	37
<b>Overall EB Approach</b>	<b>B/17.7</b>				<b>B/19.7</b>				<b>C/20.3</b>			
WB-LEFT	B/19.9	0.39	39	102	C/22.5	0.43	53	129	C/24.4	0.48	59	138
WB-THRU	C/25.8	0.16	21	64	C/28.0	0.17	28	78	C/29.1	0.18	31	82
WB-RIGHT	A/0.6	0.12	0	0	A/0.5	0.13	0	0	A/0.6	0.14	0	0
<b>Overall WB Approach</b>	<b>B/17.3</b>				<b>B/19.3</b>				<b>C/20.8</b>			
Straits Turnpike (Route 63)												
NB-LEFT	A/8.4	0.10	7	17	A/8.8	0.14	9	20	A/9.2	0.18	11	23
NB-THRU	C/21.2	0.50	99	144	C/22.6	0.57	125	171	C/21.6	0.53	130	178
NB-RIGHT	A/2.7	0.09	0	12	A/2.6	0.12	0	12	A/2.5	0.12	0	12
<b>Overall NB Approach</b>	<b>B/16.4</b>				<b>B/17.4</b>				<b>B/16.5</b>			
SB-LEFT	A/8.6	0.15	14	36	A/9.0	0.20	18	42	A/9.0	0.19	18	43
SB-THRU	C/25.2	0.69	150	274	C/29.6	0.78	191	338	C/33.3	0.83	210	370
SB-RIGHT	B/15.5	0.03	4	16	B/15.3	0.03	5	18	B/15.5	0.04	6	20
<b>Overall SB Approach</b>	<b>C/22.5</b>				<b>C/26.1</b>				<b>C/29.2</b>			
<b>Overall Intersection</b>	<b>B/18.9</b>				<b>C/21.2</b>				<b>C/22.4</b>			
<b>Straits Turnpike (Route 63) &amp; New Wood Road/Stop &amp; Shop Driveway</b>												
New Wood Road												
EB-LEFT	-	-	-	-			-	-			-	-
EB-THRU	B/12.1	0.43	14	58	B/12.9	0.44	15	62	B/15.9	0.51	25	84
EB-RIGHT	-	-	-	-			-	-			-	-
<b>Overall EB Approach</b>	<b>B/12.1</b>				<b>B/12.9</b>				<b>B/15.9</b>			
Stop & Shop Driveway												
WB-LEFT	-	-	-	-			-	-			-	-
WB-THRU	B/19.1	0.11	7	30	C/20.9	0.12	7	32	C/22.4	0.13	8	33
WB-RIGHT	A/0.7	0.11	0	2	A/0.5	0.11	0	1	A/0.5	0.11	0	1
<b>Overall WB Approach</b>	<b>A/8.0</b>				<b>A/8.7</b>				<b>A/9.3</b>			
Straits Turnpike (Route 63)												
NB-LEFT	A/4.5	0.12	6	18	A/4.4	0.13	6	19	A/5.7	0.29	13	36
NB-THRU	B/11.7	0.36	73	141	B/11.7	0.41	87	168	B/11.3	0.38	89	177
NB-RIGHT	A/0.1	0.04	0	0	A/0.1	0.04	0	0	A/0.1	0.03	0	0
<b>Overall NB Approach</b>	<b>A/9.8</b>				<b>B/10.0</b>				<b>A/9.4</b>			
SB-LEFT	A/4.3	0.09	5	16	A/4.2	0.09	5	17	A/4.3	0.09	5	18
SB-THRU	B/13.5	0.50	110	198	B/13.9	0.55	135	240	B/16.1	0.62	157	285
SB-RIGHT	-	-	-	-			-	-			-	-
<b>Overall SB Approach</b>	<b>B/12.5</b>				<b>B/13.0</b>				<b>B/15.0</b>			
<b>Overall Intersection</b>	<b>B/11.2</b>				<b>B/11.6</b>				<b>B/12.7</b>			
<b>Bunker Hill Road &amp; Site Driveway</b>												
Bunker Hill Road												
EB-THRU/RIGHT	-	-	-	-			-	-			-	-
<b>Overall EB Approach</b>												
WB-THRU/LEFT	-	-	-	-			-	-			-	-
<b>Overall WB Approach</b>												
Site Driveway												
NB-LEFT/RIGHT	-	-	-	-			-	-			-	-
<b>Overall NB Approach</b>												
<b>Overall Intersection</b>												

# = 95th percentile queue exceeds capacity, queue may be longer

~ = Volume exceeds capacity, queue may be infinite

\*\*\* = Queue length recorded in vehicles

Weekday PM Peak Hour Capacity Analysis Summary Proposed Development - Bunker Hill Road, Watertown												
Lane Use	2023 Existing				2028 Background				2028 Build			
	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th	LOS/Delay(s)	V/C Ratio	50th	Queue (ft) 95th
<b>Bunker Hill Road &amp; Davis Street Extension</b>												
Bunker Hill Road			-	-			-	-			-	-
EB-THRU			-	-			-	-			-	-
<b>Overall EB Approach</b>												
WB-THRU			-	-			-	-			-	-
<b>Overall WB Approach</b>												
Davis Street Extension												
SB-LEFT/RIGHT	B/11.2	0.148	-	0.5***	B/12.1	0.186	-	0.7***	B/12.7	0.199	-	0.7***
<b>Overall SB Approach</b>	<b>B/11.2</b>				<b>B/12.1</b>				<b>B/12.7</b>			
<b>Overall Intersection</b>												
<b>Straits Turnpike (Route 63) &amp; Bunker Hill Road</b>												
Bunker Hill Road												
EB-LEFT	C/20.9	0.40	56	113	C/23.6	0.49	76	130	C/24.7	0.53	79	134
EB-THRU	D/36.4	0.54	76	154	D/41.2	0.64	103	177	D/42.4	0.66	108	#196
EB-RIGHT	A/5.6	0.18	0	36	A/5.4	0.21	0	38	A/5.3	0.23	0	39
<b>Overall EB Approach</b>	<b>C/23.2</b>				<b>C/26.1</b>				<b>C/26.7</b>			
WB-LEFT	C/21.3	0.41	53	109	C/24.4	0.52	73	125	C/25.1	0.54	75	127
WB-THRU	D/36.7	0.51	65	132	D/40.3	0.59	87	150	D/42.2	0.63	95	163
WB-RIGHT	A/3.8	0.28	0	17	A/5.3	0.32	0	28	A/5.2	0.32	0	28
<b>Overall WB Approach</b>	<b>C/22.3</b>				<b>C/25.2</b>				<b>C/26.6</b>			
Straits Turnpike (Route 63)												
NB-LEFT	B/11.9	0.34	28	60	B/14.4	0.46	36	69	B/16.6	0.54	43	78
NB-THRU	C/28.2	0.73	208	348	C/32.7	0.81	272	#467	C/35.0	0.84	294	#500
NB-RIGHT	A/2.0	0.21	0	27	A/2.0	0.23	0	29	A/2.0	0.24	0	30
<b>Overall NB Approach</b>	<b>B/19.6</b>				<b>C/22.7</b>				<b>C/24.3</b>			
SB-LEFT	B/11.7	0.31	23	53	B/14.2	0.44	30	60	B/15.3	0.47	31	60
SB-THRU	C/27.8	0.71	175	296	C/31.1	0.78	226	357	C/31.8	0.79	236	365
SB-RIGHT	B/16.8	0.05	9	27	B/16.8	0.06	11	29	B/17.0	0.08	14	36
<b>Overall SB Approach</b>	<b>C/24.2</b>				<b>C/27.2</b>				<b>C/27.9</b>			
<b>Overall Intersection</b>	<b>C/22.0</b>				<b>C/25.0</b>				<b>C/26.1</b>			
<b>Straits Turnpike (Route 63) &amp; New Wood Road/Stop &amp; Shop Driveway</b>												
New Wood Road												
EB-LEFT	-	-	-	-			-	-			-	-
EB-THRU	B/16.2	0.40	18	48	B/16.2	0.40	18	48	C/28.2	0.71	60	107
EB-RIGHT	-	-	-	-			-	-				
<b>Overall EB Approach</b>	<b>B/16.2</b>				<b>B/16.2</b>				<b>C/28.2</b>			
Stop & Shop Driveway												
WB-LEFT	-	-	-	-			-	-			-	-
WB-THRU	C/29.4	0.37	32	70	C/29.4	0.37	32	70	C/32.1	0.44	33	74
WB-RIGHT	A/8.0	0.41	0	45	A/8.0	0.41	0	45	A/7.3	0.38	0	45
<b>Overall WB Approach</b>	<b>B/15.3</b>				<b>B/15.3</b>				<b>B/15.8</b>			
Straits Turnpike (Route 63)												
NB-LEFT	A/4.2	0.13	7	18	A/4.3	0.15	7	18	A/5.5	0.23	13	24
NB-THRU	C/25.8	0.86	276	347	D/46.7	1.00	~381	#501	E/61.2	1.04	~498	#521
NB-RIGHT	A/2.3	0.26	0	15	A/2.3	0.26	0	15	A/2.4	0.26	0	15
<b>Overall NB Approach</b>	<b>B/19.4</b>				<b>D/35.8</b>				<b>D/46.1</b>			
SB-LEFT	B/11.2	0.47	13	50	B/11.4	0.47	13	50	B/12.4	0.48	17	51
SB-THRU	B/12.5	0.48	112	216	B/13.7	0.55	136	260	B/15.5	0.60	167	280
SB-RIGHT	-	-	-	-			-	-			-	-
<b>Overall SB Approach</b>	<b>B/12.2</b>				<b>B/13.2</b>				<b>B/14.9</b>			
<b>Overall Intersection</b>	<b>B/16.7</b>				<b>C/26.1</b>				<b>C/32.8</b>			
<b>Bunker Hill Road &amp; Site Driveway</b>												
Bunker Hill Road												
EB-THRU/RIGHT	-	-	-	-			-	-			-	-
<b>Overall EB Approach</b>												
WB-THRU/LEFT	-	-	-	-			-	-			-	-
<b>Overall WB Approach</b>												
Site Driveway												
NB-LEFT/RIGHT	-	-	-	-			-	-			-	-
<b>Overall NB Approach</b>												
<b>Overall Intersection</b>												

# = 95th percentile queue exceeds capacity, queue may be longer

~ = Volume exceeds capacity, queue may be infinite

\*\*\* = Queue length recorded in vehicles

Lanes, Volumes, Timings  
3: Bunker Hill Road & Davis Street Ext.

Proposed Development Bunker Hill Road  
2023 Existing AM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	246	132	0	8	38
Future Volume (vph)	0	246	132	0	8	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.888	
Flt Protected					0.991	
Satd. Flow (prot)	0	1900	1900	0	1672	0
Flt Permitted					0.991	
Satd. Flow (perm)	0	1900	1900	0	1672	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		727	1293		499	
Travel Time (s)		19.8	35.3		13.6	
Peak Hour Factor	0.89	0.89	0.87	0.87	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	276	152	0	9	43
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	276	152	0	52	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 22.9% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	246	132	0	8	38
Future Vol, veh/h	0	246	132	0	8	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	87	87	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	276	152	0	9	43
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	428	152
Stage 1	-	-	-	-	152	-
Stage 2	-	-	-	-	276	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	588	900
Stage 1	0	-	-	0	881	-
Stage 2	0	-	-	0	775	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	588	900
Mov Cap-2 Maneuver	-	-	-	-	588	-
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	775	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	9.7			
HCM LOS			A			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1			
Capacity (veh/h)	-	-	824			
HCM Lane V/C Ratio	-	-	0.063			
HCM Control Delay (s)	-	-	9.7			
HCM Lane LOS	-	-	A			
HCM 95th %tile Q(veh)	-	-	0.2			

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2023 Existing AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	43	101	96	140	60	52	31	233	65	74	405	13
Future Volume (vph)	43	101	96	140	60	52	31	233	65	74	405	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1805	1900	1615	1787	1900	1615
Flt Permitted	0.713			0.455			0.359			0.512		
Satd. Flow (perm)	1355	1900	1615	864	1900	1615	682	1900	1615	963	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			109			146			89			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.88	0.88	0.88	0.90	0.90	0.90	0.73	0.73	0.73	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	49	115	109	156	67	58	42	319	89	82	450	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	115	109	156	67	58	42	319	89	82	450	14
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2023 Existing AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex	NA	Prot									
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	Prot
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases	8			4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	12.0	25.0		12.0	25.0	25.0	12.0	45.0		12.0	45.0	45.0
Total Split (%)	12.8%	26.6%		12.8%	26.6%	26.6%	12.8%	47.9%		12.8%	47.9%	47.9%
Maximum Green (s)	8.0	19.7		8.0	19.7	19.7	8.0	37.4		8.0	37.4	37.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.0	5.0			2.0	5.0	5.0
Recall Mode	None	None		None	None	None	Min			None	Min	Min
Act Effct Green (s)	15.0	10.5	19.0	18.7	13.2	13.2	28.5	20.5	35.9	29.5	21.0	21.0
Actuated g/C Ratio	0.25	0.17	0.31	0.31	0.22	0.22	0.47	0.34	0.59	0.49	0.35	0.35
v/c Ratio	0.13	0.35	0.19	0.39	0.16	0.12	0.10	0.50	0.09	0.15	0.69	0.03
Control Delay	16.9	29.8	5.3	19.9	25.8	0.6	8.4	21.2	2.7	8.6	25.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	29.8	5.3	19.9	25.8	0.6	8.4	21.2	2.7	8.6	25.2	15.5
LOS	B	C	A	B	C	A	A	C	A	A	C	B
Approach Delay		17.7			17.3			16.4			22.5	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 60.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 18.9

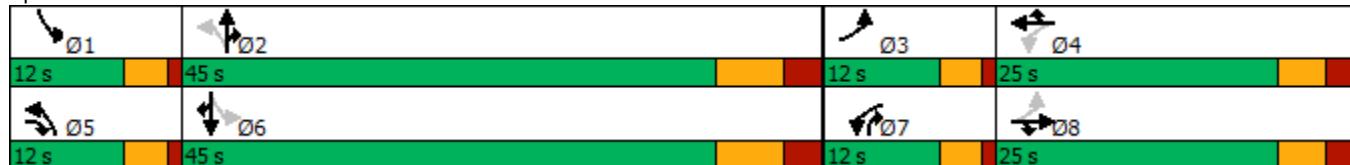
Intersection LOS: B

Intersection Capacity Utilization 53.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2023 Existing AM

	↗	→	↘	↖	←	↙	↑	↗	↘	↓	↖	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	115	109	156	67	58	42	319	89	82	450	14
v/c Ratio	0.13	0.35	0.19	0.39	0.16	0.12	0.10	0.50	0.09	0.15	0.69	0.03
Control Delay	16.9	29.8	5.3	19.9	25.8	0.6	8.4	21.2	2.7	8.6	25.2	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.9	29.8	5.3	19.9	25.8	0.6	8.4	21.2	2.7	8.6	25.2	15.5
Queue Length 50th (ft)	11	39	0	39	21	0	7	99	0	14	150	4
Queue Length 95th (ft)	39	97	31	102	64	0	17	144	12	36	274	16
Internal Link Dist (ft)	1213			748			2197			908		
Turn Bay Length (ft)	215		225	200		170	215		310	115		145
Base Capacity (vph)	443	655	709	410	655	652	496	1243	1104	602	1243	1057
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.18	0.15	0.38	0.10	0.09	0.08	0.26	0.08	0.14	0.36	0.01

## Intersection Summary

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	5	96	22	7	45	61	314	29	53	415	8
Future Volume (vph)	47	5	96	22	7	45	61	314	29	53	415	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	125		465	230		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913				0.850			0.850		0.997	
Flt Protected		0.984			0.964		0.950			0.950		
Satd. Flow (prot)	0	1674	0	0	1765	1615	1770	1881	1615	1805	1894	0
Flt Permitted		0.881			0.719		0.407			0.548		
Satd. Flow (perm)	0	1499	0	0	1317	1615	758	1881	1615	1041	1894	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		114				115			95		2	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		334			405			894			2277	
Travel Time (s)		7.6			9.2			13.5			34.5	
Peak Hour Factor	0.84	0.84	0.84	0.93	0.93	0.93	0.88	0.88	0.88	0.86	0.86	0.86
Heavy Vehicles (%)	0%	0%	3%	5%	0%	0%	2%	1%	0%	0%	0%	0%
Adj. Flow (vph)	56	6	114	24	8	48	69	357	33	62	483	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	0	0	32	48	69	357	33	62	492	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	3		1	3	3	3	1	1	3	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306	
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	10			10	10	10				10		
Detector 2 Size(ft)	6			6	6	6				6		
Detector 2 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Detector 3 Position(ft)	26			26	26	16				26		
Detector 3 Size(ft)	6			6	6	6				6		

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Turn Type	Perm	NA		Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA	
Protected Phases	4			4	4	5	2	2	1	6		
Permitted Phases	4			4		2			6			
Detector Phase	4	4		4	4	5	2	2	1	6		
Switch Phase												
Minimum Initial (s)	9.0	9.0		9.0	9.0	3.0	16.0	16.0	3.0	16.0		
Minimum Split (s)	14.1	14.1		14.1	14.1	7.0	22.4	22.4	7.0	22.4		
Total Split (s)	20.0	20.0		20.0	20.0	10.0	40.0	40.0	10.0	40.0		
Total Split (%)	28.6%	28.6%		28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%	
Maximum Green (s)	14.9	14.9		14.9	14.9	6.0	33.6	33.6	6.0	33.6		
Yellow Time (s)	3.3	3.3		3.3	3.3	3.0	4.5	4.5	3.0	4.5		
All-Red Time (s)	1.8	1.8		1.8	1.8	1.0	1.9	1.9	1.0	1.9		
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.1			5.1	5.1	4.0	6.4	6.4	4.0	6.4		
Lead/Lag						Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	5.0	5.0	2.0	5.0		
Recall Mode	None	None		None	None	None	Min	Min	None	Min		
Act Effct Green (s)	9.8			9.8	9.8	28.1	24.0	24.0	27.8	23.9		
Actuated g/C Ratio	0.21			0.21	0.21	0.61	0.52	0.52	0.61	0.52		
v/c Ratio	0.43			0.11	0.11	0.12	0.36	0.04	0.09	0.50		
Control Delay	12.1			19.1	0.7	4.5	11.7	0.1	4.3	13.5		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	12.1			19.1	0.7	4.5	11.7	0.1	4.3	13.5		
LOS	B			A	A	B	A	A	A	B		
Approach Delay	12.1			8.0		9.8				12.5		
Approach LOS	B			A		A				B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 45.9

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 11.2

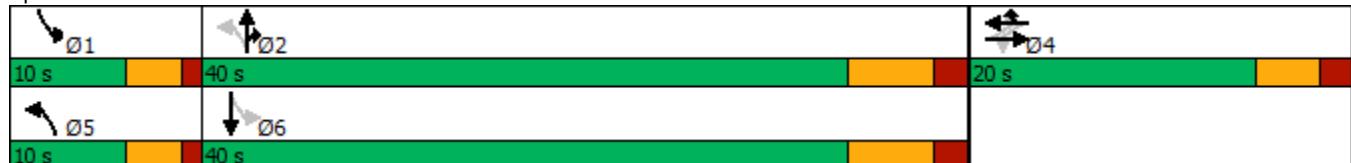
Intersection LOS: B

Intersection Capacity Utilization 54.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



Queues  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing AM



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	176	32	48	69	357	33	62	492
v/c Ratio	0.43	0.11	0.11	0.12	0.36	0.04	0.09	0.50
Control Delay	12.1	19.1	0.7	4.5	11.7	0.1	4.3	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	19.1	0.7	4.5	11.7	0.1	4.3	13.5
Queue Length 50th (ft)	14	7	0	6	73	0	5	110
Queue Length 95th (ft)	58	30	2	18	141	0	16	198
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	579	442	619	602	1425	1247	740	1436
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.07	0.08	0.11	0.25	0.03	0.08	0.34

Intersection Summary



Lanes, Volumes, Timings  
3: Bunker Hill Road & Davis Street Ext.

