NEEDHAM PLANNING BOARD
Wednesday, September 7, 2022
7:00 p.m.

Powers Hall
Needham Town Hall, 1471 Highland Avenue
AND
Virtual Meeting using Zoom
Meeting ID: **880 4672 5264**
(Instructions for accessing below)

To view and participate in this virtual meeting on your phone, download the "Zoom Cloud Meetings" app in any app store or at www.zoom.us. At the above date and time, click on "Join a Meeting" and enter the following Meeting ID: 880 4672 5264

To view and participate in this virtual meeting on your computer, at the above date and time, go to www.zoom.us click "Join a Meeting" and enter the following ID: 880 4672 5264

Or to Listen by Telephone: Dial (for higher quality, dial a number based on your current location): US: +1 312 626 6799 or +1 646 558 8656 or +1 301 715 8592 or +1 346 248 7799 or +1 669 900 9128 or +1 253 215 8782 Then enter ID: 880 4672 5264

Direct Link to meeting: https://us02web.zoom.us/j/88046725264

1. Public Hearing:

   7:05 p.m. Major Project Site Plan Special Permit No. 2022-02: 557 Highland, LLC, an affiliate of The Bulfinch Companies, Inc., 116 Huntington Avenue, Suite 600, Boston, MA, Petitioner. (Property located at 557 Highland Avenue, Needham, Massachusetts). Regarding proposal to redevelop the Property with approximately 496,694 square feet of office, laboratory and research and development uses (see legal notice and application for more details). *Please note: this hearing has been continued from the June 7, 2022 and July 7, 2022 meetings of the Planning Board.*

   7:15 p.m. Article 1: Amend Zoning By-Law – Schedule of Use Regulations Brew Pub and Microbrewery *Please note: this hearing will not begin at 7:15 p.m., but will begin at the close of the hearing immediately prior to this one.*

2. Decision: Amendment to Major Project Site Plan Special Permit No. 2012-04: Needham Bank, 1063 Great Plain Avenue, Needham, MA, Petitioner. (Property located at 1063 Great Plain Avenue, Needham, Massachusetts). Regarding proposal to convert the existing bank building mezzanine space into 1,325 SF for executive offices, as well as demolish the existing drive-thru free-standing automatic teller machine (ATM) and to construct a 321 SF drive-up teller building with an ATM.

3. Board of Appeals – September 15, 2022.

4. Minutes.

5. Report from Planning Director and Board members.

6. Correspondence.

(Items for which a specific time has not been assigned may be taken out of order.)

goulston&storrs
counsellors at law

August 15, 2022

BY HAND DELIVERY, OVERNIGHT DELIVERY
& ELECTRONIC MAIL

Town of Needham Planning Board Members
Public Service Administration Building
500 Dedham Avenue
Needham, MA 02492
Attn: Lee Newman, Planning Director

Re: Highland Innovation Center – 557 Highland Avenue, Needham Heights, Massachusetts (the "Property") – Application for Major Project Site Plan Review and Special Permits – Revisions dated as of September 7, 2022 Planning Board Public Hearing Letter #3

Dear Planning Board Members:

As you know, we are counsel to 557 Highland, LLC, an affiliate of The Bulfinch Companies, Inc. (the "Applicant"), in connection with the redevelopment of the Property with a new, mixed-use development of office, laboratory, research and development, and retail/restaurant uses (the "Project"), all as described in our letter dated April 5, 2022 and supplemental letter dated June 30, 2022 (collectively, the "Prior Letters") transmitting the Application for Site Plan Review and issuance of Special Permits in connection with development of the Project (the "Application").

Since submission of our April 5, 2022 letter, the Applicant has undertaken an extensive community engagement process including seven (7) community meetings and two (2) public hearings with the Planning Board. At the first Planning Board public hearing, on June 7, 2022, the Applicant presented an overview of the Project and heard feedback and discussion from the Planning Board and general public. At the second Planning Board public hearing, on July 7, 2022, the Applicant and the Applicant's traffic engineers presented the Project's transportation aspects and heard additional feedback from the Planning Board and the general public.

Responding to feedback from the Planning Board, several Town departments, neighbors, and the community at large, the Applicant has further refined the Project design. This letter describes those refinements. The description of the Project in this letter is meant to restate the characteristics of the Project in their entirety from our letter of April 5, 2022 and to identify the refinements. ***Significant revisions from our submission of April 5, 2022 are indicated by italic/bold text***.

In support of the Application, the Applicant is submitting the following additional materials and information as requested for the next Planning Board public hearing on September 7, 2022:

1. ***Revised Plan Set entitled "Special Permit Package R1, August 15, 2022 for September 7, 2022 Planning Board Special Permit Public Hearing" (the "Plan Set");***

2. ***Memorandum from Stantec Architecture and Engineering P.C., Re: Special Permit Package R1 (08/16/2022 for 09/07/2022 Planning Board public hearing), dated August 16, 2022;***

3. ***Letter from VHB, Inc., Re: Transportation Updates to Special Permit Submission, dated August 15, 2022;***

4. ***Letter from VHB, Inc., Re: 557 Highland Ave – Highland Innovation Center – Plan Revisions for Permitting, dated August 15, 2022;***

5. ***Memorandum from Paul Finger Associates, Re: 557 Highland Ave – Special Permit Summary of Plan Revisions -01, dated August 15, 2022;***

6. ***Preliminary Exterior/Community Noise Evaluation/Narrative – Revision 2, prepared by Acentech Incorporated, dated August 15, 2022;***

7. ***Fiscal Impact Analysis, prepared by Fougere Planning & Development, Inc., dated May 16, 2022;***

8. ***Plan entitled "Conveyance Plan" prepared by Feldman Geospatial dated August 15, 2022, prepared for September 7, 2022 Planning Board public hearing (the "Conveyance Plan").***

* * *

ZONING ANALYSIS DISCUSSION:

Background and Overview:

The Property is the former site of the Muzi Ford and Chevrolet automotive dealership and service centers and the Muzi car wash. ***The former Muzi property consists of 403,933 square feet (sq. ft.) of land area totaling approximately 9.273 acres***. The Property is bordered by Highland Avenue to the south, Interstate 95/Route 128 to the east, Gould Street to the west, and TV Place (formerly known as Permil Road), a private way, to the north. ***As part of the Applicant's redevelopment revised plans, the Applicant proposes to widen Gould Street***

between the intersection with Highland Avenue and TV Place. To that end, the Applicant proposes to convey to the Town of Needham a portion of the Property along Gould Street containing approximately 12,080 sq. ft. of land (the "Conveyance Area"). This widening of Gould Street will shift the street line toward Interstate 95/Route 128, with corresponding shifts in the 50 and 200 foot setbacks from Gould Street required by the HC-1 zoning. Shifting these setbacks requires a reduction of the Buildings' total gross floor area by 16,694 sq. ft., and will reduce the Garage's gross floor area by 5,412 sq. ft., eliminating 18 parking spaces. The Plan Set includes a view of the reduced Garage from the westerly side of Gould Street.

The Applicant is proposing to redevelop the Property with approximately ***479,948*** sq. ft. of office, laboratory, and research and development uses, approximately ***10,052*** sq. ft. of retail and restaurant uses (yielding a total project program of ***490,000*** sq. ft.), construction of one level of below-grade parking under each building, and a separate stand-alone parking garage (the "Project"). The Project will include two buildings, one on the northerly portion of the Property (the "North Building") and one on the southerly portion of the Property (the "South Building"), together with a shared connector atrium (the "Atrium").

Based on input from the community, the neighborhood, and representatives of the Town, including the Town's traffic consultant, the Applicant has relocated the Multi-Use Walkway (defined below) constructed for the benefit of the Town and maintained by the Applicant, all as further shown in the Plan Set. In addition, the Applicant's transfer of the Conveyance Area will improve the street alignment of Hunting Road and Gould Street to make for more efficient traffic flow. The transfer of valuable land in the Conveyance Area to the Town for nominal consideration will improve the Town's roadway network, providing significant benefit to the Town.

As described below, the HC-1 District zoning allows a maximum Floor Area Ratio ("FAR") of 1.35 for the Property, generating a maximum build out of ***545,310*** sq. ft.[1] The Project, ***following conveyance to the Town of a portion of the Property for public benefit***, proposes an FAR of 1.25, based on a buildout of ***490,000*** sq. ft., which is ***39,002*** sq. ft. less than the maximum buildout.

As mentioned in our Prior Letters, the materials and studies submitted with this Application previously and in the Project's MEPA Environmental Notification Form have conservatively studied and presented an analysis based on a significantly higher build out for the Property of approximately 531,000 sq. ft. As a result of the reduced buildout, the traffic generation numbers in these materials and studies should be reduced by approximately *8*%, yielding lesser impacts than what was studied.

Pursuant to the Town of Needham Zoning Map, as amended by Article 6 of the Annual Town Meeting held on May 3, 2021 (as amended, the "Zoning Map"), the Property is located

[1] After transfer of the Conveyance Area to the Town, the remaining Property would support a maximum build out of 529,002 sq. ft. at an FAR of 1.35.

within the Highway Commercial 1 District (the "HC-1 District"). The HC-1 District was established by an amendment to the Town of Needham Zoning By-Law (as amended, the "By-Law") adopted by a 168-37 vote of Town Meeting pursuant to Article 5 of the Annual Town Meeting held on May 3, 2021. According to the Zoning Map, the Property is not located within any overlay districts.

The creation of the HC-1 District was the result of an extensive planning effort by the Town of Needham (the "Town"). The Town's Council of Economic Advisors ("CEA") began an evaluation of the Town's Industrial Zoning Districts in 2013. The CEA held public meetings with residents, neighbors, public officials, businesses, and landowners (collectively, the stakeholders) in 2014 and obtained a build-out analysis and a traffic impact report. The CEA made preliminary recommendations to the public and Select Board to upgrade the zoning adjacent to I-95/Route 128 to make these areas more economically competitive.

The Planning Board and Select Board decided to move forward with rezoning of the former Industrial-1 Zoning District circumscribed by I-95/Route 128, Highland Avenue, Gould Street, and the MBTA right of way, and occupied by the Muzi Ford and Chevrolet dealership, a car wash, and WCVB Channel 5. A Warrant Article proposing to rezone this Industrial-1 Zoning District was developed and presented to the October 2019 Special Town Meeting, where it received a majority vote but less than the required two-thirds.

In response to public concerns about density, traffic impacts, permitted and special permit uses, and environmental issues, a Town-wide community meeting was held with stakeholders in January 2020 to discuss overall land use goals for the HC-1 District. A working group, including representatives from the Planning Board, Select Board, Finance Committee, and CEA was formed. The working group then commissioned an updated traffic study of the area, to analyze the ability of the Town's traffic infrastructure to accommodate development at various densities and use profiles, as well as an updated fiscal impact analysis. From these efforts, the Planning Board drafted a revised Zoning Article to establish the HC-1 District. The revised Zoning Article reduced maximum floor area ratios and building height, increased building setback distances, required additional landscape buffering along Gould Street and Highland Avenue, increased open space requirements and established green building standards for issuance of a special permit.

In connection with the above process, the Town commissioned the Fiscal Analysis to study the potential financial benefit of such rezoning. Based on the Fiscal Analysis, a full-build out of the Property and the adjacent land owned by Channel 5 and related entities in the HC-1 District at 1.35 FAR would yield an annual net financial benefit to the Town of approximately $8,342,400. Without the adjacent land[2], the Project, as proposed, will result in a prorated annual net financial benefit of approximately $5,000,000 to the Town. ***The Fougere Report confirmed this approximate benefit to the Town***.

[2] The Applicant is unaware of any current plans by the Channel 5 entities to redevelop the approximately 260,000 sq. ft. of its land in the HC-1 District.

The Applicant proposes the Project to realize the goals of this re-zoning.

Proposed Project:

Use

As described above, the Property was most recently used as an automotive dealership and car wash making up a nearly entirely impervious surface which included parking for approximately 532 vehicles. The Project will remove environmentally hazardous materials and redevelop the existing underutilized site to include approximately ***479,948*** sq. ft. of office, laboratory, and research and development uses. The Project will also feature approximately ***10,052*** sq. ft. of retail and/or restaurant uses and accessory parking use in the form of underground parking beneath the North and South Buildings and separate stand-alone Garage. A breakdown of proposed uses and the approximate square footage of such uses is as follows:

USES	PROPOSED
Office	***239,974*** sq. ft.
Lab/Research and Development	***239,974*** sq. ft.
Retail/Restaurant	***10,052*** sq. ft.
Accessory Parking	***1,390 total parking spaces of which 362 will be located beneath the buildings, 998 will be located in a stand-alone parking garage, and 30 will be surface parking. This represents a reduction in 18 spaces from our prior submission.***

Because the specific square footage breakdown is subject to final tenant demands, the Applicant requests that the Board allow the allocation among the uses (and floor plans) to change from time to time without further Board review or approval as long as the Project maintains the number of parking spaces required by the approvals. The Applicant requests the ability to construct the Project in phases, including the right to obtain a final certificate of occupancy for the parking garage and/or either building prior to completion of construction of both buildings.[3]

Pursuant to By-Law Section 3.2.7, professional, business, or administrative offices and laboratory uses are allowed by-right in the HC-1 District. Retail uses are also allowed by-right so

[3] If a bond is required in connection with the issuance of a Certificate of Occupancy for the North or South Building or the Garage before completion of the other buildings, the Applicant requests that the amount of the bond be limited to the costs of completing internal roadways and landscaping, excluding the costs of any unfinished (or unstarted)) other buildings.

long as no single retail establishment contains more than 5,750 square feet of gross floor area. Light-manufacturing uses— including manufacture of pharmaceutical, bio-pharmaceutical, medical, robotic, and micro-biotic products, which may be part of the Project tenants' laboratory uses—are allowed by right and also as an accessory use to any lab/research development use. The Applicant anticipates that light-manufacturing uses accessory to research and development uses, including the production of prototypes, may be part of the Project depending upon the ultimate tenanting of the Project.

By-Law Section 3.2.7.1(m) allows all by right customary and proper uses accessory to lawful principal uses. Given that the accessory parking on the Property is intended to provide parking incidental to operation of the main uses described above, such accessory use is allowed by-right. Formerly, the Property showed 532 lined spaces, a portion of which were used for parking for customers and employees, and the balance of which were used for parking of new and used car inventory and auto repair activities in connection with the dealership on the Property. These spaces do not include any employees or visitors for the car wash.

The Applicant anticipates that the retail space may contain a tenant in excess of approximately *6,052* sq. ft., and a restaurant of approximately 4,000 sq. ft. Accordingly, the Project will require a Special Permit for the potential occupancy of a single retail tenant in excess of 5,750 sq. ft. and a Special Permit for restaurant use.

Parking

The Applicant plans to construct a total of ***1,390*** parking spaces (***an 18 space reduction from our prior submission***) to be provided between a one-level underground parking structure beneath the buildings and a separate above-ground parking garage.[4] The following chart describes the number of parking spaces required pursuant to By-Law Section 5.1.2.

Use	Space Required by Zoning	Proposed Parking Spaces
Research facilities/laboratories	***800*** spaces (1 space per 300 sq. ft.)*	
Office	***800*** spaces (1 space per 300 sq. ft.)	
Retail	***up to 34*** **s**paces (1 space per 300 sq. ft.)	
Restaurant	***up to 44*** spaces, for a 100 seat restaurant with one take-out service station (1 space per 3 seats plus 10 spaces per take-out service station)	

[4] The stand-alone garage will contain two levels of underground parking as shown in the Plan Set.

Total	***up to 1,678, assuming 6,052 sf of retail use and 4,000 sf restaurant with 100 seats and one take-out service station***	***1,390 total parking spaces of which 362 will be located beneath the buildings, 998 will be located in a stand-alone parking garage, and 30 will be surface parking. This represents a reduction in 18 spaces from our prior submission.***
*Provided that occupancy by a single tenant of more than 50,000 sq. ft. shall require one space per 300 sq. ft. for the first 50,000 sq. ft. and 1 space per 400 sq. ft. in excess of 50,000 sq. ft. Thus, the number of required parking spaces will be reduced if a single tenant occupies all of the North Building or the South Building, or both.		

As shown above, the Applicant proposes ***1,390*** parking spaces. However, the By-Law's parking requirements assume a higher employee density than is typical for lab/research & development uses. The By-Law also assumes that each employee will commute alone and does not take into account the Applicant's proposed use of carpool, walking, biking, and public transit alternatives that will reduce the number of vehicles required to be parked on-site. Furthermore, the By-Law does not consider the potentially permanent changes in commuting patterns resulting from the COVID-19 pandemic, including hybrid/remote work programs. For these reasons, the Applicant's proposed number of parking spaces is more reflective of expected demand than the parking requirement under the By-Law. Therefore, the Project will require a Special Permit from the Planning Board, waiving strict adherence to the minimum number of required parking spaces for the ***288*** space difference between the proposed ***1,390*** spaces and the ***1678*** required spaces under zoning owing to these special circumstances, or for less than ***1,390*** total spaces, as the Planning Board may deem sufficient based on a review of the Application.[5]

The parking spaces provided will comply with all design guidelines prescribed by By-Law Section 5.1.3 as shown on the Plan Set included with the Application.

Dimensional Requirements

The following chart sets forth dimensional requirements applicable to the Project:

Item	Required	Project	Compliance with Zoning?
Minimum Lot Area	20,000 sq. ft.	***391,846*** sq. ft**	YES
Minimum Lot Frontage	100 ft.	At least 100 ft.	YES

[5] As described below, the Planning Board is the special permit granting authority for all special permit relief for Major Projects under Section 7.4.3 of the By-Law, and accordingly may grant relief under Section 5.1.1.5 from both parking space requirements under Section 5.1.2 and parking plan under Section 5.1.3.

Item	Required	Project	Compliance with Zoning?
Maximum Floor Area Ratio	0.70 as-of-right Up to 1.35 by special permit	1.25	**YES – Special Permit Required**
Front Setback from Highland Avenue and Gould Street	15 ft.	North Building: 200 ft. South Building: 50 ft.	YES
Landscape Buffer	50 ft. along Highland Ave. and Gould Street	50 ft.***	YES
Increased Height Setback	200 ft. from Highland Ave. and Gould Street	North Building: 200ft.	YES
Side/Front Setback on Rt. 95	20 ft.	20 ft.	YES
Rear Setback	20 ft. (along TV Place)	20 ft.	YES
Maximum Lot Coverage	65%	***47.9***%	YES
Maximum South Building Height* (within 200 ft. height limitation zone)	35 ft. as-of-right 42 ft. by special permit	42 ft.	**YES – Special Permit Required**
Maximum Building North Height* (outside 200 ft. height limitation zone)	56 ft. as-of-right 70 ft. by special permit	70 ft.	**YES – Special Permit Required**
Maximum Garage Height*	44 ft. as-of-right 55 ft. by special permit	55 ft.	**YES – Special Permit Required**

Item	Required	Project	Compliance with Zoning?
Maximum Stories* (within 200 ft. height limitation zone)	2.5 stories as-of-right Up to 3 stories by special permit	3 stories (South Building)	**YES – Special Permit Required**
Maximum Stories* (outside 200 ft. height limitation zone)	4 stories as-of-right Up to 5 stories by special permit	5 stories (North Building)	**YES – Special Permit Required**
Maximum Garage Footprint	42,000 sq. ft.	***41,361*** sq. ft.	YES
Minimum Open Space	25%	***>25%***	YES
Maximum Uninterrupted Façade Length	200 ft.	200 ft.****	YES
Building Parapet Height	5 ft.	5 ft.	YES

*Pursuant to Section 4.11.1(e), structures erected on a building and not used for human occupancy, including mechanical equipment, may exceed the maximum building height provided that no part of such structures extends more than 15 ft. above the maximum allowable building height (e.g., 57 ft and 85 ft., respectively for each building) and such structures do not cover more than 25% of the building roof.

** ***This area calculation is based on the reduction of the Property area's after transfer to the Town of Needham of the 12,080 sq. ft. Conveyance Area***. Separately, the Applicant's property on the north side of TV Place (known as 0 Gould Street) containing approximately 7,127 sq. ft. is not included in calculation of lot area and other measurements.

*** ***Pursuant to Section 4.11.1(1)(d) of the By-Law, sidewalks and walkways, including the Multi-Use Walkway (defined below), may be located within the 50 ft. setback buffer along Highland Avenue and Gould Street***.

**** As shown in the Plan Set, the Garage's façade will be broken up through the use of banners which will provide uninterrupted façade lengths of less than 200 ft.

Based on the foregoing, the Project will require Site Plan Review (described below) and Special Permits from the Planning Board as follows: (i) to allow a maximum Floor Area Ratio of 1.25; (ii) to allow a maximum height of 70 feet for the North Building; (iii) to allow a maximum of 5 stories in height for the North Building; (iv) to allow a maximum height of 42 feet for the

South Building; (v) to allow a maximum of 3 stories in height for the South Building; and (vi) to allow a maximum building height of 55 feet for the above-ground parking structure.

With respect to clause (i) above, pursuant to By-Law Section 4.11.1(5) the Planning Board may allow an FAR of up to 1.35 by issuance of a Special Permit. The grant of a Special Permit pursuant to this section must consider the factors detailed further below.

With respect to clauses (ii) through (vi) above, pursuant to By-Law Section 4.11.1(1), buildings within 200 ft. of Highland Avenue and Gould Street are limited to a height of 35 ft. and 2.5 stories. The Planning Board may grant a Special Permit to increase the height of buildings within the 200 ft. height limitation zone to 42 ft. and 3 stories and may further increase the height of buildings beyond the 200 ft. height limitation zone to up to 70 ft. and 5 stories. The 200 ft. height limitation envelopes allowing for such height increases are depicted in Figure 1 and Figure 2 of By-Law Section 4.11.1(f), which provides for such figures to clarify the limits of the required setbacks and allowed envelopes. Additionally, pursuant to Section 4.11.2, the Planning Board may grant a Special Permit to increase the height of a parking structure up to 55 ft.[6]

The Project will also require a Special Permit to allow for retaining wall height greater than 4 ft. and other applicable design requirements for retaining walls pursuant to By-Law Section 6.11.5.

Major Project Site Plan Review and Special Permit:

Site Plan Review and Approval, in the form of a Planning Board Special Permit, is required for any "Major Project". Pursuant to Section 7.4.2 a "Major Project" is any project in the HC-1 District that involves the construction of 10,000 or more square feet, an increase in gross floor area of 5,000 or more square feet, or the creation of 25 or more new off-street parking spaces. The Project will exceed each of the foregoing thresholds and therefore qualifies as a Major Project subject to Site Plan Review.

Pursuant to By-Law Section 7.4.3, "the special permit granting authority for all permits the issuance of which is necessary for the construction or use of a Major Project shall be the Planning Board."

Based on the above, the Project will require Site Plan Review and Approval pursuant to By-Law Section 7.4 from the Planning Board and subject to review by the Design Review Board. Additionally, as a Major Project, the Project will require a Special Permit from the Planning Board in connection with Site Plan Review. As provided by By-Law Section 7.4.3, the Planning Board may also issue any other Special Permits required for the Project given its status as a Major Project.

[6] In lieu of applying the height/story limitation in Section 4.11.1, the By-Law sets parking garage height at 44 ft. and allows an increase up to 55 ft. by Special Permit pursuant to Section 4.11.2(1).

Relief Requested:

Based on the foregoing analysis and in accordance with By-Law Sections 3.2.7.2, 4.11, 5.1.1.5, 6.11.5, 7.2, 7.4, 7.5 and 7.6, and such other By-Law Sections as may apply, the following items of zoning relief are requested:

1. Special Permit in accordance with By-Law Section 4.11.1(5) for an FAR of 1.25 for the Project.

2. Special Permit, in accordance with By-Law Section 4.11.1(1) for a building height of 70 feet for the North Building.

3. Special Permit, in accordance with By-Law Section 4.11.1(1) for 5 stories for the North Building.

4. Special Permit, in accordance with By-Law Section 4.11.1(1) for a building height of 42 feet for the South Building.

5. Special Permit, in accordance with By-Law Section 4.11.1(1) for 3 stories for the South Building.

6. Special Permit, in accordance with By-Law Section 3.2.7.2 (g), for restaurant use.

7. Special Permit, in accordance with By-Law Section 3.2.7.2 (d), for retail use by a single tenant of between 5,750 – 10,000 sq. ft.

8. Special Permit, in accordance with By-Law Section 4.11.2(1) for a parking garage structure height of 55 feet.

9. Site Plan Review and Approval of the Project as a Major Project in accordance with Section 7.4.

10. Special Permit, in accordance with By-Law Section 5.1.1.5, for a waiver of approximately ***288*** parking spaces from the required parking space number under By-Law Section 5.1.2 to be provided as part of the Project.

11. Special Permit, in accordance with By-Law Section 6.11.5, for deviation from the design requirements for retaining walls.

12. Any additional Special Permits required for the permitting of the Project.

Satisfaction of Criteria for Granting Relief Requested:

In connection with granting the above-requested relief, the Planning Board must make certain findings related to the Project as set forth in the applicable Sections of the By-Law. The applicable criteria are set forth in bold below and are followed by the Applicant's description of how the Project complies or will comply with such criteria. Explanatory notes from the By-Law are provided in italics.

I. Pursuant to By-Law Section 7.6.1, the Planning Board must make the following findings and determinations when issuing a Special Permit, as delineated in By-Law Section 7.5.2.1:

*Prior to granting a special permit, the Planning Board, shall make a finding and determination that the proposed use, building structure, off-street parking or loading, modification of dimensional standards, screening or landscaping, or other activity, which is the subject of the application for the special permit***:**

(a) Complies with such criteria or standards as may be set forth in the section of this By-Law which refers to the granting of the requested special permit;

As set forth below, the Project complies with the specific criteria and standards for the special permit relief requested herein.

(b) is consistent with: 1) the general purposes of this By-Law as set forth in subparagraph 1.1, and 2) the more specific objectives and purposes applicable to the requested special permit which may be set forth elsewhere in this By-Law, such as, but not limited to, those at the beginning of the various sections;

The Project is consistent with the general purposes of the By-Law, including the promotion of health, safety, convenience, morals, and welfare for Needham residents because it redevelops an underutilized and environmentally compromised site into an economically viable and eco-friendly development with public amenities.

The Project will promote the welfare of the inhabitants of Needham through a significant increase in property tax revenues, providing approximately $5,000,000[7] ***(based on both the Barret and Fougere Fiscal Analyses)*** in annual additional real estate and personal property taxes which will support the Town's educational and recreational programs, housing initiatives, community and open spaces, and other Town priorities. The Project includes traffic mitigation measures and bicycle lane improvements to lessen congestion on area streets. This is an appropriate use of the land, specifically contemplated by the recent rezoning of the area. With the requested

[7] As described above, this is an approximate proration based on the development scenarios for a full-buildout of the Property and the adjacent parcels described in the Fiscal Analysis and as applied to the Project, which is for approximately 60% of the full-buildout scenario.

special permits, the Project will comply with the applicable use, height, area, and building location requirements of the By-Law.

By-Law Section 1.2 requires that any building or structure erected and any use of premises established must be in conformity with the By-Law. With the requested special permits, the Project will be in conformity with the By-Law.

(c) is designed in a manner that is compatible with the existing natural features of the site and is compatible with the characteristics of the surrounding area.

The site has few natural features, as it is almost entirely covered with the foundations of the former car dealership and car wash buildings and associated impervious areas used for parking and for the display of motor vehicles for sale. The Project is compatible with the characteristics of the surrounding area. The orientation of the buildout with the parking garage located near the "rear" of the Property will result in limited visibility of the parking structures from the major surrounding roads, including Highland Avenue and Gould Street. Extensive landscaping will be provided around the entire Project site, including a ***multi-use fitness/access walkway*** with exercise stations for use by tenants' employees, neighbors, and the general public.

Where the Planning Board determines that one or more of the following objectives are applicable to the particular application for a special permit, the Planning Board shall make a finding and determination that the objective will be met:

(d) the circulation patterns for motor vehicles and pedestrians which would result from the use or structure which is the subject of the special permit will not result in conditions that unnecessarily add to traffic congestion or the potential for traffic accidents on site or in the surrounding area; and

The Transportation Impact and Access Study ("TIAS") prepared by VHB analyzes existing traffic conditions on area roadways and at area intersections, under current conditions and as projected to exist in seven years with and without construction of the Project. The TIAS recommends, and the Applicant has committed to implement, several measures to prevent the Project from increasing traffic congestion or the potential for traffic accidents. These measures include widening and reconfiguring Gould Street at the intersection with Highland Avenue and at the intersection with the Property entrance (opposite the Wingate Residences entrance), and construction of a ***shared multi-use walkway on the Property along Gould Street (the "Multi-Use Walkway")*** for use by neighbors and residents. The internal circulation pattern has been designed to control vehicle speeds and to reduce vehicle-pedestrian interactions by providing wide sidewalks. Therefore, the circulation patterns for motor vehicles and pedestrians which would result from the Project will not result in conditions that

unnecessarily add to traffic congestion or the potential for traffic accidents on the Property or in the surrounding area.

(e) the proposed use, structure or activity will not constitute a demonstrable adverse impact on the surrounding area resulting from:

1) **excessive noise, level of illumination, glare, dust, smoke, or vibration which are higher than levels now experienced from uses permitted in the surrounding area,**
2) **emission or discharge of noxious or hazardous materials or substances, or**
3) **pollution of water ways or ground water.**

The proposed use, structures and activity at the Property resulting from the Project will not have a demonstrable adverse impact on the surrounding area. Any minimal noise, illumination or glare associated with the Project will be mitigated with thoughtful design features, including landscaping and cut-off lighting, as more particularly shown in the Plan Set. No noxious or hazardous substances are anticipated to be emitted as a result of the Project, and no waterways or groundwater will be polluted.

As referenced in the foregoing criteria, certain Sections of the By-Law prescribe additional criteria to be considered for particular Special Permit relief. Such criteria, and how the Project complies or will comply with such criteria, are provided below:

1. <u>Special Permit criteria for relief for FAR of 1.25, pursuant to By-Law Section 4.11.1(5)</u>:

In granting such special permit, the Planning Board shall consider the following factors:

(i) the ability of the existing or proposed infrastructure to adequately service the proposed facility without negatively impacting existing uses or infrastructure, including but not limited to, water supply, drainage, sewage, natural gas, and electric services;

As set forth in the Stormwater Report, the TIAS, and based on the Applicant's engineer's independent review of the infrastructure, the existing or proposed infrastructure can adequately service the Project without negatively impacting existing uses or infrastructure, including but not limited to, water supply, drainage, sewage, natural gas, and electric services.

(ii) impact on traffic conditions at the site, on adjacent streets, and in nearby neighborhoods, including, but not limited to, the adequacy of the roads and intersections to safely and effectively provide access and egress;

As set forth in the TIAS and elsewhere in this letter, the Project will include significant off-site mitigation, including traffic improvements, that will counterbalance the intersection capacity impacts of the additional Project-generated trips added to the roadway network. The Project will also include a robust Traffic Demand Management (TDM) program to incentivize reduced single occupant driving and increase use of alternative forms of transportation.

(iii) the Environmental impacts of the proposal; and

Regarding direct environmental impacts, the Applicant will take feasible steps to reduce carbon emissions and minimize energy usage and has designed the Project accordingly. Energy modeling will evaluate several emissions mitigation measures including hybrid electric/gas heating with electric heating being the first to operate whenever capacity allows, high efficiency glycol heat recovery loop, reduced laboratory exhaust through exhaust monitoring, electric water heating, and more. The Applicant also studied options to include photovoltaic solar panels at the roof of the Garage and roof of the North & South Buildings. In addition to these emission reduction strategies, the Project will utilize the LEED v4 BD+C rating system for the Core and Shell building components to incorporate other sustainability strategies. The Applicant anticipates the Project will be LEED Silver Certified with higher targets possible.

In addition, the Project has utilized the MEPA Environmental Justice tool, which demonstrates that this Project is not within 1-mile of any Environmental Justice community. The Project will not exceed any air quality thresholds or cause impacts outside of the 1-mile radius and therefore will not negatively impact such communities.

Regarding future impacts due to Sea Level Rise/Storm Surge and other climate change considerations, the Project is not exposed to Sea Level Rise/Storm Surge or Extreme Precipitation-Riverine Flooding. Although the Property has a high risk of Extreme Precipitation-Urban Flooding and a high risk of Extreme Heat, the Project will combat these risks by including measures to reduce the threat of urban flooding from extreme precipitation and developing appropriate strategies for a changing climate in the near term, as well as planning for a longer-term adaptation strategy over the course of the Project's life span.

No part of the Property has a historic structure, or a structure within a historic district listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth.

(iv) the fiscal implications of the proposal to the Town

Based on the Barret Fiscal Analysis, ***and confirmed in the Fougere Fiscal Analysis***, full-build out of the Property and the adjacent parcels at 1.35 FAR would yield a net annual financial benefit to the Town of approximately $8,342,400. As described above, the Project proposes a build-out of approximately 90% of the Property's full-build out potential, which results in a prorated net annual financial benefit of approximately $5,000,000 to the Town from development of the Project, plus personal property taxes which would also generate significant additional revenue.

(v) In granting a special permit, the Planning Board shall also consider any proposed mitigation measures and whether the proposed project's benefits to the Town outweigh the costs and adverse impacts, if any, to the Town.

The Project will include significant mitigation as described above and below. In addition, based on the Barret Fiscal Analysis, ***and confirmed in the Fougere Fiscal Analysis***, the Project is anticipated to provide a net annual financial benefit to the Town of approximately $5,000,000, plus personal property taxes which would also generate significant additional revenue.

2. <u>Pursuant to By-Law Section 4.11.3, in addition to the foregoing criteria, the Planning Board must consider the below design guidelines when issuing a Special Permit for relief under By-Law Section 3.2.7.2 and/or Section 4.11</u>:

(a) The proposed development should provide or contribute to providing pedestrian and neighborhood connections to surrounding properties, e.g., by creating inviting buildings or street edge, by creating shared publicly accessible green spaces, and/or by any other methods deemed appropriate by the Planning Board;

The Project will contain various pedestrian and neighborhood connections and amenities. The south end of the South Building, near the intersection of Gould Street and Highland Avenue will contain the Project's "retail zone" of approximately ***10,052*** sq. ft. of retail and/or restaurant use. This area is being developed with retail plaza and landscapes visible from the public streets, making it a vibrant and cohesive part of the neighborhood. A multi-use fitness/access walkway is planned around the Property, with various exercise areas planned at intervals on the loop, and including a pond and water feature.

(b) Any parking structure should have a scale, finish and architectural design that is compatible with the new buildings and which blunts the impact of such structures on the site and on the neighborhood;

The Garage will be constructed primarily of structural precast concrete columns and spandrel beams with color and finish intended to coordinate with the color and finish of the lab buildings. In addition, the overall scale of the stand-alone Garage will be broken up through the use of fabric banners hung from the upper levels, which will result in visual interruptions and a softening of the façades on the sides most visible to the neighborhood. These design elements will create interruptions in the Garage façade so that uninterrupted façade length is less than 200 ft., in compliance with Section 4.11.2(3) of the By-Law. The Garage will be in the northeast corner of the site, downgradient and well way from Gould Street. Its presence will be masked to the south and southwest by the North Building. The Garage will comply with the specific dimensional criteria developed for this district to integrate with the surrounding area, as shown on the plans.

(c) The proposed development should encourage creative design and mix of uses which create an appropriate aesthetic for this gateway to Needham, including but not limited to, possible use of multiple buildings to enhance the corner of Highland Avenue and Gould Street, possible development of a landscape feature or park on Gould Street or Highland Avenue, varied façade treatments, streetscape design, integrated physical design, and/or other elements deemed appropriate by the Planning Board;

The Project will include two buildings, the North Building on the northerly portion of the Property, and the South Building on the southerly portion of the Property, as well as a shared Atrium to connect them that will help break down the scale of the overall project into smaller pieces. As noted above, the south end of the South Building, near the intersection of Gould Street and Highland Avenue is planned to contain the "retail zone" which will have approximately ***10,052*** sq. ft. of public retail or restaurant use. This area is being developed with retail plaza featuring soft and hardscape landscaping, outdoor seating, and a water feature at the former location of Muzi pond at the Gould Street and Highland Avenue intersection. Together the proposed R&D, Office, and Lab uses mixed with Retail/Restaurant uses at the corner will create an active gateway condition visible from the public streets. As described above a multi-use fitness/access walkway is planned around the Property, with various exercise areas planned at intervals around the buildings, and including a pond and water feature.

(d) The proposed development should promote site features and a layout which is conducive to the uses proposed;

The buildings' massing was designed to take advantage of unique view corridors, interesting topography, solar orientation, and comply with the zoning requirements outlined above. The buildings will provide flexible floorplates that are desirable for today's tenants looking for access to light and views and opportunities for shared

indoor and outdoor amenities, including, among other amenities, the previously described multi-use fitness/access walkway.

(e) The proposed development should incorporate as many green building standards as practical, given the type of building and proposed uses;

The Applicant is committed to taking all feasible steps to reduce carbon emissions and minimize energy usage. Energy modeling will evaluate several emissions mitigation measures including hybrid electric/gas heating with electric heating being the first to operate whenever capacity allows; high efficiency glycol heat recovery loop; high efficiency chilled water plant; reduced laboratory exhaust through exhaust monitoring; electric water heating; improved envelope insulation and infiltration without thermal bridging; and high-performance lighting and controls.

In addition to emission reduction strategies, the Project will utilize the LEED v4 BD+C rating system for the core and shell building components to incorporate other sustainability strategies such as: green vehicle parking; open space; rainwater management; heat island reduction; construction and demolition waste management; and building product disclosure and optimization. The current goal is to achieve LEED Silver Certified with higher targets being evaluated. In addition, the Project will be Energy Star rated and certified as a WELL Building.

The WELL Building Standard takes a holistic approach to health in the built environment addressing behavior, operations and design. WELL is a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and well-being, through air, water, nourishment, light, fitness, comfort and mind. WELL is grounded in a body of medical research that explores the connection between the buildings where we spend more than 90 percent of our time, and the health and wellness impacts on us as occupants. WELL Certified™ spaces can help create a built environment that improves the nutrition, fitness, mood, sleep patterns and performance of its occupants.

(f) The proposed development should be designed and conditioned to reduce or mitigate adverse impacts on adjacent properties or the surrounding area such as those resulting from excessive traffic congestion or excessive demand for parking; and

The Project will include off-site mitigation that will counterbalance the intersection capacity impacts of the additional Project-generated trips added to the roadway network. The prior use of the Property as a car wash previously reported 1,360 peak daily vehicle trips to/from the car wash during the winter months, or roughly 600 vehicles daily during peak periods. The car wash coupled with Muzi employees,

visitors, new and used car sales, parts distribution, etc., yielded an additional 600 single occupancy vehicles such that there will be little, if any, increase in traffic from the Project. Furthermore, the Applicant will implement significant traffic mitigation measures as described herein, including traffic improvements and the Multi-Use Walkway. As set forth above, the Project will also include a robust TDM program to incentivize reduced single occupant driving and increase use of alternative forms of transportation. Based on the TIAS, the roadway network, as improved through the Project's proposed transportation mitigation, can safely and adequately handle the trips associated with the Project.

(g) The proposed development shall include participation in a transportation demand management program to be approved by the Planning Board as a traffic mitigation measure, including but not limited to, membership and participation in an integrated or coordinated shuttle program.

As set forth above, the Project will also include a robust TDM program to incentivize reduced single occupant driving and increase use of alternative forms of transportation. The Applicant will explore and look to implement shuttle connectivity through its future proactive involvement in the Route 128 Business Council to improve public transportation access and accessibility to the Property. The Applicant will incentivize reduced single occupant driving and increased use of alternative forms of transportation

3. <u>Pursuant to By-Law Section 6.11.5, the Planning board must consider the specific criteria given below when issuing a Special Permit for relief from retaining wall requirements in By-Law 6.11:</u>

(a) That the retaining wall will not cause an increase of water flow off the property;

The 4-6 foot high retaining wall proposed along the eastern Property boundary will be located along the side of the proposed multi-use fitness/access walkway and adjacent to the I-95/Route 128 off ramp. The retaining wall will direct stormwater discharge toward the site's proposed drainage system and not to the MassDOT's ROW. This is a significant improvement over existing conditions, under which sheet drainage discharges untreated runoff off to adjacent properties and roadways.

(b) That the requested retaining wall will not adversely impact adjacent property or the public;

The requested retaining walls will face the Exit 35C ramp from I-95/Route 128 to Highland Avenue. As such, they will have little, if any, impact on adjacent

property or the public. Additionally, each retaining wall has a low profile and there is a wide vegetated shoulder from the roadway before the wall.