Proposed Development Bunker Hill Road  
2023 Existing PM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↑	
Traffic Volume (vph)	0	308	333	0	4	71
Future Volume (vph)	0	308	333	0	4	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.872	
Flt Protected					0.998	
Satd. Flow (prot)	0	1900	1900	0	1653	0
Flt Permitted					0.998	
Satd. Flow (perm)	0	1900	1900	0	1653	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		727	1293		499	
Travel Time (s)		19.8	35.3		13.6	
Peak Hour Factor	0.90	0.90	0.96	0.96	0.75	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	342	347	0	5	95
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	342	347	0	100	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 28.8% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	308	333	0	4	71
Future Vol, veh/h	0	308	333	0	4	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	96	96	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	342	347	0	5	95
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	689	347
Stage 1	-	-	-	-	347	-
Stage 2	-	-	-	-	342	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	415	701
Stage 1	0	-	-	0	720	-
Stage 2	0	-	-	0	724	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	415	701
Mov Cap-2 Maneuver	-	-	-	-	415	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	724	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	11.2			
HCM LOS			B			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1			
Capacity (veh/h)	-	-	676			
HCM Lane V/C Ratio	-	-	0.148			
HCM Control Delay (s)	-	-	11.2			
HCM Lane LOS	-	-	B			
HCM 95th %tile Q(veh)	-	-	0.5			

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2023 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	161	166	103	153	138	100	128	498	189	111	451	29
Future Volume (vph)	161	166	103	153	138	100	128	498	189	111	451	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1787	1900	1599	1787	1900	1615
Flt Permitted	0.577			0.631			0.316			0.293		
Satd. Flow (perm)	1096	1900	1615	1199	1900	1615	594	1900	1599	551	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			112			162			197			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.96	0.96	0.96	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%
Adj. Flow (vph)	175	180	112	168	152	110	133	519	197	112	456	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	180	112	168	152	110	133	519	197	112	456	29
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2023 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex	NA	Prot									
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases	8			4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	15.0	20.0		15.0	20.0	20.0	10.0	40.0		10.0	40.0	40.0
Total Split (%)	17.6%	23.5%		17.6%	23.5%	23.5%	11.8%	47.1%		11.8%	47.1%	47.1%
Maximum Green (s)	11.0	14.7		11.0	14.7	14.7	6.0	32.4		6.0	32.4	32.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	5.0		2.0	5.0	5.0
Recall Mode	None	None		None	None	None	Min			None	Min	Min
Act Effct Green (s)	23.2	12.7	24.1	20.8	11.5	11.5	35.5	27.1	39.2	34.2	24.7	24.7
Actuated g/C Ratio	0.32	0.17	0.33	0.29	0.16	0.16	0.49	0.37	0.54	0.47	0.34	0.34
v/c Ratio	0.40	0.54	0.18	0.41	0.51	0.28	0.34	0.73	0.21	0.31	0.71	0.05
Control Delay	20.9	36.4	5.6	21.3	36.7	3.8	11.9	28.2	2.0	11.7	27.8	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	36.4	5.6	21.3	36.7	3.8	11.9	28.2	2.0	11.7	27.8	16.8
LOS	C	D	A	C	D	A	B	C	A	B	C	B
Approach Delay		23.2			22.3			19.6			24.2	
Approach LOS		C			C			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 72.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 22.0

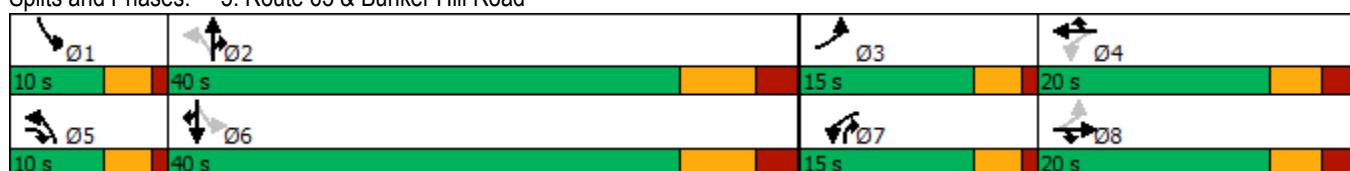
Intersection LOS: C

Intersection Capacity Utilization 67.0%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2023 Existing PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	175	180	112	168	152	110	133	519	197	112	456	29
v/c Ratio	0.40	0.54	0.18	0.41	0.51	0.28	0.34	0.73	0.21	0.31	0.71	0.05
Control Delay	20.9	36.4	5.6	21.3	36.7	3.8	11.9	28.2	2.0	11.7	27.8	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.9	36.4	5.6	21.3	36.7	3.8	11.9	28.2	2.0	11.7	27.8	16.8
Queue Length 50th (ft)	56	76	0	53	65	0	28	208	0	23	175	9
Queue Length 95th (ft)	113	154	36	109	132	17	60	348	27	53	296	27
Internal Link Dist (ft)		1213			748			2197			908	
Turn Bay Length (ft)	215		225	200		170	215		310	115		145
Base Capacity (vph)	480	392	603	487	392	462	390	866	984	366	866	736
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.46	0.19	0.34	0.39	0.24	0.34	0.60	0.20	0.31	0.53	0.04

## Intersection Summary

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	14	57	58	22	154	58	632	183	133	455	15
Future Volume (vph)	27	14	57	58	22	154	58	632	183	133	455	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	125		465	230		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.922				0.850			0.850		0.995	
Flt Protected		0.986			0.965		0.950			0.950		
Satd. Flow (prot)	0	1707	0	0	1834	1615	1770	1900	1615	1805	1890	0
Flt Permitted		0.884			0.749		0.417			0.119		
Satd. Flow (perm)	0	1531	0	0	1423	1615	777	1900	1615	226	1890	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		72				169			251		3	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		334			405			894			2277	
Travel Time (s)		7.6			9.2			13.5			34.5	
Peak Hour Factor	0.79	0.79	0.79	0.91	0.91	0.91	0.73	0.73	0.73	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	18	72	64	24	169	79	866	251	137	469	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	124	0	0	88	169	79	866	251	137	484	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	3		1	3	3	3	1	1	3	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306	
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	10			10	10	10				10		
Detector 2 Size(ft)		6			6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0				0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	26			26	26	16				26		
Detector 3 Size(ft)	6				6	6	6			6		

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)		0.0			0.0	0.0	0.0			0.0		
Turn Type	Perm	NA		Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA	
Protected Phases		4			4	4	5	2	2	1	6	
Permitted Phases	4			4			2			6		
Detector Phase	4	4		4	4	4	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	9.0	9.0		9.0	9.0	9.0	3.0	16.0	16.0	3.0	16.0	
Minimum Split (s)	14.1	14.1		14.1	14.1	14.1	7.0	22.4	22.4	7.0	22.4	
Total Split (s)	20.0	20.0		20.0	20.0	20.0	10.0	40.0	40.0	10.0	40.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%	
Maximum Green (s)	14.9	14.9		14.9	14.9	14.9	6.0	33.6	33.6	6.0	33.6	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.8	1.8		1.8	1.8	1.8	1.0	1.9	1.9	1.0	1.9	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.1			5.1	5.1	4.0	6.4	6.4	4.0	6.4	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max	None	Max		
Act Effct Green (s)		10.6			10.6	10.6	40.9	33.8	33.8	40.9	33.8	
Actuated g/C Ratio	0.17			0.17	0.17	0.64	0.53	0.53	0.64	0.53		
v/c Ratio	0.40				0.37	0.41	0.13	0.86	0.26	0.47	0.48	
Control Delay		16.2			29.4	8.0	4.2	25.8	2.3	11.2	12.5	
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		16.2			29.4	8.0	4.2	25.8	2.3	11.2	12.5	
LOS	B			C	A	A	C	A	B	B		
Approach Delay		16.2			15.3			19.4			12.2	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 63.7

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 16.7

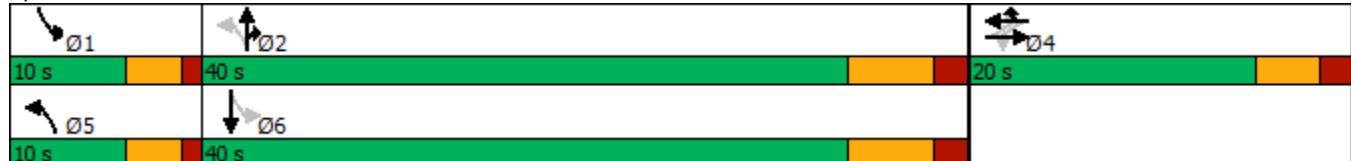
Intersection LOS: B

Intersection Capacity Utilization 65.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



Queues  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2023 Existing PM



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	124	88	169	79	866	251	137	484
v/c Ratio	0.40	0.37	0.41	0.13	0.86	0.26	0.47	0.48
Control Delay	16.2	29.4	8.0	4.2	25.8	2.3	11.2	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	29.4	8.0	4.2	25.8	2.3	11.2	12.5
Queue Length 50th (ft)	18	32	0	7	276	0	13	112
Queue Length 95th (ft)	48	70	45	18	347	15	50	216
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	415	335	509	593	1009	975	294	1005
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.26	0.33	0.13	0.86	0.26	0.47	0.48

Intersection Summary



## Lanes, Volumes, Timings

## 3: Bunker Hill Road &amp; Davis Street Ext.

## Proposed Development Bunker Hill Road

2028 Background AM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↗	
Traffic Volume (vph)	0	285	153	0	9	44
Future Volume (vph)	0	285	153	0	9	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.887	
Flt Protected					0.992	
Satd. Flow (prot)	0	1900	1900	0	1672	0
Flt Permitted					0.992	
Satd. Flow (perm)	0	1900	1900	0	1672	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		727	1293		499	
Travel Time (s)		19.8	35.3		13.6	
Peak Hour Factor	0.89	0.89	0.87	0.87	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	320	176	0	10	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	320	176	0	60	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 25.0% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	285	153	0	9	44
Future Vol, veh/h	0	285	153	0	9	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	87	87	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	320	176	0	10	50
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	496	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	320	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	537	872
Stage 1	0	-	-	0	859	-
Stage 2	0	-	-	0	741	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	537	872
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	741	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	9.9			
HCM LOS			A			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1			
Capacity (veh/h)	-	-	788			
HCM Lane V/C Ratio	-	-	0.076			
HCM Control Delay (s)	-	-	9.9			
HCM Lane LOS	-	-	A			
HCM 95th %tile Q(veh)	-	-	0.2			

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	50	117	111	162	70	60	36	270	75	86	470	15
Future Volume (vph)	50	117	111	162	70	60	36	270	75	86	470	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1805	1900	1615	1787	1900	1615
Flt Permitted	0.706			0.523			0.254			0.429		
Satd. Flow (perm)	1341	1900	1615	994	1900	1615	483	1900	1615	807	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			126			146			103			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.88	0.88	0.88	0.90	0.90	0.90	0.73	0.73	0.73	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	57	133	126	180	78	67	49	370	103	96	522	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	57	133	126	180	78	67	49	370	103	96	522	17
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Background AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex											
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases	8			4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	12.0	25.0		12.0	25.0	25.0	12.0	45.0		12.0	45.0	45.0
Total Split (%)	12.8%	26.6%		12.8%	26.6%	26.6%	12.8%	47.9%		12.8%	47.9%	47.9%
Maximum Green (s)	8.0	19.7		8.0	19.7	19.7	8.0	37.4		8.0	37.4	37.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.0	5.0		2.0	5.0	5.0	
Recall Mode	None	None		None	None	None	Min		None	Min	Min	
Act Effct Green (s)	18.9	11.0	22.3	22.3	16.7	16.7	31.3	23.0	34.7	32.3	23.6	23.6
Actuated g/C Ratio	0.28	0.16	0.33	0.33	0.25	0.25	0.47	0.34	0.52	0.48	0.35	0.35
v/c Ratio	0.14	0.43	0.20	0.43	0.17	0.13	0.14	0.57	0.12	0.20	0.78	0.03
Control Delay	18.9	33.6	5.4	22.5	28.0	0.5	8.8	22.6	2.6	9.0	29.6	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	33.6	5.4	22.5	28.0	0.5	8.8	22.6	2.6	9.0	29.6	15.3
LOS	B	C	A	C	A	A	C	A	A	C	B	
Approach Delay		19.7			19.3			17.4			26.1	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 67.2

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

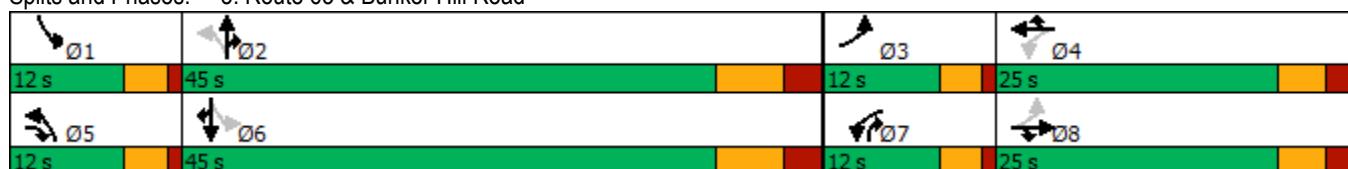
Maximum v/c Ratio: 0.78

Intersection Signal Delay: 21.2 Intersection LOS: C

Intersection Capacity Utilization 57.8% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Background AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	57	133	126	180	78	67	49	370	103	96	522	17
v/c Ratio	0.14	0.43	0.20	0.43	0.17	0.13	0.14	0.57	0.12	0.20	0.78	0.03
Control Delay	18.9	33.6	5.4	22.5	28.0	0.5	8.8	22.6	2.6	9.0	29.6	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	33.6	5.4	22.5	28.0	0.5	8.8	22.6	2.6	9.0	29.6	15.3
Queue Length 50th (ft)	15	51	0	53	28	0	9	125	0	18	191	5
Queue Length 95th (ft)	48	118	36	129	78	0	20	171	12	42	338	18
Internal Link Dist (ft)	1213			748			2197			908		
Turn Bay Length (ft)	215			225	200			170	215			310
Base Capacity (vph)	471	582	677	431	586	599	400	1105	1002	522	1105	939
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.23	0.19	0.42	0.13	0.11	0.12	0.33	0.10	0.18	0.47	0.02

## Intersection Summary

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Background AM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	5	96	22	7	45	61	364	29	53	481	8
Future Volume (vph)	47	5	96	22	7	45	61	364	29	53	481	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	125		465	230		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.913				0.850			0.850		0.998	
Flt Protected		0.984			0.964		0.950			0.950		
Satd. Flow (prot)	0	1674	0	0	1765	1615	1770	1881	1615	1805	1896	0
Flt Permitted		0.881			0.705		0.342			0.494		
Satd. Flow (perm)	0	1499	0	0	1291	1615	637	1881	1615	939	1896	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		114				115			95		2	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		334			405			894			2277	
Travel Time (s)		7.6			9.2			13.5			34.5	
Peak Hour Factor	0.84	0.84	0.84	0.93	0.93	0.93	0.88	0.88	0.88	0.86	0.86	0.86
Heavy Vehicles (%)	0%	0%	3%	5%	0%	0%	2%	1%	0%	0%	0%	0%
Adj. Flow (vph)	56	6	114	24	8	48	69	414	33	62	559	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	176	0	0	32	48	69	414	33	62	568	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	3		1	3	3	3	1	1	3	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306	
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	10			10	10	10				10		
Detector 2 Size(ft)	6			6	6	6				6		
Detector 2 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Detector 3 Position(ft)	26			26	26	16				26		
Detector 3 Size(ft)	6			6	6	6				6		

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Background AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Turn Type	Perm	NA		Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA	
Protected Phases	4			4	4	5	2	2	1	6		
Permitted Phases	4			4		2			6			
Detector Phase	4	4		4	4	5	2	2	1	6		
Switch Phase												
Minimum Initial (s)	9.0	9.0		9.0	9.0	3.0	16.0	16.0	3.0	16.0		
Minimum Split (s)	14.1	14.1		14.1	14.1	7.0	22.4	22.4	7.0	22.4		
Total Split (s)	20.0	20.0		20.0	20.0	10.0	40.0	40.0	10.0	40.0		
Total Split (%)	28.6%	28.6%		28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%	
Maximum Green (s)	14.9	14.9		14.9	14.9	6.0	33.6	33.6	6.0	33.6		
Yellow Time (s)	3.3	3.3		3.3	3.3	3.0	4.5	4.5	3.0	4.5		
All-Red Time (s)	1.8	1.8		1.8	1.8	1.0	1.9	1.9	1.0	1.9		
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Lost Time (s)	5.1			5.1	5.1	4.0	6.4	6.4	4.0	6.4		
Lead/Lag						Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	5.0	5.0	2.0	5.0		
Recall Mode	None	None		None	None	None	Min	Min	None	Min		
Act Effct Green (s)	10.1			10.1	10.1	30.0	26.1	26.1	29.8	25.9		
Actuated g/C Ratio	0.21			0.21	0.21	0.62	0.54	0.54	0.62	0.54		
v/c Ratio	0.44			0.12	0.11	0.13	0.41	0.04	0.09	0.55		
Control Delay	12.9			20.9	0.5	4.4	11.7	0.1	4.2	13.9		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	12.9			20.9	0.5	4.4	11.7	0.1	4.2	13.9		
LOS	B			C	A	A	B	A	A	B		
Approach Delay	12.9			8.7			10.0			13.0		
Approach LOS	B			A			B			B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 48

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

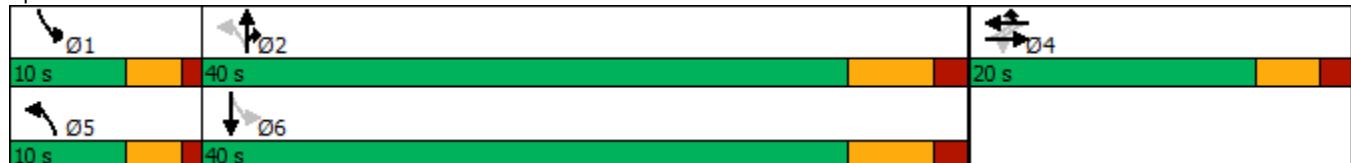
Maximum v/c Ratio: 0.55

Intersection Signal Delay: 11.6 Intersection LOS: B

Intersection Capacity Utilization 57.5% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



Queues  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road

2028 Background AM



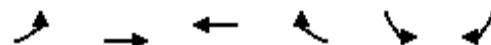
Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	176	32	48	69	414	33	62	568
v/c Ratio	0.44	0.12	0.11	0.13	0.41	0.04	0.09	0.55
Control Delay	12.9	20.9	0.5	4.4	11.7	0.1	4.2	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.9	20.9	0.5	4.4	11.7	0.1	4.2	13.9
Queue Length 50th (ft)	15	7	0	6	87	0	5	135
Queue Length 95th (ft)	62	32	1	19	168	0	17	240
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	565	420	603	548	1381	1211	700	1393
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.08	0.08	0.13	0.30	0.03	0.09	0.41

Intersection Summary



Lanes, Volumes, Timings  
3: Bunker Hill Road & Davis Street Ext.

Proposed Development Bunker Hill Road  
2028 Background PM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↖	↙
Traffic Volume (vph)	0	357	386	0	5	82
Future Volume (vph)	0	357	386	0	5	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.873	
Flt Protected					0.997	
Satd. Flow (prot)	0	1900	1900	0	1654	0
Flt Permitted					0.997	
Satd. Flow (perm)	0	1900	1900	0	1654	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		727	1293		499	
Travel Time (s)		19.8	35.3		13.6	
Peak Hour Factor	0.90	0.90	0.96	0.96	0.75	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	397	402	0	7	109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	397	402	0	116	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 32.3% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	357	386	0	5	82
Future Vol, veh/h	0	357	386	0	5	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	96	96	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	397	402	0	7	109
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	799	402
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	397	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	357	653
Stage 1	0	-	-	0	680	-
Stage 2	0	-	-	0	683	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	357	653
Mov Cap-2 Maneuver	-	-	-	-	357	-
Stage 1	-	-	-	-	680	-
Stage 2	-	-	-	-	683	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	12.1			
HCM LOS			B			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1	SBLn2	SBLn3	SBLn4
Capacity (veh/h)	-	-	623	-	-	-
HCM Lane V/C Ratio	-	-	0.186	-	-	-
HCM Control Delay (s)	-	-	12.1	-	-	-
HCM Lane LOS	-	-	B	-	-	-
HCM 95th %tile Q(veh)	-	-	0.7	-	-	-

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Background PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	187	192	119	177	160	116	148	577	219	129	523	34
Future Volume (vph)	187	192	119	177	160	116	148	577	219	129	523	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1787	1900	1599	1787	1900	1615
Flt Permitted	0.507			0.523			0.246			0.212		
Satd. Flow (perm)	963	1900	1615	994	1900	1615	463	1900	1599	399	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			129			162			228			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.96	0.96	0.96	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%
Adj. Flow (vph)	203	209	129	195	176	127	154	601	228	130	528	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	203	209	129	195	176	127	154	601	228	130	528	34
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Background PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex	NA	Prot									
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases				4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	15.0	20.0		15.0	20.0	20.0	10.0	40.0		10.0	40.0	40.0
Total Split (%)	17.6%	23.5%		17.6%	23.5%	23.5%	11.8%	47.1%		11.8%	47.1%	47.1%
Maximum Green (s)	11.0	14.7		11.0	14.7	14.7	6.0	32.4		6.0	32.4	32.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	5.0		2.0	5.0	5.0
Recall Mode	None	None		None	None	None	Min			None	Min	Min
Act Effct Green (s)	24.4	13.3	24.7	22.1	12.2	12.2	38.2	30.0	42.7	37.0	27.5	27.5
Actuated g/C Ratio	0.32	0.17	0.32	0.29	0.16	0.16	0.50	0.39	0.56	0.48	0.36	0.36
v/c Ratio	0.49	0.64	0.21	0.52	0.59	0.32	0.46	0.81	0.23	0.44	0.78	0.06
Control Delay	23.6	41.2	5.4	24.4	40.3	5.3	14.4	32.7	2.0	14.2	31.1	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	41.2	5.4	24.4	40.3	5.3	14.4	32.7	2.0	14.2	31.1	16.8
LOS	C	D	A	C	D	A	B	C	A	B	C	B
Approach Delay		26.1			25.2			22.7			27.2	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 76.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 25.0

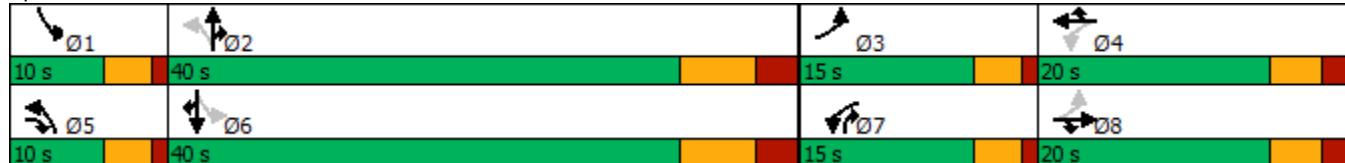
Intersection LOS: C

Intersection Capacity Utilization 74.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Background PM

	↗	→	↘	↖	←	↙	↑	↗	↘	↓	↖	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	203	209	129	195	176	127	154	601	228	130	528	34
v/c Ratio	0.49	0.64	0.21	0.52	0.59	0.32	0.46	0.81	0.23	0.44	0.78	0.06
Control Delay	23.6	41.2	5.4	24.4	40.3	5.3	14.4	32.7	2.0	14.2	31.1	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.6	41.2	5.4	24.4	40.3	5.3	14.4	32.7	2.0	14.2	31.1	16.8
Queue Length 50th (ft)	76	103	0	73	87	0	36	272	0	30	226	11
Queue Length 95th (ft)	130	177	38	125	150	28	69	#467	29	60	357	29
Internal Link Dist (ft)		1213			748			2197			908	
Turn Bay Length (ft)	215		225	200		170	215		310	115		145
Base Capacity (vph)	440	371	591	437	371	446	336	818	1027	304	818	696
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.56	0.22	0.45	0.47	0.28	0.46	0.73	0.22	0.43	0.65	0.05

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Background PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	14	57	58	22	154	58	733	183	133	527	15
Future Volume (vph)	27	14	57	58	22	154	58	733	183	133	527	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	125		465	230		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.922				0.850			0.850		0.996	
Flt Protected		0.986			0.965		0.950			0.950		
Satd. Flow (prot)	0	1707	0	0	1834	1615	1770	1900	1615	1805	1892	0
Flt Permitted		0.884			0.749		0.356			0.118		
Satd. Flow (perm)	0	1531	0	0	1423	1615	663	1900	1615	224	1892	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		72				169			251		3	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		334			405			894			2277	
Travel Time (s)		7.6			9.2			13.5			34.5	
Peak Hour Factor	0.79	0.79	0.79	0.91	0.91	0.91	0.73	0.73	0.73	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	34	18	72	64	24	169	79	1004	251	137	543	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	124	0	0	88	169	79	1004	251	137	558	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16			16			16			16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	3		1	3	3	3	1	1	3	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306	
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	10			10	10	10				10		
Detector 2 Size(ft)	6			6	6	6				6		
Detector 2 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex				Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0				0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	26			26	26	16				26		
Detector 3 Size(ft)	6			6	6	6				6		

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Background PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex				Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex				
Detector 3 Channel												
Detector 3 Extend (s)	0.0				0.0	0.0	0.0	0.0				
Turn Type	Perm	NA	Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA		
Protected Phases	4				4	4	5	2	2	1	6	
Permitted Phases	4				4	2		6				
Detector Phase	4	4	4	4	4	5	2	2	1	6		
Switch Phase												
Minimum Initial (s)	9.0	9.0	9.0	9.0	9.0	3.0	16.0	16.0	3.0	16.0		
Minimum Split (s)	14.1	14.1	14.1	14.1	14.1	7.0	22.4	22.4	7.0	22.4		
Total Split (s)	20.0	20.0	20.0	20.0	20.0	10.0	40.0	40.0	10.0	40.0		
Total Split (%)	28.6%	28.6%	28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%		
Maximum Green (s)	14.9	14.9	14.9	14.9	14.9	6.0	33.6	33.6	6.0	33.6		
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	4.5	4.5	3.0	4.5		
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.0	1.9	1.9	1.0	1.9		
Lost Time Adjust (s)	0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.1				5.1	5.1	4.0	6.4	6.4	4.0	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	None	None	None	Max	Max	None	Max		
Act Effct Green (s)	10.6				10.6	10.6	40.9	33.8	33.8	40.9	33.8	
Actuated g/C Ratio	0.17				0.17	0.17	0.64	0.53	0.53	0.64	0.53	
v/c Ratio	0.40				0.37	0.41	0.15	1.00	0.26	0.47	0.55	
Control Delay	16.2				29.4	8.0	4.3	46.7	2.3	11.4	13.7	
Queue Delay	0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	16.2				29.4	8.0	4.3	46.7	2.3	11.4	13.7	
LOS	B				C	A	A	D	A	B	B	
Approach Delay	16.2				15.3	35.8				13.2		
Approach LOS	B				B	D				B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 63.7

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 26.1

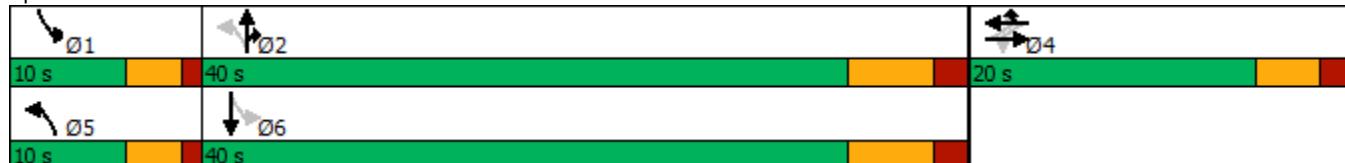
Intersection LOS: C

Intersection Capacity Utilization 71.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



## Queues

## 8: Route 63 &amp; New Wood Road

## Proposed Development Bunker Hill Road

2028 Background PM



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	124	88	169	79	1004	251	137	558
v/c Ratio	0.40	0.37	0.41	0.15	1.00	0.26	0.47	0.55
Control Delay	16.2	29.4	8.0	4.3	46.7	2.3	11.4	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.2	29.4	8.0	4.3	46.7	2.3	11.4	13.7
Queue Length 50th (ft)	18	32	0	7	~381	0	13	136
Queue Length 95th (ft)	48	70	45	18	#501	15	50	260
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	415	335	509	530	1009	975	293	1006
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.26	0.33	0.15	1.00	0.26	0.47	0.55

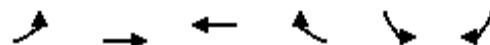
## Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.



Lanes, Volumes, Timings  
3: Bunker Hill Road & Davis Street Ext.

Proposed Development Bunker Hill Road  
2028 Build AM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↗	
Traffic Volume (vph)	0	314	167	0	9	44
Future Volume (vph)	0	314	167	0	9	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.887	
Flt Protected					0.992	
Satd. Flow (prot)	0	1900	1900	0	1672	0
Flt Permitted					0.992	
Satd. Flow (perm)	0	1900	1900	0	1672	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		408	1293		499	
Travel Time (s)		11.1	35.3		13.6	
Peak Hour Factor	0.89	0.89	0.87	0.87	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	353	192	0	10	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	353	192	0	60	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.5% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		Y	
Traffic Vol, veh/h	0	314	167	0	9	44
Future Vol, veh/h	0	314	167	0	9	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	89	89	87	87	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	353	192	0	10	50
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	545	192
Stage 1	-	-	-	-	192	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	503	855
Stage 1	0	-	-	0	845	-
Stage 2	0	-	-	0	716	-
Platoon blocked, %	-	-				
Mov Cap-1 Maneuver	-	-	-	-	503	855
Mov Cap-2 Maneuver	-	-	-	-	503	-
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	716	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	10.1			
HCM LOS			B			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1			
Capacity (veh/h)	-	-	764			
HCM Lane V/C Ratio	-	-	0.079			
HCM Control Delay (s)	-	-	10.1			
HCM Lane LOS	-	-	B			
HCM 95th %tile Q(veh)	-	-	0.3			

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Build AM

Lane Group	EBL	EBT	EBC	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	126	125	172	74	60	42	277	78	86	495	18
Future Volume (vph)	56	126	125	172	74	60	42	277	78	86	495	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1805	1900	1615	1787	1900	1615
Flt Permitted	0.704			0.523			0.212			0.454		
Satd. Flow (perm)	1338	1900	1615	994	1900	1615	403	1900	1615	854	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			142			146			107			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.88	0.88	0.88	0.90	0.90	0.90	0.73	0.73	0.73	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Adj. Flow (vph)	64	143	142	191	82	67	58	379	107	96	550	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	64	143	142	191	82	67	58	379	107	96	550	20
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex											
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases	8			4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	12.0	25.0		12.0	25.0	25.0	12.0	45.0		12.0	45.0	45.0
Total Split (%)	12.8%	26.6%		12.8%	26.6%	26.6%	12.8%	47.9%		12.8%	47.9%	47.9%
Maximum Green (s)	8.0	19.7		8.0	19.7	19.7	8.0	37.4		8.0	37.4	37.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.0	5.0			2.0	5.0	5.0
Recall Mode	None	None		None	None	None	Min			None	Min	Min
Act Effct Green (s)	19.2	11.3	22.7	22.5	16.8	16.8	35.2	26.6	38.4	34.8	24.8	24.8
Actuated g/C Ratio	0.27	0.16	0.32	0.32	0.24	0.24	0.50	0.37	0.54	0.49	0.35	0.35
v/c Ratio	0.16	0.48	0.23	0.48	0.18	0.14	0.18	0.53	0.12	0.19	0.83	0.04
Control Delay	19.8	35.5	5.2	24.4	29.1	0.6	9.2	21.6	2.5	9.0	33.3	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	35.5	5.2	24.4	29.1	0.6	9.2	21.6	2.5	9.0	33.3	15.5
LOS	B	D	A	C	A	A	C	A	A	C		B
Approach Delay		20.3			20.8			16.5			29.2	
Approach LOS		C			C			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 71.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 22.4

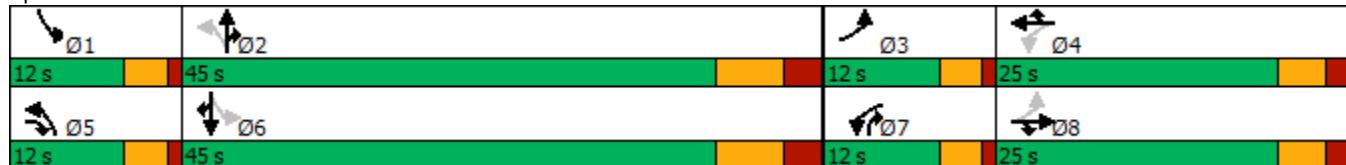
Intersection LOS: C

Intersection Capacity Utilization 63.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	64	143	142	191	82	67	58	379	107	96	550	20
v/c Ratio	0.16	0.48	0.23	0.48	0.18	0.14	0.18	0.53	0.12	0.19	0.83	0.04
Control Delay	19.8	35.5	5.2	24.4	29.1	0.6	9.2	21.6	2.5	9.0	33.3	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	35.5	5.2	24.4	29.1	0.6	9.2	21.6	2.5	9.0	33.3	15.5
Queue Length 50th (ft)	18	57	0	59	31	0	11	130	0	18	210	6
Queue Length 95th (ft)	53	127	37	138	82	0	23	178	12	43	370	20
Internal Link Dist (ft)	1213			748			2197			908		
Turn Bay Length (ft)	215		225	200		170	215		310	115		145
Base Capacity (vph)	445	541	658	408	549	570	369	1028	954	549	1028	874
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.26	0.22	0.47	0.15	0.12	0.16	0.37	0.11	0.17	0.54	0.02

## Intersection Summary

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Build AM

	↑	→	↓	↗	↖	↙	↖	↗	↑	↗	↖	↓	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	59	5	114	22	7	45	121	369	29	53	490	48	
Future Volume (vph)	59	5	114	22	7	45	121	369	29	53	490	48	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	0		200	125		465	230		0	
Storage Lanes	0		0	0		1	1		1	1		0	
Taper Length (ft)	25			25			40			60			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.913				0.850			0.850		0.987		
Flt Protected		0.984			0.964		0.950			0.950			
Satd. Flow (prot)	0	1675	0	0	1765	1615	1770	1881	1615	1805	1875	0	
Flt Permitted		0.877			0.615		0.274			0.516			
Satd. Flow (perm)	0	1493	0	0	1126	1615	510	1881	1615	980	1875	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		117				115			95		10		
Link Speed (mph)		30			30			45			45		
Link Distance (ft)		334			405			894			2277		
Travel Time (s)		7.6			9.2			13.5			34.5		
Peak Hour Factor	0.84	0.84	0.84	0.93	0.93	0.93	0.88	0.88	0.88	0.86	0.86	0.86	
Heavy Vehicles (%)	0%	0%	3%	5%	0%	0%	2%	1%	0%	0%	0%	0%	
Adj. Flow (vph)	70	6	136	24	8	48	138	419	33	62	570	56	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	212	0	0	32	48	138	419	33	62	626	0	
Enter Blocked Intersection	No												
Lane Alignment	Left	Left	Right										
Median Width(ft)	0				0				12		12		
Link Offset(ft)	0				0			0			0		
Crosswalk Width(ft)	16			16			16			16			
Two way Left Turn Lane													
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15		9	15		9	15		9	15		9	
Number of Detectors	1	3		1	3	3	3	1	1	3	1		
Detector Template	Left			Left									
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306		
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300		
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300		
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6		
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex									
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	10			10	10	10				10			
Detector 2 Size(ft)	6			6	6	6				6			
Detector 2 Type	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex			
Detector 2 Channel													
Detector 2 Extend (s)	0.0				0.0	0.0	0.0			0.0			
Detector 3 Position(ft)	26			26	26	16				26			
Detector 3 Size(ft)	6			6	6	6				6			

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Build AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Turn Type	Perm	NA		Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA	
Protected Phases		4			4	4	5	2	2	1	6	
Permitted Phases	4			4			2			6		
Detector Phase	4	4		4	4	4	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	9.0	9.0		9.0	9.0	9.0	3.0	16.0	16.0	3.0	16.0	
Minimum Split (s)	14.1	14.1		14.1	14.1	14.1	7.0	22.4	22.4	7.0	22.4	
Total Split (s)	20.0	20.0		20.0	20.0	20.0	10.0	40.0	40.0	10.0	40.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%	
Maximum Green (s)	14.9	14.9		14.9	14.9	14.9	6.0	33.6	33.6	6.0	33.6	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.8	1.8		1.8	1.8	1.8	1.0	1.9	1.9	1.0	1.9	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		5.1			5.1	5.1	4.0	6.4	6.4	4.0	6.4	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	5.0	5.0	2.0	5.0		
Recall Mode	None	None		None	None	None	Min	Min	None	Min		
Act Effct Green (s)	11.1			11.1	11.1	33.3	29.9	29.9	31.8	27.5		
Actuated g/C Ratio	0.22			0.22	0.22	0.65	0.58	0.58	0.62	0.54		
v/c Ratio	0.51			0.13	0.11	0.29	0.38	0.03	0.09	0.62		
Control Delay	15.9			22.4	0.5	5.7	11.3	0.1	4.3	16.1		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.9			22.4	0.5	5.7	11.3	0.1	4.3	16.1		
LOS	B			C	A	A	B	A	A	A	B	
Approach Delay	15.9			9.3			9.4				15.0	
Approach LOS	B			A			A				B	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 51.2

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

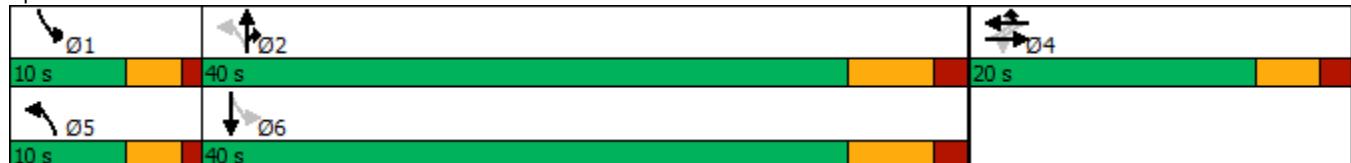
Maximum v/c Ratio: 0.62

Intersection Signal Delay: 12.7 Intersection LOS: B

Intersection Capacity Utilization 65.5% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



Queues  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road

2028 Build AM



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	212	32	48	138	419	33	62	626
v/c Ratio	0.51	0.13	0.11	0.29	0.38	0.03	0.09	0.62
Control Delay	15.9	22.4	0.5	5.7	11.3	0.1	4.3	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	22.4	0.5	5.7	11.3	0.1	4.3	16.1
Queue Length 50th (ft)	25	8	0	13	89	0	5	157
Queue Length 95th (ft)	84	33	1	36	177	0	18	285
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	554	357	592	493	1286	1134	723	1285
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.09	0.08	0.28	0.33	0.03	0.09	0.49

Intersection Summary

## Lanes, Volumes, Timings

## 11: Site Driveway &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Build AM



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↓	↖	↙	↖	↗
Traffic Volume (vph)	290	3	12	199	6	24
Future Volume (vph)	290	3	12	199	6	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>	0.999				0.893	
Flt Protected				0.997	0.990	
Satd. Flow (prot)	1898	0	0	1894	1680	0
Flt Permitted				0.997	0.990	
Satd. Flow (perm)	1898	0	0	1894	1680	0
Link Speed (mph)	25			25	30	
Link Distance (ft)	318			408	324	
Travel Time (s)	8.7			11.1	7.4	
Peak Hour Factor	0.89	0.89	0.87	0.87	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	326	3	14	229	7	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	329	0	0	243	34	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 30.3% ICU Level of Service A

Analysis Period (min) 15

Intersection

Int Delay, s/veh 0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	290	3	12	199	6	24
Future Vol, veh/h	290	3	12	199	6	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	87	87	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	326	3	14	229	7	27

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	329	0	585 328
Stage 1	-	-	-	-	328 -
Stage 2	-	-	-	-	257 -
Critical Hdwy	-	-	4.1	-	6.4 6.2
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	-	-	2.2	-	3.5 3.3
Pot Cap-1 Maneuver	-	-	1242	-	477 718
Stage 1	-	-	-	-	734 -
Stage 2	-	-	-	-	791 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1242	-	471 718
Mov Cap-2 Maneuver	-	-	-	-	471 -
Stage 1	-	-	-	-	734 -
Stage 2	-	-	-	-	781 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	10.8
HCM LOS		B	

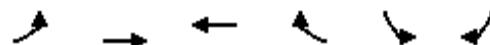
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	650	-	-	1242	-
HCM Lane V/C Ratio	0.052	-	-	0.011	-
HCM Control Delay (s)	10.8	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

## Lanes, Volumes, Timings

## 3: Bunker Hill Road &amp; Davis Street Ext.

## Proposed Development Bunker Hill Road

2028 Build PM



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	383	431	0	5	82
Future Volume (vph)	0	383	431	0	5	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.873	
Flt Protected					0.997	
Satd. Flow (prot)	0	1900	1900	0	1654	0
Flt Permitted					0.997	
Satd. Flow (perm)	0	1900	1900	0	1654	0
Link Speed (mph)		25	25		25	
Link Distance (ft)		408	1293		499	
Travel Time (s)		11.1	35.3		13.6	
Peak Hour Factor	0.90	0.90	0.96	0.96	0.75	0.75
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	426	449	0	7	109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	426	449	0	116	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 34.7%

ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↘	
Traffic Vol, veh/h	0	383	431	0	5	82
Future Vol, veh/h	0	383	431	0	5	82
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	96	96	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	426	449	0	7	109
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	875	449
Stage 1	-	-	-	-	449	-
Stage 2	-	-	-	-	426	-
Critical Hdwy	-	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	0	-	-	0	322	614
Stage 1	0	-	-	0	647	-
Stage 2	0	-	-	0	663	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	322	614
Mov Cap-2 Maneuver	-	-	-	-	322	-
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	663	-
Approach	EB	WB	SB			
HCM Control Delay, s	0	0	12.7			
HCM LOS			B			
Minor Lane/Major Mvmt	EBT	WBT	SBLn1	SBLn2	SBLn3	SBLn4
Capacity (veh/h)	-	-	584	-	-	-
HCM Lane V/C Ratio	-	-	0.199	-	-	-
HCM Control Delay (s)	-	-	12.7	-	-	-
HCM Lane LOS	-	-	B	-	-	-
HCM 95th %tile Q(veh)	-	-	0.7	-	-	-

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	201	130	181	175	116	168	602	229	129	533	44
Future Volume (vph)	193	201	130	181	175	116	168	602	229	129	533	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	215		225	200		170	215		310	115		145
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (ft)	75			150			40			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1900	1615	1805	1900	1615	1787	1900	1599	1787	1900	1615
Flt Permitted	0.465			0.496			0.235			0.186		
Satd. Flow (perm)	884	1900	1615	942	1900	1615	442	1900	1599	350	1900	1615
Right Turn on Red			Yes			Yes			Yes			No
Satd. Flow (RTOR)			141			162			239			
Link Speed (mph)		25			25			45			40	
Link Distance (ft)		1293			828			2277			988	
Travel Time (s)		35.3			22.6			34.5			16.8	
Peak Hour Factor	0.92	0.92	0.92	0.91	0.91	0.91	0.96	0.96	0.96	0.99	0.99	0.99
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%
Adj. Flow (vph)	210	218	141	199	192	127	175	627	239	130	538	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	210	218	141	199	192	127	175	627	239	130	538	44
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	3	3	3	3	3	3	3	1	1	3	1	0
Detector Template												
Leading Detector (ft)	37	37	37	37	37	37	37	206	206	37	236	0
Trailing Detector (ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Position(ft)	-1	-1	1	-6	-6	-6	-1	200	200	-1	230	0
Detector 1 Size(ft)	6	6	6	6	6	6	6	6	6	6	6	20
Detector 1 Type	Cl+Ex											
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	15	15	15	15	15	15	15			15		
Detector 2 Size(ft)	6	6	6	6	6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex								
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Detector 3 Position(ft)	31	31	31	31	31	31	31			31		
Detector 3 Size(ft)	6	6	6	6	6	6	6			6		

Lanes, Volumes, Timings  
5: Route 63 & Bunker Hill Road

Proposed Development Bunker Hill Road  
2028 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex											
Detector 3 Channel												
Detector 3 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Turn Type	pm+pt	NA	pt+ov	pm+pt	NA	Prot	pm+pt	NA	pt+ov	pm+pt	NA	Prot
Protected Phases	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Permitted Phases	8			4			2			6		
Detector Phase	3	8	5 8	7	4	4	5	2	2 7	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	9.0		5.0	9.0	9.0	3.0	16.0		3.0	16.0	16.0
Minimum Split (s)	9.0	14.3		9.0	14.3	14.3	7.0	23.6		7.0	23.6	23.6
Total Split (s)	15.0	20.0		15.0	20.0	20.0	10.0	40.0		10.0	40.0	40.0
Total Split (%)	17.6%	23.5%		17.6%	23.5%	23.5%	11.8%	47.1%		11.8%	47.1%	47.1%
Maximum Green (s)	11.0	14.7		11.0	14.7	14.7	6.0	32.4		6.0	32.4	32.4
Yellow Time (s)	3.0	3.3		3.0	3.3	3.3	3.0	4.8		3.0	4.8	4.8
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	1.0	2.8		1.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	5.3		4.0	5.3	5.3	4.0	7.6		4.0	7.6	7.6
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.0	5.0		2.0	5.0	5.0
Recall Mode	None	None		None	None	None	Min			None	Min	Min
Act Effct Green (s)	24.8	13.6	25.1	22.6	12.4	12.4	38.8	30.6	43.4	37.5	27.9	27.9
Actuated g/C Ratio	0.32	0.18	0.32	0.29	0.16	0.16	0.50	0.39	0.56	0.48	0.36	0.36
v/c Ratio	0.53	0.66	0.23	0.54	0.63	0.32	0.54	0.84	0.24	0.47	0.79	0.08
Control Delay	24.7	42.4	5.3	25.1	42.2	5.2	16.6	35.0	2.0	15.3	31.8	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	42.4	5.3	25.1	42.2	5.2	16.6	35.0	2.0	15.3	31.8	17.0
LOS	C	D	A	C	D	A	B	C	A	B	C	B
Approach Delay		26.7			26.6			24.3			27.9	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 77.7

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 26.1

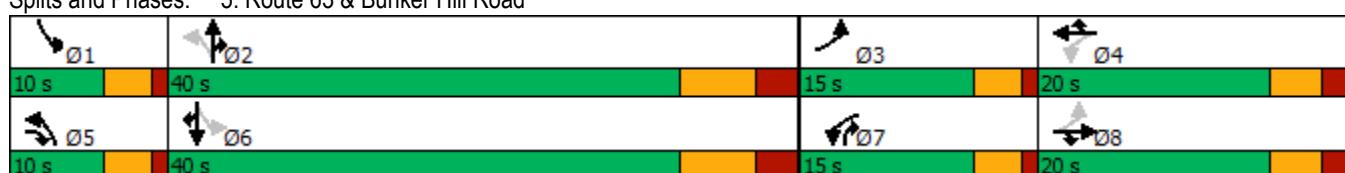
Intersection LOS: C

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 5: Route 63 & Bunker Hill Road



## Queues

## 5: Route 63 &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	210	218	141	199	192	127	175	627	239	130	538	44
V/c Ratio	0.53	0.66	0.23	0.54	0.63	0.32	0.54	0.84	0.24	0.47	0.79	0.08
Control Delay	24.7	42.4	5.3	25.1	42.2	5.2	16.6	35.0	2.0	15.3	31.8	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	42.4	5.3	25.1	42.2	5.2	16.6	35.0	2.0	15.3	31.8	17.0
Queue Length 50th (ft)	79	108	0	75	95	0	43	294	0	31	236	14
Queue Length 95th (ft)	134	#196	39	127	163	28	78	#500	30	60	365	36
Internal Link Dist (ft)		1213			748			2197			908	
Turn Bay Length (ft)	215		225	200		170	215		310	115		145
Base Capacity (vph)	423	366	594	427	366	442	326	807	1022	283	807	686
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.60	0.24	0.47	0.52	0.29	0.54	0.78	0.23	0.46	0.67	0.06

## Intersection Summary

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Build PM

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	14	117	58	22	154	81	748	183	133	536	30
Future Volume (vph)	67	14	117	58	22	154	81	748	183	133	536	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		200	125		465	230		0
Storage Lanes	0		0	0		1	1		1	1		0
Taper Length (ft)	25			25			40			60		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920				0.850			0.850		0.992	
Flt Protected		0.983			0.965		0.950			0.950		
Satd. Flow (prot)	0	1698	0	0	1834	1615	1770	1900	1615	1805	1885	0
Flt Permitted		0.853			0.554		0.324			0.118		
Satd. Flow (perm)	0	1474	0	0	1053	1615	604	1900	1615	224	1885	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		94				169			251		6	
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		334			405			894			2277	
Travel Time (s)		7.6			9.2			13.5			34.5	
Peak Hour Factor	0.79	0.79	0.79	0.91	0.91	0.91	0.73	0.73	0.73	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	85	18	148	64	24	169	111	1025	251	137	553	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	251	0	0	88	169	111	1025	251	137	584	0
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)	0				0			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	3		1	3	3	3	1	1	3	1	
Detector Template	Left			Left								
Leading Detector (ft)	20	32		20	32	32	22	206	206	32	306	
Trailing Detector (ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Position(ft)	0	-6		0	-8	-8	-6	200	200	-6	300	
Detector 1 Size(ft)	20	6		20	6	6	6	6	6	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		10			10	10	10			10		
Detector 2 Size(ft)		6			6	6	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)		0.0				0.0	0.0	0.0			0.0	
Detector 3 Position(ft)		26			26	26	16			26		
Detector 3 Size(ft)		6			6	6	6			6		