(c) That the report of the Design Review Board has been received and considered.

The Applicant will continue to consider and integrate any comments from the Design Review Board into the Project.

II. Special Permit in accordance with By-Law Section 5.1.1.5 waiving adherence to the required number of parking spaces and/or parking design requirements:

Such a special permit waiving strict adherence to the minimum number of required parking spaces may be granted only after it is demonstrated by an applicant that either:

(i) special circumstances in a particular use of structure does not warrant the minimum number of spaces required under Section 5.1.2; or

There are special circumstances relating to the proposed uses of the Project that do not warrant the minimum number of parking spaces required under Section 5.1.2. The Applicant plans to construct a total of ***1,390*** parking spaces, which is less than the required amount under the By-Law of ***1,678***. The TIAS reports that actual parking demand for the Project is anticipated to be approximately 1,355 spaces. The By-Law's required parking ratios assume a higher employee density than is typical for lab/research & development uses. The By-Law also assumes that each office employee will commute alone, by motor vehicle. The Applicant is committed to a transportation demand management program to encourage the use of carpool, walking, biking, and public transit alternatives to single occupancy vehicle trips. Also, the By-Law's parking ratio does not consider the potentially permanent changes in commuting patterns resulting from the COVID-19 pandemic, including hybrid/remote work programs. Additionally, the Project will construct significant traffic improvements and implement TDM measures making transportation by multiple methods more feasible. For these reasons, the minimum number of spaces that would be required under the By-Law is not warranted for the Project.

(ii) the extent of existing building coverage on a particular lot is such that in laying out parking spaces in accordance with the design requirements of Subsection 5.1.3, the requirement for minimum number of spaces under Section 5.1.2 cannot be met.

As noted above, the proposed quantity of parking spaces is sufficient to satisfy the anticipated parking demand for the Project.

In reviewing a request for a special permit under this Section 5.1.1.5, the Planning Board shall consider the following:

(a) The issuance of a special permit will not be detrimental to the Town or to the general character and visual appearance of the surrounding neighborhood and abutting uses, and is consistent with the intent of this Zoning By-Law;

The Project redevelops an underutilized site into an economically viable development with public amenities. The addition of the Project will be a source of employment for Needham residents, will generate significant additional tax revenues for the Town, introduces uses, including retail/restaurant uses, which will contribute to making the Project a vibrant and cohesive part of the neighborhood and will be designed to enhance the aesthetic of a prominent entry to Needham.

(b) In the case of waiving strict adherence to the requirements of Section 5.1.2 under subparagraph (i) above, the special permit shall define the conditions of the use of structure so as to preclude changes that would alter the special circumstances contributing to the reduced parking need or demand;

The Applicant anticipates working with the Board to incorporate appropriate conditions regarding such changes.

(c) [Not Applicable]

(d) Provisions to demonstrate the ability to provide for additional parking consistent with Section 5.1.2 and/or parking designed in accordance with the particular requirements of Section 5.1.3; and

As noted above, the proposed quantity of parking spaces is sufficient to satisfy the anticipated parking demand for the Project.

(e) The granting of a special permit under this Section shall not exempt a structure, use or lot from future compliance with the provisions of Section 5.1.2 and/or 5.1.3.

The special permit decision will not so exempt the structure, use, or lot.

III. Site Plan Review and Special Permit for Major Project

In conducting the Site Plan Review, the Planning Board shall consider the following matters:

(a) Protection of adjoining premises against seriously detrimental uses by provision for surface water drainage, sound and sight buffers and preservation of views, light, and air;

The Project has adequately protected adjoining premises against serious detriment. The Project maintains a significant landscape buffer between the proposed structures and Highland Avenue and Gould Street, which streets themselves provide a buffer for the nearby residential neighborhoods and other properties. The Project's landscape buffer includes berms planted with shade trees and conifers. The Project's buildings are far enough from the Property line (in conformance with By-Law setbacks) so there will be no shade cast towards any residential properties beyond the Property boundary. Except for a small surface parking lot next to Gould Street, all parking will be contained below the buildings or within the Garage. Service and loading areas are located within the buildings. As described above, the Project will provide a multi-use fitness/access walkway around the perimeter of the Property, adding another buffer. Adjoining premises will be protected against any seriously detrimental uses on the Property through provision of surface water drainage, a retention pond, sound and sight buffers, and the addition of natural landscaping and green space to the Property. As detailed in the Stormwater Report, stormwater will be contained within the Property and catch basins with sumps and hoods, oil/water separators, rain gardens, and vegetated swales to improve storm water quality discharges, are provided. Stormwater will be infiltrated to mitigate storm water volumes. The retention pond is incorporated along the multi-use fitness/access walkway as an attractive feature.

(b) Convenience and safety of vehicular and pedestrian movement within the site and on adjacent streets, the location of driveway openings in relation to traffic or to adjacent streets and, when necessary, compliance with other regulations for the handicapped, minors and the elderly;

As described in greater detail above, the Project will provide enough parking to accommodate all vehicles on the Property and the parking spaces provided will comply with the design criteria set forth in By-Law Section 5.1.3 (with deviations as necessary and granted pursuant to the requested Special Permit). The Project will provide a primary entrance on Gould Street, across from the existing curb cut for the Wingate senior housing community via a newly signalized intersection. An internal drive loop will mitigate traffic queuing in and out of the Property. There will be a secondary entrance/exit from the Garage to TV Place. The Applicant will construct significant traffic mitigation, including the Traffic Improvements, which will widen Gould Street to better handle traffic movements and volume. Internal sidewalks and the Multi-Use Walkway connected to Gould Street will encourage multimodal transportation opportunities. Bicycle storage for short-term and long-term use is incorporated into the Project design. Handicapped parking will be provided in compliance with applicable requirements. All access walks and paths are designed

with slopes of less than 5%, so no ramps will be needed. Crosswalks are proposed at the Gould Street signalized intersection.

(c) Adequacy of the arrangement of parking and loading spaces in relation to the proposed uses of the premises;

Parking and loading spaces have been adequately arranged in relation to the proposed uses on the Property, and in compliance with parking plan and design requirements under By-Law Section 5.1.3. Structured parking is provided under the buildings, and in a parking garage. A small surface parking area will provide handicapped parking near the primary building entrances, and parking for adjacent retail and/or restaurant space. Loading areas are included in each section of the buildings.

(d) Adequacy of the methods of disposal of refuse and other wastes resulting from the uses permitted on the site;

The Project will provide adequate methods for disposal of refuse and waste. Solid waste and refuse will be disposed of in compliance with all applicable rules and regulations. The wastewater system will be connected to the municipal sewer system. The Applicant will require Tenants to comply with all applicable regulations regarding the handling and disposal of wastes.

(e) Relationship of structures and open spaces to the natural landscape, existing buildings and other community assets in the area and compliance with other requirements of this By-Law; and

The Project will comply with the setback and landscape buffer requirements of the By-Law that were specifically developed to create an appropriate relationship between the Project and the surrounding area. As stated above, a multi-use fitness/access walkway is proposed along the perimeter of the Property, to be available for use by the general public. Fitness stations will be provided along the walkway.

(f) Mitigation of adverse impacts on the Town's resources including the effect on the Town's water supply and distribution system, sewer collection and treatment, fire protection, and streets; and may require when acting as the Special Permit Granting Authority or recommend in the case of minor projects, when the Board of Appeals is acting as the Special Permit Granting Authority, such appropriate conditions, limitations, and safeguards necessary to assure the project meets the criteria of a through f.

The Project will not have any adverse impact on the Town's water supply and distribution system, sewer collection and treatment, fire protection, or streets. The

Project will not have any adverse impact on the Town's water or wastewater infrastructure. Sufficient pump stations provide support for the area. The proposed buildings will be fully accessible for the Town's firefighting apparatus.

As detailed above and in the materials submitted herewith and in our Prior Letters, the Project, as refined, continues to satisfy each of the applicable criteria for the requested relief.

We appreciate your attention to this matter. The Applicant and Project team will be prepared to answer any questions you may have at the next public hearing with the Planning Board for the Project on Wednesday September 7, 2022.

Very truly yours,

Timothy W. Sullivan
Attorney for Applicant

Enclosures

557 HIGHLAND AVENUE - SPECIAL PERMIT R1

BOUNDARY DESCRIPTION PREPARED BY FELDMAN SURVEYORS

BOUNDARY DESCRIPTION (PER SURVEY)

A CERTAIN PARCEL OF LAND SITUATED IN THE TOWN OF NEEDHAM, COUNTY OF NORFOLK AND THE COMMONWEALTH OF MASSACHUSETTS MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT OF TANGENCY ON THE SOUTHEASTERLY SIDELINE OF TV PLACE. THENCE RUNNING SOUTHEASTERLY ALONG A CURVE TO THE RIGHT FORMING THE INTERSECTION WITH THE NORTHEASTERLY SIDELINE OF GOULD STREET, HAVING A RADIUS OF 119.49 FEET, AN ARC LENGTH OF 32.76 FEET TO THE POINT OF BEGINNING. THENCE;

CONTINUING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 119.49 FEET, A CHORD BEARING OF S 11°25'24" W, A CHORD DISTANCE OF 61.26 FEET, A DELTA ANGLE OF 29°42'24" AND AN ARC LENGTH OF 61.95 FEET TO A POINT OF TANGENCY ON SAID GOULD STREET;

THENCE RUNNING S 03°25'48" E, BY SAID GOULD STREET, A DISTANCE OF 284.30 FEET TO A POINT OF CURVATURE;

THENCE RUNNING ALONG SAID GOULD STREET, BY A CURVE TO THE LEFT, HAVING A RADIUS OF 505.00 FEET, A CHORD BEARING OF S 18°06'58" E, A CHORD DISTANCE OF 256.06 FEET, A DELTA ANGLE OF 29°22'20" AND AN ARC LENGTH OF 258.88 FEET TO A POINT OF COMPOUND CURVATURE;

THENCE RUNNING ALONG SAID GOULD STREET, BY A CURVE TO THE LEFT, HAVING A RADIUS OF 44.00 FEET, A CHORD BEARING OF S 71°42'32" E, A CHORD DISTANCE OF 55.27 FEET, A DELTA ANGLE OF 77°48'49" AND AN ARC LENGTH OF 59.76 FEET TO A POINT OF NON-TANGENCY;

THENCE RUNNING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 39.30 FEET, A CHORD BEARING OF N 62°20'24" W, A CHORD DISTANCE OF 40.83 FEET, A DELTA ANGLE OF 62°35'17" AND AN ARC LENGTH OF 42.93 FEET TO A POINT OF NON-TANGENCY;

THENCE RUNNING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 466.51 FEET, A CHORD BEARING OF N 27°59'42" W, A CHORD DISTANCE OF 69.69 FEET, A DELTA ANGLE OF 08°34'03" AND AN ARC LENGTH OF 69.76 FEET TO A POINT OF COMPOUND CURVATURE;

THENCE RUNNING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 623.02 FEET, A CHORD BEARING OF N 19°51'38" W, A CHORD DISTANCE OF 83.68 FEET, A DELTA ANGLE OF 07°42'05" AND AN ARC LENGTH OF 83.74 FEET TO A POINT OF COMPOUND CURVATURE;

THENCE RUNNING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 91.71 FEET, A CHORD BEARING OF N 09°22'22" W, A CHORD LENGTH OF 21.20, A DELTA ANGLE OF 13°16'27" AND AN ARC LENGTH OF 21.25 FEET TO A POINT OF NON-TANGENCY;

THENCE TURNING AND RUNNING N 03°17'17" W, A DISTANCE OF 141.32 FEET TO A POINT;

THENCE TURNING AND RUNNING N 09°43'54" W, A DISTANCE OF 87.70 FEET TO A POINT OF CURVATURE;

THENCE RUNNING ALONG A CURVE TO THE RIGHT, HAVING A RADIUS 25.00 FEET, A CHORD BEARING OF N 06°30'35" W, A CHORD DISTANCE OF 2.81 FEET, A DELTA ANGLE OF 6°26'37" AND AN ARC LENGTH OF 2.81 FEET TO A POINT OF TANGENCY;

THENCE RUNNING N 03°17'17" W, A DISTANCE OF 165.38 FEET TO A POINT;

THENCE TURNING AND RUNNING N 07°25'09" W, A DISTANCE OF 29.14 FEET TO THE POINT OF BEGINNING.

SAID PARCEL CONTAINING 12,087 SQUARE FEET.

557 HIGHLAND AVENUE - SPECIAL PERMIT R1

REVISION LETTERS

August 15, 2022

Ref: 15306.00

Lee Newman
Director of Planning and Community Development
Town of Needham
500 Dedham Avenue
Needham, MA 02492

Re: 557 Highland Ave – Highland Innovation Center – Plan Revisions for Permitting

The following is a list of changes to the Highland Innovation Center Civil Permitting Plans that have been made since the initial submission (plans dated 2022-03-30):

- North building, South building, and Garage footprints updated (per revised property line and setbacks)
- Underground Telephone and Electrical conduits between the North building and Garage adjusted
- Waterline connection in intersection of Highland Ave and Gould Street updated to address DPW comments
- Hydrant, waterline, and fire protection lines adjusted above the South building to address DPW comments
- Various Drain locations, rims, and inverts adjusted to match revised grading
- Parking requirements and summary tables updated per revised building square footages

Sincerely,

VHB

Nicholas Skoly, P.E.
Project Manager

August 15, 2022

Ref: 15306.00

Lee Newman
Director of Planning and Community Development
Town of Needham
500 Dedham Avenue
Needham, MA 02492

Re: Transportation Updates to Special Permit Submission

Dear Ms. Newman:

This letter serves as an update of the transportation elements for the Special Permit application for the proposed 557 Highland Avenue project in Needham, Massachusetts. Key updates that have been made since our last Planning Board presentation on July 7, 2022, include the following:

- VHB conducted a Traffic Impact and Access Study (TIAS) for the project, which was included as part of the initial Special Permit submission on April 5, 2022. The Town of Needham contracted with Greenman-Pedersen Inc. (GPI) to peer review the TIAS and a Traffic Peer Review letter was submitted by GPI on May 27, 2022. VHB provided a Response to the Traffic Peer Review comments on June 29, 2022, ahead of the Planning Board public hearing on July 7, 2022.

- Based upon ongoing coordination with the Town of Needham and GPI, the roadway mitigation has been modified to accommodate the following features based on direct feedback from GPI, Town of Needham staff, and the community:
    - A two-way multi-use walkway has been included along the east side (Project side) of Gould Street between Highland Avenue and the abandoned railroad right-of-way north of TV Place to accommodate all non-motorized roadway users.
    - A new crosswalk has been placed across Gould Street at the location of the abandoned railroad right-of-way north of TV Place with a supporting rapid rectangular flashing beacon (RRFB) to alert drivers.
    - A four-foot unmarked bicycle-accommodating shoulder on west side of Gould Street is also now included to accommodate southbound bicyclists who wish to travel on-road.
    - A revised cross-section on Gould Street with three southbound lanes approaching Highland Avenue and one northbound lane approaching TV Place to limit the amount of new pavement added while providing a suitable level of vehicle operations

- As noted in the revised Special Permit application dated August 15, 2022, the building program has been reduced in size by approximately 41,000 square feet (from 531,000 square feet to 490,000 square feet), the TIAS has not been updated to reflect this reduction in size. The analyses presented in the TIAS can be considered conservative as it is expected that the actual project will generate fewer trips than what was estimated in the TIAS due to the reduction in square footage. The proposed comprehensive transportation mitigation is still based on the larger building program presented in the TIAS to accommodate all roadway traffic (the proposed roadway mitigation is based on the concept developed by GPI as part of the rezoning of the Site which included potential redevelopment of the Channel 5 site that is not included in this project).

99 High Street, 10th Floor
Boston, Massachusetts 02110-2354
617.728.7777 ▪ FAX 617.728.7782
www.vhb.com

- The proposed parking supply on-site has been reduced by 18 parking spaces, from 1,408 parking spaces to 1,390 parking spaces. The project will require a Special Permit from the Planning Board, as the proposed parking supply is 274 spaces fewer than the up to 1,664 parking spaces that is required based on Town of Needham zoning requirements. The project is not expected to require the full amount of parking required by zoning due to the lower employee density of lab/research & development uses over traditional office uses and the anticipated use of public transit, walking, and bicycling by some employees to access the site. The proposed parking supply of 1,390 parking spaces is expected to accommodate the anticipated parking demand while providing sufficient buffer so that visitors and employees to the site do not park on nearby residential streets.

Please call me at (617) 607-2971 if you have any questions.

Very truly yours,

Sean M. Manning, PE, PTOE
Principal

99 High Street, 10th Floor
Boston, Massachusetts 02110-2354
617.728.7777 ▪ FAX 617.728.7782
www.vhb.com

LANDSCAPE ARCHITECTS • PLANNERS
CIVIL ENGINEERS • WETLAND SCIENTISTS
PAUL FINGER ASSOCIATES

Memorandum

TO: Eric Weyant, Stantec

FROM: Eric Joseph

DATE: August 15, 2022

RE: 557 Highland Ave – Special Permit
Summary of Plan Revisions -01

The Landscape Plans & Details Sheets (L1.0-L5.1) provided as part of the original Special Permit Plan Set dated 03-30-2022 have been revised and updated through August 15th as part of the project's pending supplemental submission. The revisions are in response to comments and requests noted during the various neighbor and town meetings since the projects original submission and include:

- General:
  - Reduced building and garage footprints, and realignment of the retail portion of the building away from Highland Ave (see plans and elevations by project architect);
  - Relocation of loading area for South Building farther away from Gould Street (see plans and elevations by project architect);
  - Relocation of loading area for North Building to north side of building to eliminate visibility of loading area from Gould Street (see plans and elevations by project architect);
  - Revised roadway and bike lane layout for Gould Street and TV Place in coordination with the neighbors and the Town's traffic consultant (see plans/ exhibits by project traffic engineer);
  - Added Community Open Space areas for the public including pickle ball courts (2) and open lawn/ turf areas (2);
  - Expanded Multi-Use Walkway along Gould Street from 8' wide to 18' wide;
  - Realigned Multi-Use Fitness/ Access Walkway along Highland Avenue in order to provide a greater landscape buffer from traffic along Highland Avenue;
  - Added planting beds and raised planters within Retail Plaza to further soften plaza area, as well as provide locations for potential artwork in conjunction with Needham Council for Arts & Culture;

- L-1.0 Site Plan **(see attached):**
  - Revisions associated with the additional site improvements as described above;
  - Relocated transformers for North Building and Garage further out of view from TV Place;

14 Spring Street
Second Floor
Waltham, Massachusetts 02451-4429

T: 781·647·4900
F: 781·232·6307
info@pfai.net

  - Added several walks from the proposed buildings for egress purposes as required.
  - Relocated surface parking entry farther north to improve truck turning movements for relocated loading area;
  - Increased size of water feature at corner of Highland and Gould for improved visibility and enjoyment by the public;
  - Provided additional descriptions of materials to be used.

- L-2.0 Grading Plan **(see attached):**
  - Revisions associated with the additional site improvements as described above;
  - Raised elevations along building and garage perimeters to reduce visible building heights as much as possible;
  - Minimized slopes within Community Open Space areas along Gould Street in order to help facilitate the possibility of installing portable ice-skating rink.

- L-3.0 Planting Plan **(see attached):**
  - Revisions associated with the additional site improvements as described above;
  - Provided greater detail on proposed plant materials (species, quantities and sizes);
  - Significantly increased density of proposed planting areas with additional trees, shrubs, groundcover and greater diversity of plant material;
  - Significantly limited proposed lawn areas;
  - Increased number of street trees to help soften views of proposed project.

- L-4.0 Lighting Plan **(see attached):**
  - Revisions associated with the additional site improvements as described above;
  - Provided greater photometric details with Isoline Contours and photometric summaries of retail and parking lot areas;
  - Further reduced potential of off-site light spillage by relocating perimeter light fixtures along Highland Avenue and Gould Street farther into the site.

- L-5.0 Site Details #1 **(see attached):**
  - Provided additional lighting details/ specifications for proposed lighting, including shielding to be used;
  - Revised labels to improve identification of fixtures to be used and their locations.

- L-5.1 Site Details #2 **(see attached):**
  - Primarily no changes.

Stantec

Memo

To:	Needham Planning Board (Lee Newman / Alexandra Clee) Planning Department, Suite 118 Town of Needham Public Services Administration Building 500 Dedham Avenue Needham, MA 02492	From:	Thomas Urtz, AIA Stantec Architecture
File:	Special Permit Package R1 (08/16/2022 for 09/07/2022 Planning Board public hearing)	Date:	August 16, 2022

Reference: Special Permit Package R1 (Submitted 8/16/2022) Dated: September 7, 2022

As a result of community input and previous meetings with the Planning Board please find the attached list of updates included as part of our Revision 1 package. We have organized the side-by-side list below outlining the Revision 1 updates compared to the previously submitted package to the Needham Planning Board: Special Permit Package (03/30/2022).

1. **Parking Spaces**: The layout of the free-standing parking garage has been modified to comply with the revised property line and setback. To minimize loss of spaces the layout of parking below the building has been modified.

Special Permit Package 03/30/2022	**Special Permit Package R1 - 08/16/2022 for 09/07/2022 Planning Board public hearing**
Office/Lab Building: 343 Spaces Garage: 1021 Spaces Surface Parking: 44 Spaces* Total Parking: 1408 Spaces	**Office/Lab Building: 362 Spaces** **Garage: 998 Spaces** **Surface Parking: 30 Spaces*** **Total Parking: 1390 Spaces** **(Loss of 18 spaces due to revised setback line)**
*Surface parking: Reference civil and landscape drawings.	

2. **Revised Setbacks & Gross Square Footage**: The layout of the North Building and South Building have been modified to comply with the revised Gould Street property line and setback restrictions. The west end of the North Building shifted east approximately 29'-6" across the upper levels of the building to comply with the modified setback and height restrictions (see item 3 below for additional information). The west end of the South Building shifted east approximately 22'-6", and has been pulled back from the corner of the Highland/Gould intersection to enlarge the retail plaza area.

Special Permit Package 03/30/2022	**Special Permit Package R1 - 08/16/2022 for 09/07/2022 Planning Board public hearing**

Reference: **Special Permit Package R1 (Submitted 8/16/2022)** **Dated: September 7, 2022**

Office/Lab Building: 506,694 GSF Garage: 332,298 GSF	**Office/Lab Building: Revised West Façade at North & South Buildings.** **490,000 GSF** **(Loss of 16,694 GSF due to revised setback line)** **Garage: Revised West Façade.** **326,886 GSF** **(Loss of 5,412 GSF due to revised setback line)**

3. **Stepped Massing on the west facade at North & South Building near Gould Street:** Both the North and South Buildings front Gould Street with new lower massing than presented in the original special permit package. In an effort to transition the massing of the North Building down towards Gould Street, the massing now includes a step down from 70' to 42', in conjunction with the revised building setback line location. In addition, the massing has been carved away from the North Building facing Gould and TV Place which allows for a softer, landscaped corner "pocket park", and better visibility for access to the below building garage and loading dock which have been relocated to the north façade of the building.

Special Permit Package 03/30/2022	**Special Permit Package R1 - 08/16/2022 for 09/07/2022 Planning Board public hearing**
North Building: (Gould Façade): Continuous façade, 70' height	**North Building: Stepped massing at tenant space, with potential for terrace at roof at Level 4. Stepped façade from 70' down to 42'.** **Reference revised GSF numbers in item number 2.**

Stantec Architecture & Engineering P.C.
40 Water Street, 3rd Floor
Boston, MA 02109

Thomas Urtz AIA, LEED AP
Senior Associate

Mobile: 857 210-2615

Stantec Architecture & Engineering P.C.

557 HIGHLAND AVENUE - SPECIAL PERMIT R1

PRELIMINARY EXTERIOR/COMMUNITY NOISE EVALUATION/NARRATIVE

ACENTECH

33 Moulton Street
Cambridge MA 02138
617 499 8000
acentech.com

August 15, 2022

Mr. Robert Schlager, CPM
Bulfinch Companies
116 Huntington Avenue, Suite 600
Boston, MA 02116
Via email: RAS@Bulfinch.com

Subject **Preliminary Exterior/Community Noise Evaluation/Narrative – Revision 2**
557 Highland Avenue (former Muzi Ford Site), Office & Lab Conversion
Needham, MA
Acentech Project J635632.00

Dear Robert:

This letter provides a preliminary discussion of the community (exterior) noise emissions at 557 Highland Avenue, the proposed research and development office at the former Muzi Ford dealership site in Needham, Massachusetts. We understand this project consists of two buildings and a parking garage. The South Building will be 3-stories with 215,000 square feet of office and lab space. The North Building will have 5-stories with 255,000 square feet of office and lab space. There will be a connecting glass atrium of 2-stories between the two buildings. Sound from the proposed campus described above will have to comply applicable noise limits from the Town of Needham and the Commonwealth of Massachusetts as discussed below.

SOUND LIMITS

TOWN OF NEEDHAM

It is our understanding that the Town of Needham does not have numerical noise limits that are part of the town bylaws. We have identified Section 3.8, Noise Regulation of the Town's General bylaws dated July 2021. Section 3.8.1 simply states:

> *Except in an emergency, construction activity conducted pursuant to a building permit, which causes noise that extends beyond the property line, shall be limited to the hours of 7AM to 8PM unless authorized by rules or regulations adopted by the Select Board. The penalty for violation of this regulation shall be a $50 fine.*

COMMONWEALTH OF MASSACHUSETTS

The Commonwealth of Massachusetts has enacted regulations for the control of air pollution (310 CMR 7.10[1]). To enforce these regulations, the Massachusetts Department of Environmental Protection (MassDEP) has issued guidelines that limit noise levels at property lines and the nearest residence. These limitations are: (a) not to increase the residual overall A-weighted background sound level by more than 10 dB and (b) not to produce a pure tone condition; where the sound pressure level (SPL) in one octave band exceeds the levels in the two adjacent octave bands by 3 dB or more.

[1] 310 Massachusetts Regulation 7.10, U Noise: https://casetext.com/regulation/code-of-massachusetts-regulations/department-310-cmr-department-of-environmental-protection/title-310-cmr-700-air-pollution-control/section-710-u-noise

BACKGROUND SOUND SURVEY

In order to determine compliance with the MassDEP noise limits, a background sound survey was performed from March 2 to 7, 2022. Acentech deployed two sound levels meters at the locations (A and B) shown in Figure 1. We monitored sound continuously for a period over 6 days. During this period, we measured the A-weighted ninetieth percentile sound pressure level (L_{90}) on an hourly basis 24 hours per day along with other metrics that can be reported as needed.

INSTRUMENTATION

We used Type 1 sound level meters (SLMs) in accordance with IEC 61672-1. The SLMs were factory-calibrated to National Institute of Standards and Technology (NIST) traceable sources within the previous 12 months; the laboratory calibration certificates are available upon request. Each SLM was also field-calibrated before and after the start of the survey. Each SLM was set to slow response, and recorded L_{90} sound pressure levels in one hour increments in octave-bands with center frequencies between 31.5 and 8,000 Hz. The equivalent continuous (L_{EQ}) A-weighted sound level (dBA), and unweighted (dBZ) octave-band SPLs were also recorded and will be used as necessary.

RESULTS

Figure 2 is a graph of the A-weighted L_{90} sound levels for the 6-day period. For unknown reasons, the data collection at Location A (Gould Street) abruptly stopped after 19-hours of monitoring. Given the limited amount of data, we retested Location A only from June 28 to July 6, 2022. We have compiled the L_{90} sound level and determined the lowest L_{90} sound level for the daytime (7:00 am to 10:00 pm), and nighttime (10:00 pm to 7:00 am) as given in Table 1.

TABLE 1: Summary of L_{90} Sound Levels and MassDEP Limits

PERIOD	Day (7:00 am-10:00 pm)	Night (10:00 pm-7:00 am)
Location A (Gould Street)	44	40
Location B (I-95 Ramps)	49	42
MassDEP Limit (min + 10 dB)	**54**	**50**

PROJECT NOISE LIMIT

The project noise limit is 10 dB higher than the minimum of the two locations. For daytime the limit would be 54 dBA (44 dBA + 10 dB), and for nighttime the limit is 50 dBA (40 dBA + 10 dB).

NOISE MODELING

The equipment that will generate sound from this Project includes:

- Two Air Handling Units (AHU)
- Two Cooling Towers (CT)
- Loading dock Exhaust Fans
- Multiple Garage Exhaust Fans
- Multiple General Exhaust Fans
- Multiple Exhaust Air Handling Unit (EAHU)
- Multiple Emergency Generators

All of the above equipment will be located on the roof of Building A or Building B. We will conduct a noise evaluation using Cadna/A acoustic modeling software, which complies with the international standard ISO 9613-2, “Attenuation of sound during propagation outdoors -- Part 2: General method of calculation”. All rooftop equipment will be evaluated for sound transmission to abutting properties, especially the Wingate Residences at Needham located at 235 Gould Street. As necessary to achieve noise limits, we will recommend noise control features such as acoustic screens/barriers, silencers, acoustic louvers, enclosures, and other treatments.

SUMMARY

We have been retained by Bulfinch to insure that the Project at 557 Highland Avenue will be compliant with the local and State limits noted above, given the potential use of sound mitigation. Once we have completed our evaluation, a final report will be issued that will document the predicted sound levels at various receptor points.

Please contact me at 617-499-8058 or mBahtiarian@acentech.com with any questions or comments.

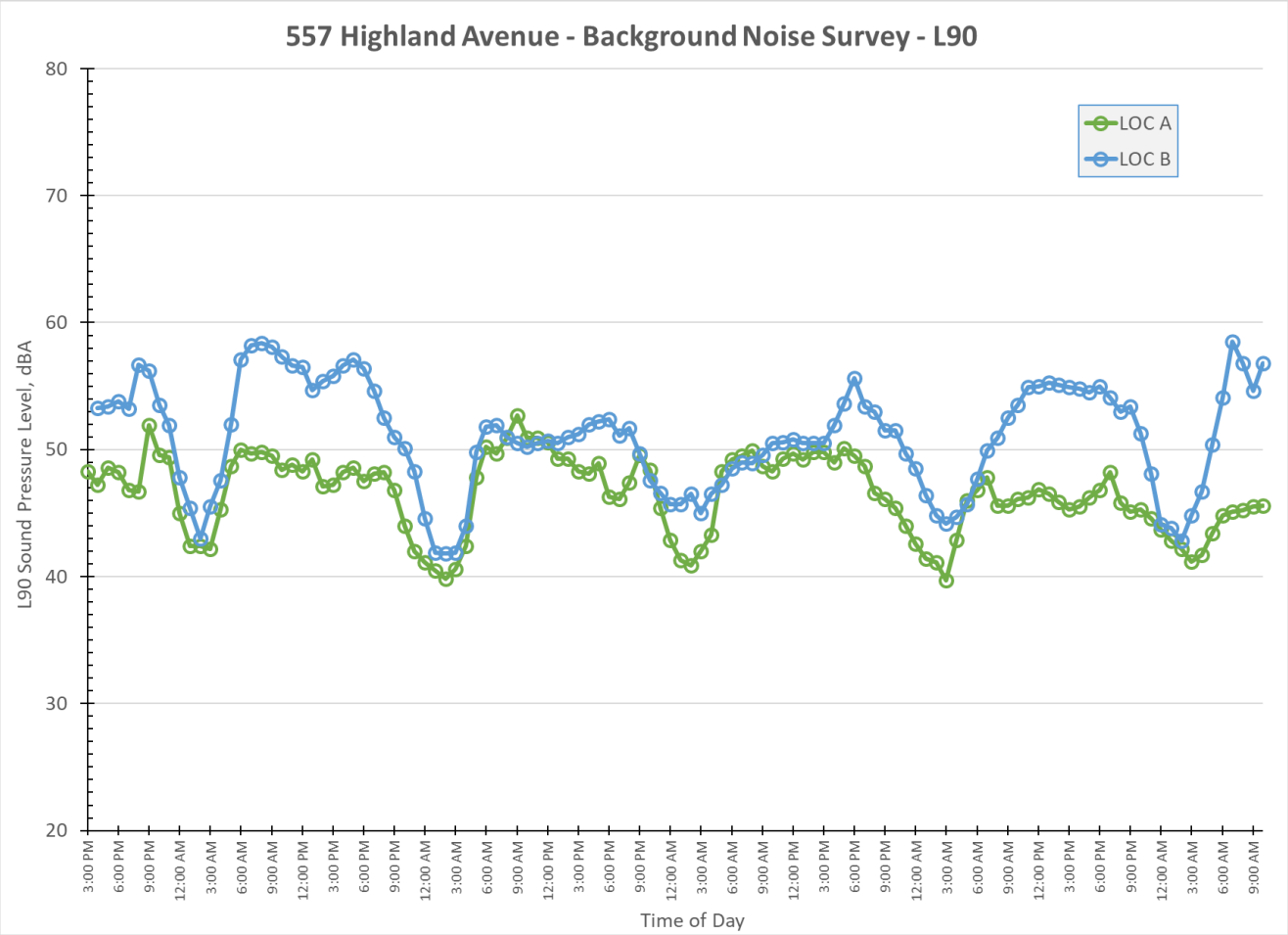
Sincerely,
ACENTECH INCORPORATED

Michael Bahtiarian, INCE Bd. Cert.

Cc: Marc Newmark, Acentech
Ben Stracco, Stantec

FIGURE 1: Background Sound Survey Monitoring Locations, A & B

FIGURE 2: Background Sound Levels, hourly L_{90}, dBA



557 Highland Ave
Needham, MA 02494

Needham Special Permit Package R1

08/15/2022 (FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Bulfinch

Stantec

Proposed

Site Plan

Aerial – Looking North

Aerial – Looking West

Aerial – Looking South

Aerial – West Entry Drive

Site Aerial - Proposed

557 Parking – Looking North-East

Gould Street – Looking North-East

Fitness Loop – Looking South

Gould Street – Looking North-East

Street View - Proposed

Bulfinch

HIGHLAND INNOVATION CENTER

557 Highland Ave
Needham, MA 02494

PROJECT TEAM

OWNER:
BULFINCH
116 HUNTINGTON AVE. SUITE 600
BOSTON, MA 02116
Contact:
ROBERT SCHLAGER
tel: 781.707.4122
email: RAS@Bulfinch.com

ARCHITECT:
STANTEC
Stantec Architecture and Engineering P.C.
40 Water Street, 3rd Floor
Boston, MA 02109
Contact:
ERIC WEYANT
tel: (617) 234-3175
email: eric.weyant@stantec.com

INTERIOR DESIGN:
STANTEC
Stantec Architecture and Engineering P.C.
311 Summer Street
Boston, MA 02210-1723
Contact:
tel: (617) 234-3100
email:

CONSTRUCTION MANAGER:
JOHN MORIARTY & ASSOCIATES
3 CHURCH STREET #2
WINCHESTER, MA 01890
Contact:
NOAH LUSKIN
tel:
email: nluskin@jm-a.com

LANDSCAPE ARCHITECT:
PAUL FINGER ASSOCIATES
14 SPRING ST.
WALTHAM, MA 02451
Contact:
PAUL FINGER
tel: 781.647-4900 x480
email: pfinger@pfai.net

STRUCTURAL ENGINEER:
SGH
800 BOYLSTON STREET, SUITE 2320
BOSTON, MA 02199
Contact:
PEDRO SIFRE
tel: 781.907.9377
email: pjsifre@sgh.com

CIVIL ENGINEER:
VHB
99 HIGH STREET, 10TH FLOOR
BOSTON, MA 02110
Contact:
NICHOLAS SKOLY
tel: 617.607.2796
email: nskoly@vhb.com

CODE CONSULTANT:
SLS CONSULTING, LLC
1 LINCOLN STREET, 24TH FLOOR
BOSTON, MA 02111
Contact:
ERIC MONTPLAISIR
tel: 603.289.8078
email: EMontplaisir@slsfire.com

MEPFP ENGINEER:
AHA CONSULTING ENGINEERS INC.
18 TREMONT ST., SUITE 1040
BOSTON, MA 02108
Contact:
ROBERT ANDREWS
tel: 781-372-3001
email: robert_andrews@aha-engineers.com

GEOTECH ENGINEER:
MCPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVE
CAMBRIDGE, MA 02140
Contact:
NATHAN DAVIS
tel: 617-868-1420 x312
email: ndavis@mcphailgeo.com

ACOUSTICAL CONSULTANT:
ACENTECH
33 MOULTON STREET
CAMBRIDGE, MA 02138
Contact:
MIKE BAHTIARIAN
tel: 617.499.8058
email: mbahtiarian@acentech.com

SPECIFICATIONS:
KALIN ASSOCIATES
21 ELIOT STREET
NATICK, MA 01760
Contact:
JAY FORD
tel: 617-964-5477 x3
email: jford@kalinassociates.com

LEGAL:
DAIN TORPHY
Contact:
CHARLES LE RAY
cleray@daintorpy.com

ROBERT T. SMART, JR.
Contact:
ROBERT SMART
bob@robertsmart.net

TIMOTHY SULLIVAN
Contact:
TIMOTHY SULLIVAN
tsullivan@goulstonstorrs.com

DRAWING INDEX

NO.	DRAWING NAME	SPECIAL PERMIT PACKAGE 2022.03.18	SPECIAL PERMIT PACKAGE R1 2022.08.15
GENERAL			
G-000a	COVER SHEET	•	•
G-005	ZONING AREA PLANS	•	•
CIVIL			
C-01	LEGEND AND GENERAL NOTES	•	•
C-02	OVERALL SITE PLAN - REVISION	•	•
C-02B	OVERALL SITE PLAN		•
C-03	DRAINAGE AND EROSION CONTROL PLAN	•	•
C-04	UTILITY PLAN	•	•
C-05	SITE DETAILS	•	•
C-06	SITE DETAILS	•	•
TRANSPORTATION			
TR-001	OFF-SITE ROADWAY IMPROVEMENTS #1		•
TR-002	OFF-SITE ROADWAY IMPROVEMENTS #2		•
SURVEY/MAPPING			
CONVEYANCE PLAN	CONVEYANCE PLAN		•
LANDSCAPE			
EX1.0	CONVEYANCE		•
L-1.0	SITE PLAN	•	•
L-2.0	GRADING PLAN	•	•
L-3.0	SITE PLANTING PLAN	•	•
L-4.0	SITE LIGHTING PLAN	•	•
L-5.0	SITE DETAILS #1	•	•
L-5.1	SITE DETAILS #2	•	•

DRAWING INDEX

NO.	DRAWING NAME	SPECIAL PERMIT PACKAGE 2022.03.18	SPECIAL PERMIT PACKAGE R1 2022.08.15
ARCHITECTURAL			
A-100G1	GARAGE LEVEL G1 - OVERALL PLAN & PARKING LEGEND	•	•
A-101	LEVEL 1 - OVERALL PLAN	•	•
A-102	LEVEL 2 - OVERALL PLAN	•	•
A-103	LEVEL 3 - OVERALL PLAN	•	•
A-104	LEVEL 4 / SOUTH BUILDING PENTHOUSE - OVERALL PLAN	•	•
A-105	LEVEL 5 / SOUTH BUILDING UPPER ROOF - OVERALL PLAN	•	•
A-106	NORTH BUILDING PENTHOUSE - OVERALL PLAN	•	•
A-107	FULL ROOF PLAN	•	•
A-201	BUILDING ELEV - LOCATOR ELEVATIONS	•	•
A-202	BUILDING ELEV - NORTH BLDG - NORTH	•	•
A-203	BUILDING ELEV - NORTH BLDG - SOUTH & EAST	•	•
A-204	BUILDING ELEV - SOUTH BLDG - SOUTH EAST		•
A-205	BUILDING ELEV - NORTH BLDG (SOUTHWEST) & SOUTH BLDG (SOUTH)	•	•
A-206	BUILDING ELEV - NORTH BLDG (WEST) & SOUTH BLDG (NORTH & WEST)	•	•
A-207	BUILDING ELEV - SOUTH BLDG - NORTH & EAST	•	•
A-211	BUILDING SECTIONS - OVERALL	•	•
A-212	BUILDING SECTIONS - NORTH BLDG	•	•
A-213	BUILDING SECTIONS - SOUTH BLDG		•
ARCHITECTURAL - GARAGE			
AG-100.B2	GARAGE LEVEL B2	•	•
AG-100.B1	GARAGE LEVEL B1	•	•
AG-101	GARAGE LEVEL 1	•	•
AG-102	GARAGE LEVEL 2	•	•
AG-103	GARAGE LEVEL 3 (LEVEL 4-5 SIM.)	•	•
AG-106	GARAGE LEVEL 6	•	•
AG-201	ELEVATIONS - NORTH & EAST	•	•
AG-202	ELEVATIONS - SOUTH & WEST	•	•
AG-211	GARAGE SECTIONS	•	•
AG-212	GARAGE SECTIONS	•	•
TOTAL: 47			