Lanes, Volumes, Timings  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road  
2028 Build PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex		
Detector 3 Channel												
Detector 3 Extend (s)	0.0			0.0	0.0	0.0				0.0		
Turn Type	Perm	NA		Perm	NA	Prot	pm+pt	NA	Prot	pm+pt	NA	
Protected Phases	4				4	4	5	2	2	1	6	
Permitted Phases	4			4			2			6		
Detector Phase	4	4		4	4	4	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	9.0	9.0		9.0	9.0	9.0	3.0	16.0	16.0	3.0	16.0	
Minimum Split (s)	14.1	14.1		14.1	14.1	14.1	7.0	22.4	22.4	7.0	22.4	
Total Split (s)	20.0	20.0		20.0	20.0	20.0	10.0	40.0	40.0	10.0	40.0	
Total Split (%)	28.6%	28.6%		28.6%	28.6%	28.6%	14.3%	57.1%	57.1%	14.3%	57.1%	
Maximum Green (s)	14.9	14.9		14.9	14.9	14.9	6.0	33.6	33.6	6.0	33.6	
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.5	4.5	3.0	4.5	
All-Red Time (s)	1.8	1.8		1.8	1.8	1.8	1.0	1.9	1.9	1.0	1.9	
Lost Time Adjust (s)	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.1			5.1	5.1	5.1	4.0	6.4	6.4	4.0	6.4	
Lead/Lag							Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max	None	Max		
Act Effct Green (s)	12.3			12.3	12.3	40.9	33.9	33.9	40.9	33.9		
Actuated g/C Ratio	0.19			0.19	0.19	0.62	0.52	0.52	0.62	0.52		
v/c Ratio	0.71			0.44	0.38	0.23	1.04	0.26	0.48	0.60		
Control Delay	28.2			32.1	7.3	5.5	61.2	2.4	12.4	15.5		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.2			32.1	7.3	5.5	61.2	2.4	12.4	15.5		
LOS	C			C	A	A	E	A	B	B		
Approach Delay	28.2			15.8			46.1			14.9		
Approach LOS	C			B			D			B		

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 65.5

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 32.8

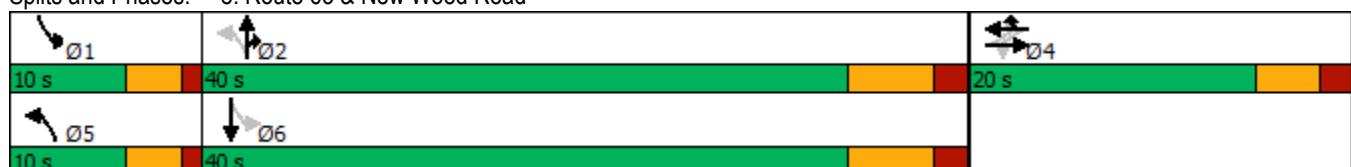
Intersection LOS: C

Intersection Capacity Utilization 78.0%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 8: Route 63 & New Wood Road



Queues  
8: Route 63 & New Wood Road

Proposed Development Bunker Hill Road

2028 Build PM



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	251	88	169	111	1025	251	137	584
v/c Ratio	0.71	0.44	0.38	0.23	1.04	0.26	0.48	0.60
Control Delay	28.2	32.1	7.3	5.5	61.2	2.4	12.4	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	32.1	7.3	5.5	61.2	2.4	12.4	15.5
Queue Length 50th (ft)	60	33	0	13	~498	0	17	167
Queue Length 95th (ft)	107	74	45	24	#521	15	51	280
Internal Link Dist (ft)	254	325			814			2197
Turn Bay Length (ft)			200	125		465	230	
Base Capacity (vph)	410	241	500	485	983	957	285	978
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.37	0.34	0.23	1.04	0.26	0.48	0.60

Intersection Summary

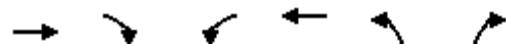
- ~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

## Lanes, Volumes, Timings

## 11: Site Driveway &amp; Bunker Hill Road

## Proposed Development Bunker Hill Road

2028 Build PM



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	556	10	40	473	6	24
Future Volume (vph)	556	10	40	473	6	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>	0.998				0.893	
Flt Protected				0.996	0.990	
Satd. Flow (prot)	1896	0	0	1892	1680	0
Flt Permitted				0.996	0.990	
Satd. Flow (perm)	1896	0	0	1892	1680	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	318			408	324	
Travel Time (s)	7.2			9.3	7.4	
Peak Hour Factor	0.90	0.90	0.96	0.96	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	618	11	42	493	7	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	629	0	0	535	34	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		60	60		60	60
Sign Control	Free			Free	Stop	

## Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 68.0% ICU Level of Service C

Analysis Period (min) 15

**Intersection**

Int Delay, s/veh 0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
----------	-----	-----	-----	-----	-----	-----

Lane Configurations						
Traffic Vol, veh/h	556	10	40	473	6	24
Future Vol, veh/h	556	10	40	473	6	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	96	96	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	618	11	42	493	7	27

Major/Minor	Major1	Major2	Minor1
-------------	--------	--------	--------

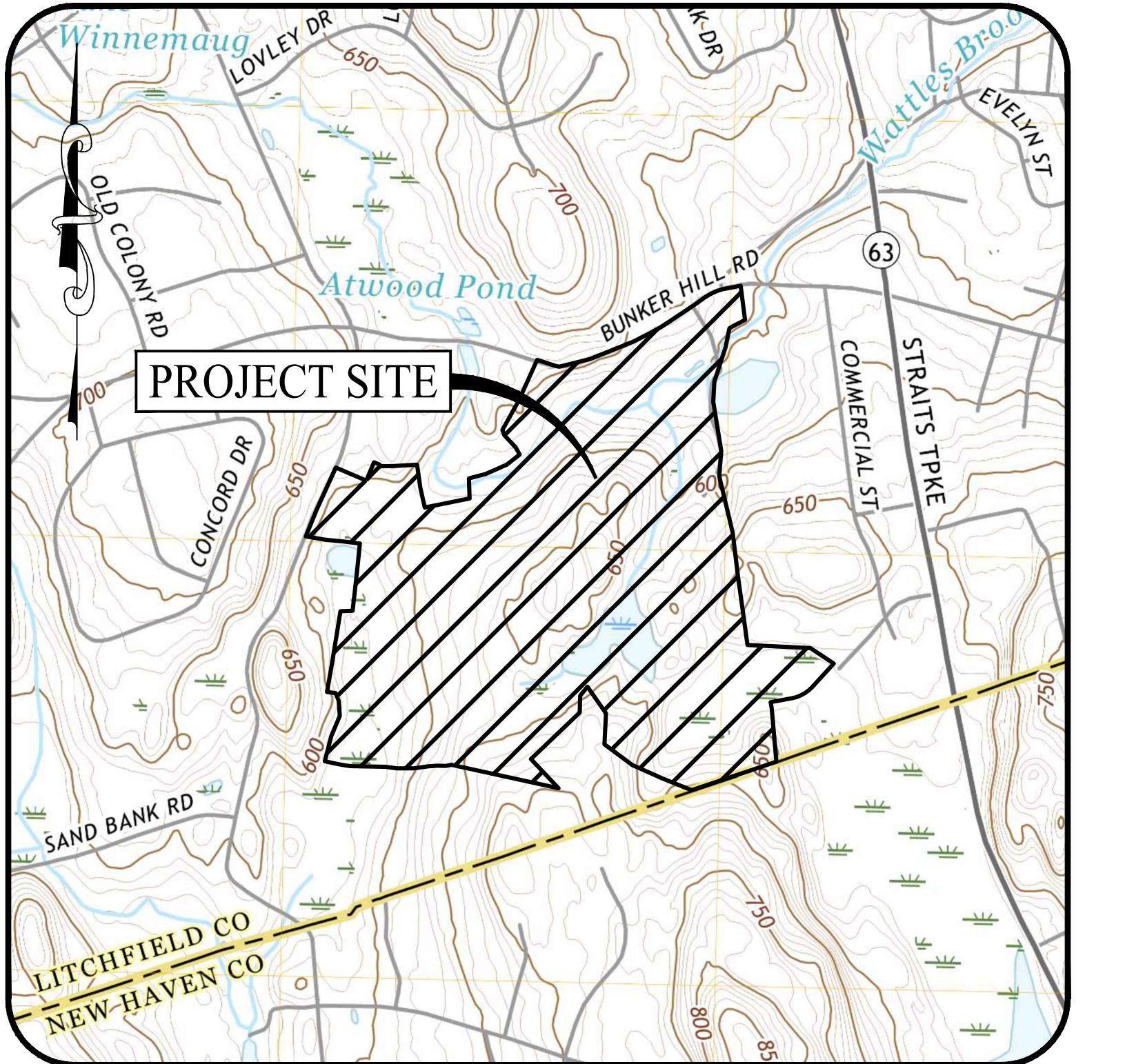
Conflicting Flow All	0	0	629	0	1201	624
Stage 1	-	-	-	-	624	-
Stage 2	-	-	-	-	577	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	963	-	206	489
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	566	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	963	-	194	489
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	532	-

Approach	EB	WB	NB
----------	----	----	----

HCM Control Delay, s	0	0.7	15.6
----------------------	---	-----	------

HCM LOS	C
---------	---

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	375	-	-	963	-
HCM Lane V/C Ratio	0.091	-	-	0.043	-
HCM Control Delay (s)	15.6	-	-	8.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-



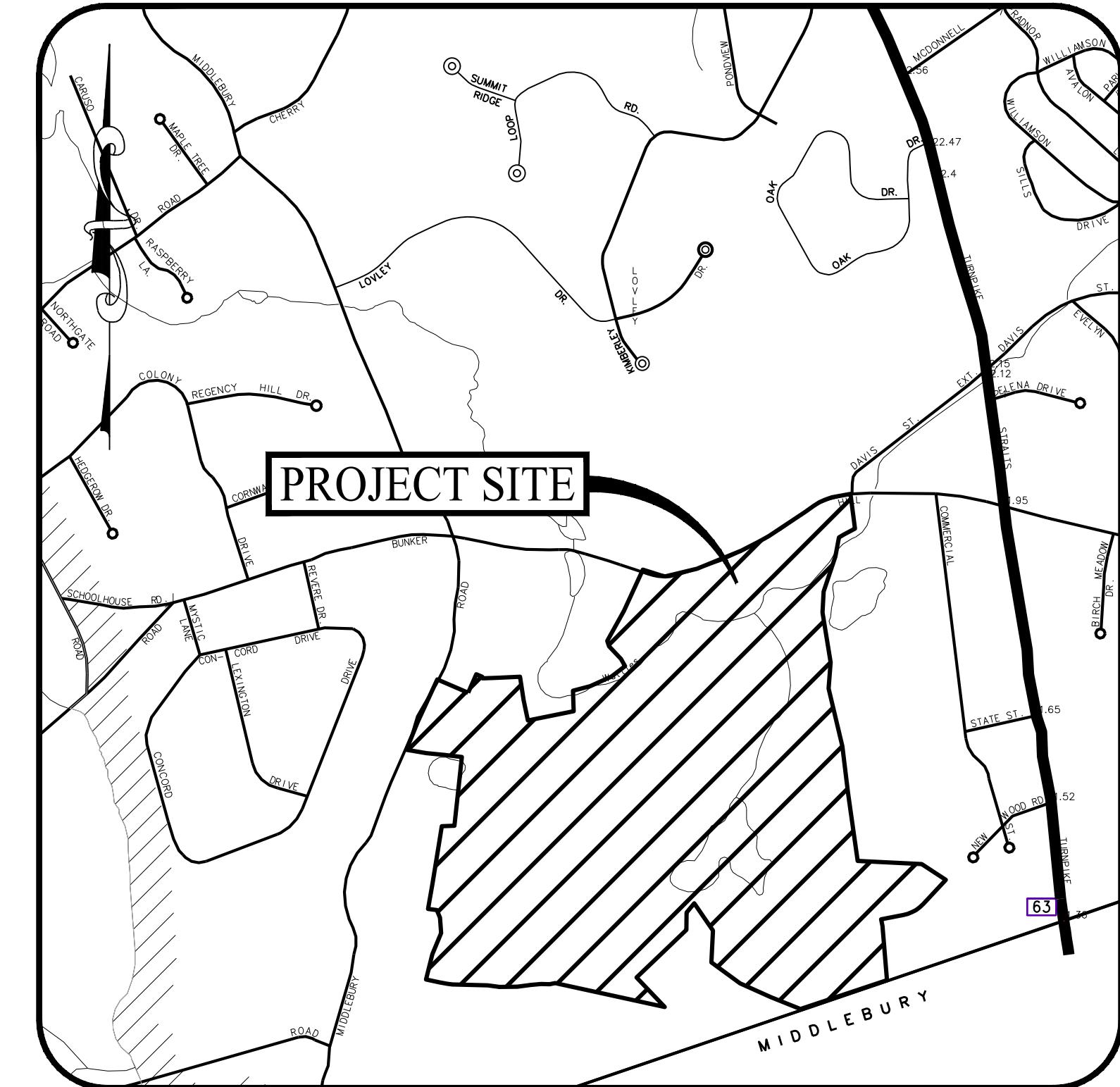
USGS MAP

SCALE: 1" = 1,000'

# PROPOSED DEVELOPMENT

BUNKER HILL ROAD & NEW WOOD ROAD  
WATERTOWN, CONNECTICUT

## MASTER PLAN SUBMISSION



LOCATION MAP

SCALE: 1" = 1,000'

PREPARED FOR:

**WPH HOLDINGS, LLC**

831 FEDERAL ROAD  
BROOKFIELD, CT 06804

PREPARED BY:



501 MAIN STREET, MONROE, CONNECTICUT 06468

### DRAWING LIST

#### SITE CIVIL DRAWINGS

SHEET #	SHEET NAME	PLAN DATE	LATEST REVISION
0.00	COVER SHEET	08/30/23	N/A
1 OF 1	PROPERTY SURVEY	04/14/23	N/A
2.10	MASTER SITE PLAN	08/30/23	N/A
2.21	CONCEPTUAL GRADING PLAN 1	08/30/23	N/A
2.22	CONCEPTUAL GRADING PLAN 2	08/30/23	N/A
2.23	CONCEPTUAL GRADING PLAN 3	08/30/23	N/A
2.24	CONCEPTUAL GRADING PLAN 4	08/30/23	N/A
2.25	CONCEPTUAL GRADING PLAN 5	08/30/23	N/A
2.51	CONCEPTUAL UTILITY PLAN 1	08/30/23	N/A
2.52	CONCEPTUAL UTILITY PLAN 2	08/30/23	N/A
2.53	CONCEPTUAL UTILITY PLAN 3	08/30/23	N/A
2.54	CONCEPTUAL UTILITY PLAN 4	08/30/23	N/A
2.55	CONCEPTUAL UTILITY PLAN 5	08/30/23	N/A
2.61	CONCEPTUAL LANDSCAPE PLAN 1	08/30/23	N/A
2.62	CONCEPTUAL LANDSCAPE PLAN 2	08/30/23	N/A
2.63	CONCEPTUAL LANDSCAPE PLAN 3	08/30/23	N/A
2.64	CONCEPTUAL LANDSCAPE PLAN 4	08/30/23	N/A
2.65	CONCEPTUAL LANDSCAPE PLAN 5	08/30/23	N/A

#### PROPERTY INFORMATION

ADDRESS: MAP 165, BLOCK 45, LOT 116  
MAP 158, BLOCK 45, LOT 118A  
MAP 151, BLOCK 45, LOT 12  
WATERTOWN, CONNECTICUT  
MAP 4, BLOCK 11, LOT 6  
MIDDLEBURY, CONNECTICUT

#### APPLICANT

WPH HOLDINGS, LLC  
831 FEDERAL ROAD  
BROOKFIELD, CONNECTICUT

#### SITE/CIVIL ENGINEER

KEVIN SOLLI, P.E., CPESC, LEED AP BD+C  
LICENSE NO. 25759  
SOLLI ENGINEERING, LLC  
501 MAIN STREET  
MONROE, CONNECTICUT 06468  
(203) 880-5455

#### SURVEYOR OF RECORD

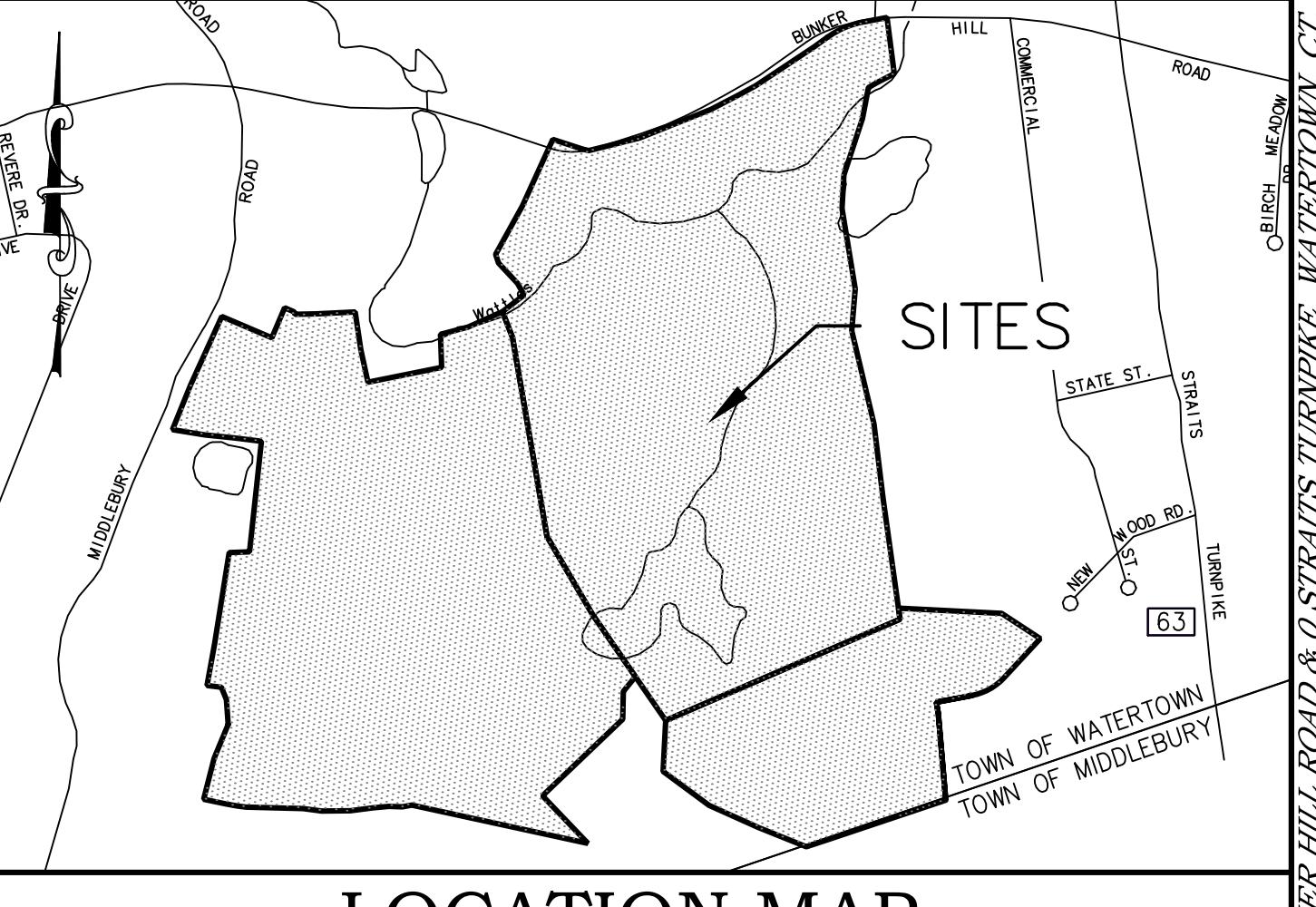
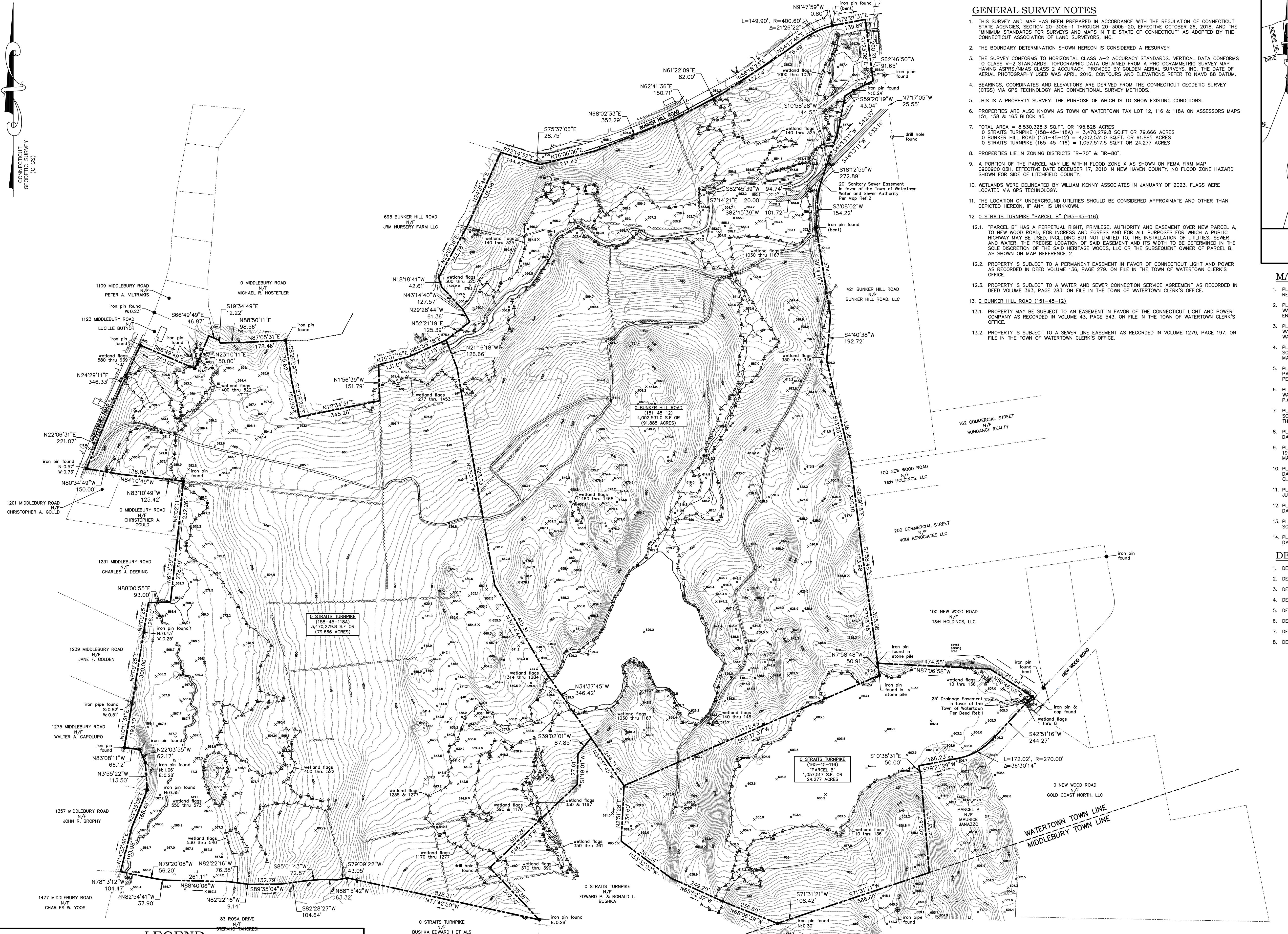
BRYAN NESTERIAK, P.E., LS  
ACCURATE LAND SURVEYING, LLC  
15 RESEARCH DRIVE  
WOODBRIDGE, CONNECTICUT 06525  
(203) 881-8145

#### LANDSCAPE ARCHITECT

MARY BLACKBURN, PLA  
LICENSE NO. 1499  
SOLLI ENGINEERING, LLC  
501 MAIN STREET  
MONROE, CONNECTICUT 06468  
(203) 880-5455



Rev. #:	Date	Description
Project:		
<b>PROPOSED DEVELOPMENT</b>		
BUNKER HILL ROAD		
WATERTOWN, CONNECTICUT		
Sheet Title:	Sheet #:	
COVER SHEET	0.00	



**LOCATION MAP**

SCALE: 1"=800'

**MAP REFERENCES**

1. PLAN ENTITLED "SUBDIVISION MAP ROSA'S ESTATES WATERTOWN, CONNECTICUT", SCALE: 1"=50', DATED: JANUARY 19, 2007. LAST REVISED: JUNE 14, 2007, BY JAMES N. SAKONICK, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 3305.
2. PLAN ENTITLED "LOT LINE REVISION-COMPLIANCE PLAN PREPARED FOR HENRY J. PAPARAZZO, TRUSTEE, NEW WOOD ROAD, WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: DECEMBER 1, 2006, BY SMITH & COMPANY SURVEYORS & ENGINEERS, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 3277.
3. PLAN ENTITLED "LOT LINE REVISION - COMPLIANCE PLAN PREPARED FOR HENRY J. PAPARAZZO, TRUSTEE BUNKER HILL ROAD, WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: DECEMBER 1, 2006, BY SMITH & COMPANY, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 3276.
4. PLAN ENTITLED "PROPERTY SURVEY PROPERTY OF LEAVENWORTH P. SPERRY, JR. MIDDLEBURY ROAD WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: NOVEMBER 8, 2004, BY SMITH & COMPANY, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 3211.
5. PLAN ENTITLED "TOWN OF WATERTOWN WATER AND SEWER AUTHORITY SANITARY SEWER EASEMENT TO BE ACQUIRED FROM HENRY J. PAPARAZZO, TRUSTEE BUNKER HILL WATERTOWN, CONNECTICUT", SCALE: 1"=40', DATED: JANUARY 24, 2003, BY DAVID P. PETROCO, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 3102.
6. PLAN ENTITLED "SITE PLAN FOR A NEW CAP PROCESSING FACILITY PREPARED FOR BMS, LLC, NEW WOOD ROAD, WATERTOWN, CONNECTICUT", SCALE: 1"=20', DATED: DECEMBER 3, 1995, LAST REVISED: MAY 22, 2000, BY MEYERS ASSOCIATES P.C., ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 2921.
7. PLAN ENTITLED "DRAINAGE EASEMENT ON LANDS OF HENRY J. PAPARAZZO, TRUSTEE, NEW WOOD ROAD WATERTOWN, CONNECTICUT", SCALE: 1"=40', DATED: OCTOBER 9, 1997, LAST REVISED: OCTOBER 27, 1997, BY F.A. HESKETH & ASSOCIATES, INC. ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 2835.
8. PLAN ENTITLED "DIVISION OF LAND PREPARED FOR JAMES ALONZO MIDDLEBURY ROAD WATERTOWN, CONNECTICUT", SCALE: 1"=50', DATED: JULY 13, 1988, BY LANDTECH, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 2445.
9. PLAN ENTITLED "PROPERTY OF NICHOLAS M. MANCINI, TOWN OF WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: AUGUST 6, 1982, LAST REVISED: AUGUST 10, 1982, BY BRADFORD E. SMITH & SON, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 2042.
10. PLAN ENTITLED "PROPERTY OF RAYMOND G. HOFFMAN, NEW WOOD ROAD, TOWN OF WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: JUNE 1972, BY HARRY OWENS, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 1664.
11. PLAN ENTITLED "MAP OF LAND BELONGING TO DIAMOND GINGER ALE INC, WATERTOWN, CONNECTICUT", SCALE: 1"=100', DATED: JUNE 1972, BY HARRY OWENS, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 1664.
12. PLAN ENTITLED "MAP SECTION TWO LAND OF GEDDES J. AND STELLA T. ULINSKAS WATERTOWN, CONNECTICUT", SCALE: 1"=40', DATED: OCTOBER 1964 BY HARRY J. OWENS, JR., ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 1252.
13. PLAN ENTITLED "MAP OF SECTION TEN OF INDUSTRIAL LAND BELONGING TO RAYMOND G. HOFFMAN, WATERTOWN, CONNECTICUT", SCALE: 1"=40', DATED: JUNE 1983, BY HARRY OWENS, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 1169.
14. PLAN ENTITLED "MAP OF PART OF LAND OF ANNA & EST. OF STANLEY SINKIEWICH WATERTOWN, CONNECTICUT", SCALE: 1"=40', DATED: JUNE 1958, BY FRANK J. SMITH, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE AS MAP 877.

**DEED REFERENCES**

1. DEED VOLUME 136 PAGE 279, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
2. DEED VOLUME 363 PAGE 283, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
3. DEED VOLUME 1033 PAGE 347, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
4. DEED VOLUME 1279 PAGE 197, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
5. DEED VOLUME 1524 PAGE 221, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
6. DEED VOLUME 1524 PAGE 223, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
7. DEED VOLUME 2237 PAGES 295, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.
8. DEED VOLUME 2237 PAGE 297, ON FILE IN THE TOWN OF WATERTOWN CLERK'S OFFICE.

No.	Date	Revision Description
		SCALE: 1"=200'



**PROPERTY SURVEY**

OF

O BUNKER HILL ROAD (151-45-12),  
O STRAITS TURNPIKE (158-45-118A)  
& O STRAITS TURNPIKE (165-45-12)  
WATERTOWN, CONNECTICUT

PREPARED FOR  
WPH HOLDINGS LLC

TO THE BEST OF MY KNOWLEDGE AND  
BELIEF THIS MAP IS SUBSTANTIALLY  
CORRECT AS NOTED HEREON.

Date 4/14/2023  
Scale 1"=200'  
Job No. 1268  
Drawing No.

BRYAN P. NESTERIK, PE, LS 23556  
Signature

1 of 1

**LEGEND**

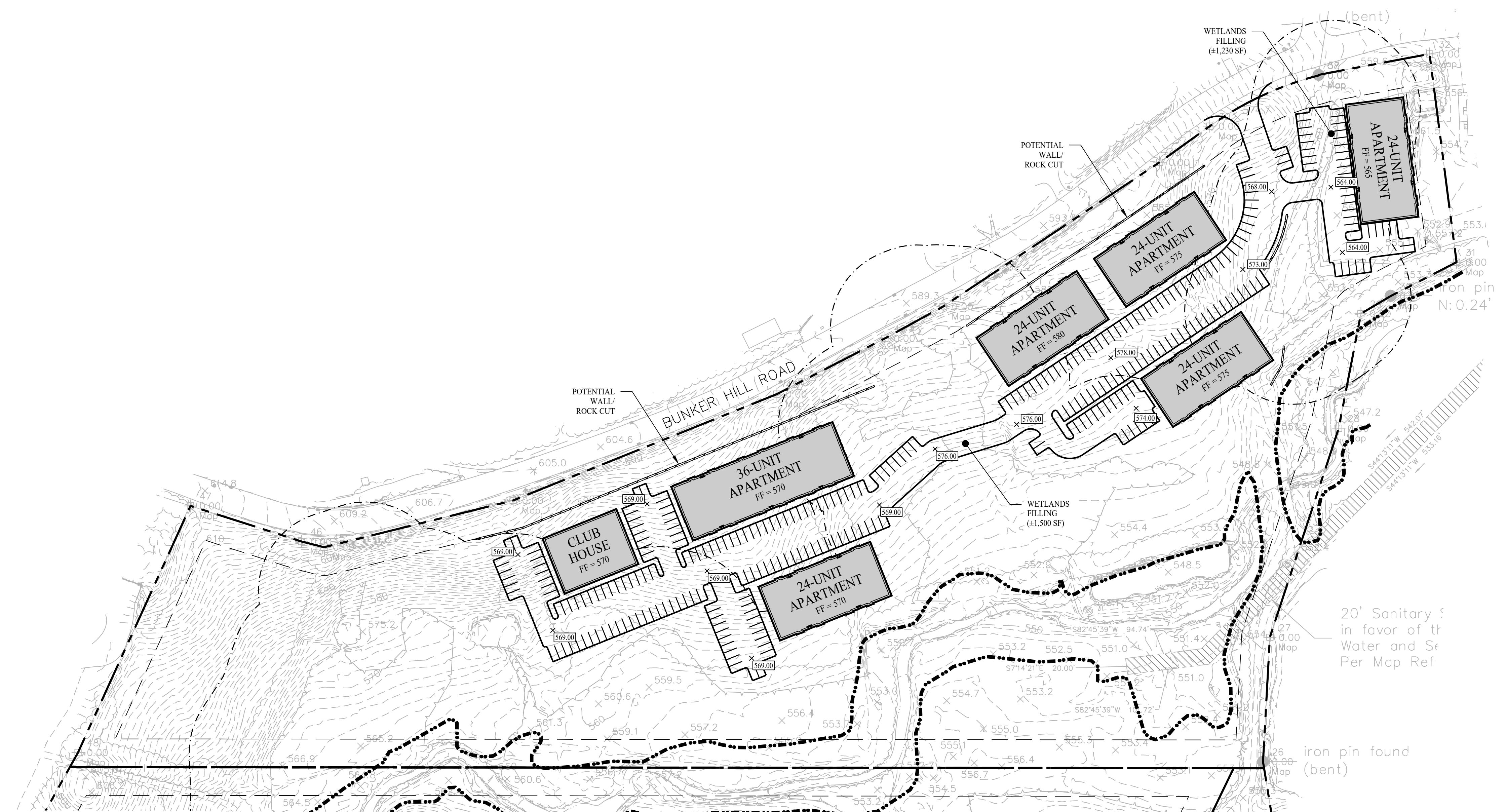
C.H.D.	Conn. Hwy. Dept. Monument
Mon.	Monument
Pin to be Set	Pin to be Set
Cone. Monument to be Set	Cone. Monument to be Set
I. Pipe	Iron Pipe
D. Pipe	Drill Hole
Pile Stones	Pile Stones
Light Post	Light Post
Found	Found
N/F	Now or Formerly
Property Line	Property Line (adjoining)
Property Line (adjoining)	Building Setback Line
Easement	Easement
Line of water	Line of water
FEMA Flood Zone	FEMA Flood Zone
Base Flood Elevation	Base Flood Elevation
Existing Spot Elevation	Existing Spot Elevation

Gas gate valve	Evergreen Tree
Water gate valve	Deciduous Tree
Water meter	Shrub or Wetlands
Hydrant	Watercourse
W-	Tree Line
WS	Reinforced Concrete Pipe
C-	Corrugated Metal Pipe
G-	Sanitary Sewer Main (existing)
SS-	Sanitary Sewer Main (existing)
L-	Drainage (existing)
S-	Sanitary Manhole
D-	Drain Manhole
TP 100	Chain Link or Split Rail Fence
TP 100	Metal/Wire Fence
TP 100	Wooden or Vinyl Fence
TP 100	Invert Elevation of Pipe
TP 100	Existing Catch Basin/Pipe
TP 100	Building (existing)
TP 100	Fence Post

THIS DOCUMENT, THE IDEAS, AND DESIGN INCORPORATED HEREON IS AN ORIGINAL WORK OF ACCURATE LAND SURVEYING, LLC, AND IS NOT TO BE REPRODUCED OR USED IN WHOLE OR IN PART, IN WHOLE OR IN PART, IN ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF ACCURATE LAND SURVEYING, LLC. THIS DOCUMENT IS NOT A FINAL AND VALID DOCUMENT UNLESS IT IS SIGNED AND CERTIFIED BY A CERTIFYING PROFESSIONAL AND A LEGAL METAL STAMP OR EMBOSSED SEAL.



- GRADING NOTES**
1. THESE PLANS ARE FOR PERMITTING PURPOSES ONLY AND ARE NOT FOR CONSTRUCTION. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL FINAL APPROVAL OF THIS PLAN IS GRANTED BY ALL GOVERNING AND REGULATORY AGENCIES.
  2. ALL PROPOSED SITE WORK IS TO BE COMPLETED IN ACCORDANCE WITH ALL PERMITS, APPROVALS, AND CONDITIONS OF APPROVALS ISSUED BY LOCAL, STATE AND/OR FEDERAL REVIEWING AGENCIES.
  3. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, UTILITY LOCATIONS, AND INVERTS PRIOR TO CONSTRUCTION. ANY CONDITIONS FOUND TO DIFFER FROM THOSE SHOWN IN THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT ENGINEER.
  4. THIS DRAWING IS INTENDED TO DESCRIBE GRADING AND DRAINAGE ONLY. REFER TO SITE PLAN FOR GENERAL INFORMATION, AND DETAIL SHEETS FOR DETAILS.
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  7. TOPSOIL SHALL BE STRIPPED AND STOCKPILED ON SITE FOR USE IN FINAL LANDSCAPING.
  8. THE CONTRACTOR SHALL COMPACT FILL IN 12" MAXIMUM LIFTS UNDER ALL PARKING, BUILDING, AND DRIVE AREAS TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 (MODIFIED PROCTOR TEST), OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
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  13. ALL EXISTING UTILITY FRAME AND GRATES SHALL BE ADJUSTED TO PROPOSED GRADED



#### LEGEND

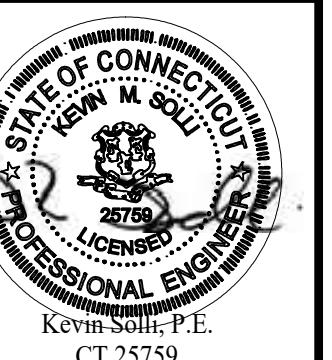
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- - - - -	ADJOINING LOT LINE
— — — — —	MAJOR CONTOURS
— — — — —	MINOR CONTOURS
— — — — —	EXISTING MAJOR CONTOURS
— — — — —	EXISTING MINOR CONTOURS
— — — — —	CONTOUR LABEL
— — — — —	PROPOSED SPOT ELEVATION
— — — — —	EXISTING SPOT ELEVATION
— — — — —	RETAINING WALL / GRAVITY OR SEGMENTAL BLOCK
— — — — —	STORM DRAIN PIPE
□	TYPE "C" CATCH BASIN
□	TYPE "CL" CATCH BASIN

Rev. #:	Date	Description
Graphic Scale:		
80	0	80 160

**SOLLI**  
ENGINEERING

501 Main Street, Monroe, CT 06468 T: (203) 880-5451 | F: (203) 880-9695  
11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491 | F: (203) 880-9695

Drawn By: VER	Checked By: LAM
Approved By: KMS	Project #: 22102801
Plan Date: 08/30/23	Scale: 1" = 80'



Project:  
**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title: CONCEPTUAL GRADING PLAN 1	Sheet #: 2.21
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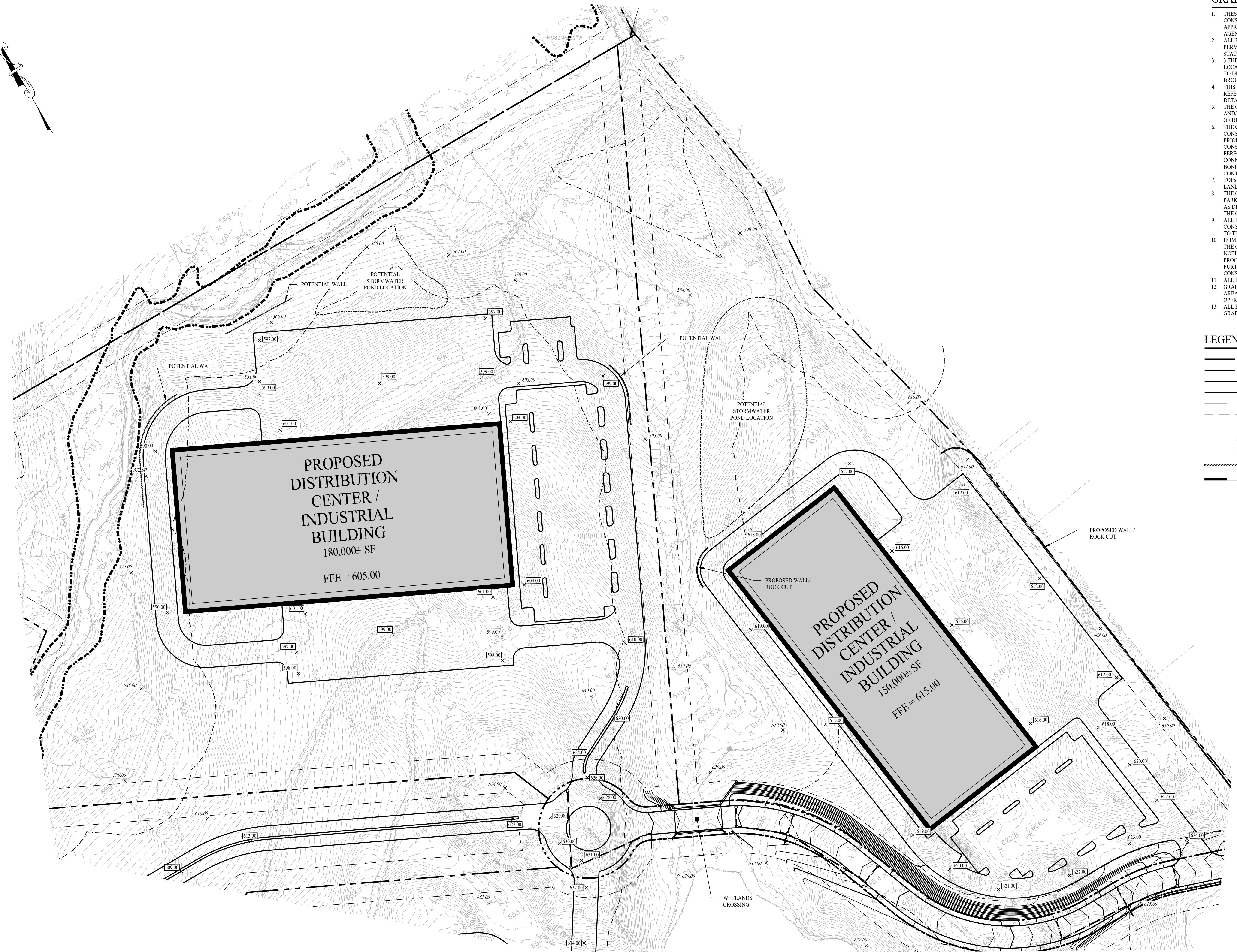
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## LEGEND

	PROPERTY LINE
	ADJOINING LOT LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	CONTOUR LABEL
	PROPOSED SPOT ELEVATION
	EXISTING SPOT ELEVATION
	RETAINING WALL / GRAVITY OR SEGMENTAL BLOCK
	STORM DRAIN PIPE
	TYPE "C" CATCH BASIN
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Rev. #:	Date	Description
Graphic Scale:		
80	0	80 160
SOLLI ENGINEERING		
501 Main Street, Monroe, CT 06468 11 Vanderbilt Ave, Norwood, MA 02062		T: (203) 880-5455 F: (203) 880-9695 T: (781) 352-8491 F: (203) 880-9695
Drawn By:	VER	
Checked By:	LAM	
Approved By:	KMS	
Project #:	22102801	
Plan Date:	08/30/23	
Scale:	1" = 80'	
Project:		
PROPOSED DEVELOPMENT BUNKER HILL ROAD WATERTOWN, CONNECTICUT		
Sheet Title:		Sheet #:
CONCEPTUAL GRADING PLAN 2		2.22



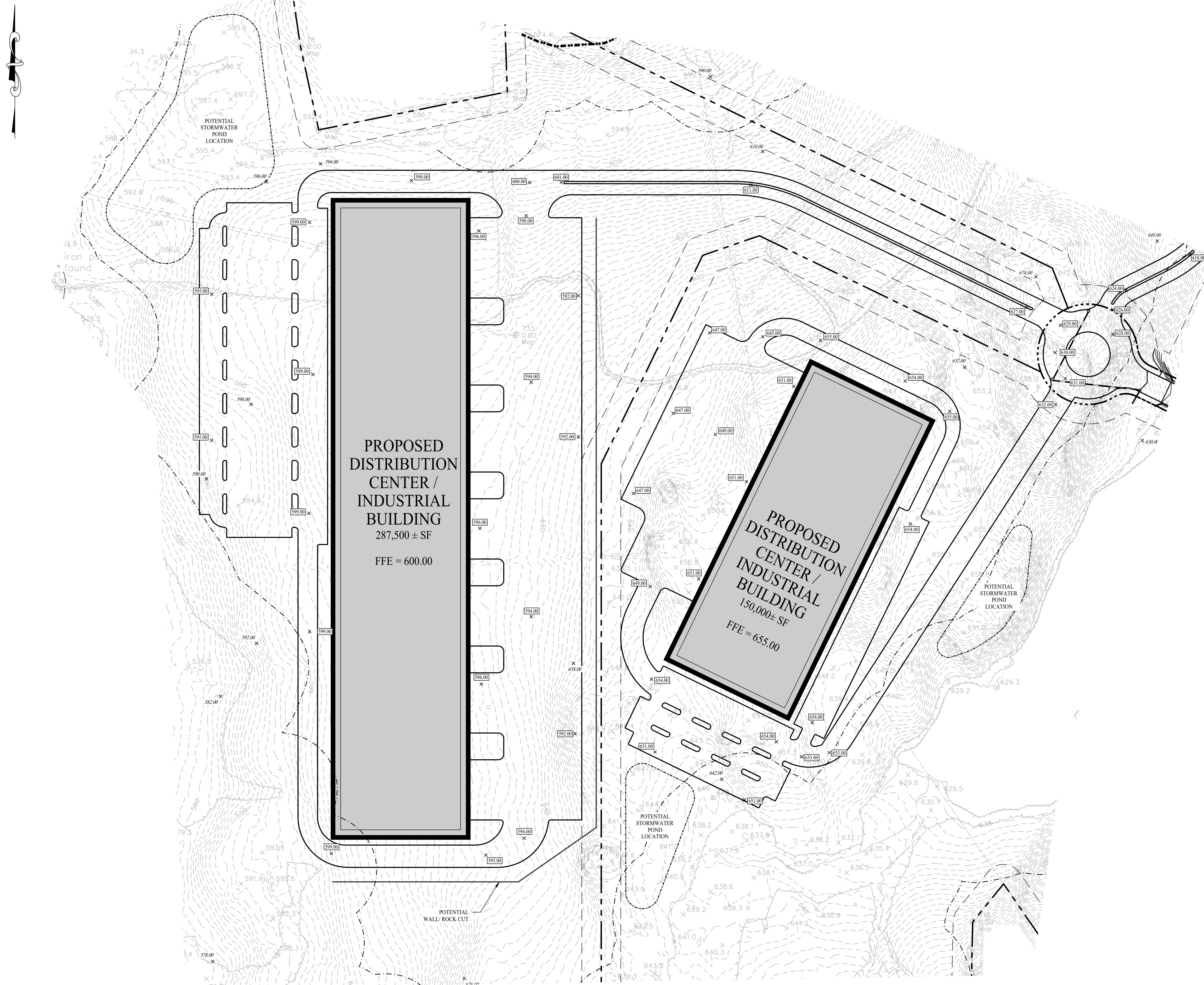
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- ALL EXISTING UTILITY FRAME AND GRATES SHALL BE ADJUSTED TO PROPOSED GRADED