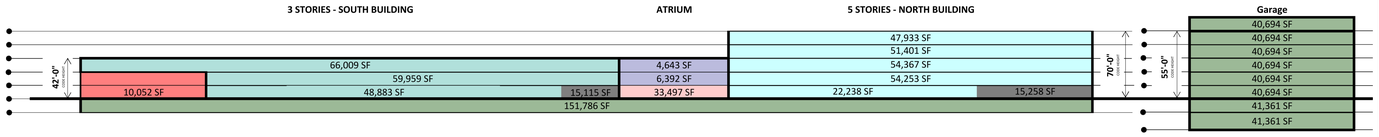
Stantec

218421343

SPECIAL PERMIT PACKAGE R1 - 08/15/2022

(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Project Stats: Highland Ave
Date: 9/7/2022
Stantec **DRAFT**



Garage
40,694 SF
40,694 SF
40,694 SF
40,694 SF
40,694 SF
40,694 SF
41,361 SF
41,361 SF

GROUND FLOOR	
Program	SF
A1 Retail	10,052 SF
A2 Amenity	33,497 SF
A3 Office/Lab	405,043 SF
A4 Tenant Bridge	11,035 SF
A5 BOH	30,373 SF
A6 PARKING & GARAGE (TOTAL)	478,672 SF
A7 **Total FAR SF (A1 + A2 + A3 + A4 + A5)**	**490,000 SF**

Garage	
Program	SF
Garage	**326,886 SF**

Parking Space Totals

Building Parking Count (Below Grade)

Level	Standard	Parallel	Compact	ADA - VAN	ADA
Level G1	182	3	169	2	6
Total by Type	**182**	**3**	**169**	**2**	6
Total Parking			**362**		

Garage Parking Count

Level	Standard	Compact	ADA - VAN	ADA	TOTAL BY LEVEL
Level B2	61	52	0	3	116
Level B1	60	56	0	3	119
Level 1	55	67	3	1	126
Level 2	52	76	0	3	131
Level 3	51	79	0	2	132
Level 4	51	79	0	2	132
Level 5	51	79	0	2	132
Roof	67	41	0	2	110
Total by Type	**448**	**529**	**3**	**18**	
Total Parking		**998**			

EV SPACES:

AREAS - LAB (GROSS - OFFICE ONLY)

BUILDING	GSF (SF)	Comments
LEVEL G1		
PARKING	151786	EXCLUDED
	151786	
LEVEL 1		
ATRIUM	33497	
BOH (NORTH)	15258	
BOH (SOUTH)	15115	
RETAIL	10052	
TENANT - NORTH	22238	
TENANT - SOUTH	48883	
	145043	
LEVEL 2		
TENANT - BRIDGE	6392	
TENANT - NORTH	54253	
TENANT - SOUTH	59959	
	120604	
LEVEL 3		
TENANT - BRIDGE	4643	
TENANT - NORTH	54367	
TENANT - SOUTH	66009	
	125019	
LEVEL 4		
BOH (SOUTH)	11160	EXCLUDED
TENANT - NORTH	51401	
	62561	
LEVEL 5		
TENANT - NORTH	47933	
	47933	
PENTHOUSE - NORTH		
BOH (NORTH)	9958	EXCLUDED
	9958	

AREAS - GARAGE (GROSS - GARAGE ONLY)

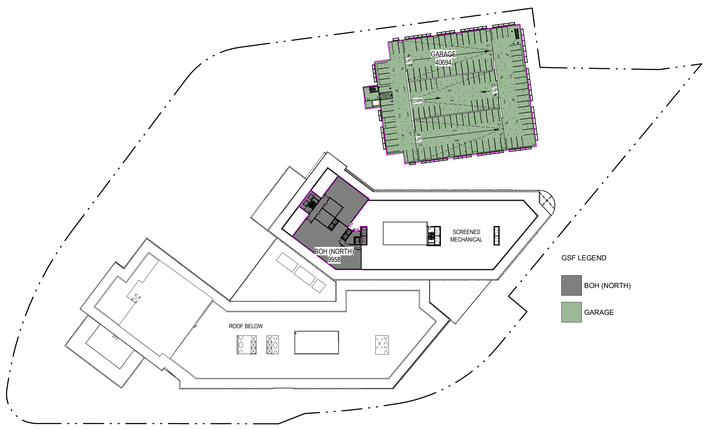
BUILDING	GSF (SF)	Comments
GARAGE - LEVEL B2		
GARAGE	41361	
	41361	
LEVEL G1		
GARAGE	41361	EXCLUDED
	41361	
LEVEL 1		
GARAGE	40694	
	40694	
LEVEL 2		
GARAGE	40694	
	40694	
LEVEL 3		
GARAGE	40694	
	40694	
LEVEL 4		
GARAGE	40694	
	40694	
LEVEL 5		
GARAGE	40694	
	40694	
PENTHOUSE - NORTH		
GARAGE	40694	
	40694	
TOTAL	326884	

Site Totals

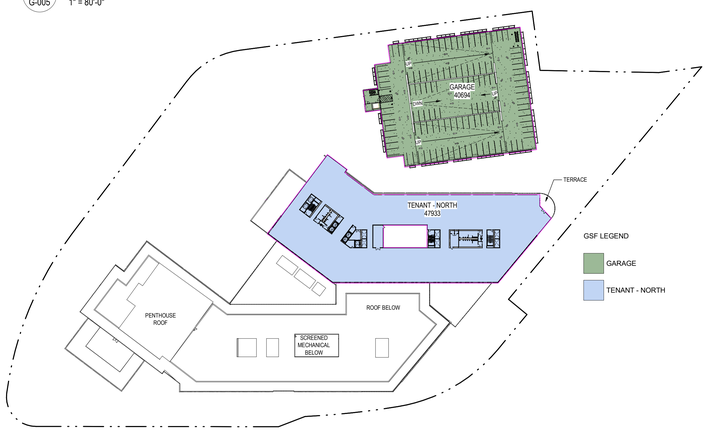
Program		
		Proposed
Total FAR SF (Office + Garage)		**490,000 SF**
TOTAL SITE SF		**391,846 SF**
SITE FAR		**1.25**

Site Parking Totals	
	Proposed
SP1 Surface Parking	30
SP2 Office/Lab Building	362
SP3 Garage	998
SP4 **Total Parking** (SP1 + S	**1390**
Total Compact Spaces (Office/Lab & Garage)	**698**
SP5 **Total % Compact On-Site**	**50%**

GENERAL NOTE: ALL AREAS ARE IN PROGRESS AND SHOULD NOT BE CONSIDERED FINAL.



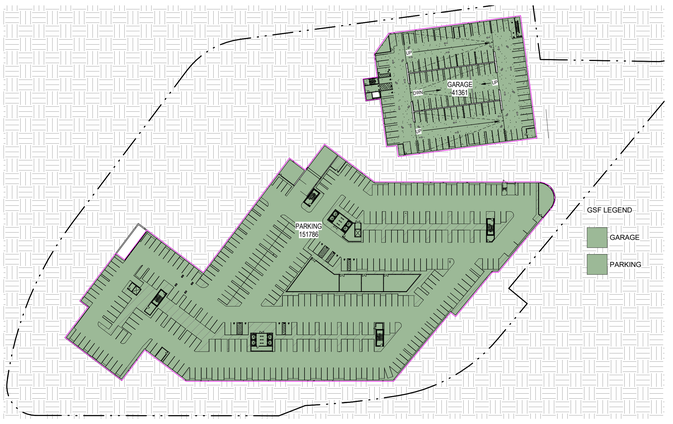
6 G-005 **FLOOR AREA - ROOF**
1" = 80'-0"



5 G-005 **FLOOR AREA - LEVEL 5**
1" = 80'-0"

4 G-005 **FLOOR AREA - LEVEL 4**
1" = 80'-0"

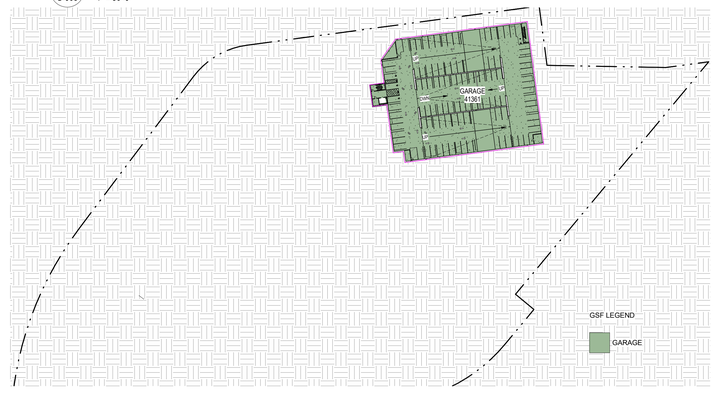
2 G-005 **FLOOR AREA - LEVEL 2**
1" = 80'-0"



G1 G-005 **FLOOR AREA - LEVEL G1**
1" = 80'-0"

3 G-005 **FLOOR AREA - LEVEL 3**
1" = 80'-0"

1 G-005 **FLOOR AREA - LEVEL 1**
1" = 80'-0"



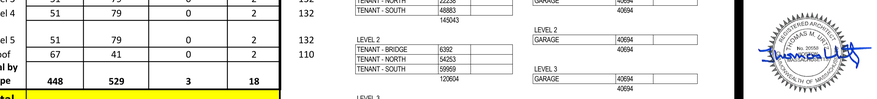
7 G-005 **GARAGE - LEVEL B2**
1" = 80'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1		2022.08.15	
SPECIAL PERMIT PACKAGE R0		2022.03.22	

Permit/Seal



SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1" = 80'-0"

Author	Designer	Checker	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
ZONING AREA PLANS

Revision:
Drawing No.
G-005

Legend

Exist.	Prop.	
		PROPERTY LINE
		PROJECT LIMIT LINE
		RIGHT-OF-WAY/PROPERTY LINE
		EASEMENT
		BUILDING SETBACK
		PARKING SETBACK
10+00	10+00	BASELINE
		CONSTRUCTION LAYOUT
		ZONING LINE
		TOWN LINE
		LIMIT OF DISTURBANCE
		WETLAND LINE WITH FLAG
		FLOODPLAIN
BLSF		BORDERING LAND SUBJECT TO FLOODING
BZ		WETLAND BUFFER ZONE
NDZ		NO DISTURB ZONE
200'RA		200' RIVERFRONT AREA
		GRAVEL ROAD
EOP	EOP	EDGE OF PAVEMENT
BB	BB	BITUMINOUS BERM
BC	BC	BITUMINOUS CURB
CC	CC	CONCRETE CURB
	CG	CURB AND GUTTER
CC	ECC	EXTRUDED CONCRETE CURB
CC	MCC	MONOLITHIC CONCRETE CURB
CC	PCC	PRECAST CONC. CURB
SGE	SGE	SLOPED GRAN. EDGING
VGC	VGC	VERT. GRAN. CURB
		LIMIT OF CURB TYPE
		SAWCUT
		BUILDING
	EN	BUILDING ENTRANCE
	LD	LOADING DOCK
		BOLLARD
D	D	DUMPSTER PAD
		SIGN
		DOUBLE SIGN
		STEEL GUARDRAIL
		WOOD GUARDRAIL
		PATH
		TREE LINE
		WIRE FENCE
		FENCE
		STOCKADE FENCE
		STONE WALL
		RETAINING WALL
		STREAM / POND / WATER COURSE
		DETENTION BASIN
		HAY BALES
		SILT FENCE
		SILT SOCK / STRAW WATTLE
4	4	MINOR CONTOUR
20	20	MAJOR CONTOUR
(10)	(10)	PARKING COUNT
	(C10)	COMPACT PARKING STALLS
DYL	DYL	DOUBLE YELLOW LINE
SL	SL	STOP LINE
		CROSSWALK
		ACCESSIBLE CURB RAMP
		ACCESSIBLE PARKING
VAN	VAN	VAN-ACCESSIBLE PARKING

Exist.	Prop.	
		CONCRETE
		HEAVY DUTY PAVEMENT
		BUILDINGS
		RIPRAP
		CONSTRUCTION EXIT
27.35 TC×	27.35 TC×	TOP OF CURB ELEVATION
26.85 BC×	26.85 BC×	BOTTOM OF CURB ELEVATION
132.75×	132.75×	SPOT ELEVATION
45.0 TW× 38.5 BW	45.0 TW× 38.5 BW	TOP & BOTTOM OF WALL ELEVATION
		BORING LOCATION
		TEST PIT LOCATION
MW	MW	MONITORING WELL
UD	UD	UNDERDRAIN
12"D	12"D	DRAIN
6"RD	6"RD	ROOF DRAIN
12"S	12"S	SEWER
FM	FM	FORCE MAIN
OHW	OHW	OVERHEAD WIRE
6"W	6"W	WATER
4"FP	4"FP	FIRE PROTECTION
	2"DW	DOMESTIC WATER
3"G	G	GAS
E	E	ELECTRIC
STM	STM	STEAM
T	T	TELEPHONE
FA	FA	FIRE ALARM
CATV	CATV	CABLE TV
		CATCH BASIN CONCENTRIC
		CATCH BASIN ECCENTRIC
		DOUBLE CATCH BASIN CONCENTRIC
		DOUBLE CATCH BASIN ECCENTRIC
		GUTTER INLET
		DRAIN MANHOLE CONCENTRIC
		DRAIN MANHOLE ECCENTRIC
TD		TRENCH DRAIN
		PLUG OR CAP
CO	CO	CLEANOUT
		FLARED END SECTION
		HEADWALL
(S)		SEWER MANHOLE CONCENTRIC
(S)		SEWER MANHOLE ECCENTRIC
CS	CS	CURB STOP & BOX
WV	WV	WATER VALVE & BOX
TSV	TSV	TAPPING SLEEVE, VALVE & BOX
		FIRE DEPARTMENT CONNECTION
HYD	HYD	FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
W	W	WATER WELL
GG	GG	GAS GATE
GM	GM	GAS METER
E	EMH	ELECTRIC MANHOLE
EM	EM	ELECTRIC METER
		LIGHT POLE
T	TMH	TELEPHONE MANHOLE
T	T	TRANSFORMER PAD
		UTILITY POLE
		GUY POLE
		GUY WIRE & ANCHOR
HH	HH	HAND HOLE
PB	PB	PULL BOX
		MATCHLINE

Abbreviations

General

ABAN	ABANDON
ACR	ACCESSIBLE CURB RAMP
ADJ	ADJUST
APPROX	APPROXIMATE
BIT	BITUMINOUS
BS	BOTTOM OF SLOPE
BWLL	BROKEN WHITE LANE LINE
CONC	CONCRETE
DYCL	DOUBLE YELLOW CENTER LINE
EL	ELEVATION
ELEV	ELEVATION
EX	EXISTING
FDN	FOUNDATION
FFE	FIRST FLOOR ELEVATION
GRAN	GRANITE
GTD	GRADE TO DRAIN
LA	LANDSCAPE AREA
LOD	LIMIT OF DISTURBANCE
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PERF	PERFORATED
PROP	PROPOSED
REM	REMOVE
RET	RETAIN
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
TS	TOP OF SLOPE
TYP	TYPICAL

Utility

CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
DCB	DOUBLE CATCH BASIN
DMH	DRAIN MANHOLE
CIP	CAST IRON PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
FES	FLARED END SECTION
FM	FORCE MAIN
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
GI	GUTTER INLET
GT	GREASE TRAP
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HH	HANDHOLE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT ELEVATION
I=	INVERT ELEVATION
LP	LIGHT POLE
MES	METAL END SECTION
PIV	POST INDICATOR VALVE
PWW	PAVED WATER WAY
PVC	POLYVINYLCHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
R=	RIM ELEVATION
RIM=	RIM ELEVATION
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UG	UNDERGROUND
UP	UTILITY POLE

Notes

General

1. CONTRACTOR SHALL NOTIFY "DIG-SAFE" (1-888-344-7233) AT LEAST 72 HOURS BEFORE EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
3. ACCESSIBLE ROUTES, PARKING SPACES, RAMPS, SIDEWALKS AND WALKWAYS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE FEDERAL AMERICANS WITH DISABILITIES ACT AND WITH STATE AND LOCAL LAWS AND REGULATIONS (WHICHEVER ARE MORE STRINGENT).
4. AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC.) SHALL RECEIVE 6 INCHES LOAM AND SEED.
5. WITHIN THE LIMITS OF THE BUILDING FOOTPRINT, THE SITE CONTRACTOR SHALL PERFORM EARTHWORK OPERATIONS REQUIRED UP TO SUBGRADE ELEVATIONS.
6. WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO LOCAL MUNICIPAL STANDARDS. WORK WITHIN STATE RIGHTS-OF-WAY SHALL CONFORM TO THE LATEST EDITION OF THE STATE HIGHWAY DEPARTMENTS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
7. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, WITHOUT APPROPRIATE PERMITS.
8. TRAFFIC SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
10. IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
11. CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS.
12. DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
13. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER.
14. THIS PROJECT DISTURBS MORE THAN ONE ACRE OF LAND AND FALLS WITHIN THE NPDES CONSTRUCTION GENERAL PERMIT (CGP) PROGRAM AND EPA JURISDICTION. PRIOR TO THE START OF CONSTRUCTION CONTRACTOR IS TO FILE A CGP NOTICE OF INTENT WITH THE EPA AND PREPARE A STORMWATER POLLUTION PREVENTION PLAN IN ACCORDANCE WITH THE NPDES REGULATIONS. CONTRACTOR SHALL CONFIRM THE OWNER HAS ALSO FILED A NOTICE OF INTENT WITH THE EPA.

Utilities

1. THE LOCATIONS, SIZES, AND TYPES OF EXISTING UTILITIES ARE SHOWN AS AN APPROXIMATE REPRESENTATION ONLY. THE OWNER OR ITS REPRESENTATIVE(S) HAVE NOT INDEPENDENTLY VERIFIED THIS INFORMATION AS SHOWN ON THE PLANS. THE UTILITY INFORMATION SHOWN DOES NOT GUARANTEE THE ACTUAL EXISTENCE, SERVICEABILITY, OR OTHER DATA CONCERNING THE UTILITIES, NOR DOES IT GUARANTEE AGAINST THE POSSIBILITY THAT ADDITIONAL UTILITIES MAY BE PRESENT THAT ARE NOT SHOWN ON THE PLANS. PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATIONS, SIZES, AND ELEVATIONS OF THE POINTS OF CONNECTIONS TO EXISTING UTILITIES AND, SHALL CONFIRM THAT THERE ARE NO INTERFERENCES WITH EXISTING UTILITIES AND THE PROPOSED UTILITY ROUTES, INCLUDING ROUTES WITHIN THE PUBLIC RIGHTS OF WAY.
2. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT AND CONTRACTOR'S FAILURE TO NOTIFY PRIOR TO PERFORMING ADDITIONAL WORK RELEASES OWNER FROM OBLIGATIONS FOR ADDITIONAL PAYMENTS WHICH OTHERWISE MAY BE WARRANTED TO RESOLVE THE CONFLICT.
3. SET CATCH BASIN RIMS, AND INVERTS OF SEWERS, DRAINS, AND DITCHES IN ACCORDANCE WITH ELEVATIONS ON THE GRADING AND UTILITY PLANS.
4. RIM ELEVATIONS FOR DRAIN AND SEWER MANHOLES, WATER VALVE COVERS, GAS GATES, ELECTRIC AND TELEPHONE PULL BOXES, AND MANHOLES, AND OTHER SUCH ITEMS, ARE APPROXIMATE AND SHALL BE SET/RESET AS FOLLOWS:
   A. PAVEMENTS AND CONCRETE SURFACES: FLUSH
   B. ALL SURFACES ALONG ACCESSIBLE ROUTES: FLUSH
   C. LANDSCAPE, LOAM AND SEED, AND OTHER EARTH SURFACE AREAS: ONE INCH ABOVE SURROUNDING AREA AND TAPER EARTH TO THE RIM ELEVATION.
5. THE LOCATION, SIZE, DEPTH, AND SPECIFICATIONS FOR CONSTRUCTION OF PROPOSED PRIVATE UTILITY SERVICES SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS PROVIDED BY, AND APPROVED BY, THE RESPECTIVE UTILITY COMPANY (GAS, TELEPHONE, ELECTRIC, FIRE ALARM, ETC.). FINAL DESIGN LOADS AND LOCATIONS TO BE COORDINATED WITH OWNER AND ARCHITECT.
6. CONTRACTOR SHALL MAKE ARRANGEMENTS FOR AND SHALL BE RESPONSIBLE FOR PAYING FEES FOR POLE RELOCATION AND FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES, WHETHER WORK IS PERFORMED BY CONTRACTOR OR BY THE UTILITIES COMPANY.
7. UTILITY PIPE MATERIALS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED ON THE PLAN:
   A. WATER PIPES SHALL BE CLASS 52 CEMENT LINED DUCTILE IRON (CLDI).
   B. SANITARY SEWER PIPES SHALL BE SDR 35 POLYVINYL CHLORIDE (PVC).
   C. STORM DRAINAGE PIPES SHALL BE HIGH DENSITY POLYETHYLENE (HDPE).
   D. PIPE INSTALLATION AND MATERIALS SHALL COMPLY WITH THE STATE PLUMBING CODE WHERE APPLICABLE. CONTRACTOR SHALL COORDINATE WITH LOCAL PLUMBING INSPECTOR PRIOR TO BEGINNING WORK.
8. CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR AND SHALL FURNISH EXCAVATION, INSTALLATION, AND BACKFILL OF ELECTRICAL FURNISHED SITEWORK RELATED ITEMS SUCH AS PULL BOXES, CONDUITS, DUCT BANKS, LIGHT POLE BASES, AND CONCRETE PADS. SITE CONTRACTOR SHALL FURNISH CONCRETE ENCASEMENT OF DUCT BANKS IF REQUIRED BY THE UTILITY COMPANY AND AS INDICATED ON THE DRAWINGS.
9. CONTRACTOR SHALL EXCAVATE AND BACKFILL TRENCHES FOR GAS IN ACCORDANCE WITH GAS COMPANY'S REQUIREMENTS.
10. ALL DRAINAGE AND SANITARY STRUCTURE INTERIOR DIAMETERS (4' MIN.) SHALL BE DETERMINED BY THE MANUFACTURER BASED ON THE PIPE CONFIGURATIONS SHOWN ON THESE PLANS AND LOCAL MUNICIPAL STANDARDS. FOR MANHOLES THAT ARE 20 FEET IN DEPTH AND GREATER, THE MINIMUM DIAMETER SHALL BE 5 FEET.

Layout and Materials

1. DIMENSIONS ARE FROM THE FACE OF CURB, FACE OF BUILDING, FACE OF WALL, AND CENTER LINE OF PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
2. CURB RADII ARE 3 FEET UNLESS OTHERWISE NOTED.
3. CURBING SHALL BE VERTICAL GRANITE WITHIN THE SITE UNLESS OTHERWISE INDICATED ON THE PLANS.
4. SEE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND DETAILS CONTIGUOUS TO THE BUILDING, INCLUDING SIDEWALKS, RAMPS, BUILDING ENTRANCES, STAIRWAYS, UTILITY PENETRATIONS, CONCRETE DOOR PADS, COMPACTOR PAD, LOADING DOCKS, BOLLARDS, ETC.
5. PROPOSED BOUNDS AND ANY EXISTING PROPERTY LINE MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LAND SURVEYOR.
6. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL VERIFY EXISTING PAVEMENT ELEVATIONS AT INTERFACE WITH PROPOSED PAVEMENTS, AND EXISTING GROUND ELEVATIONS ADJACENT TO DRAINAGE OUTLETS TO ASSURE PROPER TRANSITIONS BETWEEN EXISTING AND PROPOSED FACILITIES.

Demolition

1. PROJECT PRESENTED HEREIN IS THE ADAPTIVE REUSE OF AN EXISTING SITE. TO THE EXTENT REQUIRED TO BUILD THE PROJECT, CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING MANMADE SURFACE FEATURES WITHIN THE LIMIT OF WORK INCLUDING BUILDINGS, STRUCTURES, PAVEMENTS, SLABS, CURBING, FENCES, UTILITY POLES, SIGNS, ETC. UNLESS INDICATED OTHERWISE ON THE DRAWINGS. REMOVE AND DISPOSE OF EXISTING UTILITIES, FOUNDATIONS, AND UNSUITABLE MATERIAL BENEATH AND FOR A DISTANCE OF TEN (10) FEET BEYOND THE PROPOSED BUILDING FOOTPRINT INCLUDING EXTERIOR COLUMNS.
2. EXISTING UTILITIES SHALL BE TERMINATED, UNLESS OTHERWISE NOTED, IN CONFORMANCE WITH LOCAL, STATE AND INDIVIDUAL UTILITY COMPANY STANDARD SPECIFICATIONS AND DETAILS. THE CONTRACTOR SHALL COORDINATE UTILITY SERVICE DISCONNECTS WITH THE UTILITY REPRESENTATIVES.
3. CONTRACTOR SHALL DISPOSE OF DEMOLITION DEBRIS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, ORDINANCES AND STATUTES.
4 THE DEMOLITION LIMITS DEPICTED IN THE PLANS IS INTENDED TO AID THE CONTRACTOR DURING THE BIDDING AND CONSTRUCTION PROCESS AND IS NOT INTENDED TO DEPICT EACH AND EVERY ELEMENT OF DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THE DETAILED SCOPE OF DEMOLITION BEFORE SUBMITTING ITS BID/PROPOSAL TO PERFORM THE WORK AND SHALL MAKE NO CLAIMS AND SEEK NO ADDITIONAL COMPENSATION FOR CHANGED CONDITIONS OR UNFORESEEN OR LATENT SITE CONDITIONS RELATED TO ANY CONDITIONS DISCOVERED DURING EXECUTION OF THE WORK.
5. UNLESS OTHERWISE SPECIFICALLY PROVIDED ON THE PLANS OR IN THE SPECIFICATIONS, THE ENGINEER HAS NOT PREPARED DESIGNS FOR AND SHALL HAVE NO RESPONSIBILITY FOR THE PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF HAZARDOUS MATERIALS, TOXIC WASTES OR POLLUTANTS AT THE PROJECT SITE. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY CLAIMS OF LOSS, DAMAGE, EXPENSE, DELAY, INJURY OR DEATH ARISING FROM THE PRESENCE OF HAZARDOUS MATERIAL AND CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE ENGINEER FROM ANY CLAIMS MADE IN CONNECTION THEREWITH. MOREOVER, THE ENGINEER SHALL HAVE NO ADMINISTRATIVE OBLIGATIONS OF ANY TYPE WITH REGARD TO ANY CONTRACTOR AMENDMENT INVOLVING THE ISSUES OF PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF ASBESTOS OR OTHER HAZARDOUS MATERIALS.

Erosion Control

1. PRIOR TO STARTING ANY OTHER WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.
2. CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION CONTROL MEASURES ON A WEEKLY BASIS (MINIMUM) OR AS REQUIRED PER THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL ADDRESS DEFICIENCIES AND MAINTENANCE ITEMS WITHIN TWENTY-FOUR HOURS OF INSPECTION. CONTRACTOR SHALL PROPERLY DISPOSE OF SEDIMENT SUCH THAT IT DOES NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.
3. CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT.
4. CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION.
5. UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF EROSION CONTROL MEASURES AND CLEAN SEDIMENT AND DEBRIS FROM ENTIRE DRAINAGE AND SEWER SYSTEMS.

Existing Conditions Information

1. BASE PLAN: THE PROPERTY LINES AND EXISTING CONDITIONS ARE SHOWN BASED ON "ALTA/NSPS LAND TITLE SURVEY 557 HIGHLAND AVENUE", PREPARED BY FELDMAN LAND SURVEYORS, DATED 12/09/2021.
2. TOPOGRAPHY: ELEVATIONS ARE BASED ON NAVD88.
3. GEOTECHNICAL DATA INCLUDING TEST PIT AND BORING LOCATIONS AND ELEVATIONS WERE OBTAINED FROM A MEMO ENTITLED "PRELIMINARY EVALUATION OF SOIL HYDRAULIC CONDUCTIVITY", PREPARED BY MCPHAIL ASSOCIATES, DATED MARCH 18, 2022.

Document Use

1. THESE PLANS AND CORRESPONDING CADD DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED, WRITTEN CONSENT OF VHB. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO VHB.
2. CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.
3. SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Danvers MA 01923
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

By	Appd	YYYY.MM.DD	Issued/Revision
		2022.08.15	SPECIAL PERMIT PACKAGE R1
		2022.09.07	SPECIAL PERMIT PACKAGE

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
REGISTERED PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
NEEDHAM, MA 02494

Project No.: 15306.00
Title Name: N/A
Scale:

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
LEGEND AND GENERAL NOTES

Revision:
Drawing No.
C-01

Parking Summary Chart

Description	Size Required	Size Provided	Spaces Required	Spaces Provided
STANDARD SPACES	9 x 18.5	9 x 18.5		661[1]
COMPACT SPACES (50% ALLOWED)	8 x 16	8 x 16	-	698[2]
STANDARD ACCESSIBLE SPACES	8 x 18.5	8 x 18.5	20[3]	24[4]
VAN ACCESSIBLE SPACES	8 x 18.5	8 x 18.5	4[3]	7[5]
TOTAL SPACES			1,678	1,390[6]
LOADING BAYS			**	2

1. REQUIRED ACCESSIBLE SPACES BASED ON TOTAL PROVIDED SPACES PER ADA/MAAB REQUIREMENTS.
2. INCLUDES 633 GARAGE/BUILDING SPACES.
3. INCLUDES 698 GARAGE/BUILDING SPACES.
4. INCLUDES 24 GARAGE/BUILDING SPACES.
5. INCLUDES 5 GARAGE/BUILDING SPACES.
6. APPLICANT IS REQUESTING A SPECIAL PERMIT FOR DEVIATION FROM THE REQUIRED NUMBER OF PARKING SPACES.

** ADEQUATE OFF-STREET LOADING FACILITIES SHALL BE PROVIDED.

Parking Requirements:

OFFICE	239,974 SF	x	1 SPACES	/	300	= 800 SPACES
R&D	239,974 SF	x	1 SPACES	/	300	= 800 SPACES
RETAIL	10,052 SF	x	1 SPACES	/	300	= 34 SPACES
RESTAURANT	100 SEATS	x	1 SPACES	/	3 SEAT	= 34 SPACES
	1 TAKEOUT STATION	x	10 SPACES	/	1 TAKEOUT STATION	= 10 SPACES
					TOTAL PARKING REQUIRED	= 1,678 SPACES

Zoning Summary Chart

Zoning District(s): Highway Commercial 1

Overlay District(s):

Zoning Regulation Requirements	Required*	Provided
MINIMUM LOT AREA	0.5 Acres	391,846 SF
FRONTAGE	100 Feet	> 100 Feet
FRONT YARD SETBACK	See Plan	> 50 Feet
SIDE YARD SETBACK	See Plan	> 10 Feet
REAR YARD SETBACK	See Plan	> 20 Feet
MINIMUM LOT WIDTH	100 Feet	> 100 Feet
MAXIMUM FLOOR AREA RATIO	0.70 [1]	1.25
MAXIMUM BUILDING HEIGHT	56 Feet [2,3,4]	42 / 70 Feet
MAXIMUM LOT COVERAGE	65.0 %	47.9 %
MINIMUM OPEN SPACE	25.0 %	> 25.0%
INTERIOR PARKING LANDSCAPING PERCENTAGE	10.0 %	> 10%

* Zoning regulation requirements as specified in Zoning By-Law of the Town of Needham dated June, 2020, and amended through August 21, 2021.

1. Floor area ratio of up to 1.35 may be allowed by a Special Permit from the Planning Board per §4.11.1(5).
2. Buildings within 200 feet of Highland Avenue or the extension of the right-of-way line or within 200 feet of Gould Street shall be limited to a height of 35 feet and 2.5 stories as-of-right. The maximum height may be increased to 42 feet and 3 stories by Special Permit from the Planning Board per §4.11.1(1)(a,b).
3. The maximum building height may be increased to 70 feet and 5 stories by Special Permit from the Planning Board, provided the building is not located within 200 feet of Highland Avenue or the extension of the right-of-way line or within 200 feet of Gould Street per §4.11.1(1)(b).
4. The height of a parking garage may not exceed 44 feet. The maximum height may be increased to 55 feet by Special Permit from the Planning Board per §4.11.2(1).

Notes

1. REFER TO LANDSCAPE PLANS FOR DETAILED SITE LAYOUT AND MATERIALS INFORMATION.
2. REFER TO ARCHITECTURAL PLANS FOR PROPOSED GARAGE PARKING SPACES.

0 15 30 60 Feet

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Portsmouth, NH 03801
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

Issued/Revision	By	Appd	YYYY.MM.DD
100% SPECIAL PERMIT SUBMISSION			2022.08.15

Permit/Seal
COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
NEEDHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale: 1" = 30'-0"

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
OVERALL SITE PLAN-REVISION

Revision:
Drawing No.
C-02

Parking Summary Chart

Description	Size Required	Size Provided	Spaces Required	Spaces Provided
STANDARD SPACES	9 x 18.5	9 x 18.5		661[1]
COMPACT SPACES (50% ALLOWED)	8 x 16	8 x 16	-	698[2]
STANDARD ACCESSIBLE SPACES	8 x 18.5	8 x 18.5	20[3]	24[4]
VAN ACCESSIBLE SPACES	8 x 18.5	8 x 18.5	4[3]	7[5]
TOTAL SPACES			1,678	1,390[6]
LOADING BAYS			**	2

1. REQUIRED ACCESSIBLE SPACES BASED ON TOTAL PROVIDED SPACES PER ADA/MAAB REQUIREMENTS.
2. INCLUDES 633 GARAGE/BUILDING SPACES.
3. INCLUDES 698 GARAGE/BUILDING SPACES.
4. INCLUDES 24 GARAGE/BUILDING SPACES.
5. INCLUDES 5 GARAGE/BUILDING SPACES.
6. APPLICANT IS REQUESTING A SPECIAL PERMIT FOR DEVIATION FROM THE REQUIRED NUMBER OF PARKING SPACES.

** ADEQUATE OFF-STREET LOADING FACILITIES SHALL BE PROVIDED.

Parking Requirements:

OFFICE	239,974 SF	x	1 SPACES	/	300	= 800 SPACES
R&D	239,974 SF	x	1 SPACES	/	300	= 800 SPACES
RETAIL	10,052 SF	x	1 SPACES	/	300	= 34 SPACES
RESTAURANT	100 SEATS	x	1 SPACES	/	3 SEAT	= 34 SPACES
	1 TAKEOUT STATION	x	10 SPACES	/	1 TAKEOUT STATION	= 10 SPACES
					TOTAL PARKING REQUIRED	= 1,678 SPACES

Zoning Summary Chart

Zoning District(s): Highway Commercial 1

Overlay District(s):

Zoning Regulation Requirements	Required*	Provided
MINIMUM LOT AREA	0.5 Acres	391,846 SF
FRONTAGE	100 Feet	> 100 Feet
FRONT YARD SETBACK	See Plan	> 50 Feet
SIDE YARD SETBACK	See Plan	> 10 Feet
REAR YARD SETBACK	See Plan	> 20 Feet
MINIMUM LOT WIDTH	100 Feet	> 100 Feet
MAXIMUM FLOOR AREA RATIO	0.70 [1]	1.25
MAXIMUM BUILDING HEIGHT	56 Feet [2,3,4]	42 / 70 Feet
MAXIMUM LOT COVERAGE	65.0 %	47.9 %
MINIMUM OPEN SPACE	25.0 %	> 25.0%
INTERIOR PARKING LANDSCAPING PERCENTAGE	10.0 %	> 10%

* Zoning regulation requirements as specified in Zoning By-Law of the Town of Needham dated June, 2020, and amended through August 21, 2021.

1. Floor area ratio of up to 1.35 may be allowed by a Special Permit from the Planning Board per §4.11.1(5).
2. Buildings within 200 feet of Highland Avenue or the extension of the right-of-way line or within 200 feet of Gould Street shall be limited to a height of 35 feet and 2.5 stories as-of-right. The maximum height may be increased to 42 feet and 3 stories by Special Permit from the Planning Board per §4.11.1(1)(a,b).
3. The maximum building height may be increased to 70 feet and 5 stories by Special Permit from the Planning Board, provided the building is not located within 200 feet of Highland Avenue or the extension of the right-of-way line or within 200 feet of Gould Street per §4.11.1(1)(b).
4. The height of a parking garage may not exceed 44 feet. The maximum height may be increased to 55 feet by Special Permit from the Planning Board per §4.11.2(1).

Notes

1. REFER TO LANDSCAPE PLANS FOR DETAILED SITE LAYOUT AND MATERIALS INFORMATION.
2. REFER TO ARCHITECTURAL PLANS FOR PROPOSED GARAGE PARKING SPACES.

0 15 30 60 Feet

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Portsmouth, NH 03801
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
REGISTERED PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

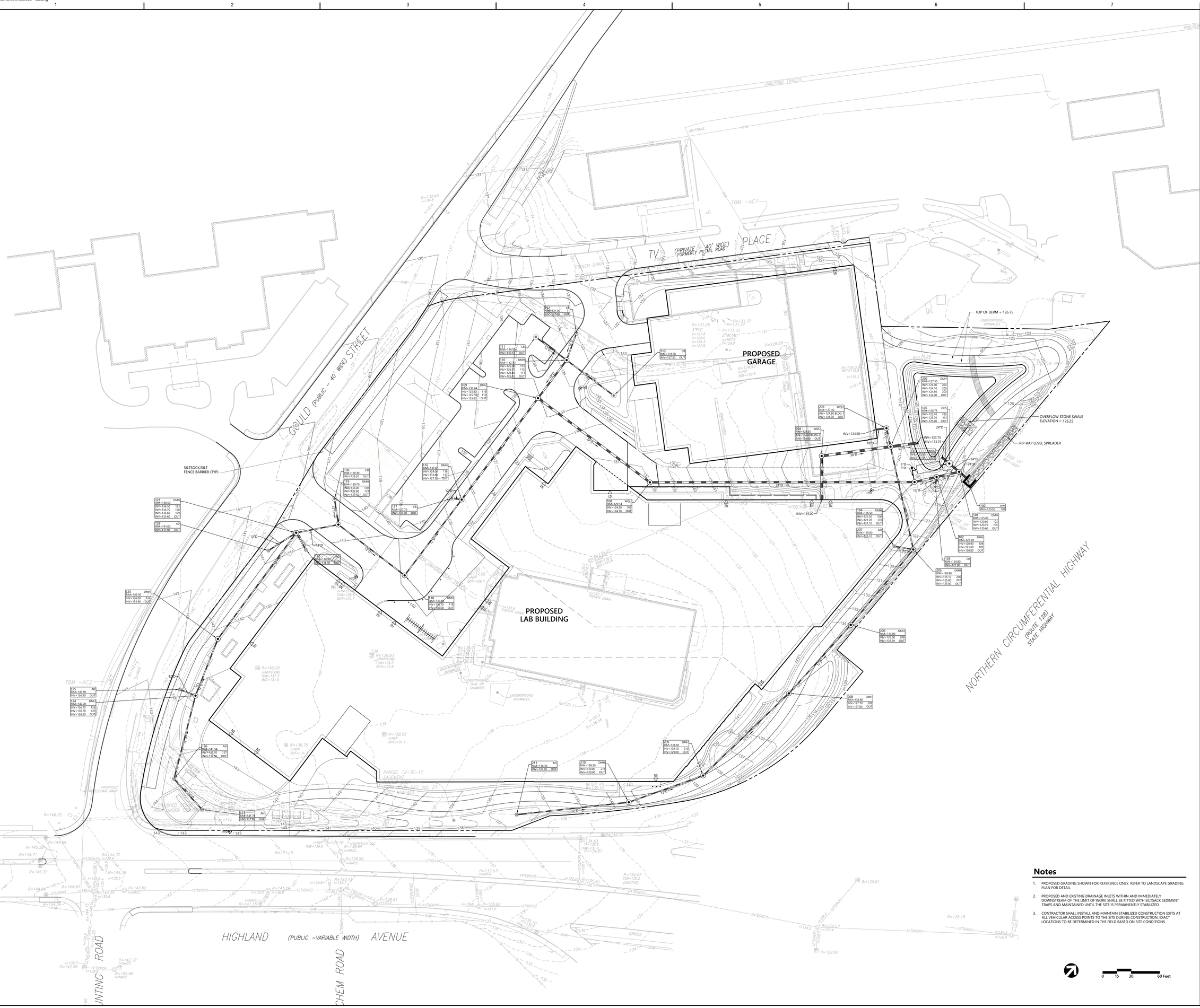
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
NEEDHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale: 1" = 30'-0"

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
OVERALL SITE PLAN

Revision:
Drawing No.
C-02B



Notes

1. PROPOSED GRADING SHOWN FOR REFERENCE ONLY. REFER TO LANDSCAPE GRADING PLAN FOR DETAIL.
2. PROPOSED AND EXISTING DRAINAGE INLETS WITHIN AND IMMEDIATELY DOWNSTREAM OF THE LIMIT OF WORK SHALL BE FITTED WITH SILTSACK SEDIMENT TRAPS AND MAINTAINED UNTIL THE SITE IS PERMANENTLY STABILIZED.
3. CONTRACTOR SHALL INSTALL AND MAINTAIN STABILIZED CONSTRUCTION EXITS AT ALL VEHICULAR ACCESS POINTS TO THE SITE DURING CONSTRUCTION. EXACT LOCATIONS TO BE DETERMINED IN THE FIELD BASED ON SITE CONDITIONS.