## LEGEND

	PROPERTY LINE
	ADJOINING LOT LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	CONTOUR LABEL
	PROPOSED SPOT ELEVATION
	EXISTING SPOT ELEVATION
	RETAINING WALL / GRAVITY OR SEGMENTAL BLOCK
	STORM DRAIN PIPE
	TYPE "C" CATCH BASIN
	TYPE "CL" CATCH BASIN

Rev. #:	Date	Description
Graphic Scale:		
80	0	80 160
<b>SOLLI</b> ENGINEERING		
501 Main Street, Monroe, CT 06468 T: (203) 880-5455   F: (203) 880-9695 11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491   F: (203) 880-9695		
Drawn By:	VER	
Checked By:	LAM	
Approved By:	KMS	
Project #:	22102801	
Plan Date:	08/30/23	
Scale:	1" = 80'	
Project:		
<b>PROPOSED DEVELOPMENT</b> <b>BUNKER HILL ROAD</b> <b>WATERTOWN, CONNECTICUT</b>		
Sheet Title:	Sheet #:	
<b>CONCEPTUAL GRADING PLAN 3</b>	<b>2.23</b>	



## GRADING NOTES

1. THESE PLANS ARE FOR PERMITTING PURPOSES ONLY AND ARE NOT FOR CONSTRUCTION. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL FINAL APPROVAL OF THIS PLAN IS GRANTED BY ALL GOVERNING AND REGULATORY AGENCIES.
2. ALL PROPOSED SITE WORK IS TO BE COMPLETED IN ACCORDANCE WITH ALL PERMITS, APPROVALS, AND CONDITIONS OF APPROVALS ISSUED BY LOCAL, STATE AND/OR FEDERAL REVIEWING AGENCIES.
3. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, UTILITY LOCATIONS, AND INVERTS PRIOR TO CONSTRUCTION. ANY CONDITIONS FOUND TO DIFFER FROM THOSE SHOWN IN THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT ENGINEER.
4. THIS DRAWING IS INTENDED TO DESCRIBE GRADING AND DRAINAGE ONLY. REFER TO SITE PLAN FOR GENERAL INFORMATION, AND DETAIL SHEETS FOR DETAILED INFORMATION.
5. THE CONTRACTOR SHALL PRESERVE EXISTING VEGETATION WHERE POSSIBLE AND/OR AS NOTED ON DRAWINGS. REFER TO EROSION CONTROL PLAN FOR LIMIT OF DISTURBANCE AND EROSION CONTROL NOTES.
6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY CONSTRUCTION PERMITS REQUIRED BY GOVERNMENT AND LOCAL AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY CONSTRUCTION PERMITS FROM THE CITY OF EAST HARTFORD REQUIRED TO PERFORM ALL REQUIRED WORK, INCLUDING FOR STREET CUTS AND CONNECTIONS TO EXISTING UTILITIES. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROL NECESSARY FOR THIS WORK.
7. TOPSOIL SHALL BE STRIPPED AND STOCKPILED ON SITE FOR USE IN FINAL LANDSCAPING.
8. THE CONTRACTOR SHALL COMPACT FILL IN 12" MAXIMUM LIFTS UNDER ALL PARKING, BUILDING, AND DRIVE AREAS TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 (MODIFIED PROCTOR TEST), OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
9. ALL DISTURBANCE INCURRED TO CITY OR STATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE CITY OF EAST HARTFORD AUTHORITY.
10. IF IMPACTED CONTAMINATED SOIL IS ENCOUNTERED BY THE CONTRACTOR, THE CONTRACTOR SHALL SUSPEND EXCAVATION WORK OF IMPACTED SOIL AND NOTIFY OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT PRIOR TO PROCEEDING WITH FURTHER WORK IN THE IMPACTED SOIL LOCATION UNTIL FURTHER INSTRUCTED BY THE OWNER AND/OR OWNER'S ENVIRONMENTAL CONSULTANT.
11. ALL PIPE LENGTHS ARE HORIZONTAL DISTANCES AND ARE APPROXIMATE.
12. GRADING CONTRACTOR SHALL RESTORE TO GRADE AND COMPACTION ALL AREAS DISTURBED BY BUILDING CONSTRUCTION PRIOR TO BASE AND PAVING OPERATIONS COMMENCING.
13. ALL EXISTING UTILITY FRAME AND GRATES SHALL BE ADJUSTED TO PROPOSED GRADED

## LEGEND

	PROPERTY LINE
	ADJOINING LOT LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	CONTOUR LABEL
	PROPOSED SPOT ELEVATION
	EXISTING SPOT ELEVATION
	RETAINING WALL / GRAVITY OR SEGMENTAL BLOCK
	STORM DRAIN PIPE
	TYPE "C" CATCH BASIN
	TYPE "CL" CATCH BASIN

Rev. #:	Date	Description
Graphic Scale:		
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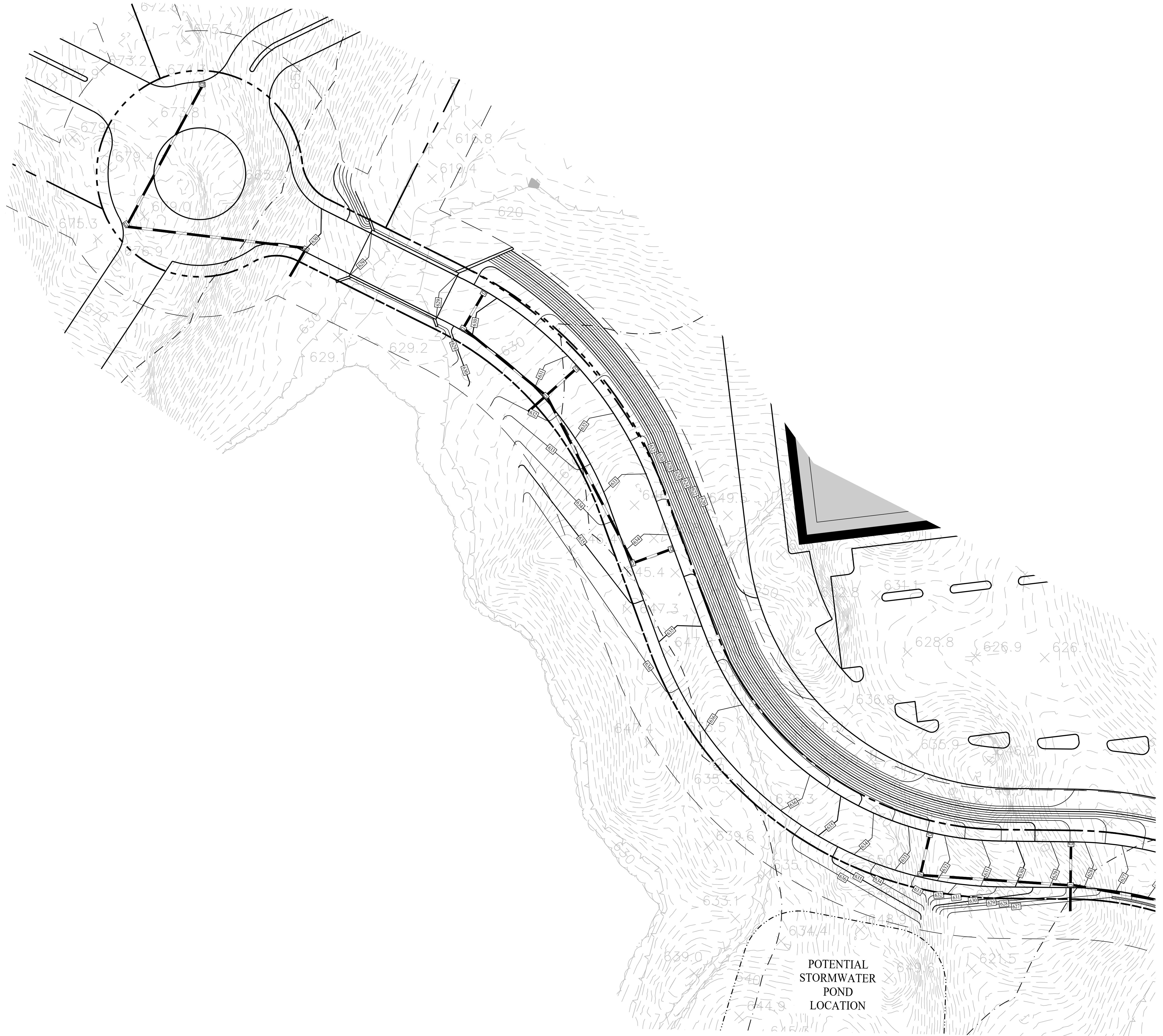
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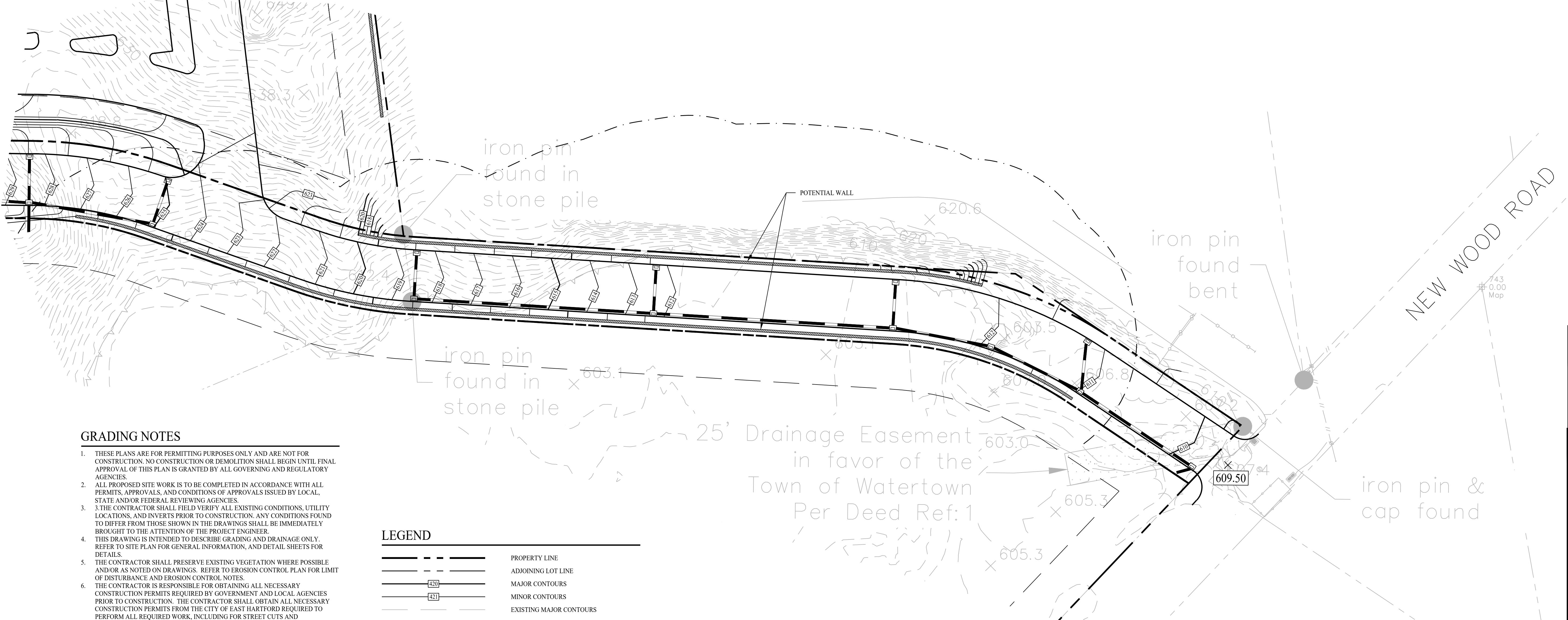
Drawn By:	VER
Checked By:	LAM
Approved By:	KMS
Project #:	22102801
Plan Date:	08/30/23
Scale:	1" = 40'

Project:

**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:	Sheet #:
CONCEPTUAL GRADING PLAN 4	2.24

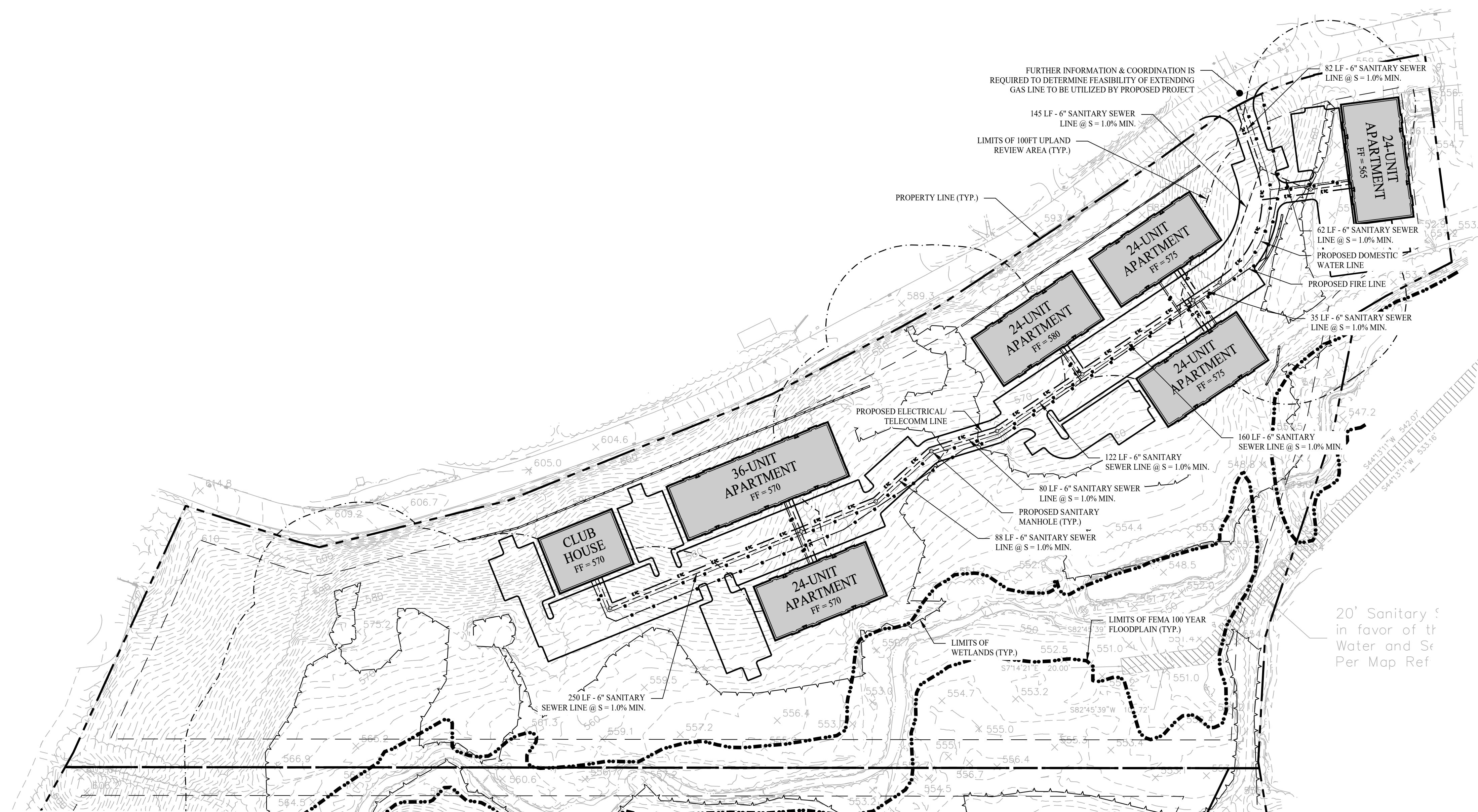




Rev. #:	Date	Description
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<b>SOLLI</b> <b>ENGINEERING</b>		
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11 Vanderbilt Ave, Norwood, MA 02062 T: (781) 352-8491   F: (203) 880-9695		
Drawn By:	VER	
Checked By:	LAM	
Approved By:	KMS	
Project #:	22102801	
Plan Date:	08/30/23	
Scale:	1" = 40'	
Project:		
<b>PROPOSED DEVELOPMENT</b> BUNKER HILL ROAD WATERTOWN, CONNECTICUT		
Sheet Title:	Sheet #:	
<b>CONCEPTUAL GRADING PLAN 5</b>		2.25

## UTILITY NOTES

1. THESE PLANS ARE FOR PERMITTING PURPOSES ONLY AND ARE NOT FOR CONSTRUCTION. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL FINAL APPROVAL OF THIS PLAN IS GRANTED BY ALL GOVERNING AND REGULATORY AGENCIES.
2. ALL PROPOSED SITE WORK IS TO BE COMPLETED IN ACCORDANCE WITH ALL PERMITS, APPROVALS, AND CONDITIONS OF APPROVALS ISSUED BY LOCAL, STATE AND/OR FEDERAL REVIEWING AGENCIES.
3. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, UTILITY LOCATIONS, AND INVERTS PRIOR TO CONSTRUCTION. ANY CONDITIONS FOUND TO DIFFER FROM THOSE SHOWN IN THE DRAWINGS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT ENGINEER.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES 72 HOURS PRIOR TO BEGINNING EXCAVATION.
5. CONTRACTOR TO COORDINATE GAS MAIN, WATER, ELECTRIC, AND TELEPHONE INSTALLATION WITH LOCAL UTILITY COMPANIES.
6. ALL DOMESTIC WATER AND SANITARY SEWER STUBS TO BE TERMINATED 5 FEET OUTSIDE OF THE BUILDING UNLESS OTHERWISE NOTED. THE END OF THESE SERVICE LINES SHALL BE TIGHTLY PLUGGED OR CAPPED AND MARKED UNTIL SUCH TIME AS CONNECTION IS MADE INSIDE BUILDING BY PLUMBING CONTRACTOR.
7. SITE UTILITY CONTRACTOR SHALL PROVIDE ALL THE MATERIALS AND APPURTENANCES NECESSARY FOR THE COMPLETE INSTALLATION OF THE UTILITIES. ALL PIPE AND FITTINGS SHALL BE INSPECTED BY THE WATER DEPARTMENT INSPECTOR PRIOR TO BEING COVERED. THE INSPECTOR MUST ALSO BE PRESENT DURING PRESSURE TESTING AND DISINFECTION OF LATERALS AND HIS SIGNATURE OF APPROVAL IS REQUIRED.
8. ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES, REGULATIONS, AND/OR LOCAL STANDARDS IMPOSED BY LOCAL UTILITY AUTHORITIES.
9. ALL UTILITY LOCATIONS ARE APPROVED BY THE LOCAL UTILITY COMPANIES UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
10. UTILITY LEAD-INS TO BUILDING SHALL NOT BE INSTALLED UNTIL BUILDING PLANS ARE COMPLETED AND LOCATIONS ESTABLISHED ON THE ARCHITECTURAL PLUMBING PLANS. UTILITY CONTRACTOR SHALL REQUEST AND RECEIVE WRITTEN APPROVAL FROM PRIME CONTRACTOR PRIOR TO INSTALLATION OF LEAD-INS.



## LEGEND

	PROPERTY LINE
	RIGHT-OF-WAY LINE
	ADJOINING LOT LINE
	WATER MAIN / LATERAL
	GAS LINE
	ELECTRIC CONDUIT
	SANITARY SEWER PIPE
	SANITARY SEWER MANHOLE
	WATER VALVE
	HYDRANT
	UTILITY HANDHOLE
	ELECTRIC TRANSFORMER

Rev. #:	Date	Description
Graphic Scale:		
80	0	80 160

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Drawn By: ARM  
Checked By: LAM  
Approved By: KMS  
Project #: 22102801  
Plan Date: 08/30/23  
Scale: 1" = 80'  
Project:



**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title: <b>CONCEPTUAL UTILITY PLAN 1</b>	Sheet #: <b>2.51</b>
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## UTILITY NOTES

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- CONTRACTOR TO COORDINATE GAS MAIN, WATER, ELECTRIC, AND TELEPHONE INSTALLATION.
- ALL DOMESTIC WATER AND SANITARY SEWER STUBS TO BE TERMINATED 5 FEET OUTSIDE OF THE BUILDING UNLESS OTHERWISE NOTED. THE END OF THESE SERVICE LINES SHALL BE TIGHTLY PLUGGED OR CAPPED AND MARKED UNTIL SUCH TIME AS CONNECTION IS MADE INSIDE THE BUILDING BY PLUMBING CONTRACTOR.
- SITE UTILITY CONTRACTOR SHALL PROVIDE ALL THE MATERIALS AND APPURTENANCES NECESSARY FOR THE COMPLETE INSTALLATION OF THE UTILITIES. ALL PIPE AND FITTINGS SHALL BE INSPECTED BY THE WATER DEPARTMENT INSPECTOR PRIOR TO BEING COVERED. THE INSPECTOR MUST ALSO BE PRESENT DURING PRESSURE TESTING AND DISINFECTION OF LATERALS AND HIS SIGNATURE OF APPROVAL IS REQUIRED.
- ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES, REGULATIONS, AND/OR LOCAL STANDARDS PROPOSED BY LOCAL UTILITY AUTHORITIES.
- ALL PERTAINING TO BE APPROVED BY THE LOCAL UTILITY COMPANIES UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
- UTILITY LEAD-INS TO BUILDING SHALL NOT BE INSTALLED UNTIL BUILDING PLANS ARE COMPLETED AND LOCATIONS ESTABLISHED ON THE ARCHITECTURAL PLUMBING PLANS. UTILITY CONTRACTOR SHALL REQUEST AND RECEIVE WRITTEN APPROVAL FROM PRIME CONTRACTOR PRIOR TO INSTALLATION OF LEAD-INS.