0 15 30 60 Feet

Stantec
Stantec Architecture and Engineering P.C.
40 Wantar Street, 3rd Floor
Boston MA 02210
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	100% DESIGN DEVELOPMENT			2022.08.12

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
REGISTERED PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
NEEDHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale: 1" = 30'-0"

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

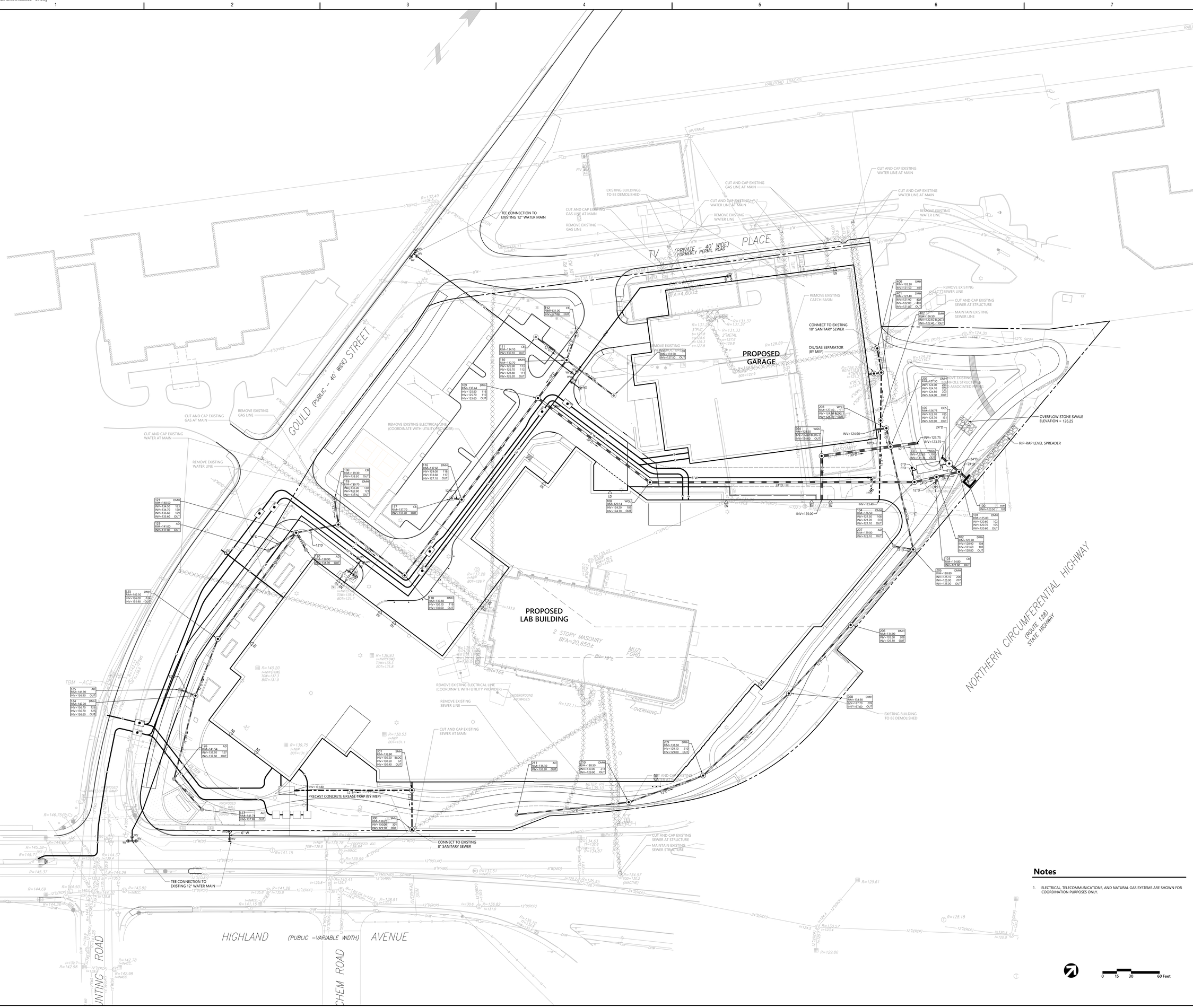
Title
DRAINAGE AND EROSION CONTROL PLAN

Revision:

Drawing No.
C-03

Saved Friday, August 12, 2022 10:27:57 AM SDIAMOND Plotted Tuesday, August 16, 2022 9:19:26 AM Sean Diamond

ORIGINAL SHEET - ARCH E



Notes

1. ELECTRICAL, TELECOMMUNICATIONS, AND NATURAL GAS SYSTEMS ARE SHOWN FOR COORDINATION PURPOSES ONLY.

0 15 30 60 Feet

Stantec
Stantec Architecture and Engineering P.C.
40 Wantar Street, 3rd Floor
Rockland MA 02370
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

Issued/Revision	By	Appd	YYYY.MM.DD
1 ADDRESS PLANNING BOARD COMMENTS			2022.08.15

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
REGISTERED PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
NEEDHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale: 1" = 30'-0"

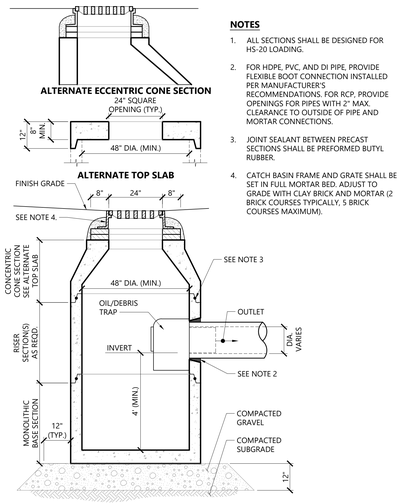
Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
UTILITY PLAN

Revision:
Drawing No.
C-04

Saved Friday, August 12, 2022 10:28:16 AM SSIMMONS Plotted Tuesday, August 16, 2022 9:20:50 AM Sean Diamond

ORIGINAL SHEET - ARCH E



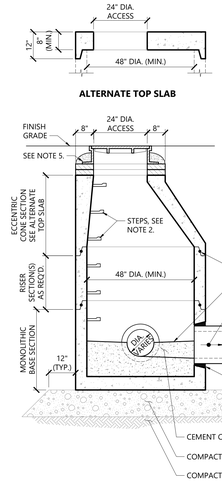
NOTES

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. FOR HDPE, PVC, AND DI PIPE, PROVIDE FLEXIBLE BOOT CONNECTION INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. FOR RCP, PROVIDE OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE AND MORTAR CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. CATCH BASIN FRAME AND GRATE SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM).

Catch Basin (CB) With Oil/Debris Trap

3/21

N.T.S. Source: VHB LD_101



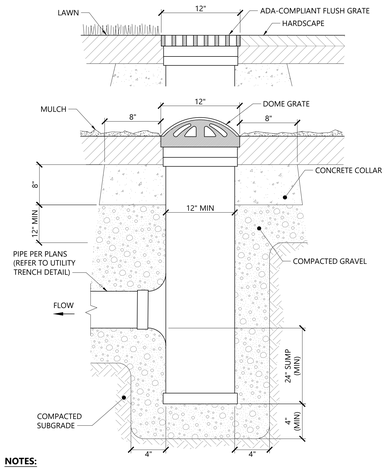
NOTES

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING. DIAMETER OF STRUCTURES SHALL BE COORDINATED WITH PIPE CONFIGURATIONS.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. FOR HDPE, PVC, AND DI PIPE, PROVIDE FLEXIBLE BOOT CONNECTION INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. FOR RCP, PROVIDE OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE AND MORTAR CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

Drain Manhole (DMH)

11/19

N.T.S. Source: VHB LD_115



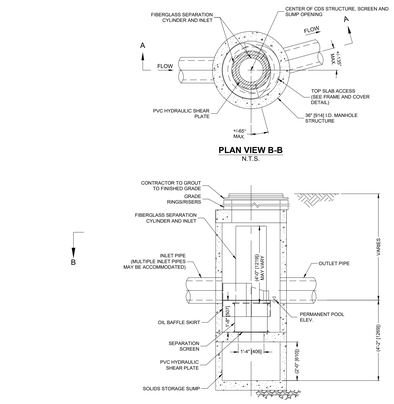
NOTES:

1. AREA DRAINS SHALL BE NYLOPLAST 12" DIAMETER DRAIN BASIN, OR APPROVED EQUAL.
2. GRATES SHALL BE NYLOPLAST 12" PEDESTRIAN MODEL 1299CGP OR 12" DOME GRATE MODEL 1299CGD (OR APPROVED EQUAL).

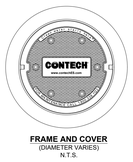
Area Drain (AD) Type 1

12/19

N.T.S. Source: VHB LD_193



CDS1515-3-C DESIGN NOTES
CDS1515-3-C RATED TREATMENT CAPACITY IS 1.0 CFS, OR PER LOCAL REGULATIONS.
THE STANDARD CDS1515-3-C CONFIGURATION IS SHOWN.



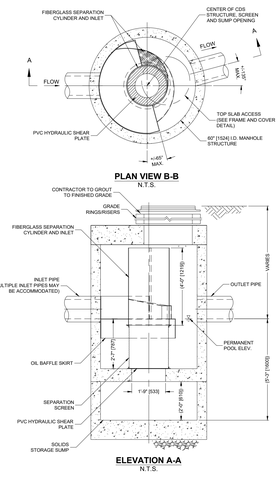
FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE OR CONTECHES.COM
3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
4. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

WQU-203 (CDS1515-3)

N.T.S. Source: Contech



CDS2020-5-C DESIGN NOTES
CDS2020-5-C RATED TREATMENT CAPACITY IS 2.2 CFS, OR PER LOCAL REGULATIONS.
THE STANDARD CDS2020-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.
CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES

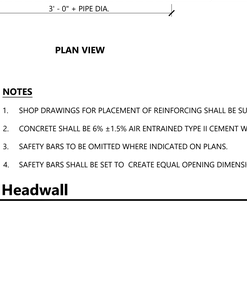
FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO H520 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
6. CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

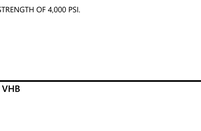
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

WQU-204 (CD2020-5)

N.T.S. Source: Contech



JELLYFISH DESIGN NOTES				
JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE LENGTH AND THE NUMBER OF CARTRIDGES. THE STANDARD PEAK DIVERSION STYLE WITH PRECAST TOP SLAB IS SHOWN. ALTERNATE OFFLINE VAULT AND/OR SHALLOW ORIENTATIONS ARE AVAILABLE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD				
CARTRIDGE SELECTION				
CARTRIDGE LENGTH	54"	40"	27"	15"
OUTLET INVERT TO STRUCTURE INVERT (A)	5'-8"	5'-4"	4'-3"	3'-3"
FLOW RATE HI-FLO / DRAINDOWN (CFS) (PER CART)	0.178 / 0.089	0.133 / 0.067	0.089 / 0.045	0.049 / 0.025
MAX. TREATMENT (CFS)	1.96	1.47	0.98	0.54
DECK TO INSIDE TOP (MIN) (B)	5.00	4.00	4.00	4.00



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

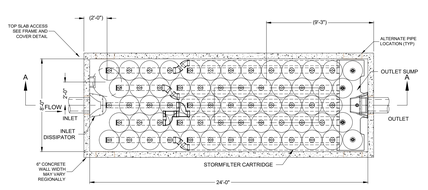
24" TRENCH COVER
(LENGTH VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE.
3. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT, ASSUMING EARTH COVER OF 0' - 10', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
5. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-858, AND AASHTO LOAD FACTOR DESIGN METHOD.
6. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION.
7. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER SLOPE.
8. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE.
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT).
D. CARTRIDGE INSTALLATION, BY CONTECH, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE JELLYFISH UNIT IS CLEAN AND FREE OF DEBRIS. CONTACT CONTECH TO COORDINATE CARTRIDGE INSTALLATION WITH SITE STABILIZATION.

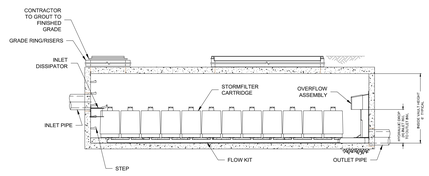
WQU-108 (Jellyfish JFPD0806-8-2)

N.T.S. Source: Contech



STORMFILTER DESIGN NOTES									
STORMFILTER TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD VAULT STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (81). VAULT STYLE OPTIONS INCLUDE INLET BAY (56), INLET BAY/OUTLET BAY (51), OUTLET BAY (59), INLET BAY/FULL HEIGHT BAFFLE WALL (45), FULL HEIGHT BAFFLE WALL (54). STORMFILTER 8X24 PEAK HYDRAULIC CAPACITY IS 1.8 CFS. IF THE SITE CONDITIONS EXCEED 1.8 CFS AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.									
CARTRIDGE SELECTION									
CARTRIDGE HEIGHT	27"			18"			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H)	3.05'			2.3'			1.8'		
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf	2 gpm/sf	1.67* gpm/sf	1 gpm/sf
CARTRIDGE FLOW RATE (gpm)	22.5	18.79	11.25	15	12.53	7.5	10	8.35	5
* 1.67 gpm/sf SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY									

FRAME, COVER, AND HATCH
(SIZE AND CONFIGURATION VARY)
N.T.S.

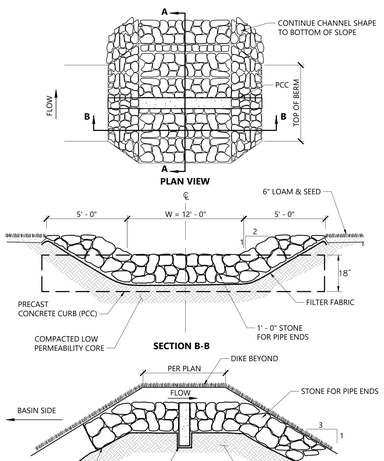


GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO H520 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONFORMING TO ASTM C-857 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER VAULT (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL VAULT SECTIONS AND ASSEMBLE VAULT.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

WQU-131 (StormFilter SF0824 with 57-18" Cartridges)

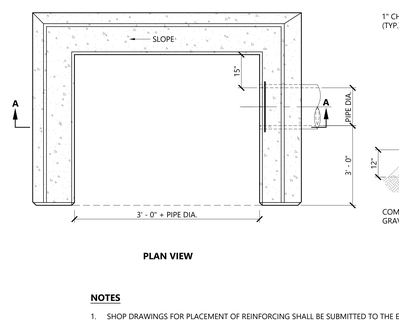
N.T.S. Source: Contech



Overflow Stone Swale

1/16

N.T.S. Source: VHB REV LD_161



NOTES

1. SHOP DRAWINGS FOR PLACEMENT OF REINFORCING SHALL BE SUBMITTED TO THE ENGINEER BY THE CONTRACTOR.
2. CONCRETE SHALL BE 6% ±1.5% AIR ENTRAINED TYPE II CEMENT WITH MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
3. SAFETY BARS TO BE OMITTED WHERE INDICATED ON PLANS.
4. SAFETY BARS SHALL BE SET TO CREATE EQUAL OPENING DIMENSIONS.

Directional Headwall

10/20

N.T.S. Source: VHB LD_135

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Allendale, NJ 07401
Tel: (617) 234-3100 • www.stantec.com

Consultant

vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

By	Appd	YYYY.MM.DD	Issued/Revision
		2022.09.07	PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING
		2022.08.15	SPECIAL PERMIT PACKAGE R1

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
NICHOLAS J. SKOLY
CIVIL
No. 52677
REGISTERED PROFESSIONAL ENGINEER

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
MEDFHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale:

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
Site Details

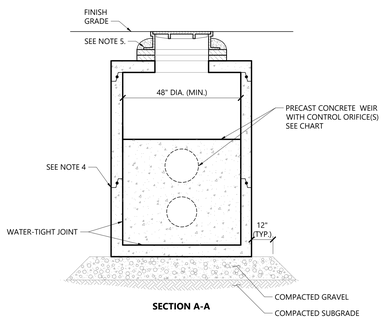
Revision:
Drawing No.
C-05

Outlet Control Structure with Weir (OCS)

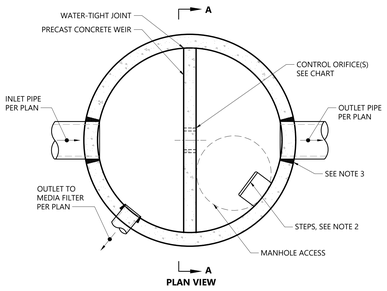
N.T.S. Source: VHB REV LD_162A 3/20

OUTLET STRUCTURE CHART

DETENTION BASIN	STRUCTURE NUMBER	TOP OF WEIR ELEVATION	DIMENSIONS ORIFICE A	INVERT ORIFICE A	DIMENSIONS ORIFICE B	INVERT ORIFICE B
P1	105	125.0	N/A	N/A	N/A	N/A



SECTION A-A



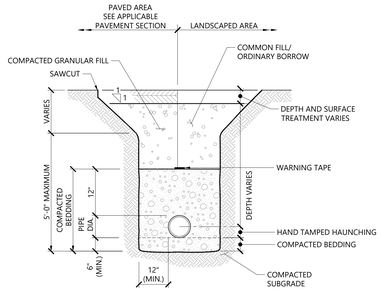
PLAN VIEW

NOTES

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING. DIAMETER OF STRUCTURES SHALL BE COORDINATED WITH PIPE CONFIGURATIONS.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. FOR HDPE, PVC, AND DI PIPE, PROVIDE FLEXIBLE BOOT CONNECTION INSTALLED PER MANUFACTURER'S RECOMMENDATIONS. FOR RCP, PROVIDE OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE AND MORTAR CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

Utility Trench

N.T.S. Source: VHB LD_300 11/19

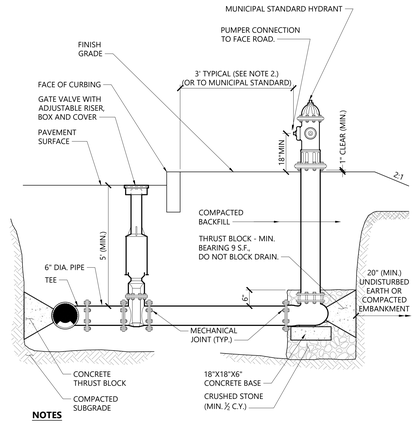


NOTES

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.
3. COMPACTED GRANULAR FILL MAY CONSIST OF GRAVEL, CRUSHED STONE, SAND, OR OTHER MATERIAL AS APPROVED BY ENGINEER.

Hydrant Construction

N.T.S. Source: VHB LD_250 12/19



NOTES

1. CONCRETE THRUST BLOCKS TO BE USED ONLY WHERE THEY CAN BEAR ON UNDISTURBED EARTH AS SHOWN. USE CLAMPS AND TIE RODS OR OTHER ACCEPTABLE METHOD OF JOINT RESTRAINT WHERE SOIL CONDITIONS PROHIBIT THE USE OF THRUST BLOCKS.
2. HYDRANT IN SIDEWALK AREAS TO BE LOCATED TO PROVIDE MINIMUM CLEAR SIDEWALK PASSAGE WIDTH OF 3 FEET AT HYDRANT.
3. A 36-INCH CLEAR SPACE SHALL BE MAINTAINED AROUND THE CIRCUMFERENCE OF THE HYDRANT UNLESS OTHERWISE APPROVED BY AUTHORITY HAVING JURISDICTION.

Restrained Joints for Water Pipe

N.T.S. Source: VHB LD_261 3/20

RESTRAINED JOINTS

FITTINGS	NUMBER OF JOINTS TO RESTRAIN ON EITHER SIDE OF FITTING (BASED ON 18-FOOT PIPE LENGTH)
90 DEGREE BEND	3
45 DEGREE BEND	2
22-1/2 DEGREE BEND	2
TEE:	
BRANCH	3
RUN	2

NOTES

1. PIPE WITH RESTRAINED JOINTS SHALL BE INSTALLED IN ALL AREAS WHERE THE PIPE IS WITHIN FILL MATERIALS AND ALSO AT LOCATIONS SHOWN ON THE DRAWINGS. RESTRAINED JOINTS SHALL BE INSTALLED AT BENDS, REDUCERS, TEES, VALVES, DEAD ENDS, AND HYDRANTS. THE MINIMUM LENGTH OF PIPE TO BE RESTRAINED ON EITHER SIDE OF THE JOINT SHALL BE AS SHOWN ON THE TABLE ABOVE THE FITTINGS OF THE NEW PIPING SHALL BE FOR RESTRAINED JOINTS, AS MARKED ON THE DRAWINGS.
2. NO RESTRAINING IS REQUIRED IN THE DIRECTION OF THE EXISTING PIPE IF ONLY A SHORT LENGTH OF IT IS EXPOSED IN THE TRENCH FOR MAKING A CONNECTION.
3. RESTRAINED JOINT ASSEMBLIES FOR PUSH-ON PIPE AND FITTINGS SHALL BE MADE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.

Level Spreader Section

N.T.S. Source: VHB

Precast Concrete Grease Trap (GT)

N.T.S. Source: VHB LD_211 12/19

PLAN VIEW

SECTION

NOTES

1. STRUCTURE SHALL BE DESIGNED FOR HS-20 LOADING.
2. EXTERIOR SURFACES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATER-PROOFING MATERIAL.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. STANDARD 30-INCH SEWER MANHOLE FRAME AND COVER SHALL BE LOCATED OVER CROSSES AND SET IN FULL MORTAR BED. ADJUST TO GRADE WITH SEWER BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)
5. PIPING SHALL BE SCH 40 PVC WITH SOLVENT WELDED JOINTS. INTERNAL PIPE DIAMETER SHALL BE SAME SIZE AS OUTLET PIPE.
6. FINAL DESIGN OF GREASE TRAP TO BE BY PLUMBING ENGINEER.
7. THE INSTALLATION OF GREASE TRAP, THE PIPING TO AND 10 FEET BEYOND IS BY PLUMBER.

GREASE TRAP

SIZE (GAL.)	LIQUID DEPTH
4,000	4'-0"
5,000	5'-0"
6,000	6'-0"
7,000	7'-0"
8,000	8'-0"
9,000	9'-0"
10,000	10'-0"

Sanitary Sewer Manhole (SMH)

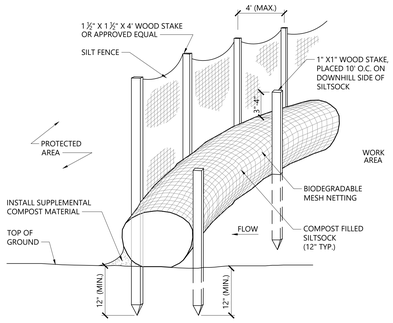
N.T.S. Source: VHB LD_200 1/16

NOTES

1. STRUCTURES SHALL BE PRECAST CONCRETE, DESIGNED FOR HS-20 LOADING.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. EXTERIOR SURFACES SHALL BE GIVEN TWO COATS OF BITUMINOUS WATER-PROOFING MATERIAL.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. STANDARD SEWER MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH SEWER BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

Siltsock / Silt Fence Barrier

N.T.S. Source: VHB LD_658-A 10/20

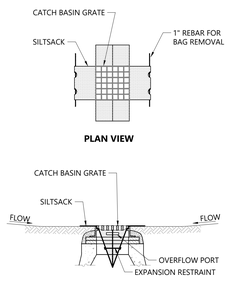


NOTES

1. SILTSOCK SHALL BE FILTREXX SILTSOXX, OR APPROVED EQUAL.
2. SILTSOCKS SHALL OVERLAP A MINIMUM OF 12 INCHES.
3. SILTSOCK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS, AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
4. UPON SITE STABILIZATION, COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
5. IF NON BIODEGRADABLE NETTING IS USED THE NETTING SHALL BE COLLECTED AND DISPOSED OF OFFSITE.

Siltsack Sediment Trap

N.T.S. Source: VHB LD_674 1/20



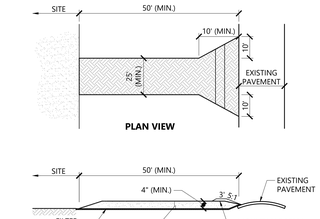
SECTION VIEW

NOTES

1. INSTALL SILTSACK IN ALL CATCH BASINS WHERE INDICATED ON THE PLAN BEFORE COMMENCING WORK OR IN PAVED AREAS AFTER BINDER COURSE IS PLACED AND HAY BALES HAVE BEEN REMOVED.
2. GRATE TO BE PLACED OVER SILTSACK.
3. SILTSACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED. MAINTAIN UNTIL UPSTREAM AREAS HAVE BEEN PERMANENTLY STABILIZED

Stabilized Construction Exit

N.T.S. Source: VHB LD_682 1/16



CROSS-SECTION

NOTES

1. EXIT WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
2. THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.
3. STABILIZED CONSTRUCTION EXIT SHALL BE REMOVED PRIOR TO FINAL FINISH MATERIALS BEING INSTALLED.

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Allendale, NJ 07401
Tel: (617) 234-3100 • www.stantec.com

Consultant
vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE			2022.08.15
DESIGN PEER REVIEW			2022.07.29

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS — NICHOLAS J. SKOLY — CIVIL — No. 52677 — REGISTERED PROFESSIONAL ENGINEER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
537 Highland Ave.
NEEDHAM, MA 02494

Project No.: 15306.00
File Name: N/A
Scale:

Author	Designer	Checker	2022.09.07
Dwn.	Dsgn.	Chkr.	YYYY.MM.DD

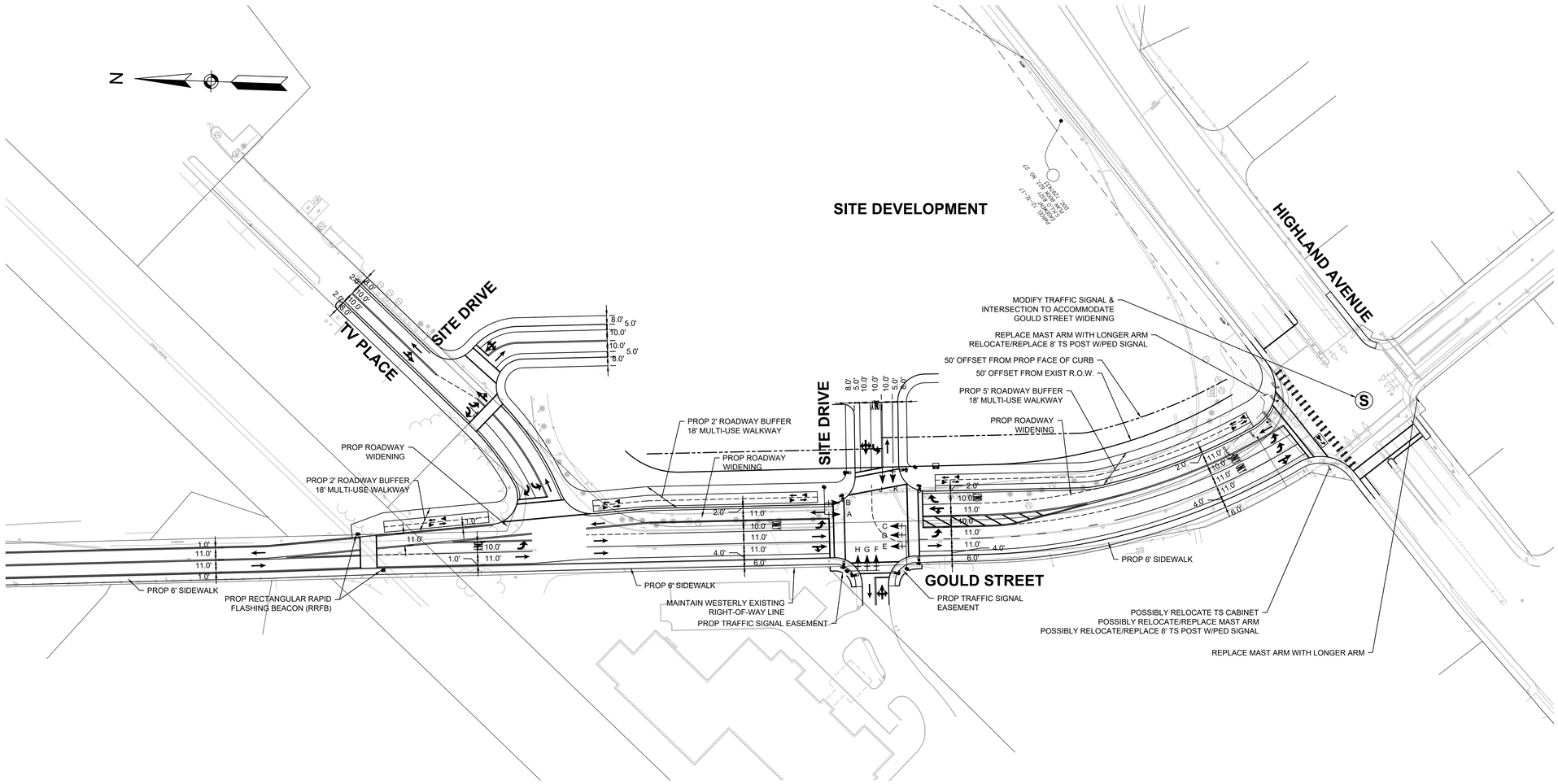
Title
Site Details

Revision:
Drawing No.
C-06

Saved Friday, August 12, 2022 9:35:26 AM SDIAMOND Plotted Tuesday, August 16, 2022 9:18:37 AM Sean Diamond

ORIGINAL SHEET - ARCH E

GOULD STREET BETWEEN HIGHLAND AVENUE
AND FORMER RAILROAD ROW
OFFSITE ROADWAY IMPROVEMENT PLAN



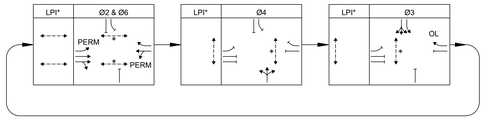
0 40 100 160
SCALE: 1" = 40'

SIGNAL HEAD DATA

A,D,E,H,K	B	C	F	G,J	ALL
R Y G	R Y G Y G	R Y FY	R Y G	R Y G G	W/COUNTDOWN TIMER
ALL 12" LENS					

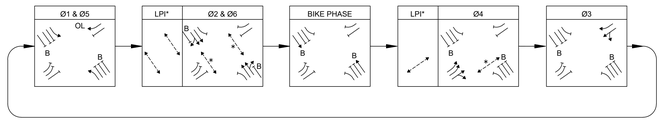
NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"x NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

SITE DRIVEWAY
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
LPI = LEADING PEDESTRIAN INTERVAL

HIGHLAND AVENUE
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
OL = OVERLAP
LPI = LEADING PEDESTRIAN INTERVAL
B = HIGHLAND AVENUE SEPARATED BIKE LANE

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Road, 3rd Floor
Rockaway, NJ 07866
Tel: (617) 534-3100 • www.stantec.com

vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	90% SUBMISSION			2022.07.22
3	SPECIAL PERMIT PACKAGE			2022.06.24

Permit/Seal
COMMONWEALTH OF MASSACHUSETTS
KYLE J. LANGLOIS
No. 52648
REGISTERED PROFESSIONAL ENGINEER
8/15/2022

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

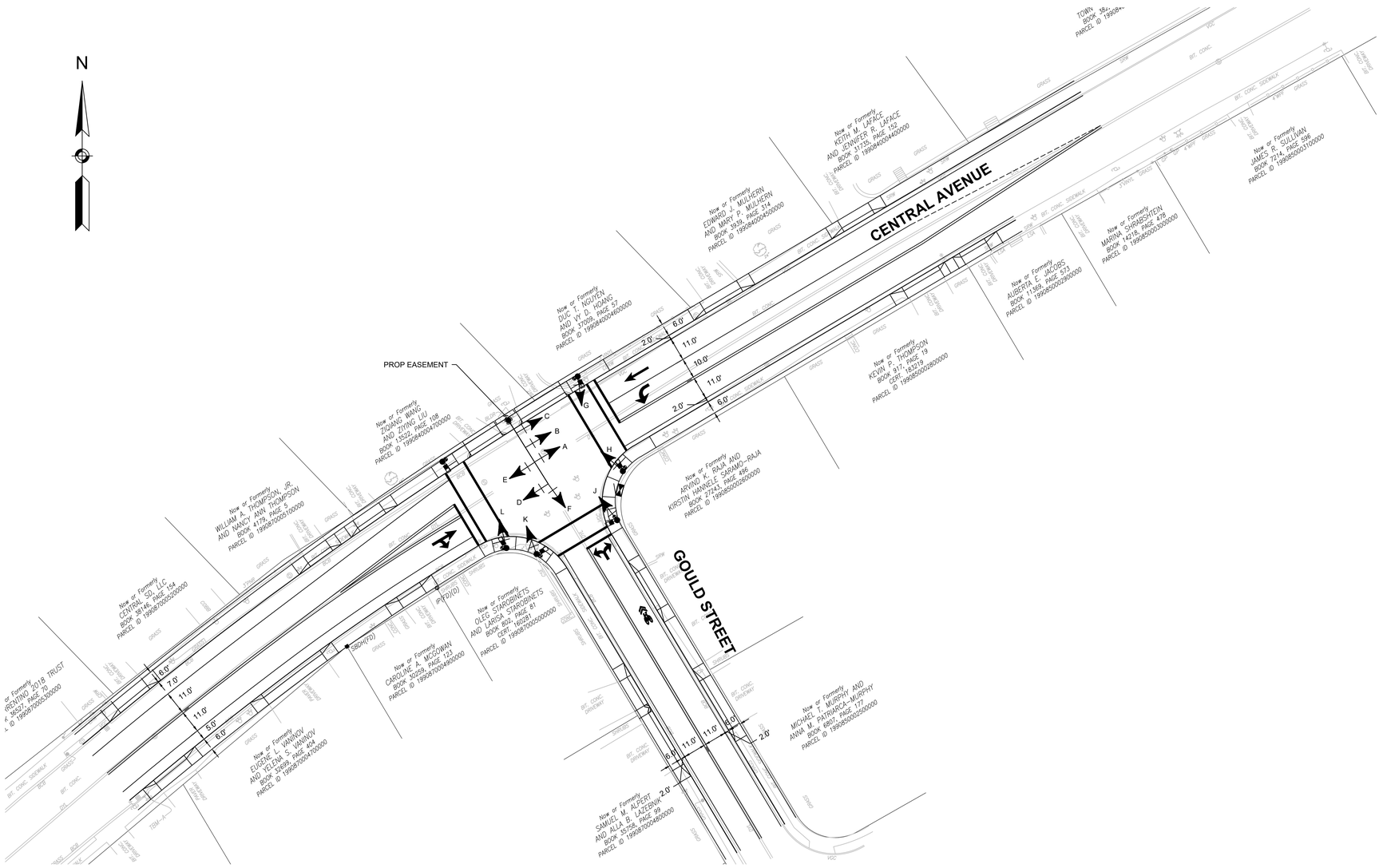
Project No.:218421343
File Name: N/A
Scale: As indicated

KL	KL	TM	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
OFF-SITE ROADWAY IMPROVEMENTS #1

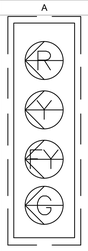
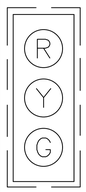
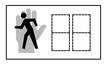
Revision:
Drawing No.
TR-001

GOULD STREET AT CENTRAL AVENUE
OFFSITE ROADWAY IMPROVEMENT PLAN



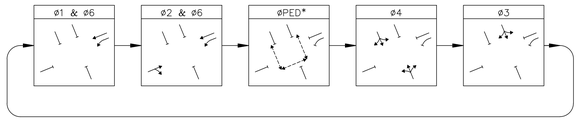
0 20 50 100
SCALE: 1" = 20'

SIGNAL HEAD DATA

A	B,C,D,E,F,G,H,J,K,L	ALL
		 W/COUNTDOWN TIMER
ALL 12" LENS		

NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

PREFERENTIAL PHASE SEQUENCE



* UPON PEDESTRIAN PUSH BUTTON ACTUATION

Stantec
Stantec, Architecture and Engineering P.C.
40 Wantz Road, 3rd Floor
Rockaway, NJ 07866
Tel: (617) 524-3100 • www.stantec.com

vhb
101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	90% SUBMISSION			2022.07.15
3	60% SUBMISSION			2022.06.17

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
KYLE J. LANGLOIS
CIVIL
No. 52643
REGISTERED PROFESSIONAL ENGINEER

8/2/2022

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

KL	KL	TM	2022.09.07
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

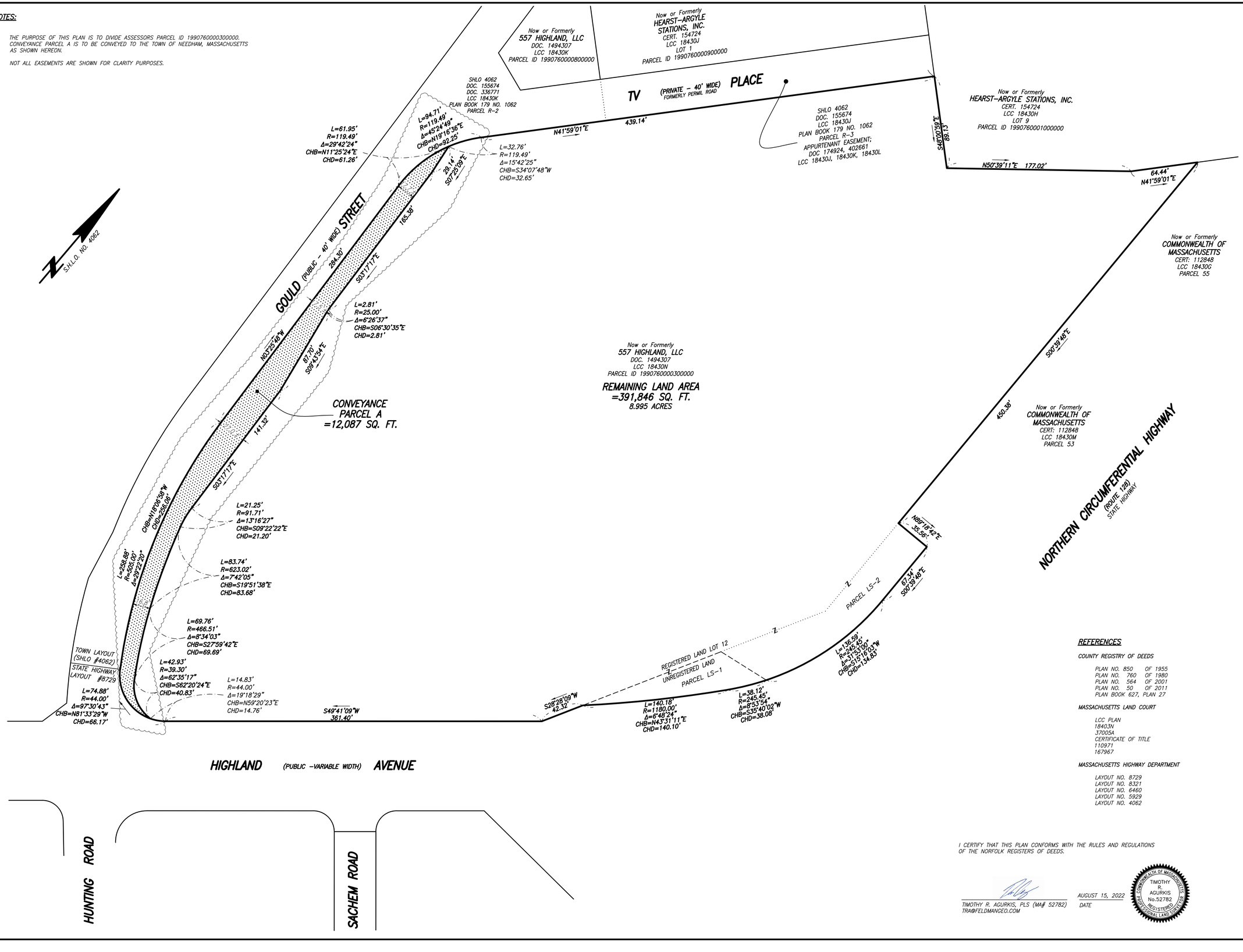
Title
OFF-SITE ROADWAY IMPROVEMENTS #2

Revision:
Drawing No.
TR-002

ORIGINAL SHEET - ARCH E

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DIVIDE ASSESSORS PARCEL ID 1990760000300000. CONVEYANCE PARCEL A IS TO BE CONVEYED TO THE TOWN OF NEEDHAM, MASSACHUSETTS AS SHOWN HEREON.
2. NOT ALL EASEMENTS ARE SHOWN FOR CLARITY PURPOSES.



REFERENCES

COUNTY REGISTRY OF DEEDS

PLAN NO. 850 OF 1955
PLAN NO. 760 OF 1980
PLAN NO. 564 OF 2001
PLAN NO. 50 OF 2011
PLAN BOOK 627, PLAN 27

MASSACHUSETTS LAND COURT

LCC PLAN
18403N
37005A
CERTIFICATE OF TITLE
110971
167967

MASSACHUSETTS HIGHWAY DEPARTMENT

LAYOUT NO. 8729
LAYOUT NO. 8321
LAYOUT NO. 6460
LAYOUT NO. 5929
LAYOUT NO. 4062

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE NORFOLK REGISTERS OF DEEDS.

TIMOTHY R. AGURKIS, PLS (M#) 52782
TRA@FELDMANGEO.COM

AUGUST 15, 2022
DATE

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY R. AGURKIS
No. 52782
REGISTERED PROFESSIONAL LAND SURVEYOR

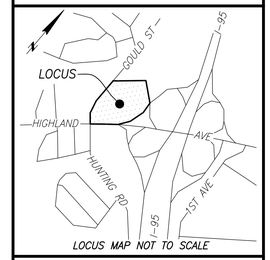
FELDMAN GEOSPATIAL

BOSTON HEADQUARTERS
152 HAMPDEN STREET
BOSTON, MA 02119

WORCESTER OFFICE
27 MECHANIC STREET
WORCESTER, MA 01608

(617)357-9740
www.feldmangeo.com

RESERVED FOR REGISTRY USE



LOCUS MAP NOT TO SCALE

ADDRESS:

557 HIGHLAND AVENUE
NEEDHAM, MASS.

RESEARCH: MDH	FIELD CHIEF:
PROJ MGR: TRA	APPROVED:
CALC: MDH	CADD: MDH
FIELD CHK:	CRD FILE:

REVISIONS:

DRAWING NAME:

CONVEYANCE PLAN

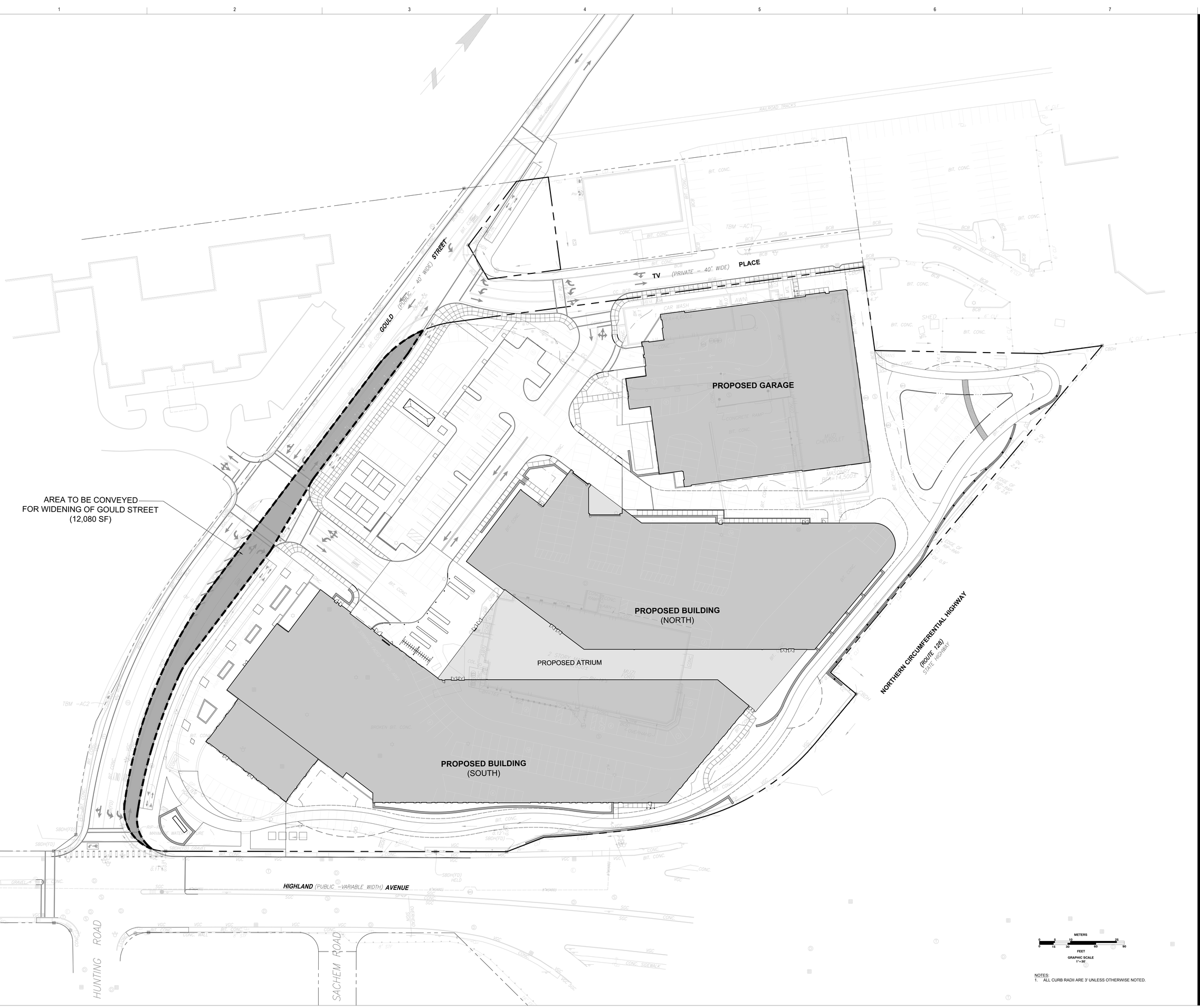
SPECIAL PERMIT PACKAGE R1
8/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

DATE: AUGUST 15, 2022

40 0 20 40 80

SCALE: 1"=40'

SHEET NO. 1 OF 1



NOTES:
1. ALL CURB RADII ARE 3' UNLESS OTHERWISE NOTED.

ORIGINAL SHEET - ARCH E

Stantec

Stantec Architecture and Engineering P.C.
Landscape Architects – Planners
Civil Engineers – Land Surveyors
40 Wantz Road, 3rd Floor
Danvers, MA 01923
Tel: (617) 524-3100 • www.stantec.com

Consultant

pfa
Landscape Architects – Planners
Civil Engineers – Land Surveyors
PAUL FINGER ASSOCIATES
14 Mica Lane
Wellesley, Massachusetts 02481-4426
781 237 6030
781 235 8857
Mark P. Finger

By	Appd	YYYY.MM.DD	Issued/Revision
		2022.08.15	SPECIAL PERMIT PACKAGE R1
		2022.07.15	SPECIAL PERMIT PACKAGE
DBF	SMM	2022.06.17	90% SUBMISSION

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

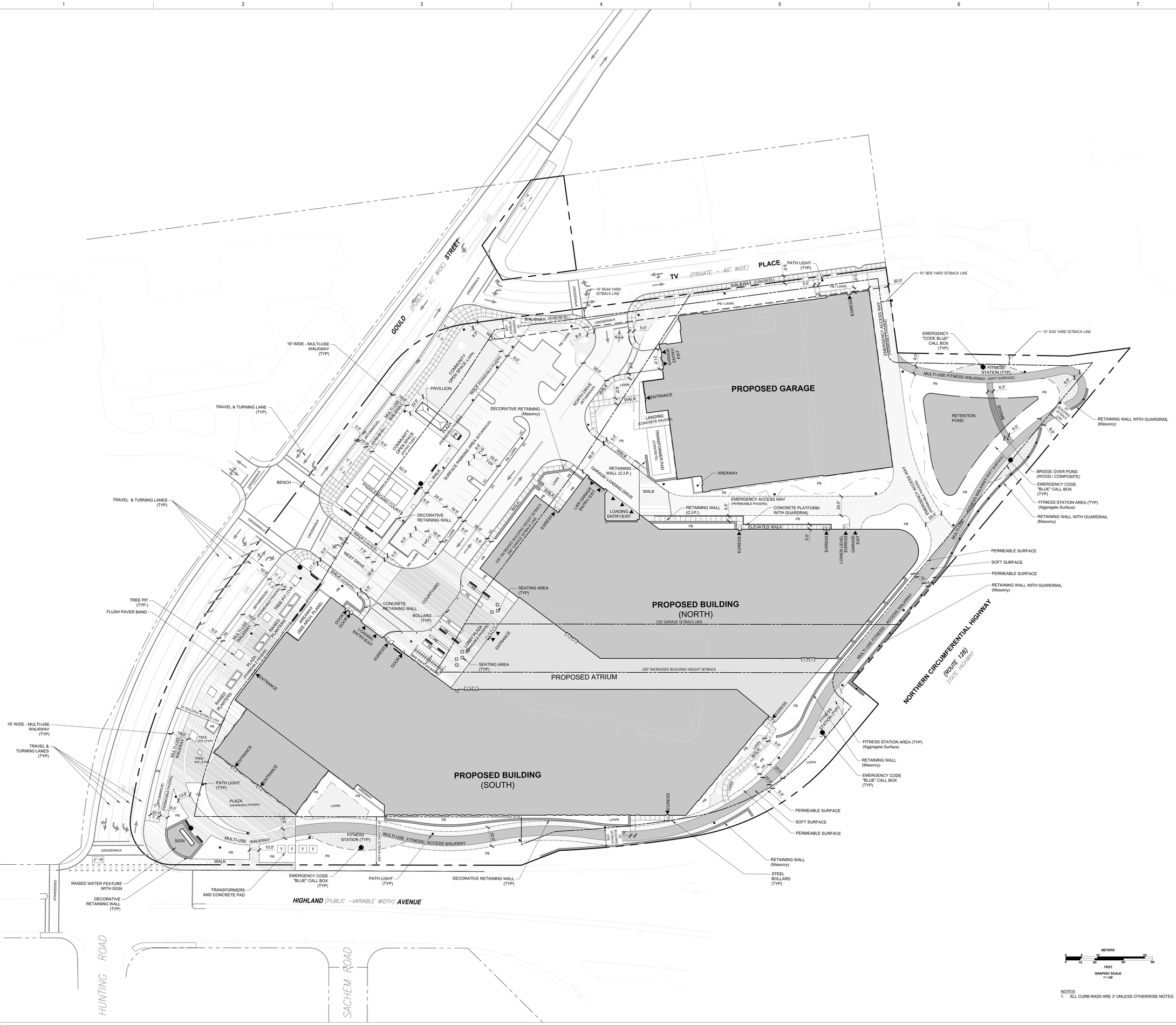
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name:
Scale: 1" = 30'-0"

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
CONVEYANCE

Revision:
Drawing No.
EX-1.0



Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston, MA 02135
Tel: (617) 234-3100 • www.stantec.com

Consultant

pfa
Landscape Architects + Planners
Urban Designers + Preservationists
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02241-4429
617 227 4911
www.paulfinger.com

By	Appd	YYYY.MM.DD	Issued/Revision
DEM	SWM	2022.06.15	SPECIAL PERMIT PACKAGE R1
DEM	SWM	2022.07.15	SPECIAL PERMIT PACKAGE R2
DEM	SWM	2022.08.12	SPECIAL PERMIT PACKAGE R3
DEM	SWM	2022.03.30	SPECIAL PERMIT PACKAGE

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.: 218421343
File Name:
Scale: 1" = 30'-0"

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
SITE PLAN

Revision:
Drawing No.
L-1.0

METERS
0 5 10 25
0 15 30 60 90
FEET
GRAPHIC SCALE
1" = 30'

NOTES:
1. ALL CURB RADII ARE 3' UNLESS OTHERWISE NOTED.

ORIGINAL SHEET - ARCH E

KEY PLAN

NOTES:
1. ALL CURB RADII ARE 3' UNLESS OTHERWISE NOTED.

METERS 0 5 10 20 35 / FEET 0 15 30 60 90
GRAPHIC SCALE 1" = 30'

ORIGINAL SHEET - ARCH E

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02135
Tel: (617) 234-3100 • www.stantec.com

Consultant

pfa Landscape Architects + Planners
Urban Designers + Preservationists
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02241-4429
617 423 8001
FAX 423 8007
www.paulfinger.com

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1	DSR	SIM/MDR	2022.08.15
DSR SIM/MDR	DSR	SIM/MDR	2022.07.15
SPECIAL PERMIT PACKAGE	DSR	SIM/MDR	2022.07.12
SPECIAL PERMIT PACKAGE	DSR	SIM/MDR	2022.03.30

Permit/Seal

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name:
Scale: 1" = 30'-0"

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GRADING PLAN

Revision:
Drawing No.
L-2.0

NO MOW LAWN MIX
HARD FESCUE (Festuca brevipila), SHEEP FESCUE (Festuca ovina), CHEWING FESCUE (Festuca rubra subs. fallax), RED FESCUE (Festuca rubra), CREEPING RED FESCUE(Festuca rubra var. rubra)

NEW ENGLAND CONSERVATION MIX (MEADOW MIX)
Virginia Wild Rye (Elymus virginicus), Little Bluestem (Schizachyrium scoparium), Big Bluestem (Andropogon gerardii). Red Fescue (Festuca rubra), Switch Grass (Panicum virgatum), Partridge Pea (Chamaecrista fasciculata), Panicledleaf Tick Trefoil (Desmodium paniculatum), Indian Grass (Sorghastrum nutans), Blue Vervain (Verbena hastata), Butterfly Milkweed (Asclepias tuberosa), Black Eyed Susan (Rudbeckia hirta), Common Sneezeweed (Helenium autunale), Heath Aster (AsterpiosusSymphyotrichum pilosum). Early Goldenrod (Solidago juncea), Upland Bentgrass (Agrostis perennans).

GROUND COVERS	QTY	BOTANICAL / COMMON NAME	CONT	ITEM		
	360	ASCLEPIAS INCARNATA SWAMP MILKWEED	FLAT 20 MIN.			18" o.c.
	858	ASTER NOVAE-ANGLIAE NEW ENGLAND ASTER	FLAT 20 MIN.			18" o.c.
	444	CAREX X 'SILVER SCEPTRE' SILVER SCEPTRE SEDGE	1 GAL			8" o.c.
	354	EUPATORIUM FISTOLOSUM JOE PYE WEED	1 GAL			18" o.c.
	283	GAULTHERIA PROCUMBENS WINTERGREEN	FLAT 20 MIN.			12" o.c.
	36	LIATRIS PYCNOSTACHYA GAYFEATHER	FLAT 20 MIN.			18" o.c.
	138	OSMUNDA CINNAMOMEA CINNAMON FERN	1 GAL			18" o.c.
	647	RHUS AROMATICA 'GRO-LOW' GRO-LOW FRAGRANT SUMAC	3 GAL			24" o.c.
	397	VERNONIA NOVEBORACENSIS COMON IRONWEED	FLAT 20 MIN.			18" o.c.
	714	WALDSTEINIA FRAGARIOIDES APPALACHIAN BARREN STRAWBERRY	FLAT 20 MIN.			12" o.c.

EVERGREEN	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NATIVE	
PG	34	PICEA GLAUCA WHITE SPRUCE	B & B	5-6' HT		
TS	45	THUJA OCCIDENTALIS 'SMARAGD' EMERALD GREEN ARBORVITAE	B & B	6-7' HT		
TM	71	TAXUS X MEDÍA 'HICKSII' HICKS YEW	B & B	4' - 5' HT		
ORNAMENTAL	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NATIVE	
CK	8	CORNUS KOUSA KOUSA DOGWOOD	B & B	3"CAL		
MS	16	MALUS X 'SPRING SNOW' SPRING SNOW CRABAPPLE	B & B	3"CAL		
SHADE TOLERANT	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NATIVE	
AC	21	AMELANCHIER CANADENSIS CANADIAN SERVICEBERRY	B & B	7-8' HT.	MULTI-STEM	
HV	40	HAMAMELIS VIRGINIANA COMMON WITCH HAZEL	B & B	6-7' HT		
SHADE TREES	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NATIVE	
AA2	3	ACER X FREEMANII 'ARMSTRONG' ARMSTRONG FREEMAN MAPLE COLUMNAR	B & B	3-4" CAL.		
BN	13	BETULA NIGRA `HERITAGE` HERITAGE RIVER BIRCH	B & B	3-4" CAL.		
BP	5	BETULA POPULIFOLIA GRAY BIRCH	B & B	3-3.5" CAL		
GI	12	GLEDITSIA TRIACANTHOS INERMIS THORNLESS HONEY LOCUST	B & B	3-4" CAL.		
LS	10	LIQUIDAMBAR STYRACIFLUA SWEET GUM	B & B	3-4" CAL.		
NS	12	NYSSA SYLVATICA TUPELO	B & B	3-4" CAL.		
QB	4	QUERCUS BICOLOR SWAMP WHITE OAK	15 GAL	3-4" CAL.		
QP	11	QUERCUS PALUSTRIS PIN OAK	B & B	3-4" CAL.		
TA	4	TILIA AMERICANA AMERICAN LINDEN	B & B	3-4" CAL.		
SHRUBS	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NOTES	
CO	65	CORNUS SERICEA 'VARIEGATA' VARIEGATED RED TWIG DOGWOOD	5 GAL	24"-36"		
HI	86	HYDRANGEA PANICULATA 'LIMELIGHT' LIMELIGHT PANICLE HYDRANGEA	5 GAL	24"-36"		
Iv	185	ILEX VERTICILLATA 'JIM DANDY' JIM DANDY WINTERBERRY	3 GAL	18"-24"		
Ir	17	ILEX VERTICILLATA 'RED SPRITE' RED SPRITE WINTERBERRY	5 GAL	24"-36"		
Jc	112	JUNIPERUS CONFERTA SHORE JUNIPER	3 GAL	12"		
Va	27	VACCINIUM ANGUSTIFOLIUM LOWBUSH BLUEBERRY	2 GAL	12"		
EVERGREEN	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NOTES	
Ig	150	ILEX GLABRA INKBERRY HOLLY	5 GAL	24"-36"		
Kl	110	KALMIA LATIFOLIA MOUNTAIN LAUREL	5 GAL	24"-36"		
Pg2	17	PICEA PUNGENS 'GLAUCA GLOBOSA' BLUE GLOBE COLORADO SPRUCE	5 GAL	24"-36"		
Rc	81	RHODODENDRON X 'CUNNINGHAM'S WHITE' CUNNINGHAM'S WHITE RHODODENDRON	5 GAL	24"-36"		
GRASSES	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NOTES	
Ce	347	CALAMAGROSTIS X ACUTIFLORA 'EL DORADO' EL DORADO FEATHER REED GRASS	3 GAL			
Pn	177	PANICUM VIRGATUM 'NORTHWIND' NORTHWIND SWITCH GRASS	2 GAL			
Ps	33	PANICUM VIRGATUM 'SHENANDOAH' SHENANDOAH SWITCH GRASS	2 GAL			
PERENNIALS	QTY	BOTANICAL / COMMON NAME	SIZE	SIZE	NOTES	
Rk	106	ROSA SHRUB 'KNOCK OUT' KNOCK OUT ROSE	5 GAL			
Rh	141	RUDBECKIA HIRTA BLACK-EYED SUSAN	2 GAL			

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Danvers, MA 01923
Tel: (617) 234-3100 • www.stantec.com

Consultant

dfa
Landscape Architects + Planners
Urban Designers + Preservationists
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02481-4429
781 235 8000

Issued/Revision	By	Appvd
2022.05.13 SPECIAL PERMIT PACKAGE R1	TYT	MJ/LDS
2022.07.13 DRB SUBMISSION		
2022.08.15 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING		

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

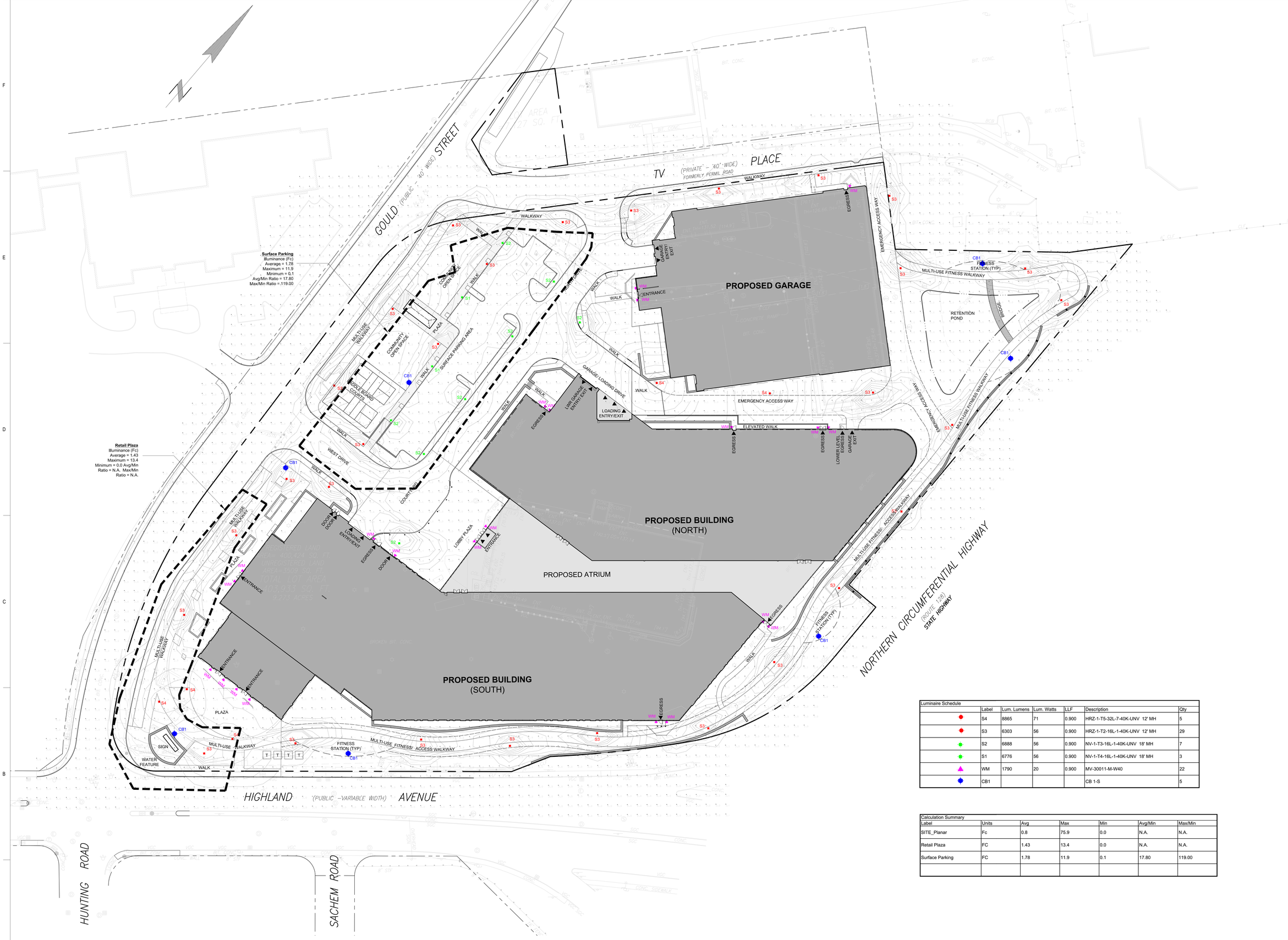
Project No.: 218421343
File Name: SPLANTING PLAN.DWG
Scale: 1" = 30'-0"

Dwn. | Dsgn. | Chkd. | YYYY.MM.DD

Title
SITE PLANTING PLAN

Revision:
Drawing No.
L-3.0

ORIGINAL SHEET - ARCH E



Luminaire Schedule						
	Label	Lum. Lumens	Lum. Watts	LLF	Description	Qty
	S4	8865	71	0.900	HRZ-1-T5-32L-7-40K-UNV 12' MH	5
	S3	6303	56	0.900	HRZ-1-T2-16L-1-40K-UNV 12' MH	29
	S2	6888	56	0.900	NV-1-T3-16L-1-40K-UNV 18' MH	7
	S1	6776	56	0.900	NV-1-T4-16L-1-40K-UNV 18' MH	3
	WM	1790	20	0.900	MV-30011-M-W40	22
	CB1				CB 1-S	5

Calculation Summary						
Label	Units	Avg	Max	Min	Avg/Min	Max/Min
SITE_Planar	Fc	0.8	75.9	0.0	N.A.	N.A.
Retail Plaza	FC	1.43	13.4	0.0	N.A.	N.A.
Surface Parking	FC	1.78	11.9	0.1	17.80	119.00

METERS 0 5 10 20
FEET 0 15 30 60 90
GRAPHIC SCALE 1"=30'

KEY PLAN

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Danvers, MA 01923
Tel: (617) 234-3100 • www.stantec.com

Consultant

Landscape Architects - Planners
Urban Designers - Environmental Consultants
PAUL FINGER ASSOCIATES
14 Main Street
Bristol, RI
Telephone: (401) 254-1744

Issued/Revision	By	Appvd
SPECIAL PERMIT PACKAGE R1	EFJ	TYP.MM.DD
DRB SUBMISSION	EFJ	2022.07.15
SPECIAL PERMIT PACKAGE	EFJ	2022.08.01
SPECIAL PERMIT PACKAGE	EFJ	2022.03.30

Permit/Seal

COMMONWEALTH OF MASSACHUSETTS
REGISTERED LANDSCAPE ARCHITECT
ERIC FINGER

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project

Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name: SLT-LIGHTING PLAN.DWG
Scale: 1" = 30'-0"

Dwn.	Dsgn.	Chkd.
EFJ	LH	EFJ
		2022.03.30
		YYYY.MM.DD

Title
SITE LIGHTING PLAN

Revision:
Drawing No.
L-4.0

ORIGINAL SHEET - ARCH E

CB 1-S SIGNATURE HELP POINT®

Code Blue

Product Description

The CB 1-s is our most-popular pedestal Help Point. Highlighted by a high intensity area light that provides added visibility, this blue light emergency tower provides direct contact with first responders and is an excellent choice for walkways, parking lots, open campus areas and more.

Standard Features

- Durable quarter-inch steel construction
- Trademarked cylindrical design
- 9 feet tall
- 12.75" diameter
- LED faceplate light

Popular Applications

Open Spaces, Entry Points, Infrastructure

Popular Upgrades

Public Address, Overhead Camera Mount, Dual Faceplates, Mounting Rings, AED Housing

Get It Customized

We know your installation is unique. From paint and graphics to height and mountings, if you dream it, we can make it. Contact Customer Service at customerservice@codeblue.com or 800-205-7186 to learn more.

Technical Features

Code Blue

Specifications
- Height: 9' (274.32 cm)
- Weight: 330 lbs. (149.69 kg)
- Diameter: 12.75" (32.38 cm)
- Material & thickness: 0.25" steel
- Access doors: 15.88" x 9.64" (40.34 x 24.49 cm)

Power
- Standard: 12-24V AC/DC
- Optional: 120, 240, 277V AC
  - Hardwire
  - NightCharge®
  - PoE

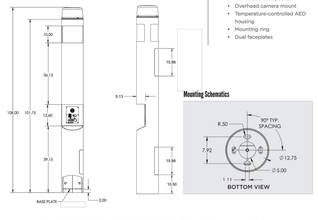
Communication
- Speakerphone Options
  - IP5000: Full duplex, SIP compatible VoIP phone.
  - IA4100: Analog full duplex phone.
- Hardwire
- Cellular
- IP wireless

Lighting
- LED faceplate light
- Beacon/strobe
- Area light

Style
- Standard wet coat colors: Dark Bronze, Gloss White, Gloss Black, Safety Blue, Safety Red, Safety Yellow, Bright Silver
- Graphics text: Assistance, Emergency
- Graphics colors: Black, Blue, White

Compliance
- UL 2017
- UL 60950-1
- NEMA 3S
- ADA

Options
- Public address speakers
- Overhead camera mount
- Temperature-controlled AED housing
- Mounting ring
- Dual faceplates



Note: Specifications subject to change without notice or obligation on the part of Code Blue Corporation.

CODE BLUE LIGHTS (CB1)
NOT TO SCALE

NV-1
AREA LIGHTING

NLS LIGHTING

FORM AND FUNCTION
- Sleek, low profile housing
- Spec grade performance
- Engineered for optimum thermal management
- Low depreciation rate
- Reduces energy consumption and costs up to 65%
- Exceeds IES foot candle levels utilizing the least number of poles and fixtures per project
- Optical system designed for:
  - Parking Lots
  - Auto Dealerships
  - General Area Lighting

CONSTRUCTION
- Die Cast Aluminum
- External cooling fins
- Corrosion resistant external hardware
- One-piece silicone gasket ensures IP-65 seal for electronics compartment
- One-piece Optics Plate® mounting silicone Micro Optics
- Two-piece silicone Micro Optic system ensures IP-67 level seal around each PCB
- Grade 2 Clear Anodized Optics Plate® standard

FINISH
- 3-5 mils electrostatic powder coat.
- NLS' standard high-quality finishes prevent corrosion protects against and extreme environmental conditions

WARRANTY
Five-year limited warranty for drivers and LEDs.

LISTINGS
- Certified to UL 1598
- UL 8750
- CSA C22.2 No. 250.0
- DesignLights Consortium® (DLC)
- DesignLights Consortium Premium® (DLCP)
- IP65/ IP67 Rated
- 3G Vibration Rated per ANSI C136.31-2010

LED WATTAGE CHART

	16L	32L	48L	64L
350 millamps	11w	-	-	-
530 millamps	20w	-	-	-
700 millamps	26w	51w	76w	102w
1050 millamps	38w	100w	150w	200w

Project Name: Type:

Cat#	Light Dist.	# of LEDs	Milliamps	Kelvin	Volts	Mounting	Color	Options
NV-1 (NV-1)	Type 2 (T2)	16 (16L)*	350 (35)	2700K, 80 CRI (2700)*	120-277 (UNV)	Direct Pole 3" Arm Single (SP3)	Bronze Textured (BRZ)	Bird Spikes (BS)
	Type 3 (T3)	32 (32L)**	530 (53)	3000K, 70 CRI (300K7)	347-480 (HV)	Direct Pole 3" Arm Double, 180, 090, 270, 120, Quad (DP3T)*	White Textured (WHT)	Marine Grade Finish (MGF)
	Type 4 (T4)	48 (48L)	700 (7)	3000K, 80 CRI (300K8)*		Knuckle Mount (NM)	Smooth White Gloss (SWT)	Optic Plate Painted to Match Fixture (OPP)
	Type 5 (T5)	64 (64L)	1050 (1)	3500K, 80 CRI (350K8)		Wall Mount (WM)	Silver (SVR)	Photocell (PE) Receptacle + Shorting Cap (PER)
	Nema 2 3/4" Narrow Beam (N2)			4000K, 70 CRI (400K7)		Trunnion Mount (TM)*	Black Textured (BLK)	FSP-211 with Motion Sensor (Universal Voltage) (FSP-9)* 9' x 9' below (FSP-10)* 10' x 10' above (FSP-40)* 40' x 40' height
	Nema 3 30° Narrow Beam (N3)			4000K, 80 CRI (400K8)*		Tenon Arm (TA)	Smooth Black Gloss (SBK)	Quick Mount Bracket (QMB) Retrofit Mount Bracket (RQMB) Receptacle Only (Twist-Lock) (RPC)
				5000K, 70 CRI (500K7)		Mast Arm (MA)	Graphite Textured (GPH)	Round Pole Adapter 5"-8" Pole (RPA5) Rotated Optic Left (ROL) Rotated Optic Right (ROR)
				5000K, 80 CRI (500K8)*			Grey Textured (GRY)	Automotive House Side Shield (AHS) House Side Shield (HSS)*
							Custom (CS)	

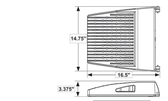
Notes:
- Consult Factory for Lead Time. Consult Factory for RI ON Requests.
- Not available with Nema 2 Optics
- Standard finish is stainless steel. Can be painted to match fixture
- Not available below 120-277
- HSS not applicable with Nema 2 Nema 3 Optics

ELECTRICAL
- 120-277 Volts (UNV) or 347-480 Volts (HV)
- 0-10V dimming driver by Philips Advance
- Driver power factor at maximum load is ≥ 95, THD maximum load is 15%
- All internal wiring UL certified for 600 VAC and 105°C
- All drivers, controls, and sensors housed in enclosed IP-65 compartment
- Lumileds Luxeon MX LED's
- CRI 70, 80 or 90
- Color temperatures: 2700K, 3000K, 3500K, 4000K, 5000K
- Surge Protection: 20KVA supplies as standard.

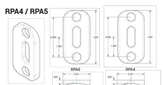
OPTIONS
- BIRD SPIKES (BS)—Offers effective and humane deterrent for larger bird species and provides cost-effective long-term solution to nuisance bird infestations and protect your property.
- MARINE GRADE FINISH (MGF)—A multi-step process creating protective finishing coat against harsh environments.
  - Chemically washed in a 5 stage cleaning system.
  - Pre-baked
  - Powder coated 3-5 mils of Zinc Rich Super Durable Polyester Primer.
  - 1-2 feet inside pole coverage top and bottom.
  - Oven Baked.
  - Finished Powder Coating of Super Durable Polyester Powder Coat 3-5 mil thickness.
- SHIELDS (HSS, AHS)—House Side Shield (HSS) is designed for full property line cut off. Automotive House Side Shield (AHS) is a single-sided shield allowing partial cut-off on either side or front of luminaire.
- ROUND POLE ADAPTER (RPA)— When using round poles, specify Round Pole Adapter (RPA). Specify RPA4 when installing on 3"-4" round poles, and RPA5 when installing on 5"-6" round poles.

CONTROLS
- FSP-211 (FSP-X)—Passive infrared (PIR) sensor providing multi-level control based on motion/daylight contribution.
  - All control parameters adjustable via wireless configuration remote storing and transmitting sensor profiles.
  - FSP-20 mounting heights 9-20 feet
  - FSP-40 mounting heights 21-40 feet.
  - Includes 5-dimming event cycles, 0-10V dimming with motion sensing, reprogrammable in the field.
- NEMA 7-PIN RECEPTACLE (PE7)—An ANSI C136.41-2013 receptacle provides electrical and mechanical interconnection between photo control cell and luminaire. Dimming receptacle available two or four dimming contacts supports 0-10 VDC dimming methods or Digital Addressable Lighting Interface (DALI), providing reliable power interconnect.

OPTICS
Silicone optics high photothermal stability and light output provides higher powered LEDs with minimized luminaire LED life. UV and thermal stability with scratch resistance increases exterior application durability.
- IES Types



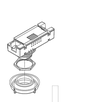
RPA4 / RPA5



HOUSE SIDE SHIELD

AUTOMOTIVE HOUSE SIDE SHIELD

FSP-211



TYPE II (T2) TYPE III (T3) TYPE IV (T4) TYPE V (T5) NEMA 3 (N3)

LUMENS

PART NUMBER	N3	LM/W	T2	LM/W	DLC	T3	LM/W	DLC	T3-HSS	LM/W	T4	LM/W	DLC	T4 AHS	LM/W	T4-HSS	LM/W	T5	LM/W	DLC	W
NV1-16L-35-30K	2016	113	2106	117	P	2106	117	P	1134	63	2227	116	P	1206	62	1116	62	2221	118	P	18
NV1-16L-35-40K	2068	116	2256	126	P	2286	127	P	1206	67	2250	125	P	1368	76	1188	66	2304	128	P	18
NV1-16L-35-50K	2184	120	2376	132	P	2394	133	P	1278	71	2358	131	P	1440	80	1260	70	2412	134	P	18
NV1-16L-53-30K	3136	112	3192	114	P	3220	115	P	1704	63	3119	113	P	2016	72	1736	62	3248	116	P	28
NV1-16L-53-40K	3248	116	3472	124	P	3472	124	P	1876	67	3444	123	P	2128	76	1848	66	3500	125	P	28
NV1-16L-53-50K	3360	120	3612	129	P	3640	130	P	1988	71	3584	128	P	2240	80	1960	70	3668	131	P	28
NV1-16L-7-30K	4033	113	3960	110	P	3960	110	P	2268	63	3973	109	P	2592	72	2352	62	3906	111	P	36
NV1-16L-7-40K	4176	116	4428	123	P	4284	119	P	2412	67	4212	117	P	2736	76	2376	66	4320	120	P	36
NV1-16L-7-50K	4320	120	4644	129	P	4500	125	P	2556	71	4428	123	P	2880	80	2520	70	4500	125	P	36
NV1-16L-10K	5272	112	5160	110	S	5384	114	P	3028	63	5232	112	P	4032	72	3472	62	5440	115	P	56
NV1-16L-10-40K	5499	116	5922	125	S	5688	120	P	3214	67	5719	121	P	4256	76	3696	66	5824	123	P	56
NV1-16L-10-50K	5712	120	6156	130	S	5974	126	P	3402	71	5874	124	P	4480	80	3920	70	5984	126	P	56
NV1-32L-7-30K	7992	117	7810	113	S	7810	113	S	4473	65	7710	109	S	5112	73	4602	63	7881	111	S	71
NV1-32L-7-40K	8226	119	8017	117	P	8449	119	P	4787	67	8067	113	P	5376	76	4985	66	8529	120	P	71
NV1-32L-7-50K	8520	120	9159	129	P	8875	125	P	5041	71	8733	123	P	5680	80	4970	70	8945	126	P	71
NV1-32L-10-30K	11872	113	11660	110	S	12084	114	S	6678	63	11600	112	S	7632	72	6872	62	11740	113	S	106
NV1-32L-1-40K	12296	116	12932	122	P	13038	123	P	7102	67	12826	121	P	8056	76	6996	66	13144	124	P	106
NV1-32L-1-50K	12720	120	13668	129	P	13674	129	P	7526	71	13462	127	P	8480	80	7420	70	13780	130	P	106
NV1-48L-7-30K	11648	112	11440	110	S	11440	110	S	6552	63	11336	109	S	7488	72	6648	62	11544	111	S	104
NV1-48L-7-40K	12064	116	13208	127	P	12376	119	P	6968	67	13168	127	P	7904	76	6864	66	13480	130	P	104
NV1-48L-7-50K	12480	120	13520	130	P	13000	125	P	7384	71	12792	123	P	8320	80	7280	70	13104	126	P	104
NV1-48L-10K	17472	112	17160	110	S	17784	114	S	9828	63	17472	112	S	11232	72	9672	62	17640	113	S	156
NV1-48L-1-40K	18096	116	19032	122	P	19188	123	P	10452	67	18876	121	P	11856	76	10296	66	19344	124	P	156
NV1-48L-1-50K	18720	120	19968	128	P	20124	129	P	11076	71	19812	127	P	12480	80	10920	70	20286	130	P	156
NV1-64L-7-30K	15232	112	14950	110	S	14960	110	S	8568	63	14824	109	S	9792	72	8432	62	15096	111	S	136
NV1-64L-7-40K	15776	116	17264	127	P	16184	119	P	9112	67	17238	127	P	10336	76	8976	66	17576	129	P	136
NV1-64L-7-50K	16320	120	17680	130	P	17000	125	P	9656	71	16728	123	P	10880	80	9520	70	17136	126	P	136
NV1-64L-10K	22960	112	22550	110	S	23376	114	S	12916	63	22960	112	S	14760	72	12716	62	23576	115	S	205
NV1-64L-1-40K	23760	116	25016	122	P	25272	123	P	13716	67	24804	121	P	15560	76	13536	66	25424	124	P	205
NV1-64L-1-50K	24600	120	26240	128	P	26440	129	P	14556	71	26035	127	P	16400	80	14350	70	26650	130	P	205

*DLC S= Standard P= Premium

BUG RATINGS

PART NUMBER	T2	T3	T3 HSS	T4	T4 HSS	T5
NV1-16L-35-30K	B1-U0-G1	B1-U0-G1	B0-U0-G0	B1-U0-G1	B0-U0-G0	B2-U0-G0
NV1-16L-35-40K	B1-U0-G1	B1-U0-G1	B0-U0-G0	B1-U0-G1	B0-U0-G0	B2-U0-G0
NV1-16L-35-50K	B1-U0-G1	B1-U0-G1	B0-U0-G0	B1-U0-G1	B0-U0-G0	B2-U0-G0
NV1-16L-53-30K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-53-40K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-53-50K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-7-30K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-7-40K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-7-50K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-10K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-10-40K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-16L-10-50K	B1-U0-G1	B1-U0-G1	B0-U0-G1	B1-U0-G1	B0-U0-G1	B3-U0-G1
NV1-32L-7-30K	B1-U0-G2	B2-U0-G2	B0-U0-G1	B2-U0-G2	B0-U0-G1	B3-U0-G2
NV1-32L-7-40K	B1-U0-G2	B2-U0-G2	B0-U0-G1	B2-U0-G2	B0-U0-G1	B3-U0-G2
NV1-32L-7-50K	B1-U0-G2	B2-U0-G2	B0-U0-G1	B2-U0-G2	B0-U0-G1	B3-U0-G2
NV1-32L-10K	B2-U0-G2	B3-U0-G2	B0-U0-G2	B3-U0-G2	B0-U0-G2	B4-U0-G2
NV1-48L-7-30K	B2-U0-G2	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B4-U0-G2
NV1-48L-7-40K	B2-U0-G2	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B4-U0-G2
NV1-48L-7-50K	B3-U0-G3	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B5-U0-G3
NV1-48L-10K	B3-U0-G3	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B5-U0-G3
NV1-64L-7-30K	B2-U0-G2	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B4-U0-G2
NV1-64L-7-40K	B3-U0-G3	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B4-U0-G2
NV1-64L-7-50K	B3-U0-G3	B3-U0-G3	B1-U0-G2	B3-U0-G3	B1-U0-G2	B4-U0-G2
NV1-64L-10K	B3-U0-G3	B3-U0-G3	B1-U0-G3	B3-U0-G3	B1-U0-G3	B5-U0-G3
NV1-64L-1-40K	B3-U0-G3	B3-U0-G3	B1-U0-G3	B3-U0-G3	B1-U0-G3	B5-U0-G3
NV1-64L-1-50K	B3-U0-G3	B3-U0-G3	B1-U0-G3	B3-U0-G3	B1-U0-G3	B5-U0-G3

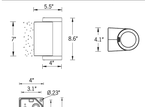
NLS LIGHTING 701 Kingshill Place, Carson, CA 90746 Call Us Today (310) 341-2037 nlslighting.com

PARKING AREA LIGHTS (S1 - * & S2 - ** : MOUNTING HEIGHT 18' POLE MOUNTED)
NOT TO SCALE

UMV-30041
Marvik 5 Surface Up/Downlight

LIGMAN LIGHTING USA

2x18W COB 2x1245 Lumens
IP65 - Suitable For Wet Locations
IK08 - Impact Resistant (Vandal Resistant)
Weight 6 lbs



Mounting Detail

Construction

Aluminum
Less than 0.1% copper content - Marine Grade 6060 extruded & LM6 Aluminum High Pressure die casting provides excellent heat dissipation and smooth, clean detailed product lines and excellent heat dissipation.