## LEGEND

	PROPERTY LINE
	RIGHT-OF-WAY LINE
	ADJOINING LOT LINE
	WATER MAIN / LATERAL
	GAS LINE
	ELECTRIC CONDUIT
	SANITARY SEWER PIPE
	SANITARY SEWER MANHOLE
	WATER VALVE
	HYDRANT
	UTILITY HANDHOLE
	ELECTRIC TRANSFORMER

Rev. #:	Date	Description
Graphic Scale:		
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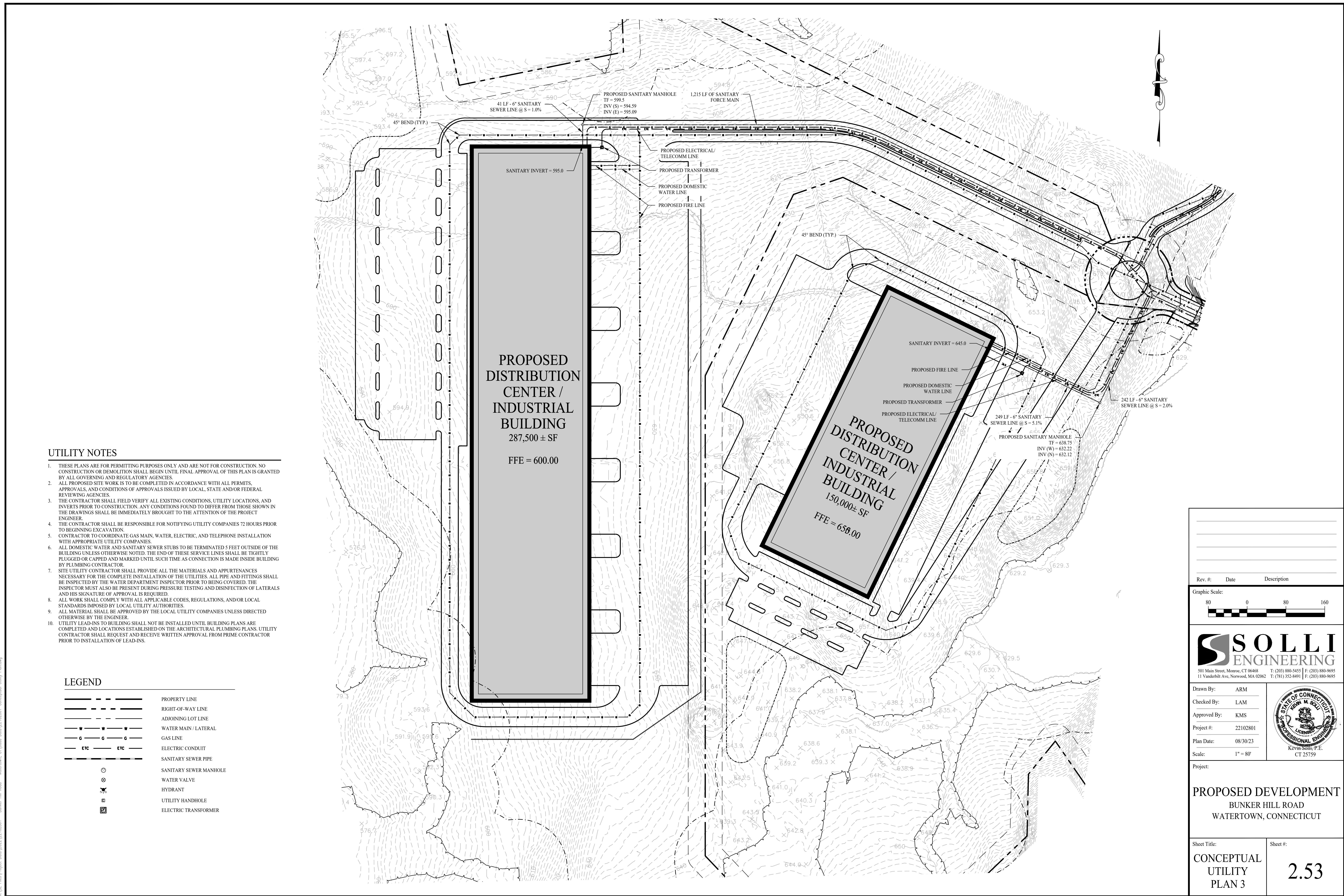
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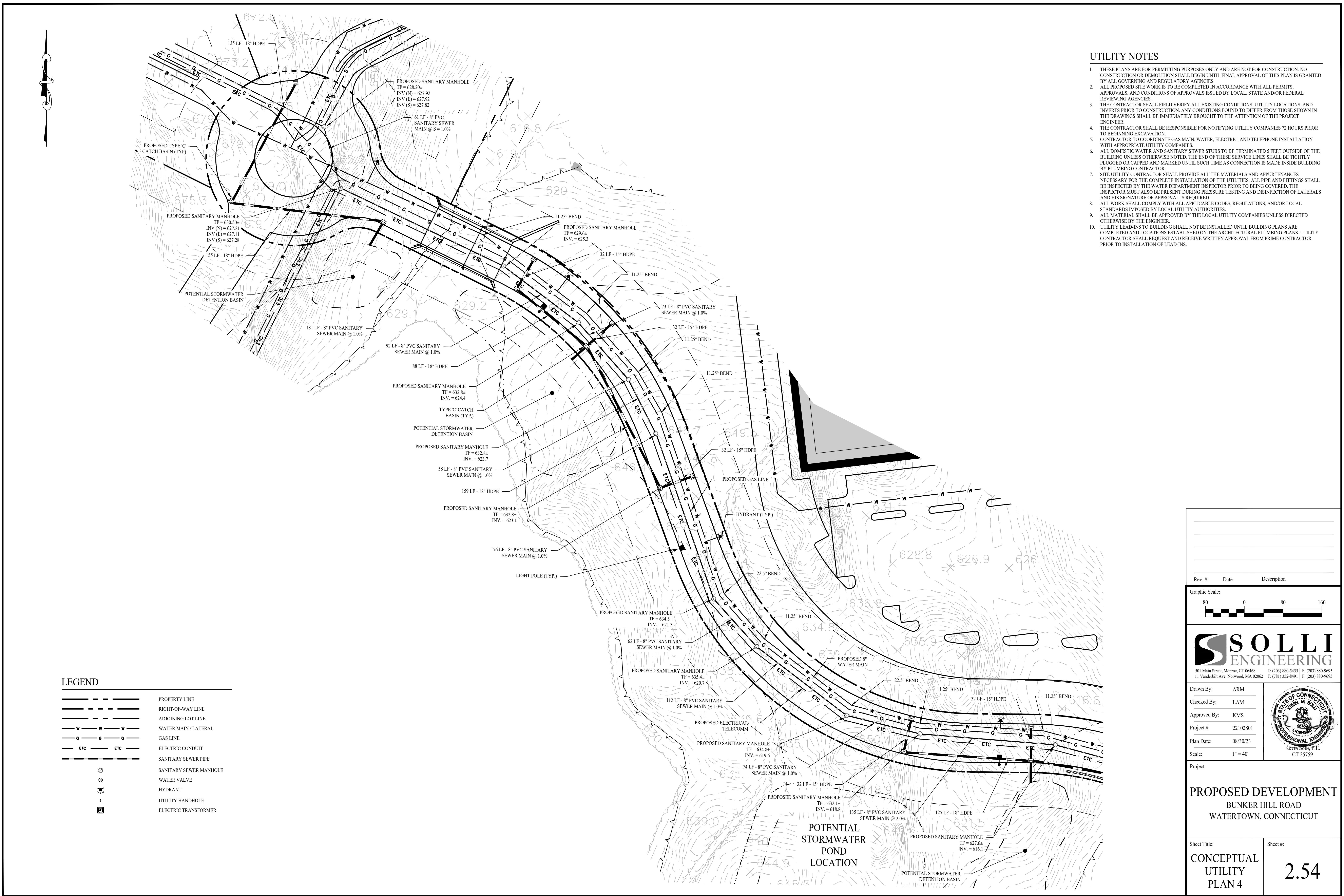
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Plan Date: 08/30/23  
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**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title: CONCEPTUAL  
UTILITY PLAN 2 | Sheet #: 2.52

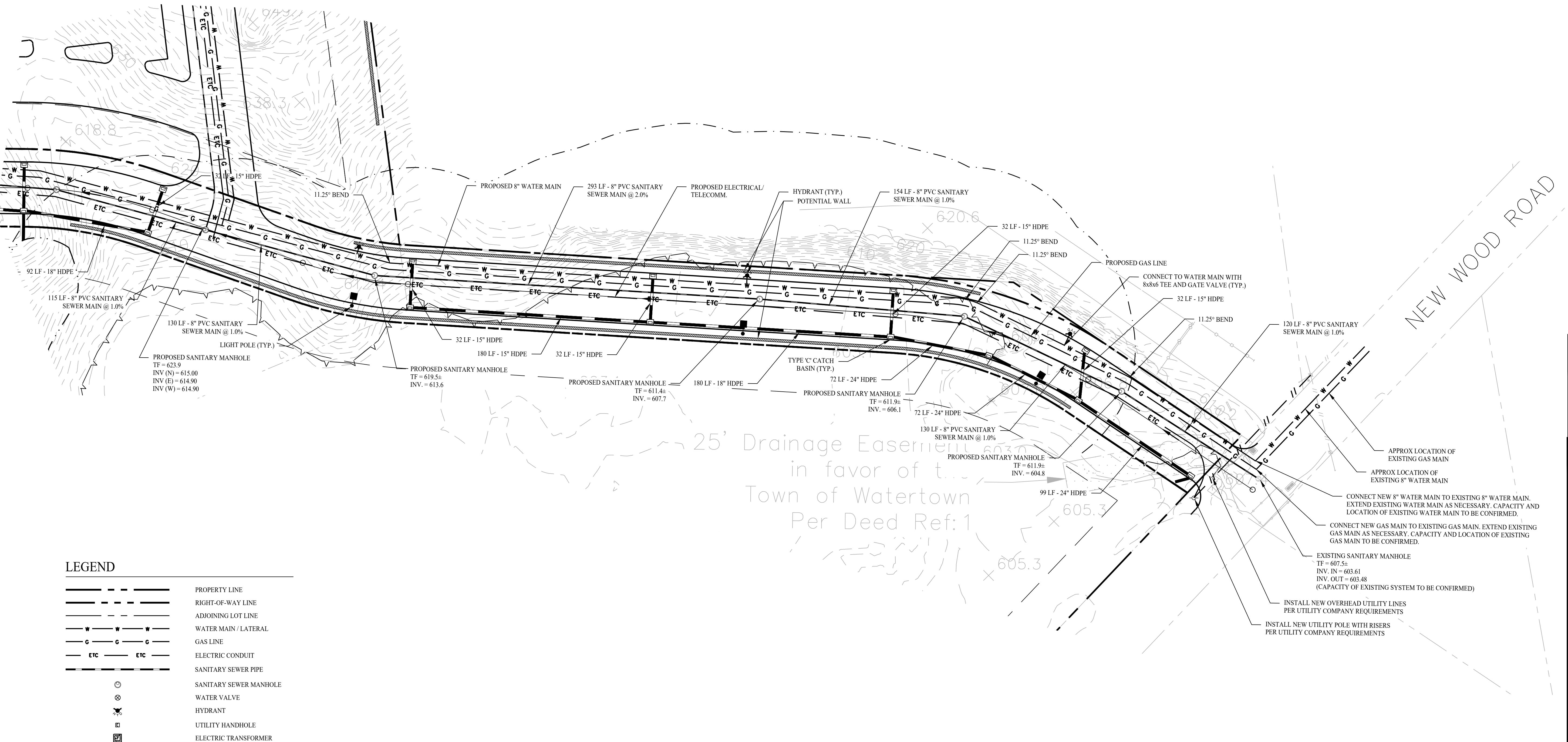




Rev. #:	Date	Description
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Drawn By:	ARM	
Checked By:	LAM	
Approved By:	KMS	
Project #:	22102801	
Plan Date:	08/30/23	
Scale:	1" = 40'	
Project:		
<b>PROPOSED DEVELOPMENT</b> BUNKER HILL ROAD WATERTOWN, CONNECTICUT		

## UTILITY NOTES

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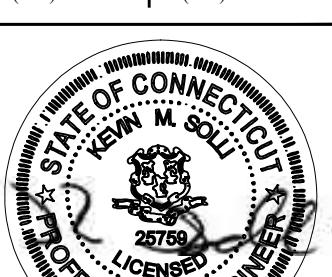


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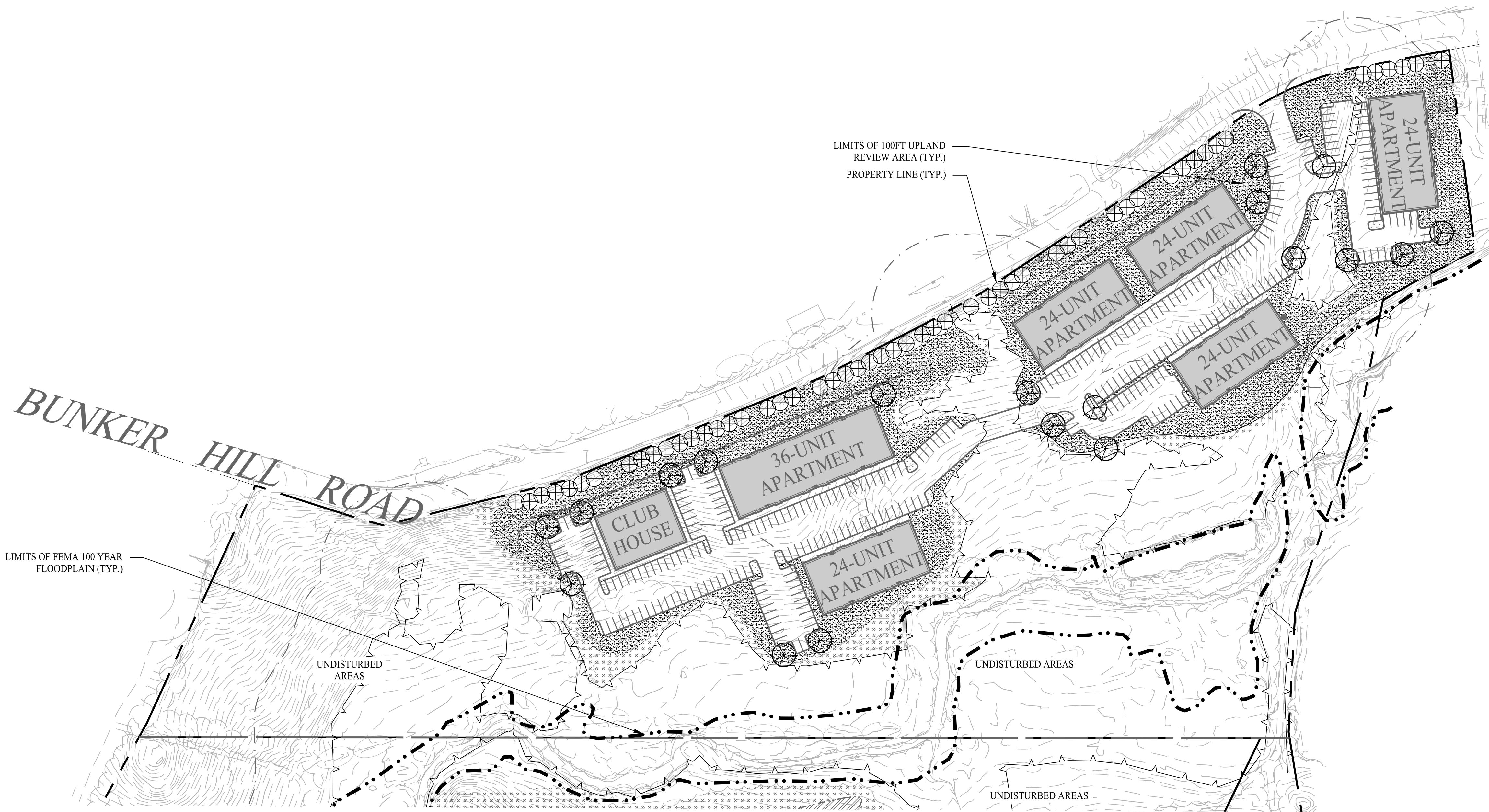
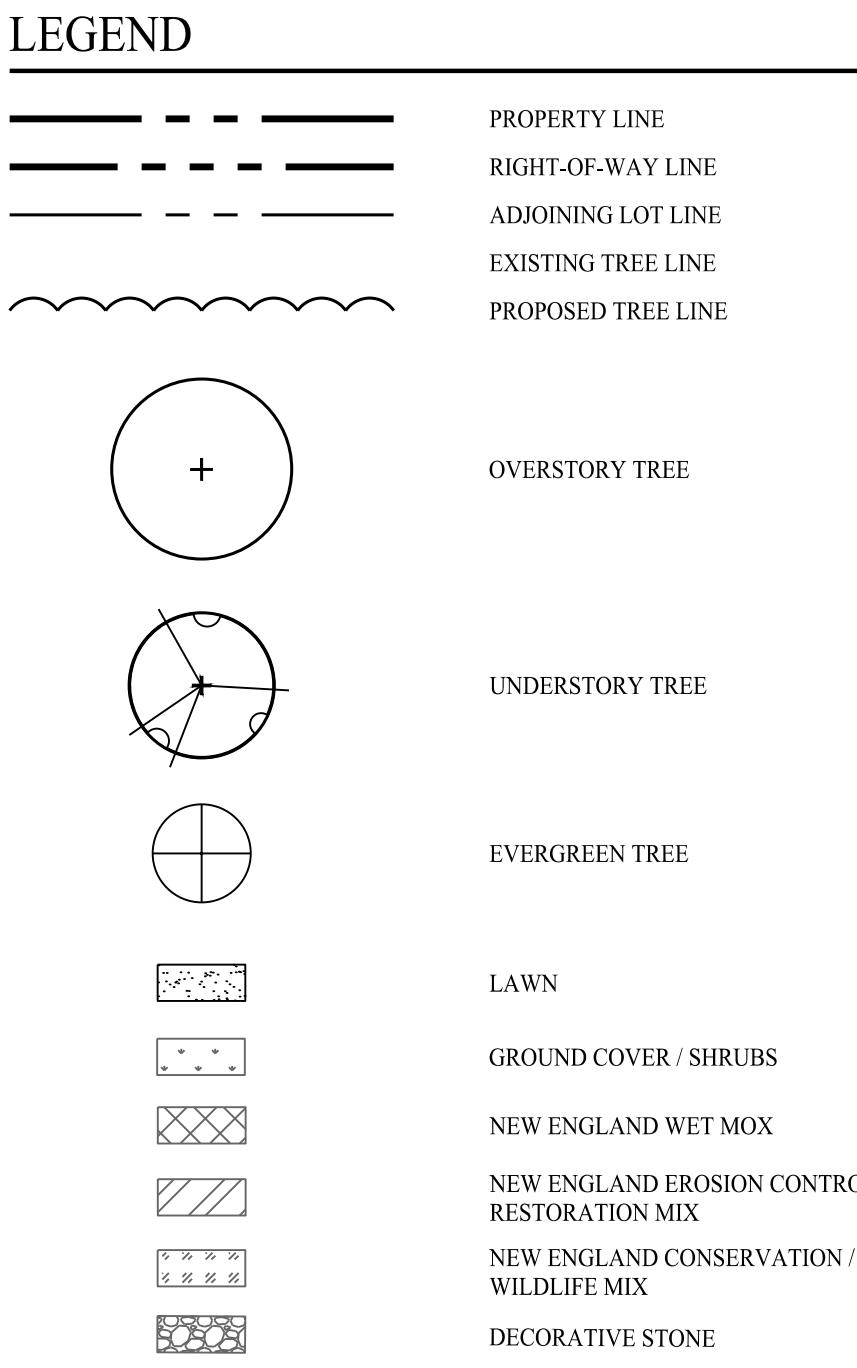
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Drawn By: ARM  
Checked By: LAM  
Approved By: KMS  
Project #: 22102801  
Plan Date: 08/30/23  
Scale: 1" = 40'  
Project:

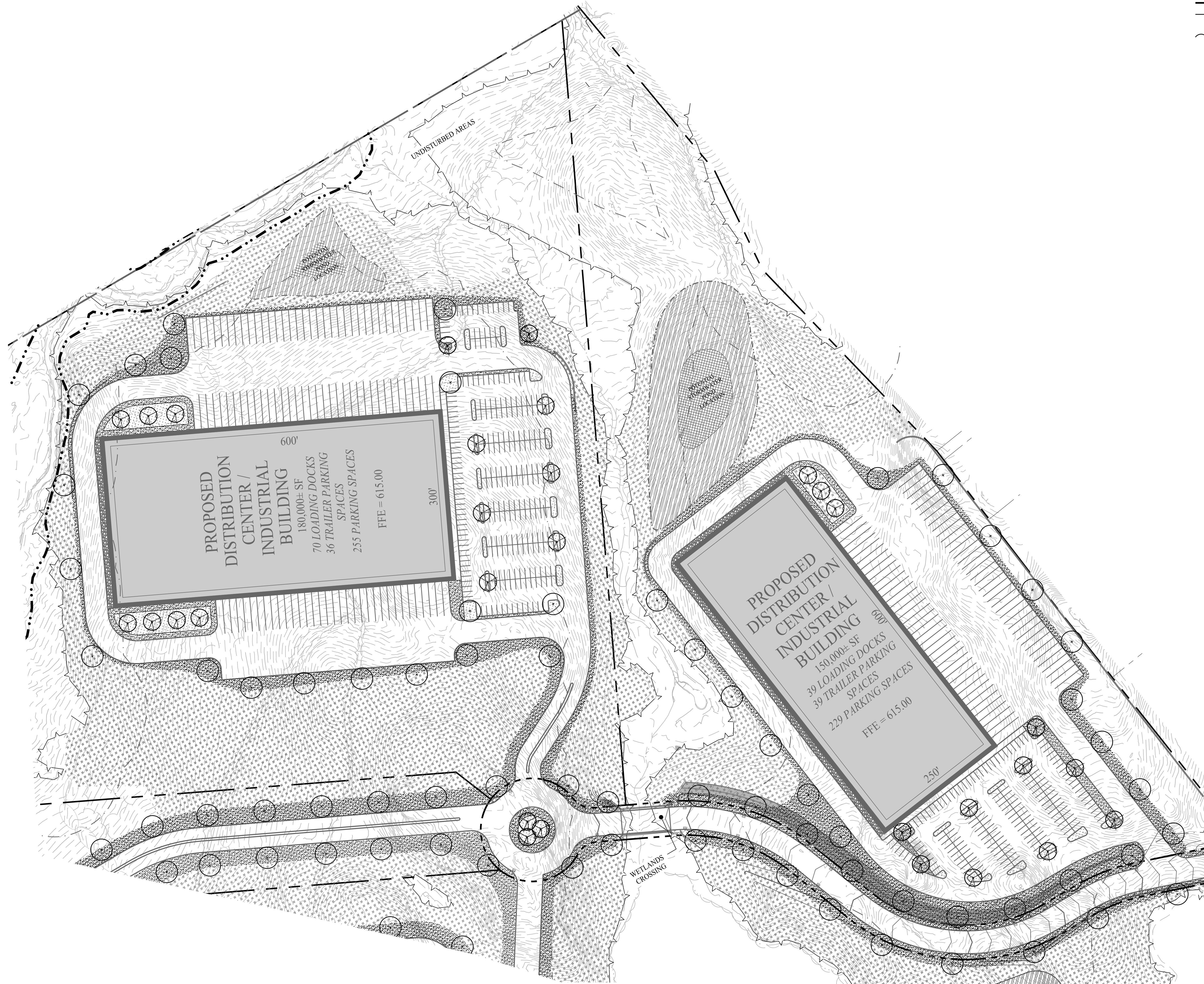
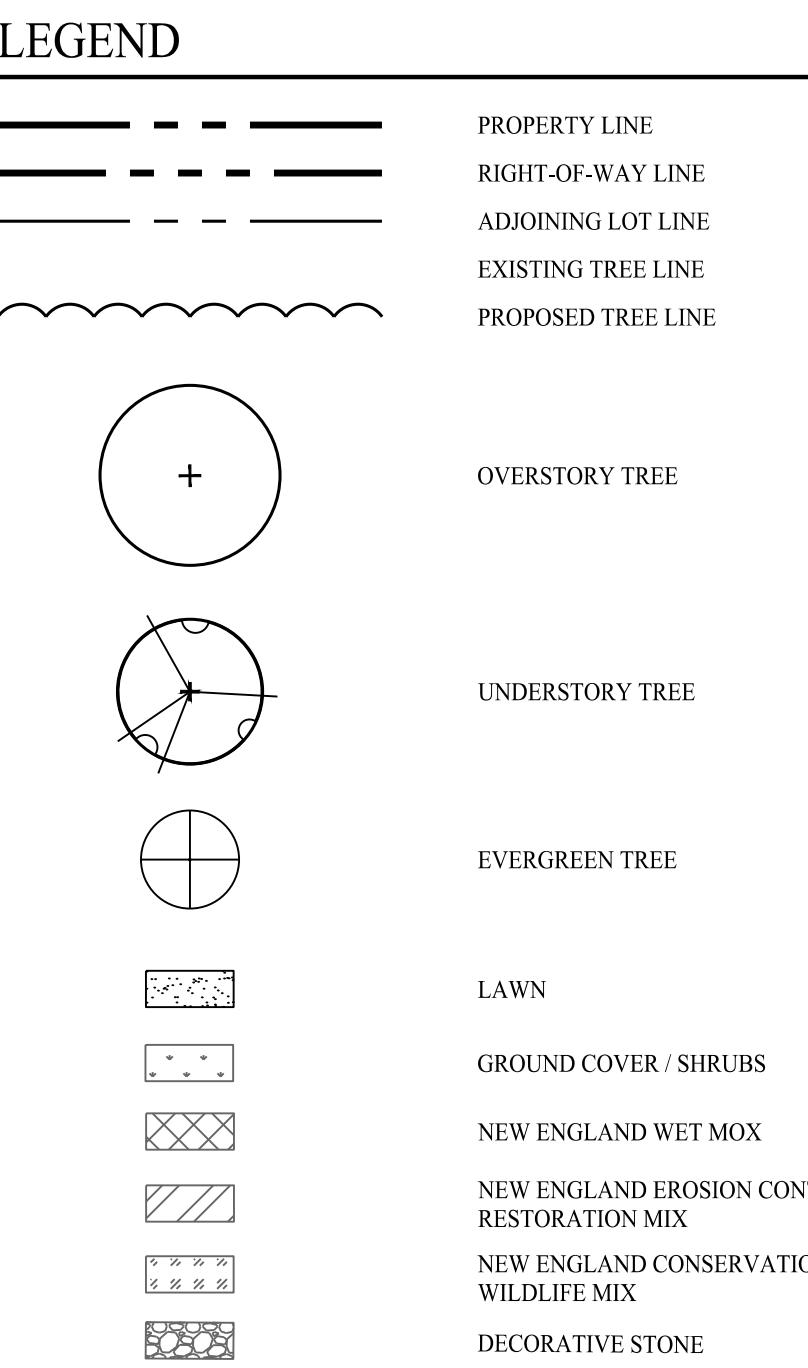