Pre-paint
8 step degrease and phosphate process that includes deoxidizing and etching as well as a zinc and nickel phosphate process before product painting.

Memory Retentive Silicon Gasket
Premium, environmentally friendly, molded "fit for purpose" long life high temperature memory retentive silicon gaskets. Maintains the gaskets exact profile and seal over years of use and compression.

Thermal management
Engineered for optimum fin to excellent mechanical strength and thermal dissipation properties in low and high ambient temperatures. The superior thermal heat sink design by Lignan ensures maximum efficiency of the luminaire and keeps the critical temperature range to ensure maximum luminous flux output, as well as providing long LED service life and ensuring less than 10% lumen depreciation at 50,000 hours.

Surge Suppression
Standard 10kv surge suppressor provided with all fixtures.

BUG Rating
B1 - U0 - G2

Finishing
All Lignan products go through an extensive finishing process that includes fettling to improve paint adherence.

Paint
UV Stabilized 4.5Mil thick powder coat paint and baked at 200 Deg. C. This process ensures that Lignan products can withstand harsh environments. Rated for use in natural ruins.

Inspired by Nature Finishes
The Lignan Wood Grain Finishing is a unique system of decorative powder coating. Our metal decoration process can easily transforms the appearance of metal or aluminum product into a wood grain finish.

This patented technology enables the simulation of wood grain, stone and exotic granite finish through the use of decorative powder coating.

The wood grain finish is so realistic that it's almost undistinguishable from real wood, even from a close visual inspection. The system of coating permeates the entire substrate, so that the finish will not chip, crack or peel but removed by normal rubbing, chipping, or scratching.

The Coating Process
After pre-treatment the prepared parts are powder coated with a specially formulated polyurethane powder. This powder coating is then cured in an oven to provide a durable finish of corrosion and acts as the relief base color for the finalized metal decoration.

The component is then wrapped with a sheet of non-porous film with the selected decoration pattern printed on it using special high temperature inks.

This printed film transfer is vacuum-sealed to the surface for a period of time sufficient to allow the pattern to sublimate into the resin. The resin transforms the ink into different forms within the paint layer before it becomes solid. Finally, the film is removed, and a wood timber look on aluminum remains.

Wood grain coating can create beautiful wood-looking products that are far more durable than natural timber products currently in use. Wood grains can be made with different colors, designs, etc.

Our powder coatings are certified for indoor and outdoor applications and are backed by a comprehensive warranty. Lignan's wood grain finishing processes exceed standard of performance excellence and design innovation.

Added Benefits:
- Resistance to salt-acid room, accelerated aging
- Boiling water, lime and condensed water resistant
- Resistant to UV, Xenon, Humidity Cabinet, Anti-Scratch
- Super durable (UV resistant)
- TGIC free (non-toxic)

Hardware
Provided Hardware is Marine grade 316 Stainless steel.

Anti Saliva Screw Holes
Tapped holes are infused with a special anti saliva compound that prevents the corrosion of stainless steel screws due to the electrolytes from food, corrosive atmospheres and moisture.

Crystal Clear Low Iron Glass Lens
Provided with tempered, impact resistant crystal clear low iron glass ensuring no green glass tinge.

Optics & LED
Precise optic design provides exceptional light control and maximum efficiency of light.
LED CRI > 80

Lumen - Maintenance Life
L80: 0/10 at 50,000 hours (This means that at least 90% of the LED still achieve 80% of their original flux)

Cylindrical, single or double-sided wall family. Compact and decorative appearance belies powerful outputs and technical optics for perfect task illumination

A stunning new waterproof & dust proof wall cylinder range, designed with no visible fasteners, a one-piece body and integrated driver housing.
This smart mechanical modern designed luminaire with cylindrical body provides a stylish solution to wall mounted cylinders.

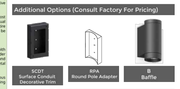
This innovative design houses a variety of COB wattages to suit designer's specific requirements as well as a selection of field interchangeable reflector optics, that include narrow, medium, wide and very wide distributions. This series is available in 3 different diameters, namely 3", 4" & 6" to suit lighting design requirements.

These luminaires are suitable for various facade lighting requirements along with accent lighting, building columns and architectural highlighting etc. The Marvik 1 protrudes 4" from the wall, making this product suitable for ADA applications.

This luminaire range can be provided with a bayonet lock baffle to reduce glare, as well as a frosted lens option. The SCE surface conduit entry box option can be provided as an option for an attractive solution to surface conduit entry.

Ligman can also provide custom made boxes to fit on a pole, bollard, spiller or pole.

Additional Options (Consult Factory For Pricing)



Lignan Lighting USA reserves the right to change specifications without prior notice, please contact factory for latest information. Due to the optical improvements in LED technology data and components may change without notice.

WALL MOUNTED LIGHTS (WM-Downlight Only)
NOT TO SCALE

HORIZON PT
ARCHITECTURAL LIGHTING

NLS LIGHTING

Horizon Post Top luminaire is a blend of beautiful luminaire design which is a compliment to commerical or recreational pathways. It is named the Horizon because the luminaire is intended to be a vehicle of which the horizon can be viewed through the inside and around the luminaire without obstruction.

This Dark Sky Friendly Full Cutoff luminaire utilizes silicone Micro Optics to distribute light uniformly as its LEDs are recessed and hidden. Its performance exceeds IES minimum foot candle levels at lower wattage and extends maintenance cycles throughout its lifetime. Horizon MA is available in (warm) 3000, (neutral) 4000 and (cool) 5000 Kelvin temperatures and a range of 18 to 205 watts.

Built to conform to the strictest Made in America standards. Designed, tooled, fabricated and assembled in the USA.

MICRO OPTIC SYSTEM

Our new cell-inclosed, micro optic silicone modules produce high clarity and outstanding performance.

LED WATTAGE CHART

	16L	32L	48L	64L
350 millamps	11w	-	-	-
530 millamps	20w	50w	-	-
700 millamps	26w	71w	104w	136w
1050 millamps	38w	100w	150w	200w

Project Name: Type:

Cat #	Light Dist.	No. of LEDs	Milliamps	Kelvin	Volts	Mounting	Color	Options
Horizon 1 (HRZ-1)	Type 2* (T2)	16 (16L)*	350 (35)	3000 (30K)	120-277** (UNV)	Post Top Over 3' OD (PT2)	Bronze (BRZ)	Dome Top (DT)
	Type 3 (T3)	32 (32L)**	530 (53)	4000** (40K)	347-480 (HV)	Post Top ** Over 3' OD (PT3) *Standard	White (WHT)	Marine Grade Finish (MGF)
	Type 4 (T4)	48 (48L)	700** (7)	5000 (50K)		Post Top Over 3-1/2' OD (PT312)	Silver (SVR)	House Side Shield (HSS)
	Type 5** (T5)	64 (64L)	1050* (1)				Hunter Green (HGN)	Nema 7-Pin Receptacle (PE7)
							Black (BLK)	Receptacle + Short Cap (PER)
							Graphite (GPH)	Photocell (PC) *Universal Voltage 120-277
							Grey (GRY)	Surge Protector (10K)
							Custom (CS)	FSP-211 with Motion Sensor (Universal Voltage) (FSP-9) *For 9' x Below (FSP-10) *For 9' to 20' (FSP-40) *For 21' to 40'

NLS LIGHTING 701 Kingshill Place, Carson, CA 90746 Call Us Today (310) 341-2037 nlslighting.com

220

PATHWAY LIGHTS (S3 - * & S4 - ** : MOUNTING HEIGHT 12'-POST TOP MOUNTED)
NOT TO SCALE

PRODUCT SPECIFICATIONS

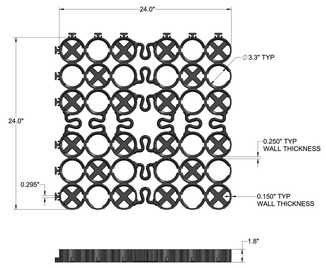
Housing: Low Profile Cast, Spun Aluminum Housing + Frame
LED: Lumileds Luxeon MX, CRI 70
Optics: Micro Optics; T2, T3, T4 and T5
Watts: 18-205
L70 Depreciation: 483,000 Hours (@77°F/ 25°C)
LSG: 70,000
Listings: Conforms to UL 1598 Standards

Driver: 0-10V Dimming driver as standard by Philips Advance
THD @ Max Load < 15%
Power Factor @ Max Load < 0.95
Kelvin: 3000, 4000, or 5000
Finish: 3-5 mils Powder Coat
Warranty: Standard Warranty is 5 years for Driver and LEDs

PRODUCT DIMENSIONS

LUMEN DATA CHART

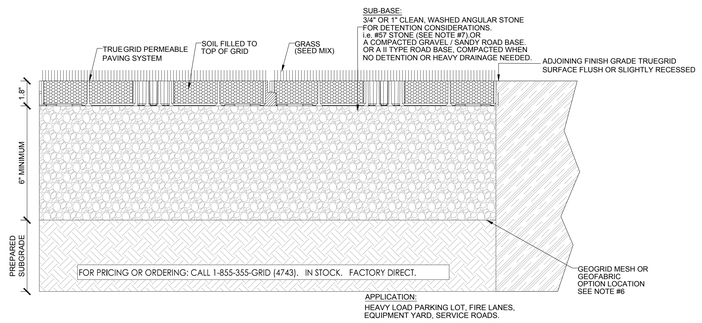
PART NUMBER	T2 LUMENS	T2 LM/W	T3 LUMENS	T3 LM/W	T3-HSS LUMENS	T3-HSS LM/W	T4 LUMENS	T4 LM/W	T4-HSS LUMENS	T4-HSS LM/W	T5 LUMENS	T5 LM/W	Watts
HRZ-1-16L-35-30K	2142	119	2088	116	1044	58	2070	115	1026	57	2160	120	18
HRZ-1-16L-35-40K	2309	128	2247	125	1116	62	2227	124	1098	61	2322	129	18
HRZ-1-16L-35-50K	2356	131	2297	128	1188	66	2277	127	1170	65	2376	132	18
HRZ-1-16L-53-30K	3375	117	3192	114	1624	58	3185	113	1596	57	3304	118	28
HRZ-1-16L-53-40K	3524	126	3435	123	1736	62	3406	122	1708	61	3556	127	28
HRZ-1-16L-53-50K	3603	129	3511	125	1848	66	3482	124	1820	65	3640	130	28
HRZ-1-16L-7-30K	4100	114	4115	111	2080	58	4032	111	2032	57	4176	115	36
HRZ-1-16L-7-40K	4411	123	4305	119	2232	62	4308	120	2196	61	4500	125	36
HRZ-1-16L-7-50K	4510	125	4396	122	2376	66	4404	122	2340	65	4608	128	36
HRZ-1-16L-10K	5995	105	5712	102	3240	58	5661	101	3192	57	5880	105	56
HRZ-1-16L-1-40K	6303	113	6146	110	3472	62	6091	109	3416	61	6328	113	56
HRZ-1-16L-1-50K	6441	115	6283	112	3696	66	6227	111	3640	65	6496	116	56
HRZ-1-32L-53-30K	5958	105	6712	102	3248	58	5661	101	3192	57	5880	105	56
HRZ-1-32L-53-40K	6303	113	6146	110	3472	62	6091	109	3416	61	6328	113	56
HRZ-1-32L-53-50K	6443	115	6283	112	3696	66	6227	111	3640	65	6496	116	56
HRZ-1-32L-7-30K	7427	106	7681	111	4118	59	7896	113	4547	65	8295	119	71
HRZ-1-32L-7-40K	7991	113	8490	119	4402	62	8496	120	4331	61	8875	125	71
HRZ-1-32L-7-50K	8186	115	8989	122	4984	66	8685	118	4613	63	9282	126	71
HRZ-1-32L-1-30K	11069	106	10812	102	6148	58	10715	101	6042	57	11130	105	106
HRZ-1-32L-1-40K	11928	113	11934	113	6572	62	11929	113	6466	61	11978	113	106
VSH-1-32L-1-50K	12195	115	11993	112	6996	66	11787	111	6890	65	12296	116	106
HRZ-1-48L-7-30K	11844	104	11544	111	6222	58	11448	112	5928	57	12068	116	104
HRZ-1-48L-7-40K	12744	123	12421	119	6468	62	12444	120	6344	61	12985	125	104
HRZ-1-48L-7-50K	13028	125	12698	122	6864	66	12760	123	6736	65	13275	128	104
HRZ-1-48L-1-30K	16318	105	15912	102	9048	58	15769	101	8892	57	16455	106	155
HRZ-1-48L-1-40K	17568	113	17157	110	9672	62	16968	109	9516	61	17755	115	156
HRZ-1-48L-1-50K	17925	115	17503	113	10296	66	17246	111	10146	65	18120	116	155
HRZ-1-64L-7-30K	15488	114	15596	111	7888	58	15124	111	7752	57	15781	116	136
HRZ-1-64L-7-40K	16665	123	16243	119	8432	62	16273	120	8296	61	16981	125	135
HRZ-1-64L-



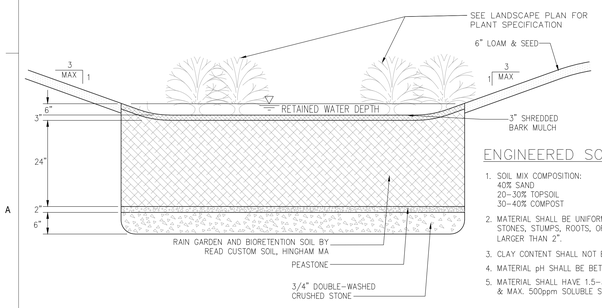
NOTES:

1. SUB-BASE DEPTH AND PREPARATION IS DEPENDENT ON SITE CONDITIONS PLUS LOADING REQUIREMENTS.
2. TRUEGRID PRO PLUS PRODUCTS ARE SUFFICIENTLY RATED FOR H-20 /HS-20 LOADING AND GREATER.
3. TYPICAL SEEDING OR HYDROSEEDING METHODS FOR GRASS GROWTH ARE ACCEPTABLE WITH TRUEGRID.
4. SOD CAN BE LAID ON SOIL FILLED GRID FOR IMMEDIATE GRASS (TYPICAL FOR FIRE LANES)
5. FOR HIGHER TRAFFIC SOD INSTALLATIONS, RECESS SOIL LEVEL WITHIN TRUEGRID AND PRESS IN SOD SO THAT TOP OF GRID IS AT SOIL LEVEL.
6. GEOGRID MESH OR GEOFABRIC MAY BE REQUIRED BETWEEN SUBGRADE & SUBBASE FOR CERTAIN SOILS AND SITE SPECIFIC REQUIREMENTS.
7. FILTER FABRIC MAY BE REQUIRED BETWEEN TRUEGRID AND SUB-BASE MATERIAL IF HIGH VOID RATIO IN SUB-BASE MATERIAL.
8. NO STAKING NECESSARY WITH TRUEGRID PRO PLUS WHEN SLOPE IS BELOW 10 DEGREES. ASSESS PROJECT, AS NEEDED.
9. FINAL ENGINEERED CROSS SECTION AGGREGATES AND DEPTH SHOULD ALLOW FOR EXPECTED INFILTRATION RATES,STORAGE CAPACITIES, OUTLET FLOW RATES, AND OTHER SITE SPECIFIC CONDITIONS AND LOAD REQUIREMENTS.
10. THIS CROSS SECTION IS FOR INFORMATION ONLY.

REINFORCED LAWN - PLAN VIEW



REINFORCED LAWN
NOT TO SCALE



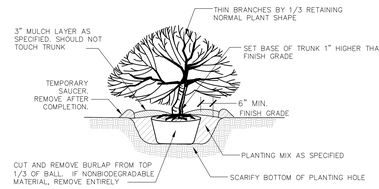
ENGINEERED SOIL MIX SPECIFICATIONS

1. SOIL MIX COMPOSITION:
   40% SAND
   20-30% TOPSOIL
   30-40% COMPOST
2. MATERIAL SHALL BE UNIFORM, FREE FROM STONES, STUMPS, ROOTS, OR OBJECTS LARGER THAN 2".
3. CLAY CONTENT SHALL NOT EXCEED 5%
4. MATERIAL pH SHALL BE BETWEEN 5.5-6.5.
5. MATERIAL SHALL HAVE 1.5-3% ORGANIC CONTENT & MAX. 500ppm SOLUBLE SALT.
6. SAND COMPONENT SHALL MEET ASTM D 422 AND THE FOLLOWING GRADATION:

SIEVE SIZE	% PASSING
2-INCH	100
3/4 INCH	70-100
1/4 INCH	50-80
No. 4	15-40
No. 200	0-3

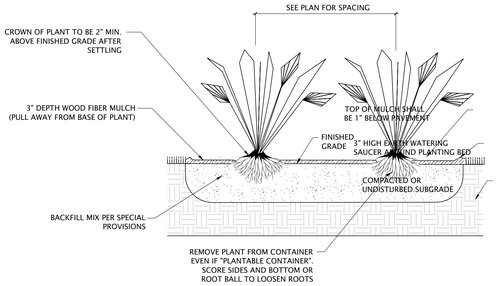
7. TOPSOIL SHALL BE A SANDY LOAM, LOAMY SAND, OR LOAM.
8. COMPOST SHALL BE PROCESSED FROM YARD WASTE IN ACCORDANCE WITH DEP GUIDELINES AND SHALL NOT CONTAIN BIO-SOLIDS.

RAIN GARDEN
NOT TO SCALE

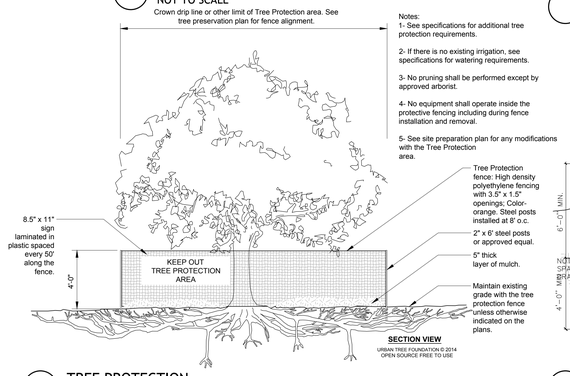


SHRUB PLANTING
NOT TO SCALE

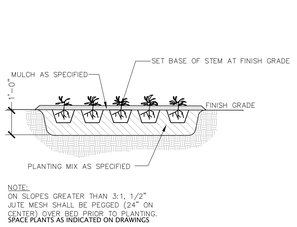
TYPICAL SEEDED NO-MOW LAWN
NOT TO SCALE



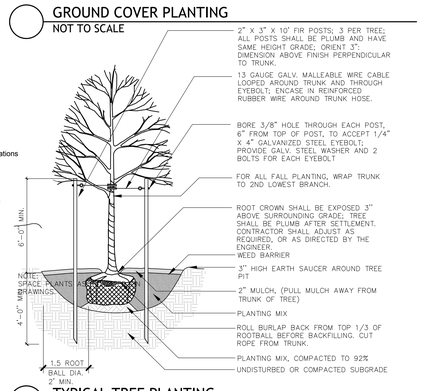
PERENNIAL PLANTING
NOT TO SCALE



TREE PROTECTION
NOT TO SCALE



GROUND COVER PLANTING
NOT TO SCALE



TYPICAL TREE PLANTING
NOT TO SCALE

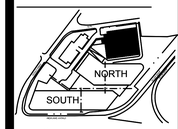
Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Danvers MA 01923
Tel: (617) 234-3100 • www.stantec.com

Consultant

pfa
Landscape Architects + Planners
Urban Designers + Land Use Consultants
PAUL FINGER ASSOCIATES
14 Beacon Street
Boston, Massachusetts 02445-4429
(617) 227-4400
(617) 227-8007 F
Paul@pfa.com

Issued/Revision	By	Appd
SPECIAL PERMIT PACKAGE R1		2022.08.15
DRB SUBMISSION		2022.07.13
ZBA SUBMISSION (Amended) R1		2022.07.12
SPECIAL PERMIT PACKAGE		2022.03.30

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

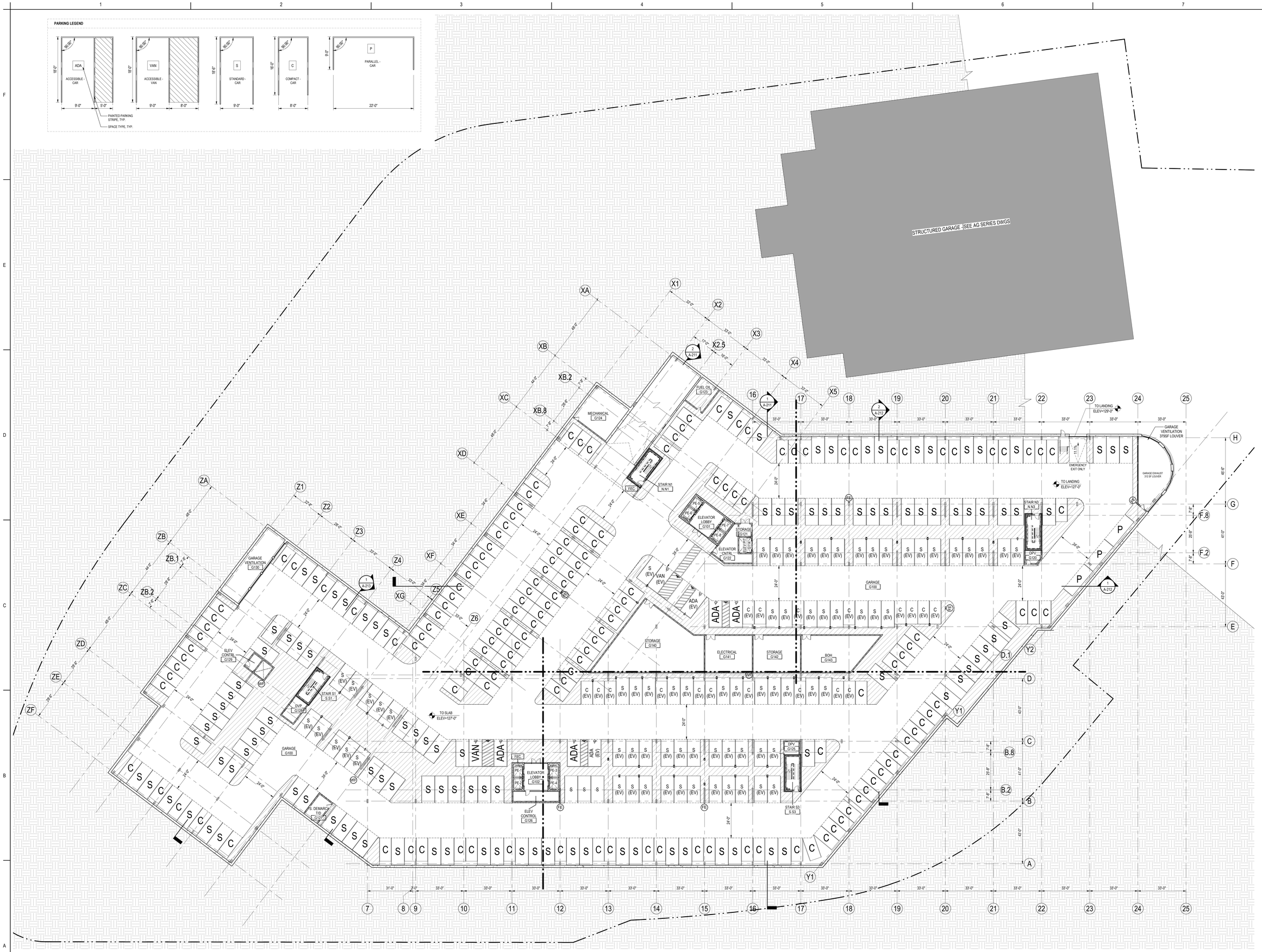
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name: SP-L-0.0-SITE DETAILS.dwg
Scale: As Specified
Dwn. Dsgn. Chkd. YYYY.MM.DD

Title
SITE DETAILS #2

Revision:
Drawing No.
L-5.1

ORIGINAL SHEET - ARCH E



1 GARAGE LEVEL G1 PLAN
A-100G1 — 1" = 20'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
3RD PLANNING BOARD SUBMISSION			2022.08.15
DEP SUBMISSION			2022.07.15
30% DESIGN SUBMISSION			2022.03.30
30% CDs PLAN SUBMISSION			2022.03.30

Permit/Seal

KEY PLAN

PARKING COUNT	
Type Comments	Count

LEVEL G1	
ACCESSIBLE	4
ACCESSIBLE - EV SPACE	2
ACCESSIBLE VAN	1
ACCESSIBLE VAN - EV SPACE	1
COMPACT	151
COMPACT - EV SPACE	18
PARALLEL	3
STANDARD	112
STANTARD - EV SPACE	70
LEVEL G1: 362	362
GRAND TOTAL: 362	362

PARKING SYMBOLS

ADA =	ACCESSIBLE
ADA-EV =	ACCESSIBLE ELECTRIC VEHICLE
VAN =	ACCESSIBLE VAN
B =	BOLLARD - EMBEDDED IN SLAB
EV =	ELECTRIC VEHICLE
P=	PARALLEL
S =	STANDARD
WF =	WHEELED FIRE EXTINGUISHER

STALL STRIPING

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

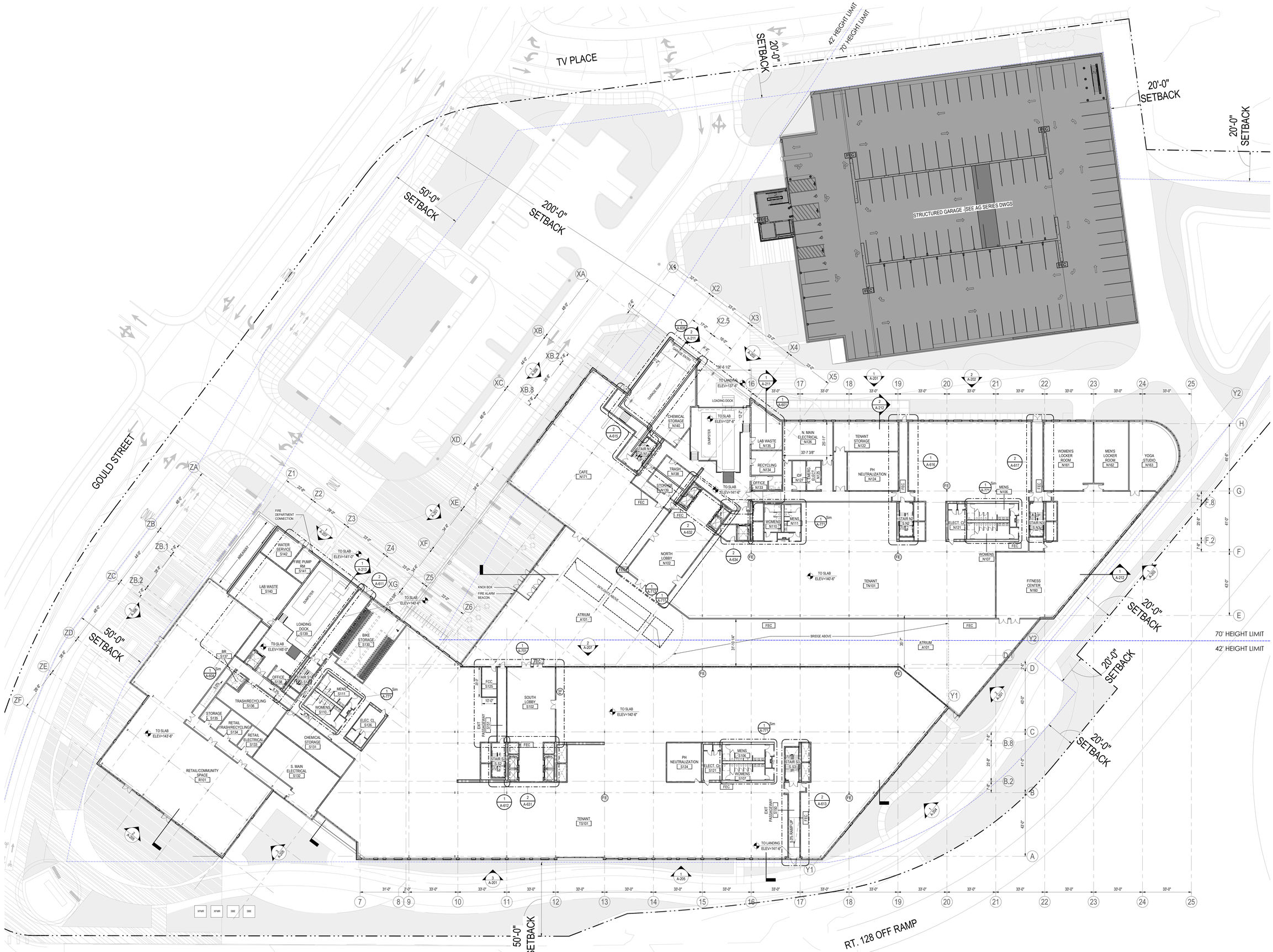
Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL G1 - OVERALL PLAN & PARKING LEGEND

Revision:

Drawing No.
A-100G1

ORIGINAL SHEET - ARCH E



1 A-101 **LEVEL 1 - OVERALL PLAN**
1" = 20'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

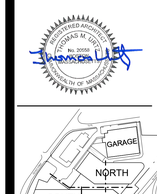
Consultant

Issued/Revision

By	Appd	YYYY.MM.DD
		2022.06.15
		2022.07.15
		2022.08.01
		2022.08.15

JPCHL RFMHT PACKAGE R1
DSB SUBMISSION
SPECIAL PERMIT PACKAGE R1

Permit/Seal



KEY PLAN

LEGEND
- WF — WHEELED FIRE EXTINGUISHER
- FE — FIRE EXTINGUISHER BRACKET WALL MTD
- FEC — FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

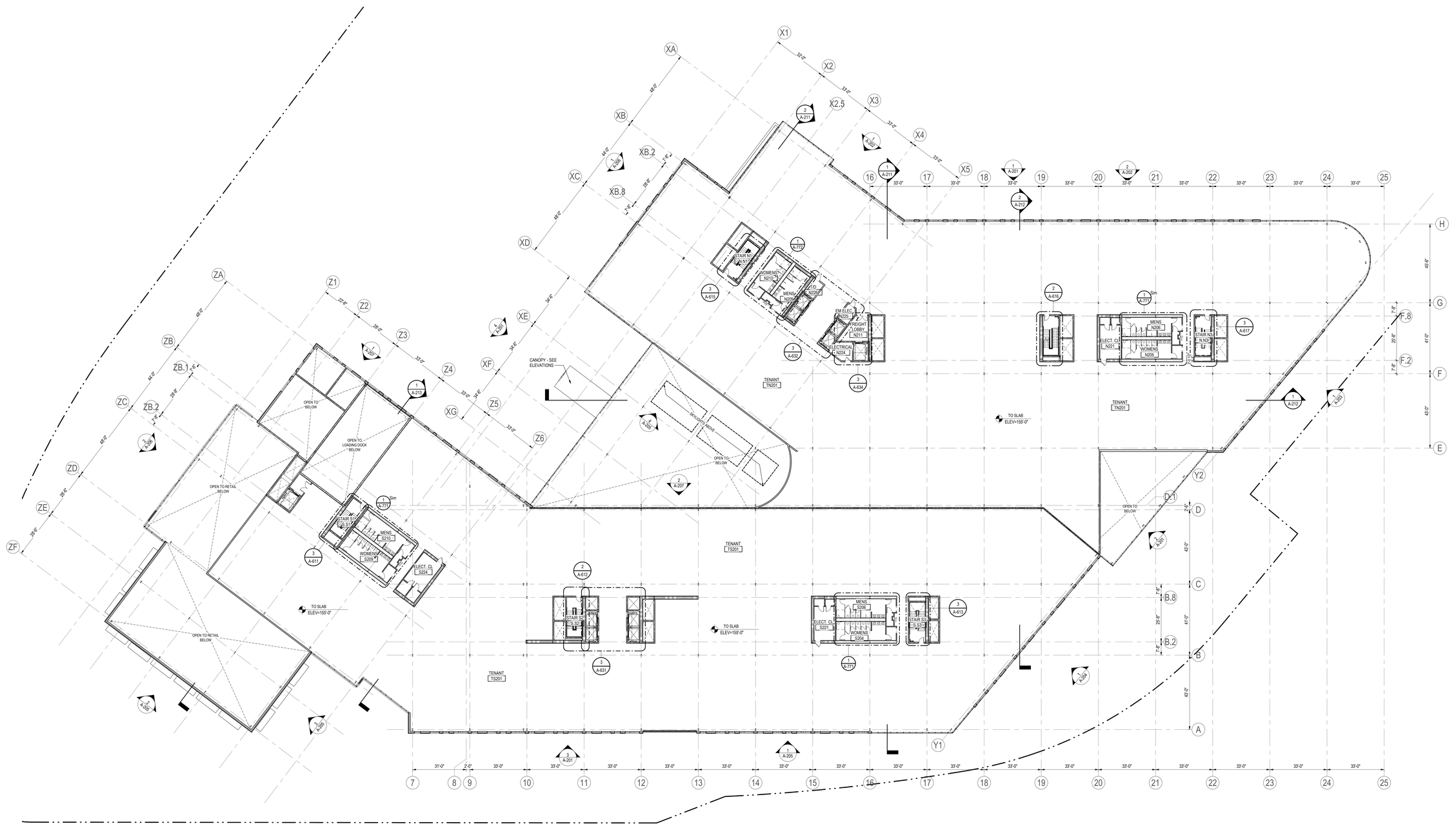
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.08.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
LEVEL 1 - OVERALL PLAN

Revision:
Drawing No.
A-101



1 LEVEL 2 PLAN - OVERALL PLAN

A-102 · 1" = 20'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision

No.	By	Appd	YYYY.MM.DD
1			2022.06.15
2			2022.07.15
3			2022.08.22
4			2022.08.30

1ST FULL REMEDIATION PACKAGE R1
DEP SUBMISSION
30% DESIGN DEVELOPMENT SET
SPECIAL PERMIT PACKAGE R1

Permit/Seal

KEY PLAN

LEGEND

WF	WHEELED FIRE EXTINGUISHER
FE	FIRE EXTINGUISHER BRACKET WALL MTD
FEC	FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

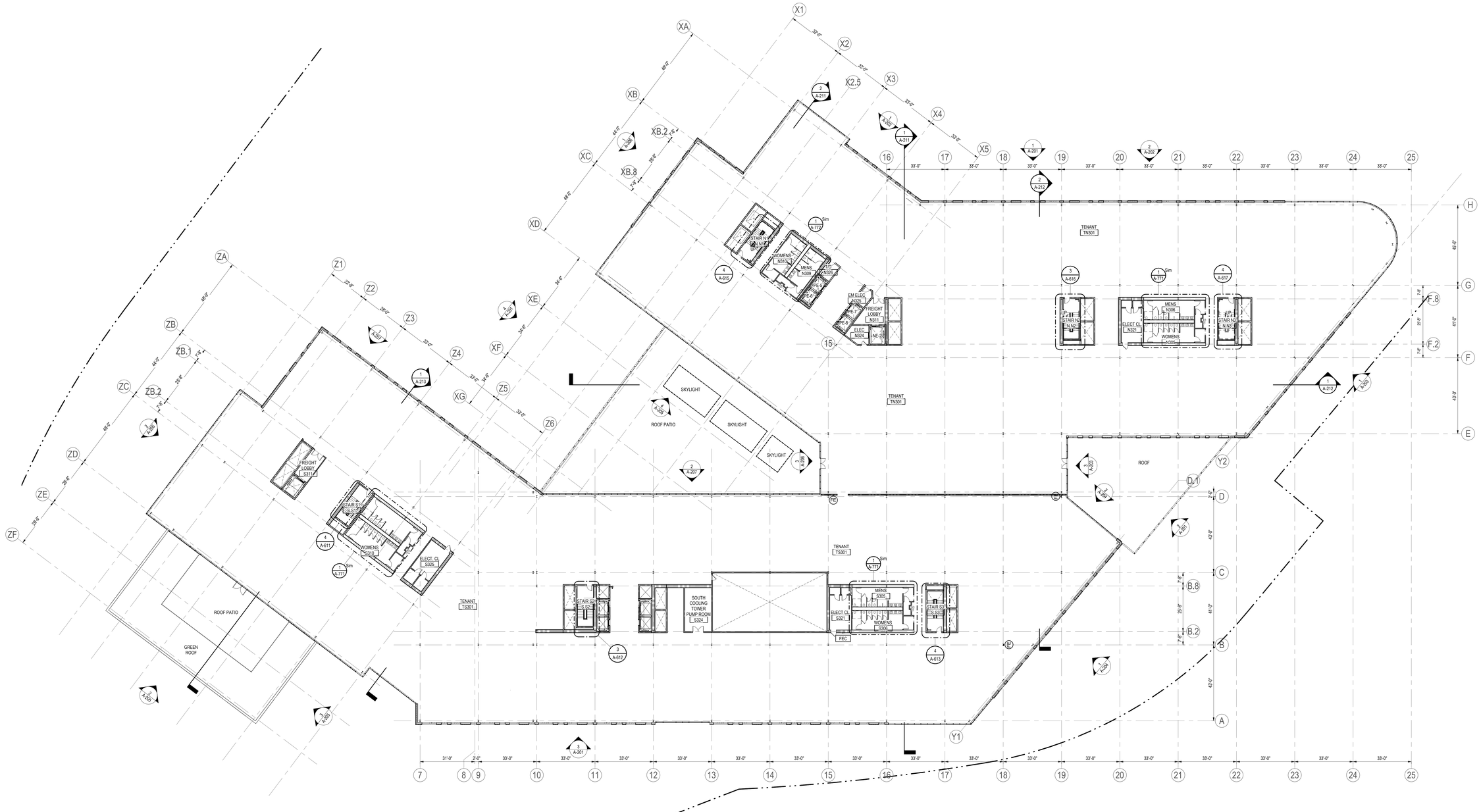
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
LEVEL 2 - OVERALL PLAN

Revision:
Drawing No.
A-102



1 LEVEL 3 - OVERALL PLAN

A-103 1" = 20'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	3RD PH. REMEDIATION PLAN			2022.08.15
2	DEP SUBMISSION			2022.07.13
3	30% DESIGN DEVELOPMENT SET			2022.03.30
4	100% DESIGN DEVELOPMENT SET			2022.06.24

Permit/Seal

KEY PLAN

LEGEND

- WHEELED FIRE EXTINGUISHER
- FIRE EXTINGUISHER BRACKET WALL MTD
- FEC FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

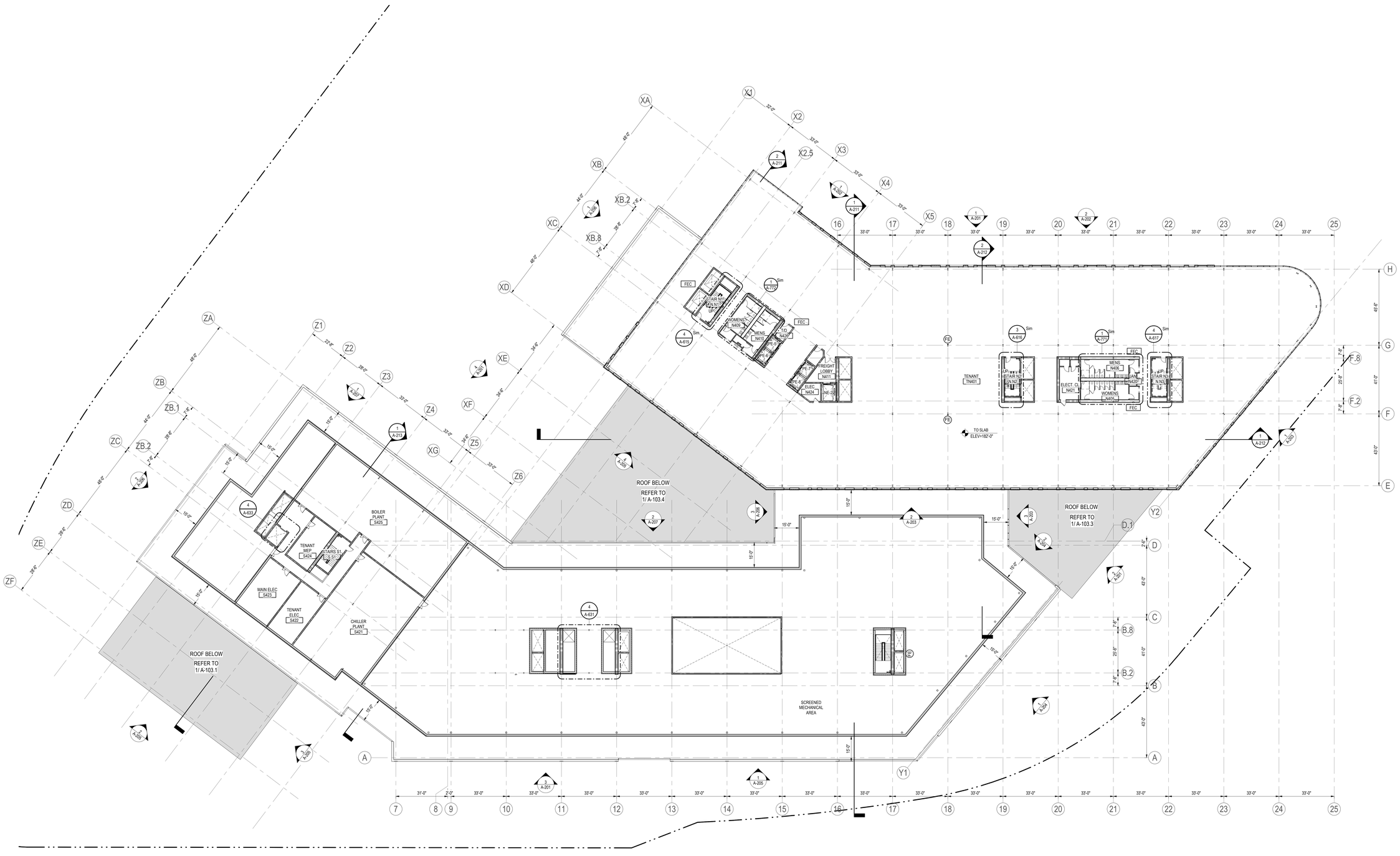
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale:As indicated

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
LEVEL 3 - OVERALL PLAN

Revision:
Drawing No.
A-103



1 LEVEL 4 / SOUTH BUILDING PENTHOUSE - OVERALL PLAN

A-104 — 1" = 20'-0"

Stantec

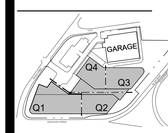
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision

No.	Description	By	Appd	YYYY.MM.DD
1	30% DESIGN DEVELOPMENT SET			2022.05.13
2	DEP SUBMISSION			2022.07.15
3	90% DESIGN DEVELOPMENT SET			2022.08.01
4	100% DESIGN DEVELOPMENT SET			2022.08.12

Permit/Seal



KEY PLAN

LEGEND

- WHEELED FIRE EXTINGUISHER
- FIRE EXTINGUISHER BRACKET WALL MTD
- FEC — FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

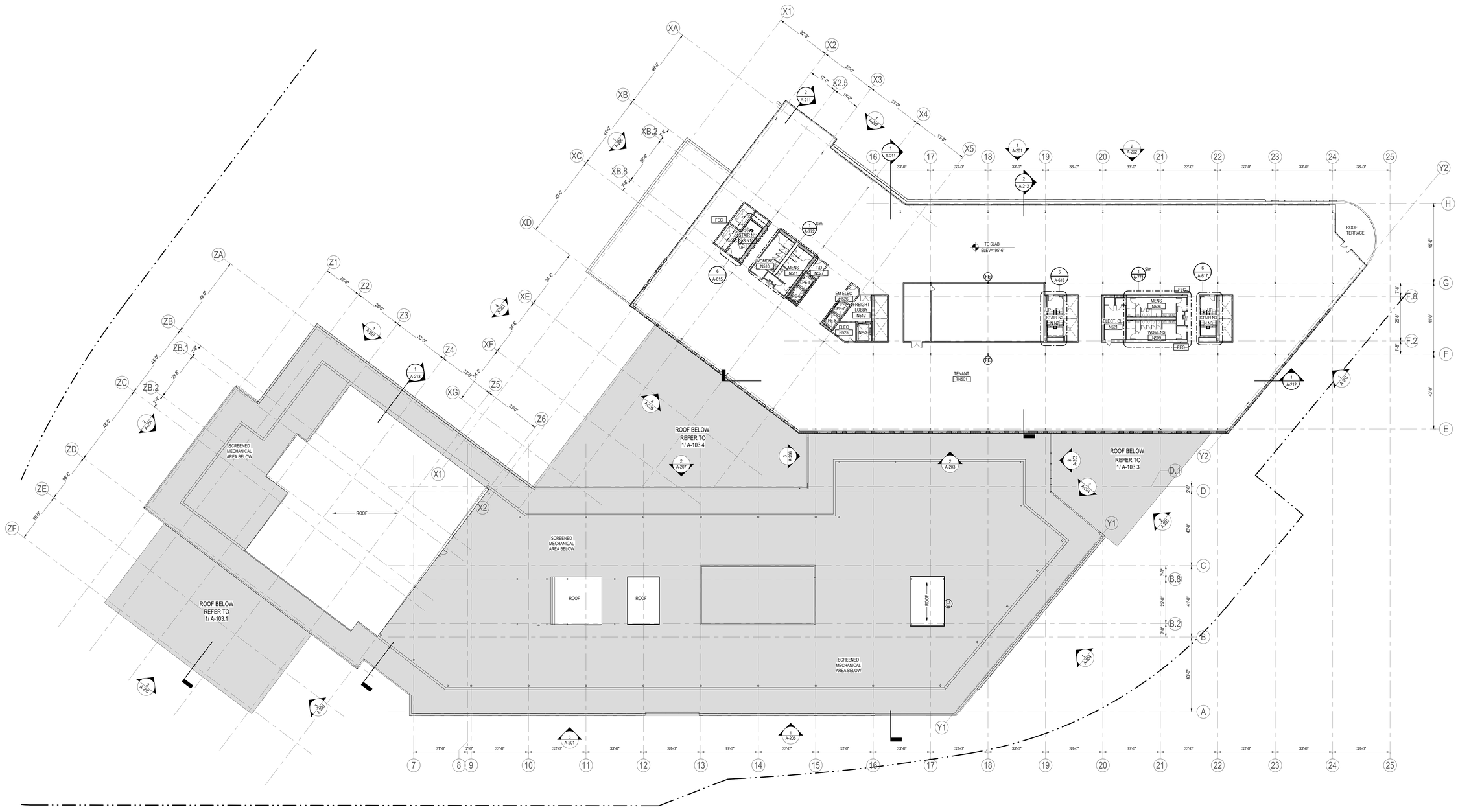
Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
LEVEL 4 / SOUTH BUILDING PENTHOUSE - OVERALL PLAN

Revision:

Drawing No.
A-104



KEY PLAN

LEGEND

- WHEELED FIRE EXTINGUISHER
- FE — FIRE EXTINGUISHER BRACKET WALL MTD
- FEC — FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE. TYP.

1 / A-105 LEVEL 5 / SOUTH BUILDING UPPER ROOF - OVERALL PLAN

1" = 20'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appvd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	100% CHECK SET			2022.07.15
1	50% CHECK SET			2022.03.30
0	ISSUED FOR PERMIT			2022.03.15

Permit/Seal

JOSHUA M. LIVESEY
No. 30550
REGISTERED ARCHITECT
COMMONWEALTH OF MASSACHUSETTS

Client/Project

Bulfinch

HIGHLAND INNOVATION CENTER

557 Highland Ave
Needham, MA 02494

Project No.:218421343

File Name: N/A

Scale: As indicated

Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

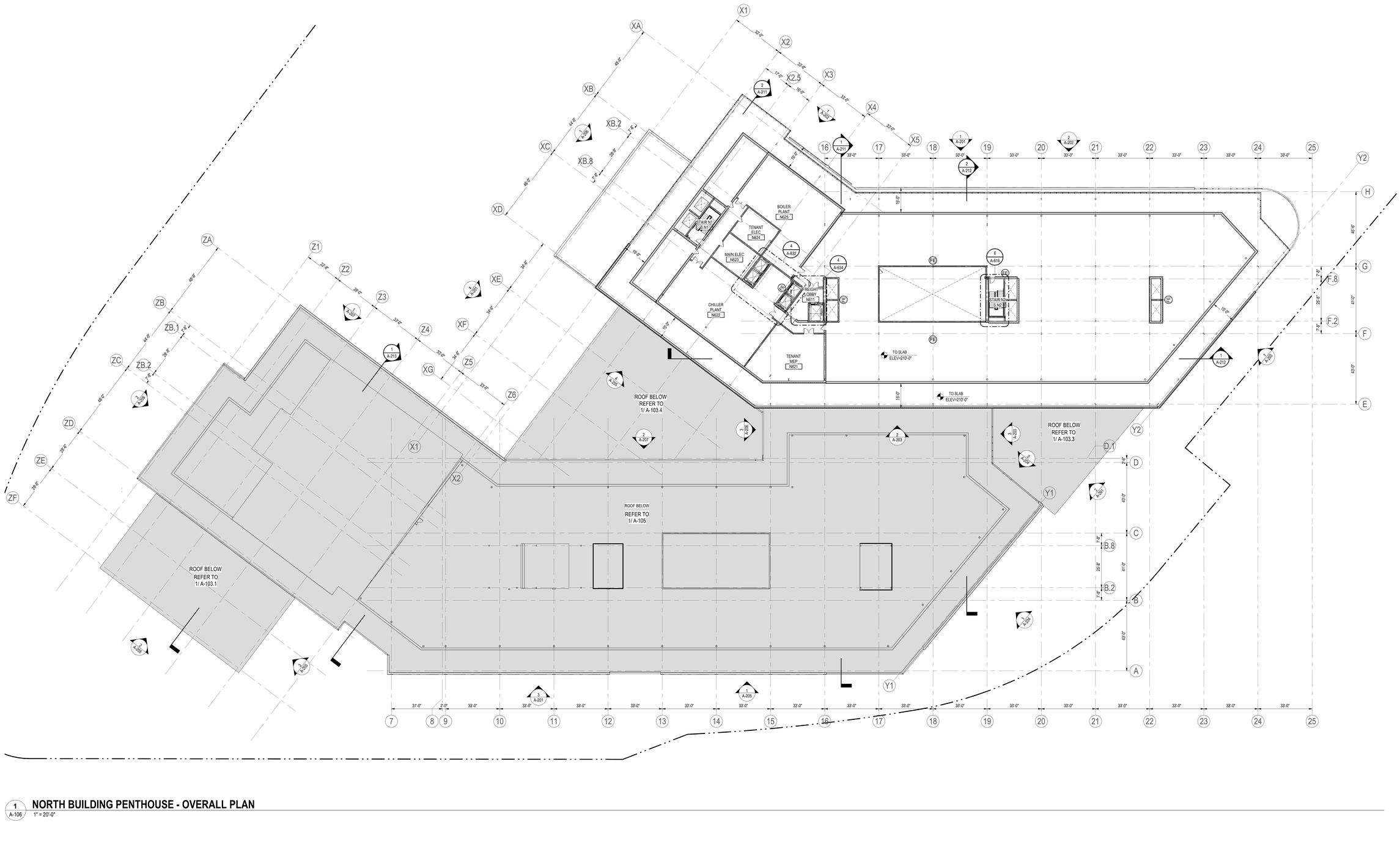
LEVEL 5 / SOUTH BUILDING UPPER ROOF - OVERALL PLAN

Revision:

Drawing No.

A-105

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)



1 NORTH BUILDING PENTHOUSE - OVERALL PLAN

A-106 1" = 20'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	2ND PLANNING BOARD SUBMISSION			2022.08.15
2	DEP SUBMISSION			2022.07.15
3	30% CD'S PLANNING BOARD SUBMISSION			2022.03.30
4	100% SCHEMATIC DESIGN			2021.12.17

Permit/Seal

KEY PLAN

LEGEND

- WE — WHEELED FIRE EXTINGUISHER
- FE — FIRE EXTINGUISHER BRACKET WALL MTD
- FEC — FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

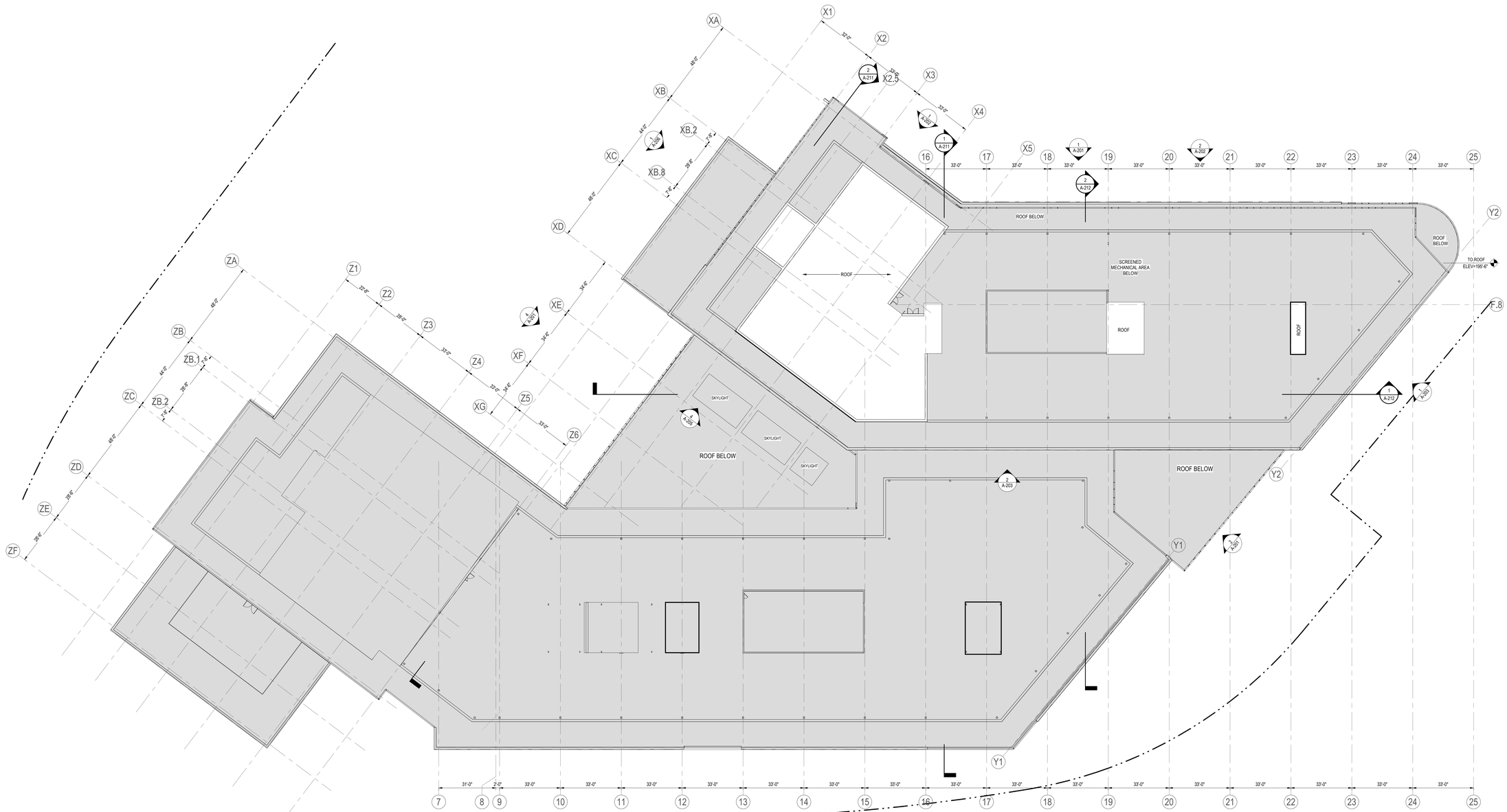
Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
NORTH BUILDING PENTHOUSE - OVERALL PLAN

Revision:

Drawing No.
A-106



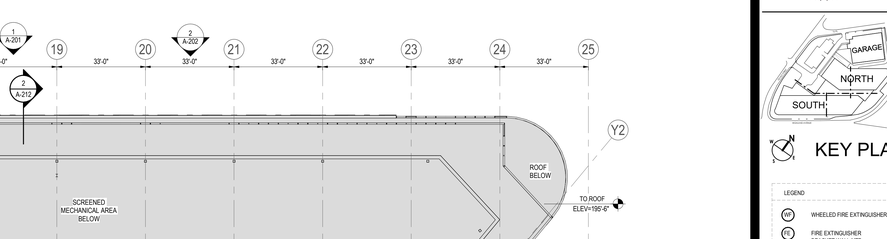
1 ROOF PLAN
A-107 1" = 20'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02135
Tel: (617) 224-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	2ND FULL REVIEW PACKAGE R1			2022.08.15
2	DEIR SUBMISSION			2022.07.15
3	30% DESIGN DEVELOPMENT			2022.03.30
4	30% DESIGN DEVELOPMENT (2)			2022.03.30

Permit/Seal



KEY PLAN

LEGEND

- WF — WHEELED FIRE EXTINGUISHER
- FE — FIRE EXTINGUISHER BRACKET WALL MTD
- FEC — FIRE EXTINGUISHER CABINET WALL MTD

75'-0" MAX. DISTANCE PER CODE, TYP.

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

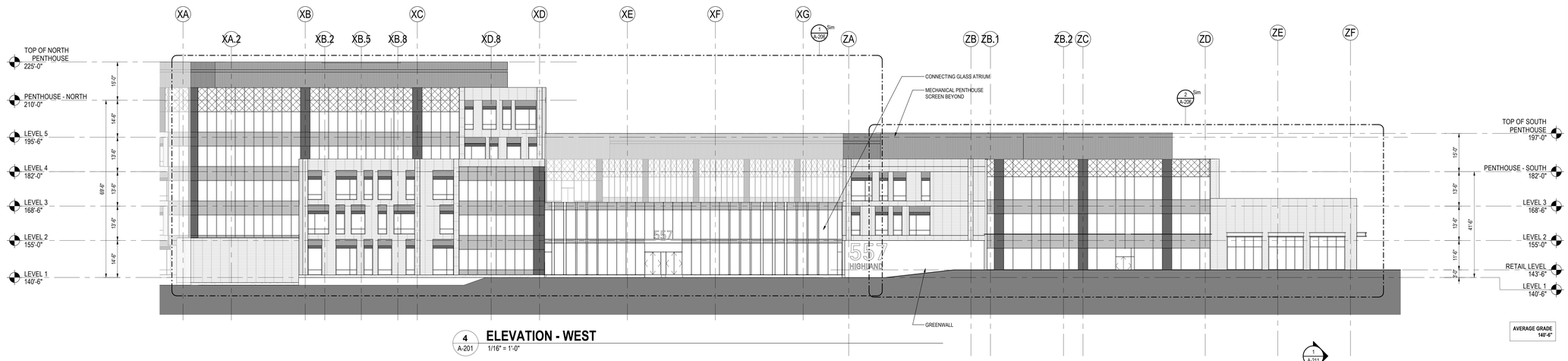
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

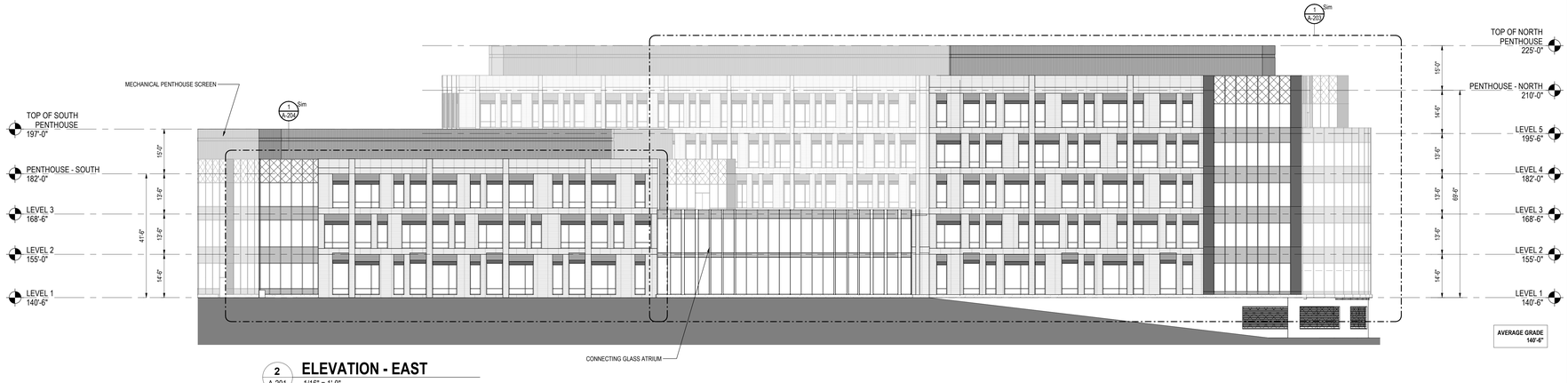
Title
FULL ROOF PLAN

Revision:
Drawing No.
A-107

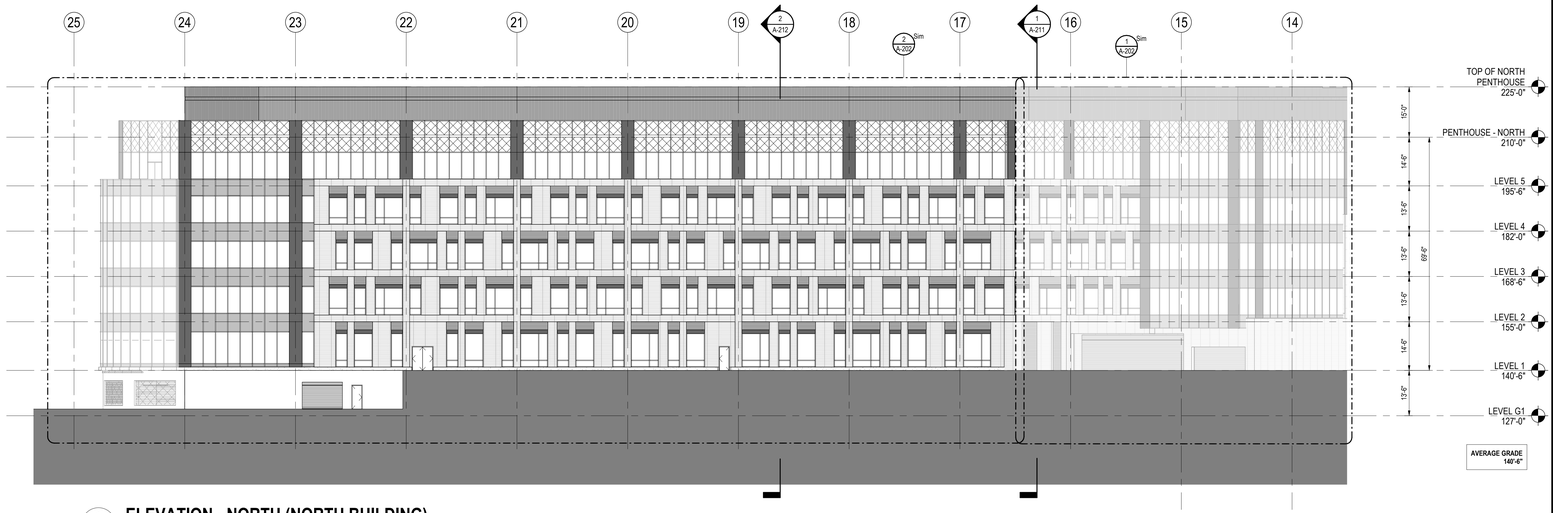


4 A-201 ELEVATION - WEST
1/16" = 1'-0"

3 A-201 ELEVATION - SOUTH (SOUTH BUILDING)
1/16" = 1'-0"



2 A-201 ELEVATION - EAST
1/16" = 1'-0"



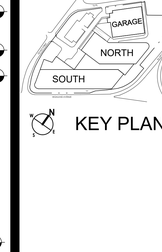
1 A-201 ELEVATION - NORTH (NORTH BUILDING)
1/16" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	ZBA SUBMISSION			2022.08.15
2	DEIR SUBMISSION			2020.01.15
3	30% DESIGN DEVELOPMENT			2020.03.27
4	SPECIAL PERMIT SUBMISSION			2020.06.26

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/16" = 1'-0"

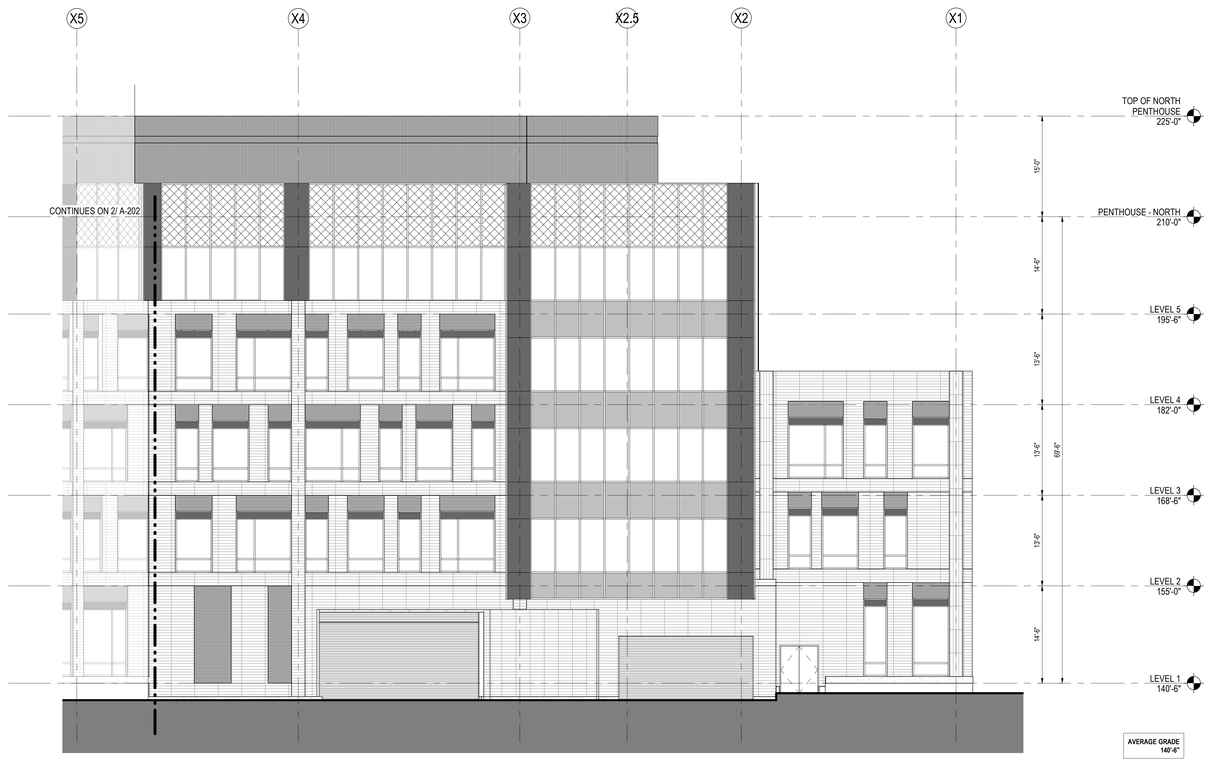
Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING ELEV - LOCATOR ELEVATIONS

Revision:
Drawing No.
A-201

2 A-202 ENLARGED ELEVATION - NORTH BUILDING - NORTH

1/8" = 1'-0"



1 A-202 ENLARGED ELEVATION - NORTH BUILDING - NORTH (ANGLED WALL)

1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02135-1004
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision

No.	Description	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	SITE PLAN SUBMITTAL			2022.03.21
3	SPECIAL PERMIT PACKAGE			2022.03.07

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1

08/15/2022

(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project

Bulfinch

HIGHLAND INNOVATION CENTER

557 Highland Ave
Needham, MA 02494

Project No.:218421343

File Name: N/A

Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

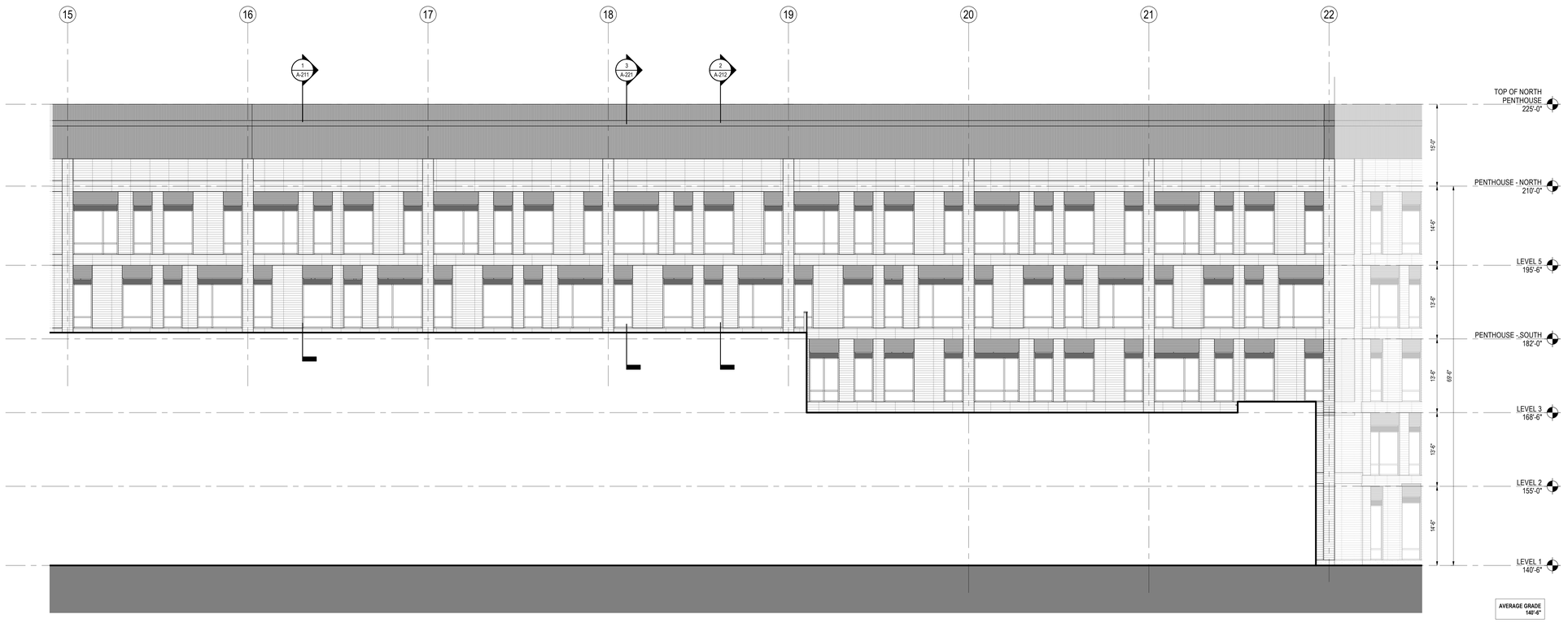
Title

BUILDING ELEV - NORTH BLDG - NORTH

Revision:

Drawing No.