**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

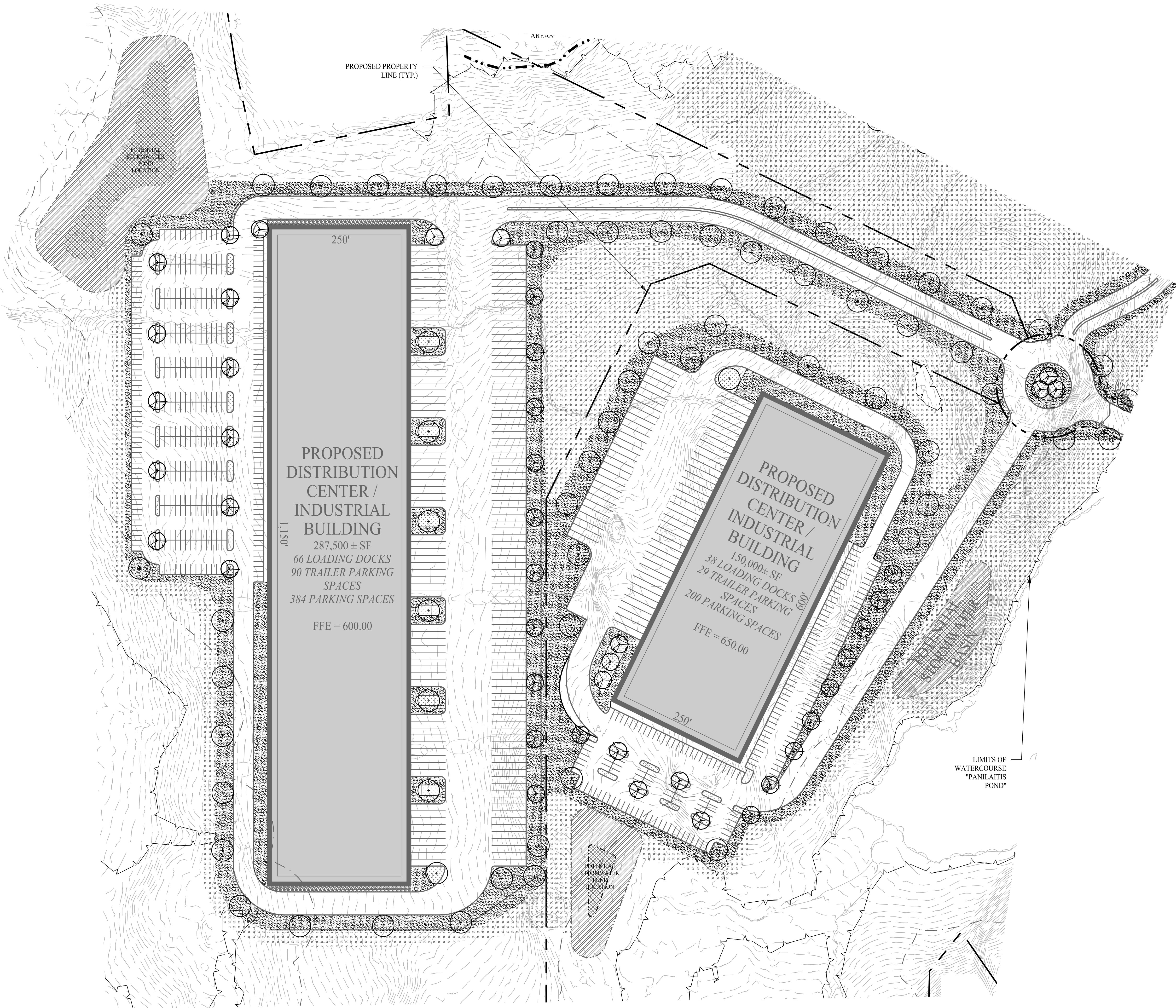
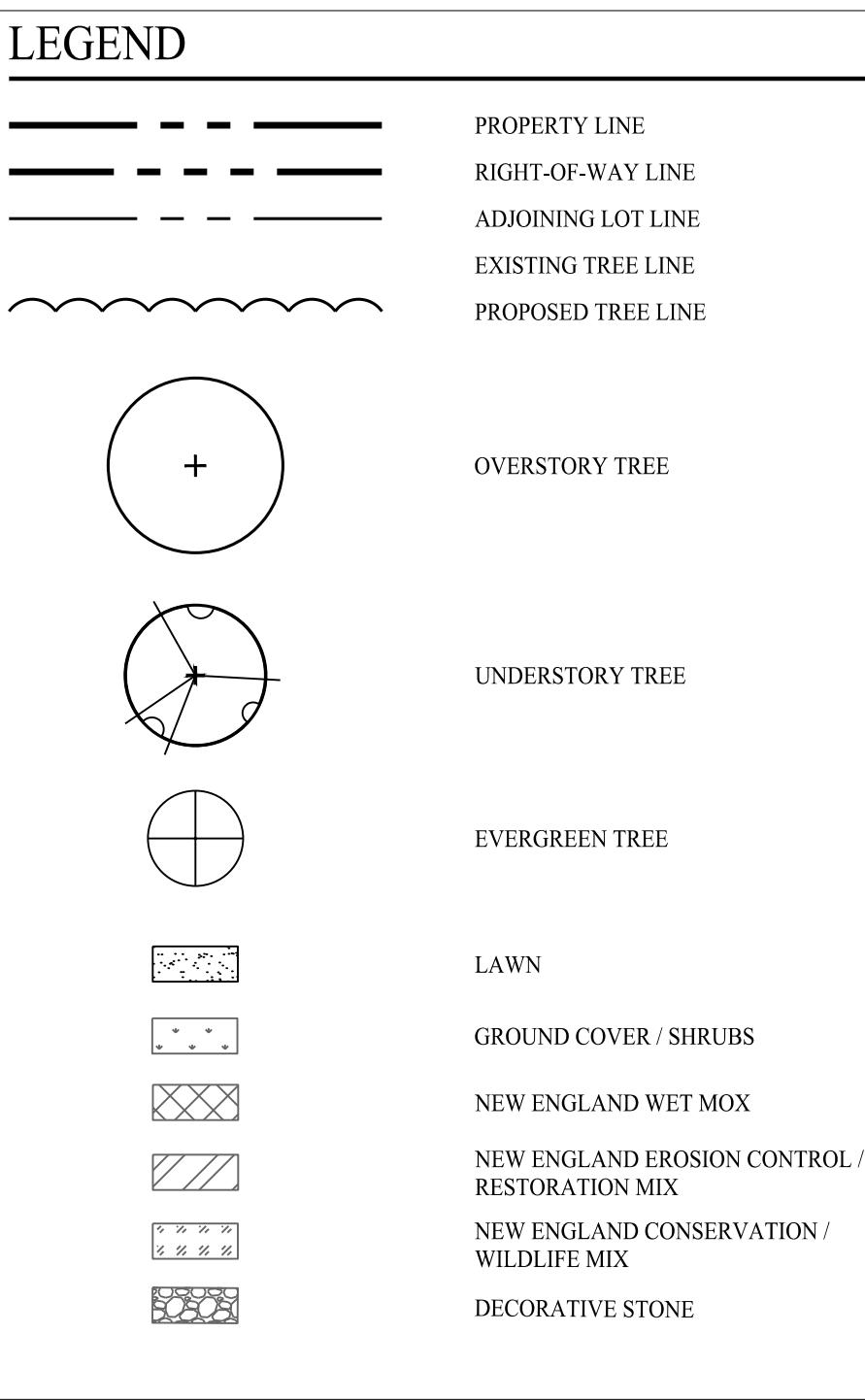
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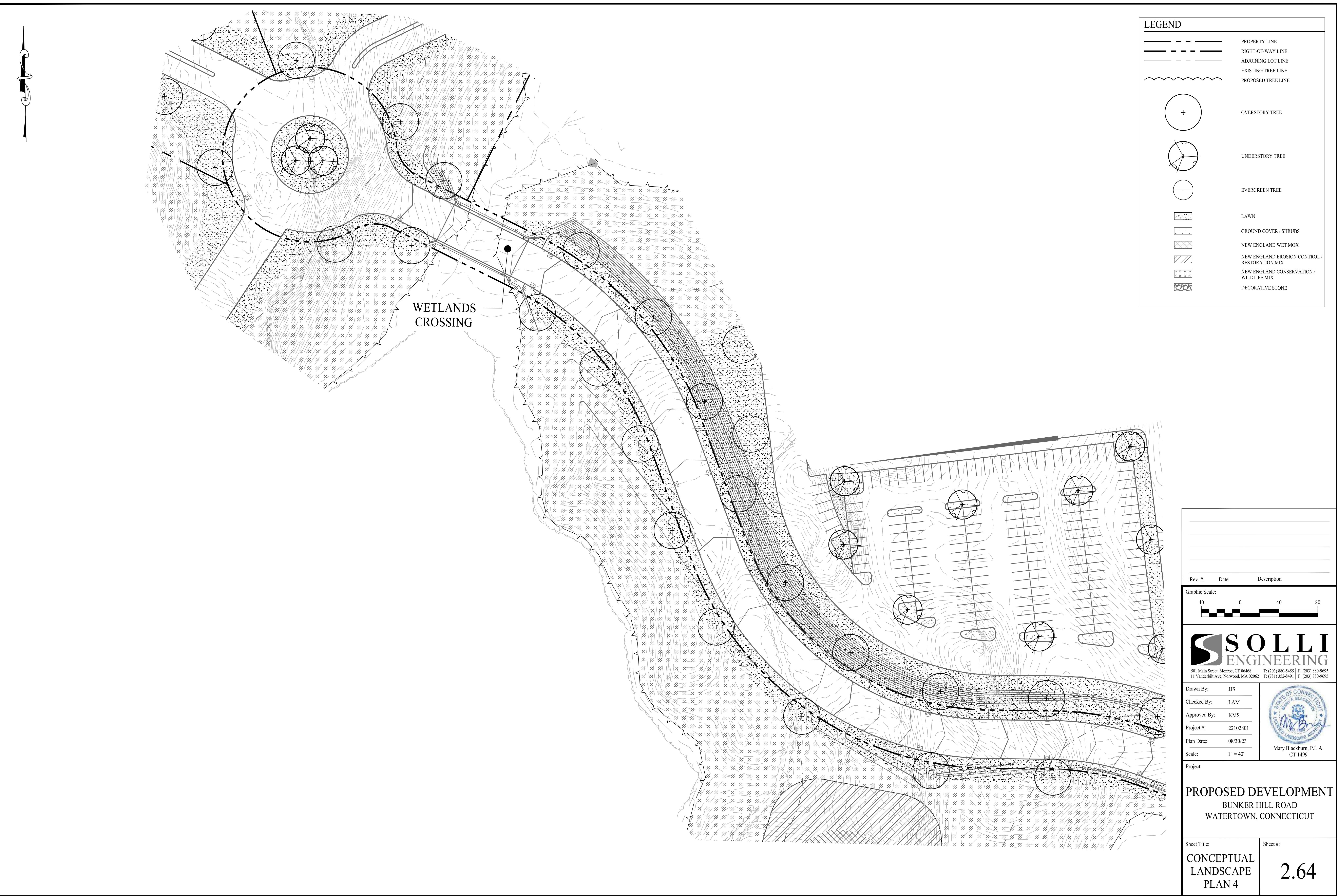
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11 Vanderbilt Ave, Norwood, MA 02062   T: (781) 352-8491   F: (203) 880-9695		
Drawn By:	JJS	
Checked By:	LAM	
Approved By:	KMS	
Project #:	22102801	
Plan Date:	08/30/23	
Scale:	1" = 80'	
Mary Blackburn, P.L.A. CT 1499		
PROPOSED DEVELOPMENT BUNKER HILL ROAD WATERTOWN, CONNECTICUT		
Sheet Title:	Sheet #:	
CONCEPTUAL LANDSCAPE PLAN 1	2.61	

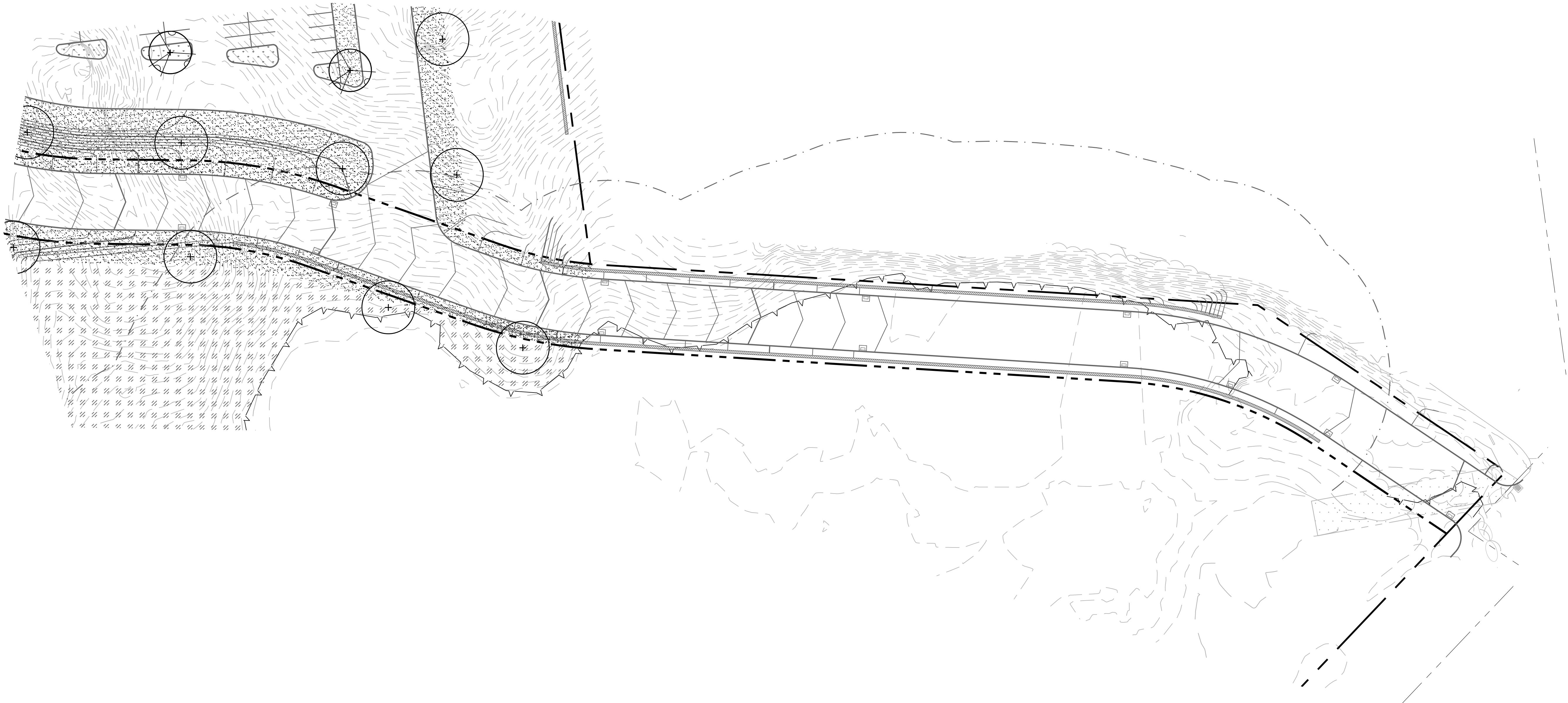
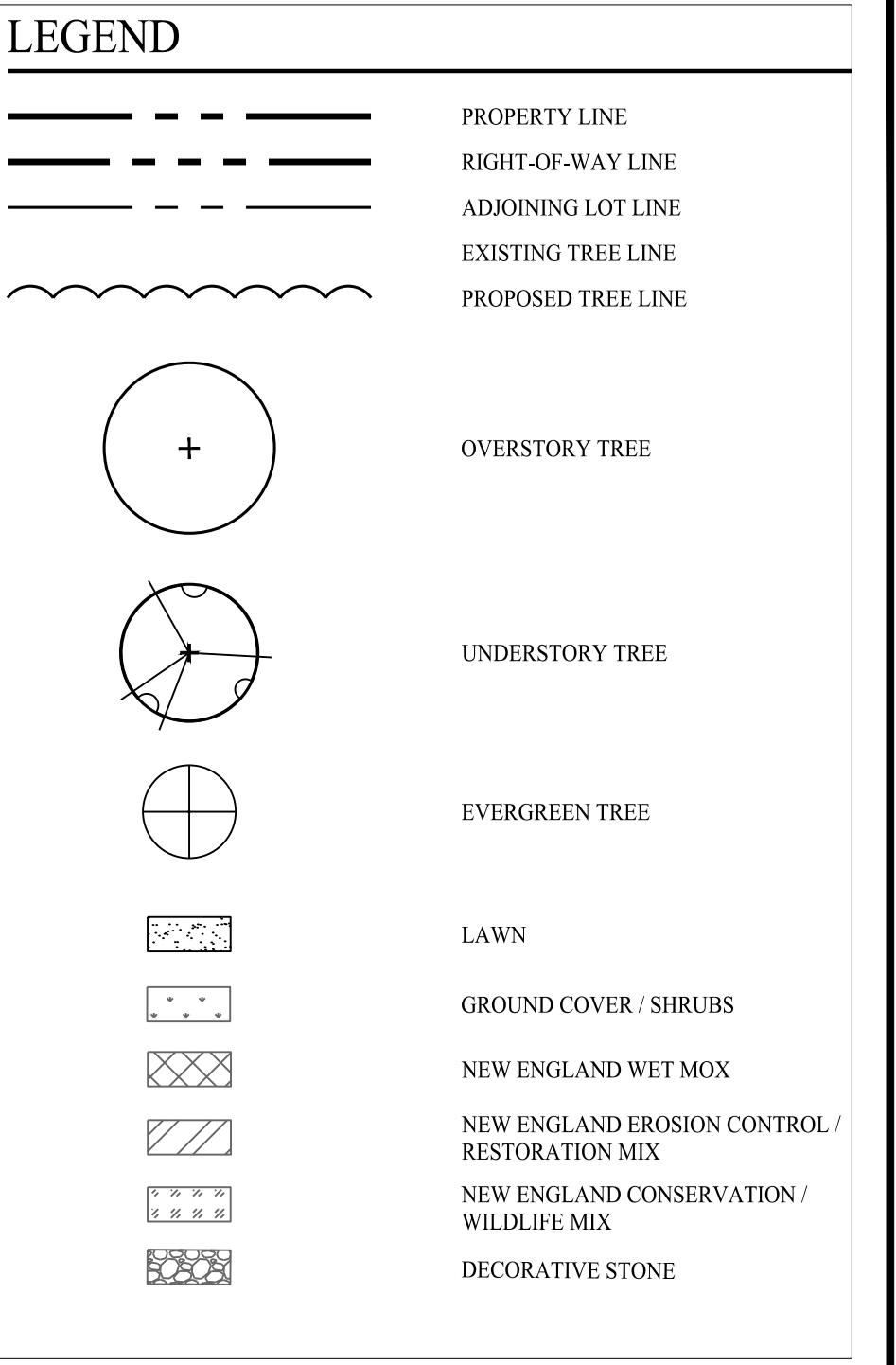


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11 Vanderbilt Ave, Norwood, MA 02062   T: (781) 352-8491   F: (203) 880-9695			
Drawn By:	JJS		
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Project #:	22102801		
Plan Date:	08/30/23		
Scale:	1" = 80'		
Mary Blackburn, P.L.A. CT 1499			
Project:			
<b>PROPOSED DEVELOPMENT</b> BUNKER HILL ROAD WATERTOWN, CONNECTICUT			
Sheet Title:	Sheet #:		
CONCEPTUAL LANDSCAPE PLAN 2	2.62		



Rev. #:	Date	Description	
Graphic Scale:			
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Drawn By:	JJS	<p>Mary Blackburn, P.L.A. CT 1499</p>	
Checked By:	LAM		
Approved By:	KMS		
Project #:	22102801		
Plan Date:	08/30/23		
Scale:	1" = 80'		
Project:			
<b>PROPOSED DEVELOPMENT</b> BUNKER HILL ROAD WATERTOWN, CONNECTICUT			
Sheet Title:	Sheet #:		
CONCEPTUAL LANDSCAPE PLAN 3	2.63		





Rev. #:	Date	Description	
Graphic Scale:			
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Drawn By:	JJS
Checked By:	LAM
Approved By:	KMS
Project #:	22102801
Plan Date:	08/30/23
Scale:	1" = 40'

Project:

**PROPOSED DEVELOPMENT**  
BUNKER HILL ROAD  
WATERTOWN, CONNECTICUT

Sheet Title:	Sheet #:
CONCEPTUAL LANDSCAPE PLAN 5	2.65