A-202



2 A-203 **ENLARGED ELEVATION - NORTH BUILDING - SOUTH**
1/8" = 1'-0"

3 A-203 **ENLARGED ELEVATION - ATRIUM - EAST (HIDDEN) AT GRID 19**
1/8" = 1'-0"

1 A-203 **ENLARGED ELEVATION - NORTH BUILDING & ATRIUM - EAST**
1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
2ND FL REMOVE FACADE EL	DSR	DSR	2022.08.15
DSR SUBMISSION	DSR	DSR	2022.07.13
30% DESIGN DEVELOPMENT	DSR	DSR	2022.03.30

Permit/Seal

REGISTERED ARCHITECT
THOMAS M. LISTER
No. 30500
COMMONWEALTH OF MASSACHUSETTS

GARAGE
NORTH
SOUTH

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

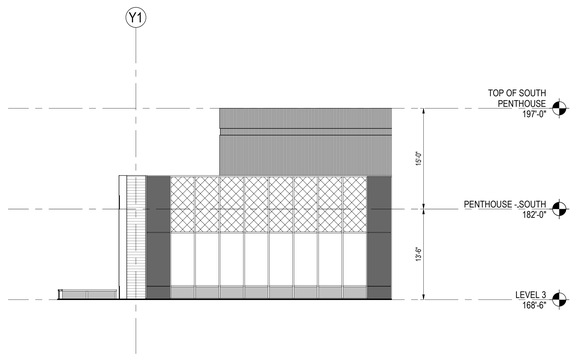
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

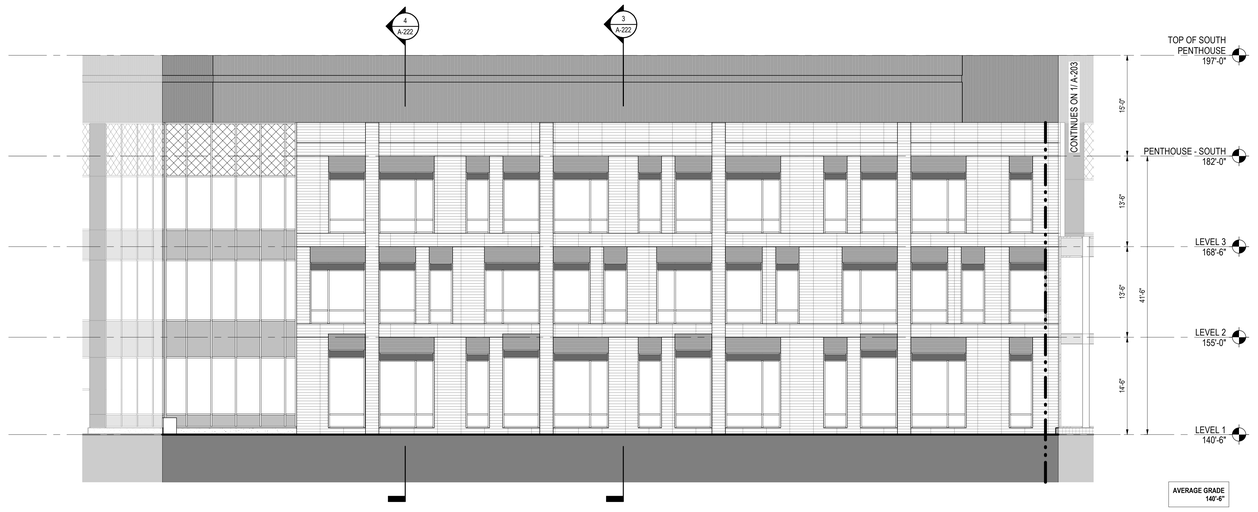
Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING ELEV - NORTH BLDG - SOUTH & EAST

Revision:
Drawing No.
A-203



2 A-204 ENLARGED ELEVATION - SOUTH BUILDING - NORTH CORNER
1/8" = 1'-0"



1 A-204 ENLARGED ELEVATION - SOUTH BUILDING - EAST
1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision

No.	Description	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
0	SPECIAL PERMIT PACKAGE			2022.07.13

Permit/Seal

KEY PLAN

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

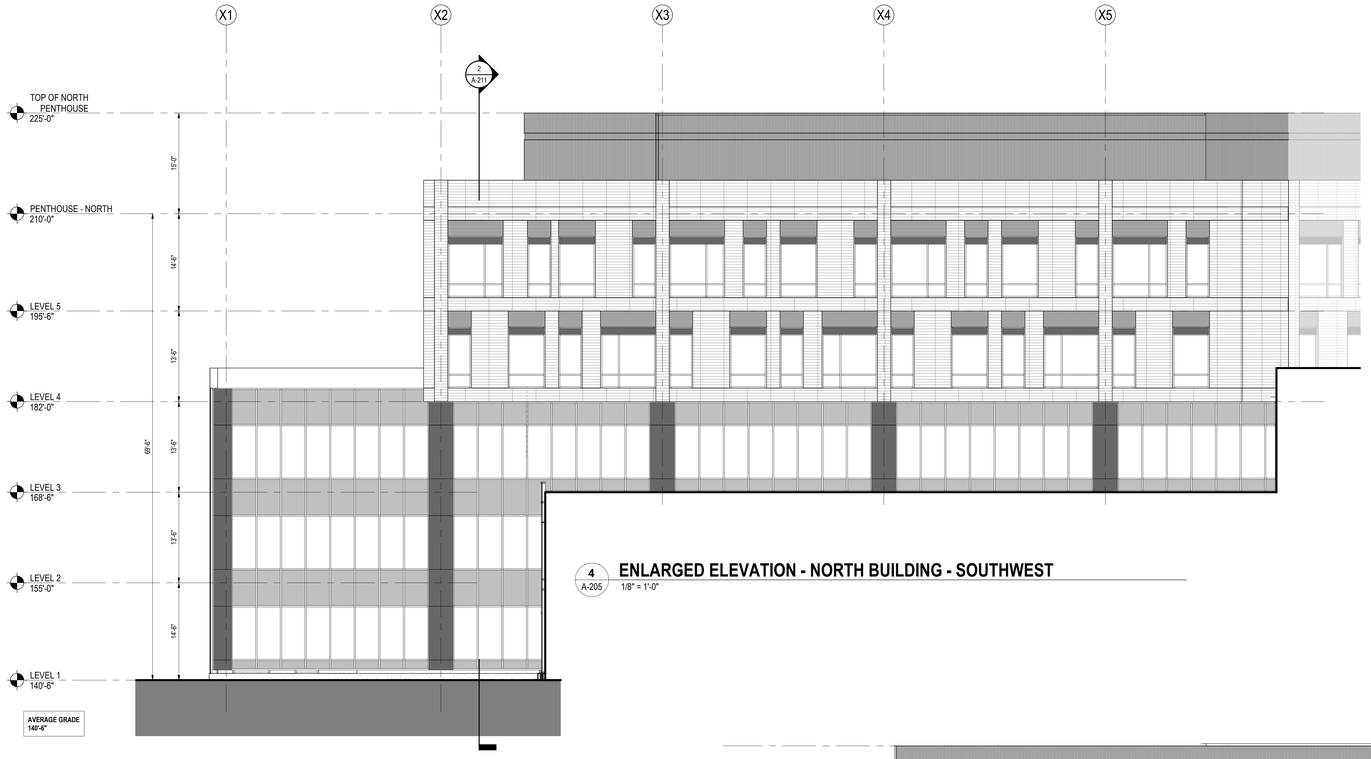
Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

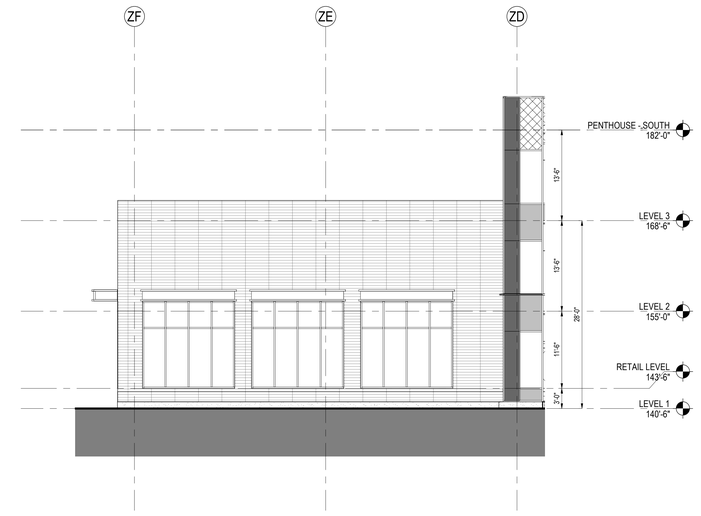
Title
BUILDING ELEV - SOUTH BLDG - SOUTH EAST

Revision:

Drawing No.
A-204

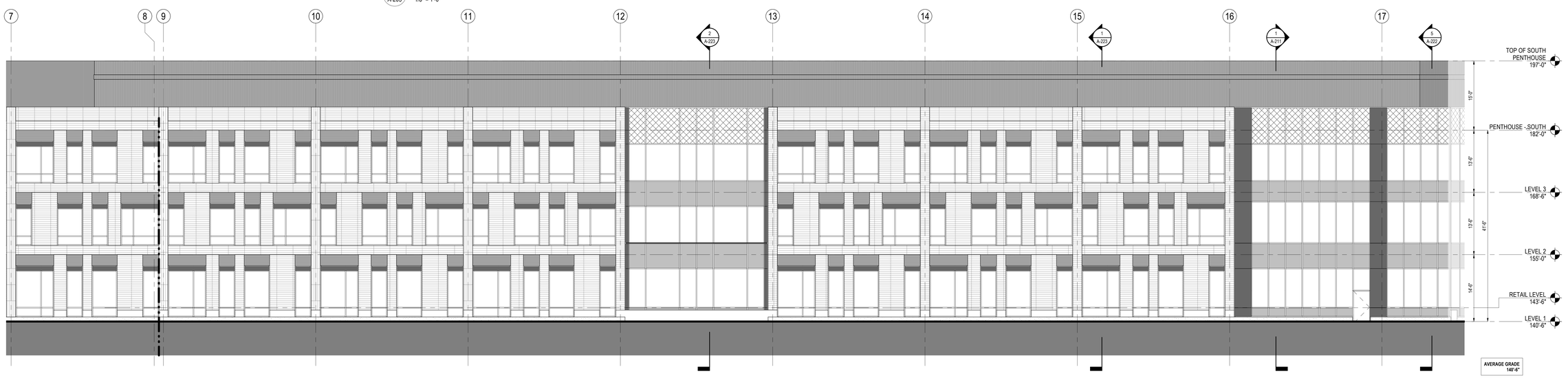


4 A-205 ENLARGED ELEVATION - NORTH BUILDING - SOUTHWEST
1/8" = 1'-0"



3 A-205 ENLARGED ELEVATION - SOUTH BUILDING - RETAIL SOUTHEAST
1/8" = 1'-0"

2 A-205 ENLARGED ELEVATION - SOUTH BUILDING - RETAIL SOUTHWEST
1/8" = 1'-0"



1 A-205 ENLARGED ELEVATION - SOUTH BUILDING - SOUTHEAST
1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	3RD PLANNING PACKAGE R1			2022.08.15
2	DEIR SUBMISSION			2022.07.15
3	30% DESIGN DEVELOPMENT			2022.03.30
4	100% SCHEMATIC DESIGN			2022.01.21

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

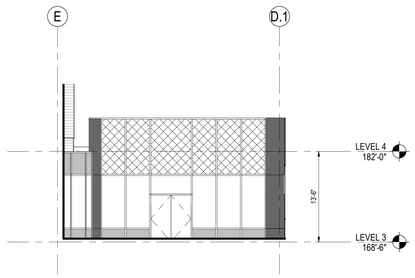
Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING ELEV - NORTH BLDG (SOUTHWEST) & SOUTH BLDG (SOUTH)

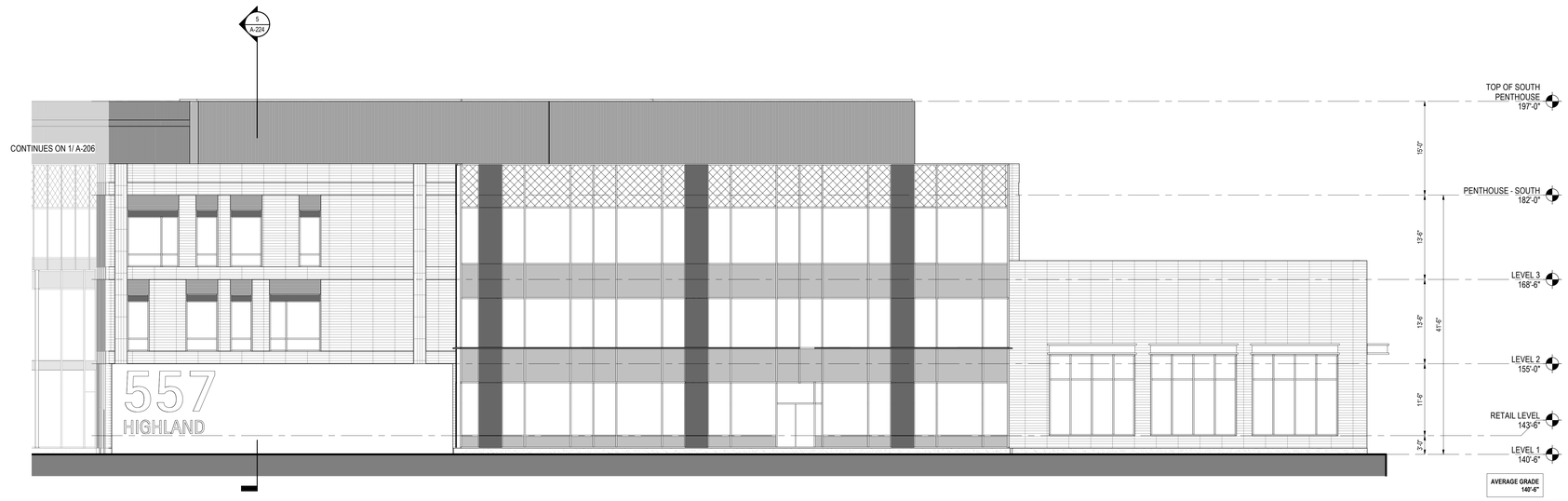
Revision:
Drawing No.
A-205

ORIGINAL SHEET - ARCH E



ENLARGED ELEVATION - ATRIUM - EAST (HIDDEN) AT GRID 15

3 A-206 1/8" = 1'-0"



SOUTH BLGD - ELEVATION - GREENWALL

2 A-206 1/8" = 1'-0"

ENLARGED ELEVATION - NORTH BUILDING - WEST

1 A-206 1/8" = 1'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	DESIGN REVIEW			2022.07.15
3	30% DESIGN DEVELOPMENT			2022.03.30

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

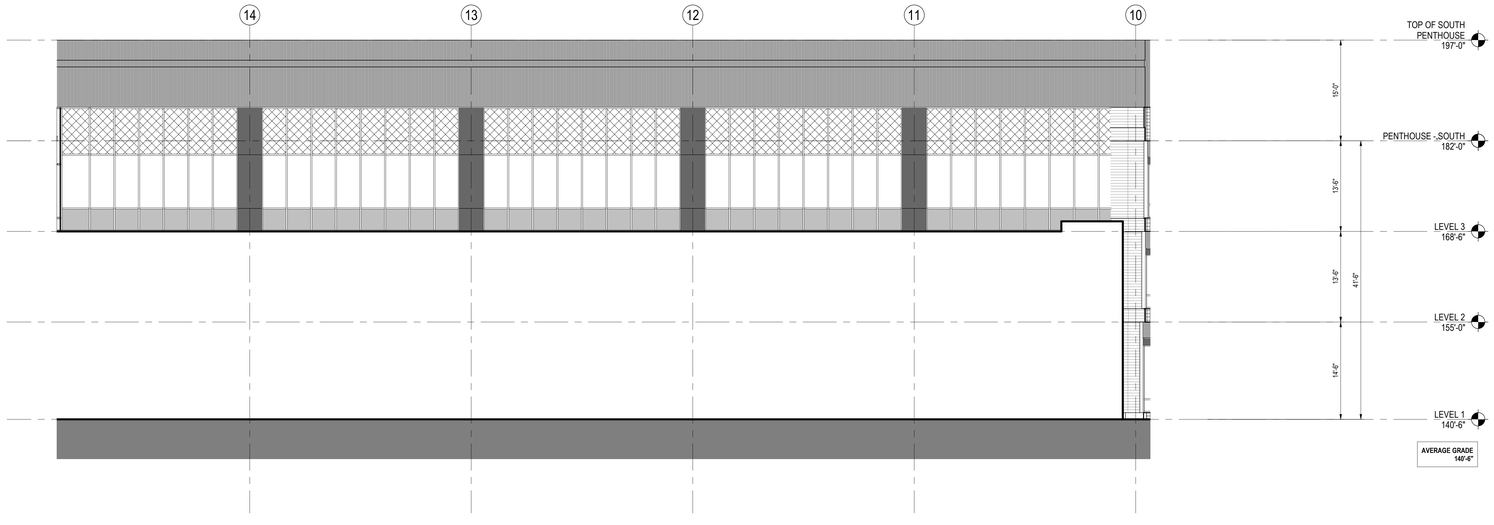
Title
BUILDING ELEV - NORTH BLDG (WEST) & SOUTH BLDG (NORTH & WEST)

Revision:

Drawing No.
A-206

1 A-207 **SOUTH BLDG - SOUTH ELEVATION LEVEL 1 - LOADING DOCK**

1/8" = 1'-0"



2 A-207 **ENLARGED ELEVATION - SOUTH BUILDING - NORTHWEST**

1/8" = 1'-0"

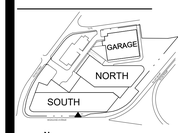
Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
100% SPECIAL PERMIT PACKAGE			2022.07.13

Permit/Seal

REGISTERED ARCHITECT
No. 30550
THOMAS M. LISS
COMMONWEALTH OF MASSACHUSETTS



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

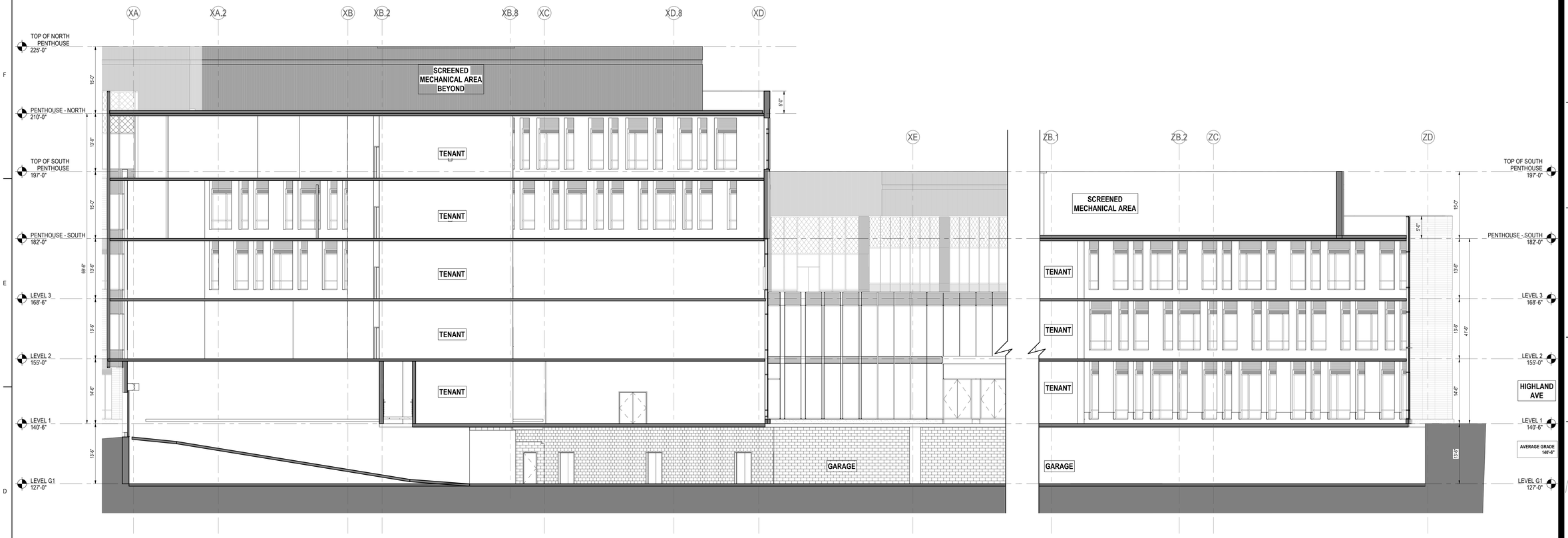
Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING ELEV - SOUTH BLDG - NORTH & EAST

Revision:

Drawing No.
A-207

ORIGINAL SHEET - ARCH E



2 A-211 **SECTION - N-S NEAR GRID 12**

1/8" = 1'-0"

1 A-211 **SECTION - N-S NEAR GRID 16**

1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	100% SPECIAL PERMIT SUBMISSION	DSB	SJM	2022.08.15
2	90% SPECIAL PERMIT SUBMISSION	DSB	SJM	2022.07.15
3	60% SPECIAL PERMIT SUBMISSION	DSB	SJM	2022.05.27
4	30% SPECIAL PERMIT SUBMISSION	DSB	SJM	2022.04.15

Permit/Seal

REGISTERED ARCHITECT JOSHUA M. LIVERTZ No. 30550 COMMONWEALTH OF MASSACHUSETTS

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

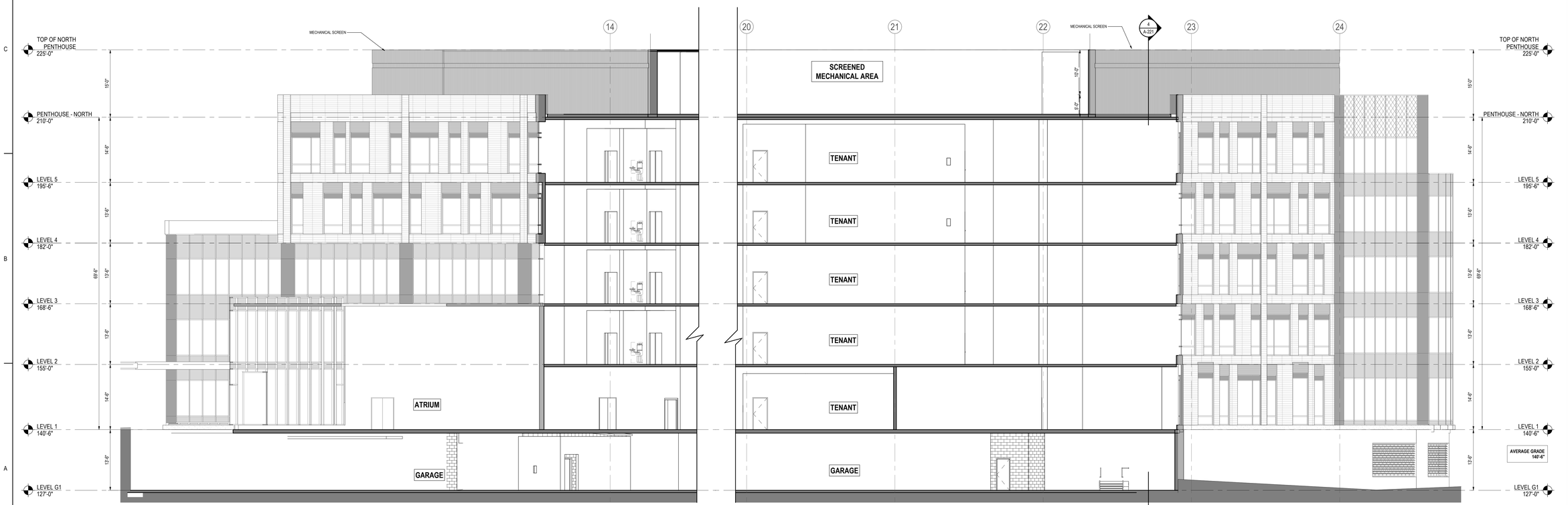
Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING SECTIONS - OVERALL

Revision:
Drawing No.
A-211

2 A-212 **SECTION - NORTH BUILDING - SECTION N-S NEAR GRID 20**

1/8" = 1'-0"



1 A-212 **SECTION - NORTH BUILDING - SECTION E-W NEAR GRID F**

1/8" = 1'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02135
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd.	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	DEIR SUBMISSION			2022.07.15
3	SITE PLAN SUBMISSION			2022.03.30
4	100% CONSTRUCTION			2022.01.07

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

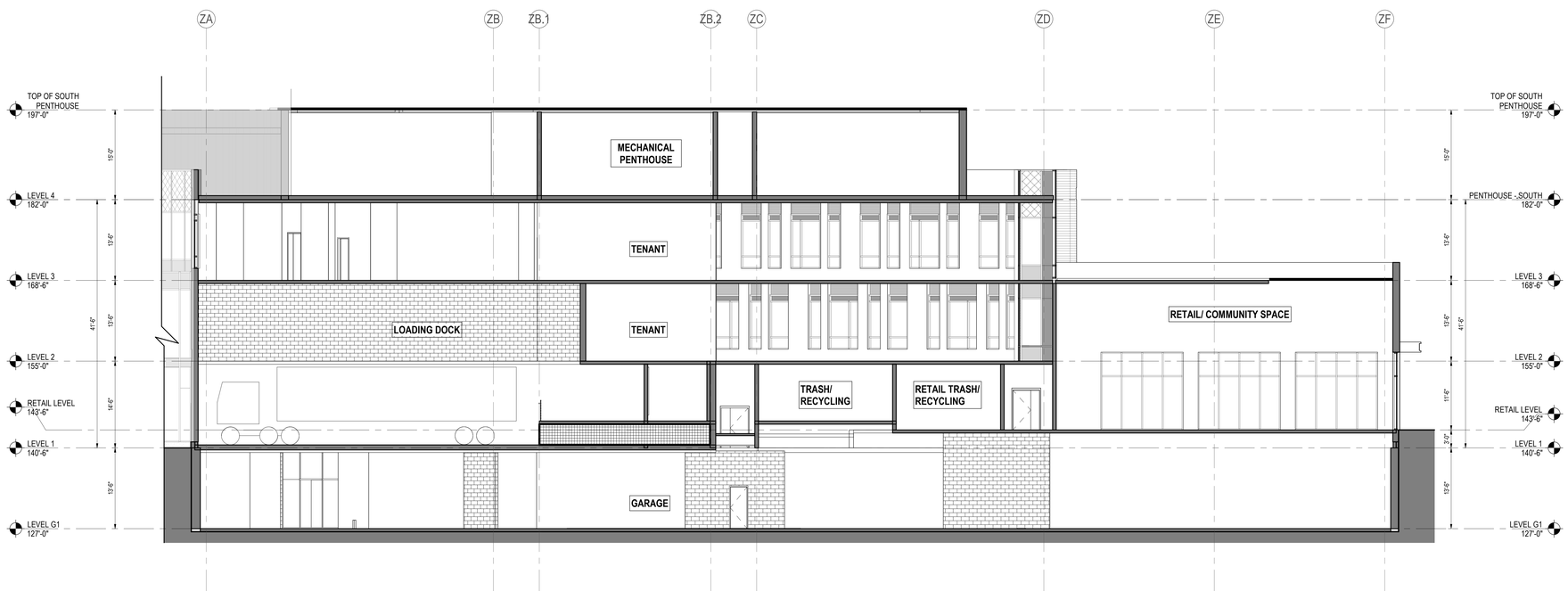
Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
BUILDING SECTIONS - NORTH BLDG

Revision:

Drawing No.
A-212



1 A-213 **SECTION - SOUTH BUILDING - SECTION N-S NEAR GRID 5**

1/8" = 1'-0"

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd.	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	90% SPECIAL PERMIT SUBMISSION			2022.07.13

Permit/Seal

KEY PLAN

Client/Project

Bulfinch HIGHLAND INNOVATION CENTER

557 Highland Ave
Needham, MA 02494

Project No.:218421343

File Name: N/A

Scale: 1/8" = 1'-0"

Author	Designer	Checker	2022.06.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

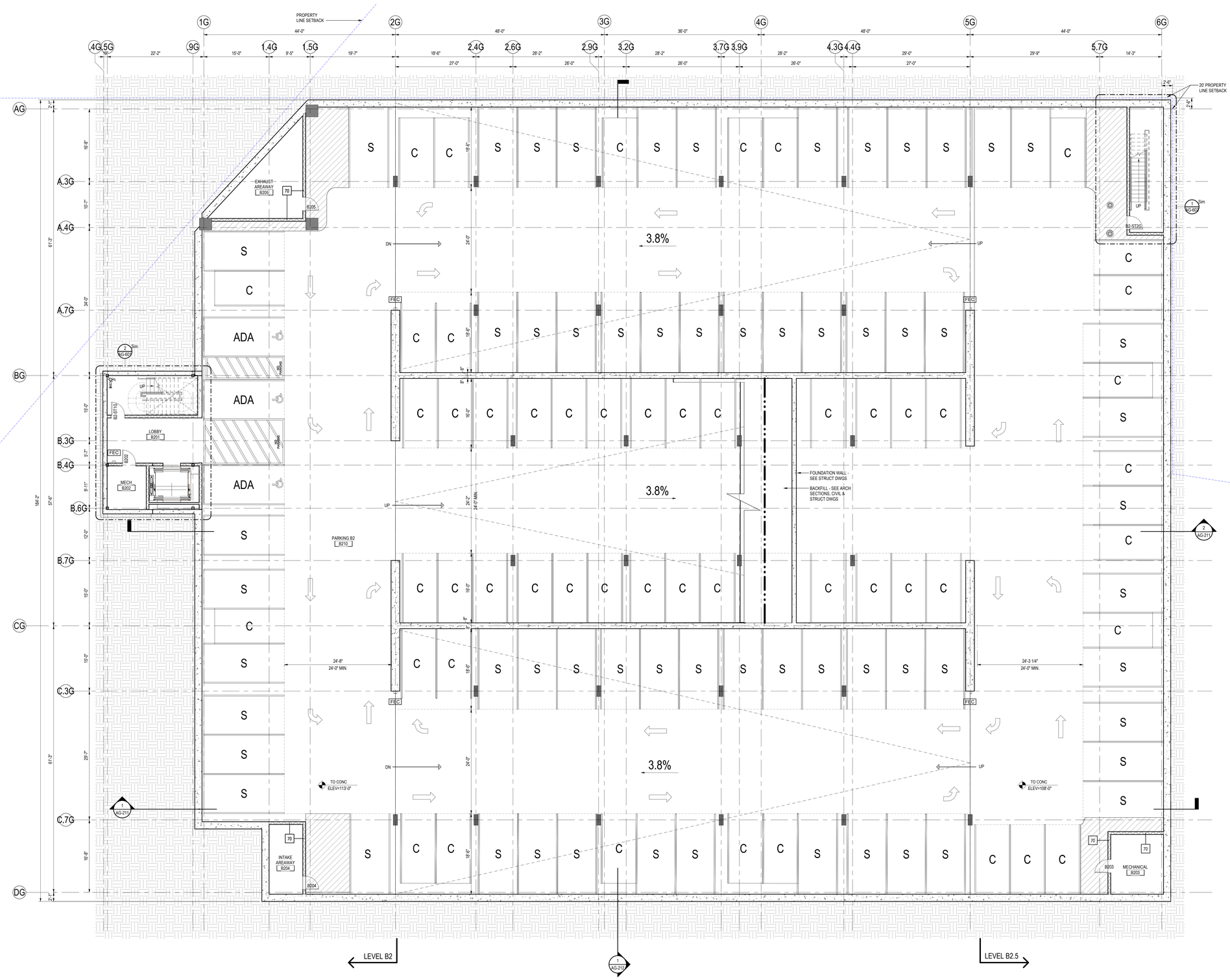
Title

BUILDING SECTIONS - SOUTH BLDG

Revision:

Drawing No.

A-213



1 GARAGE - LEVEL B2
1 AG-100B2 1/8" = 1'-0"

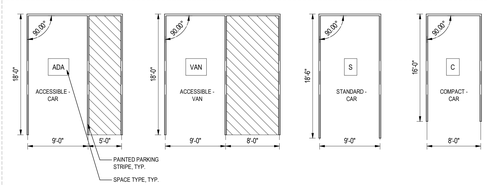
GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

LEGEND

FEC — SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND

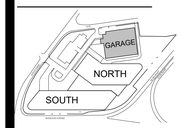


Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02135
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appvd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
SITE PLAN APPLICATION			2022.03.31
SPECIAL PERMIT PACKAGE R0			2022.03.07

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

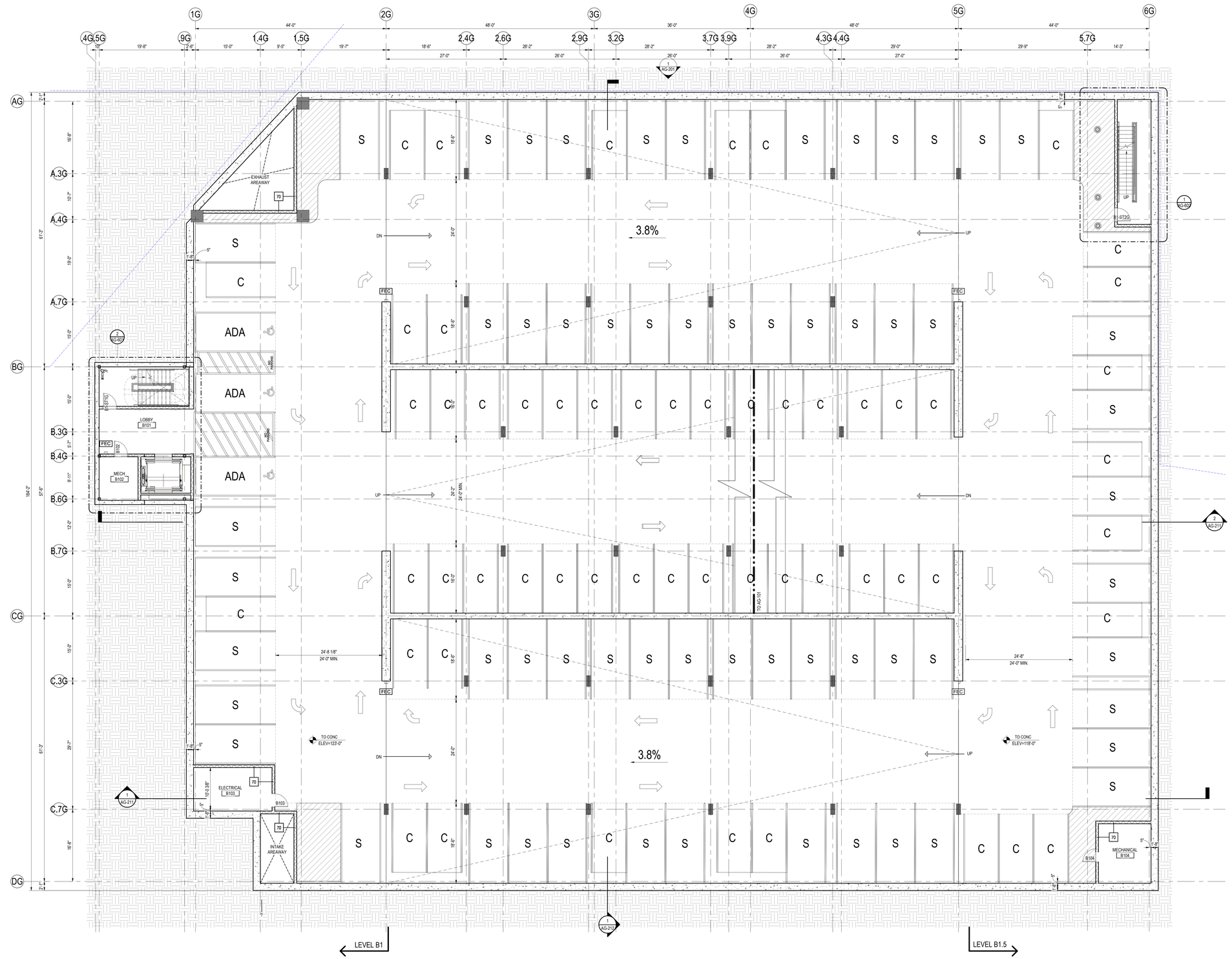
Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL B2

Revision:
Drawing No.
AG-100B2
GARAGE

"R:\Active Projects\<Project Information>
5/20/2022 3:53:15 PM
ORIGINAL SHEET - ARCH E



1 GARAGE - LEVEL B1
AG-100B1 1/8" = 1'-0"

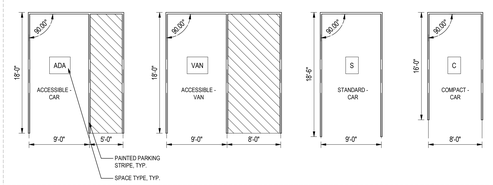
GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

LEGEND

FEC — SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND

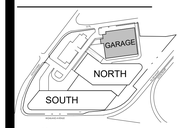


Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
SITE PLAN SUBMITTAL			2022.03.31
SPECIAL PERMIT PACKAGE R1			2022.08.15

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

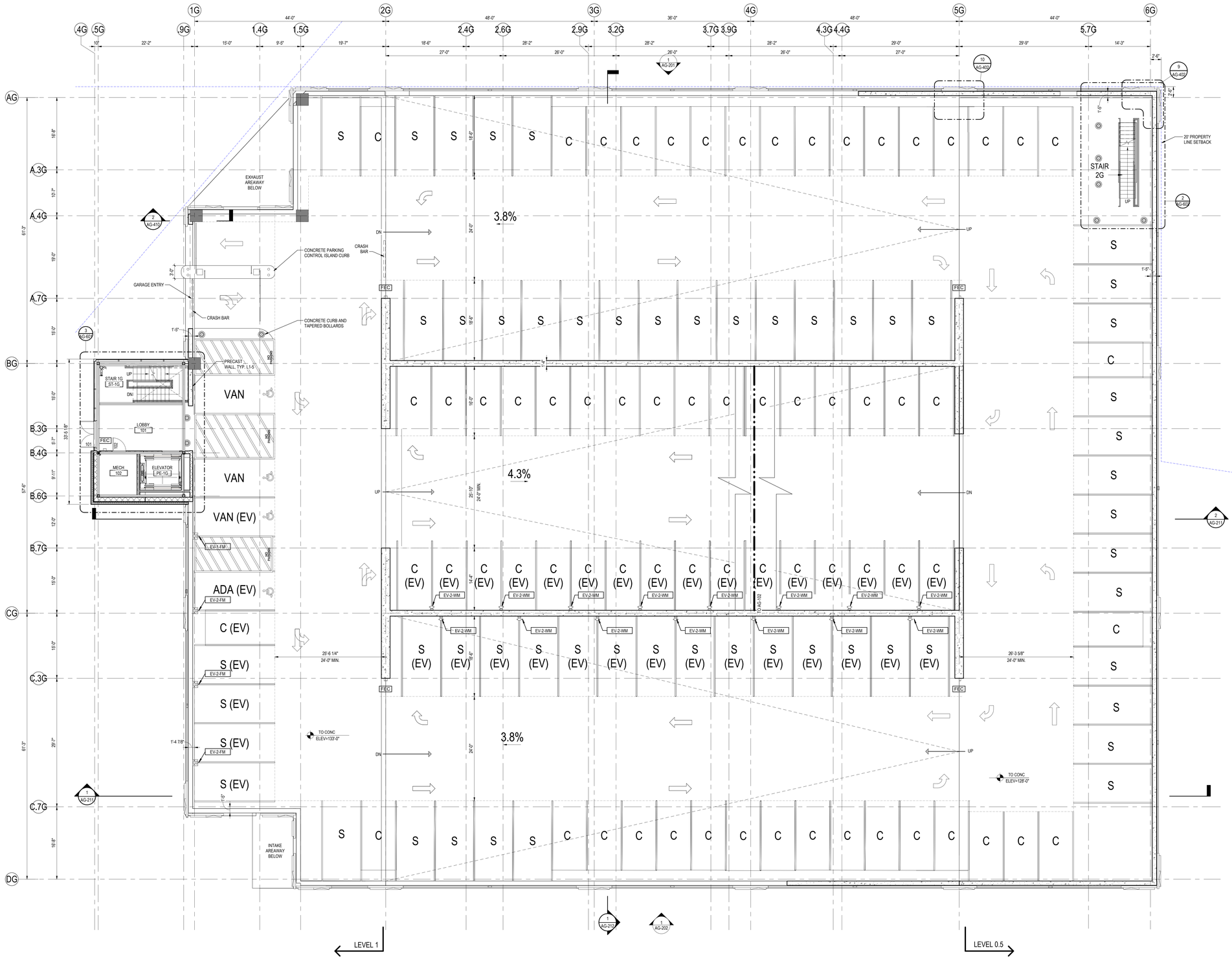
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL B1

Revision:
Drawing No.
AG-100B1
GARAGE



1 AG-101 GARAGE - LEVEL 1-

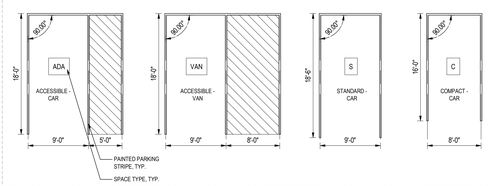
1/8" = 1'-0"

LEGEND

FEC — SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND



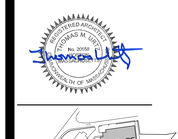
GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

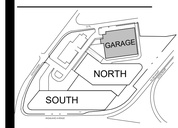
Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision		
SPECIAL PERMIT PACKAGE R1	2022.08.15	Adpnt
SITE PLAN SUBMITTAL	2022.03.31	Adpnt
SPECIAL PERMIT PACKAGE R1	YYYY.MM.DD	By

Permit/Seal





KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

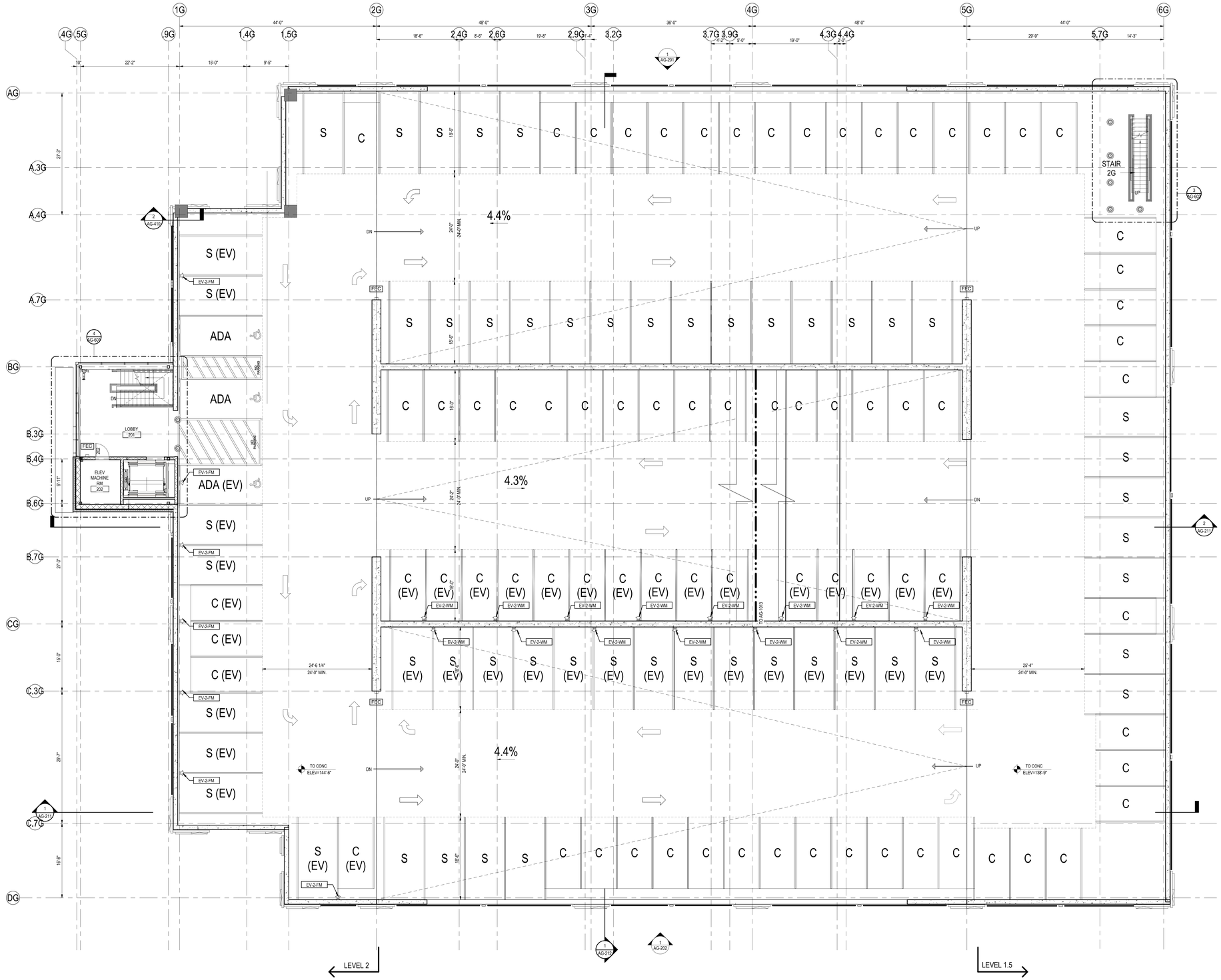
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL 1

Revision:
Drawing No.
AG-101
GARAGE



1 AG-102 GARAGE - LEVEL 2

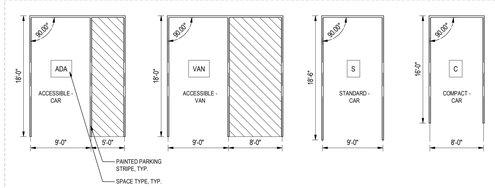
1/8" = 1'-0"

LEGEND

FEC — SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND



GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appvd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
30% DESIGN SUBMITTAL			2022.03.30
100% DESIGN SUBMITTAL			2022.05.27

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave.
Needham, MA 02494

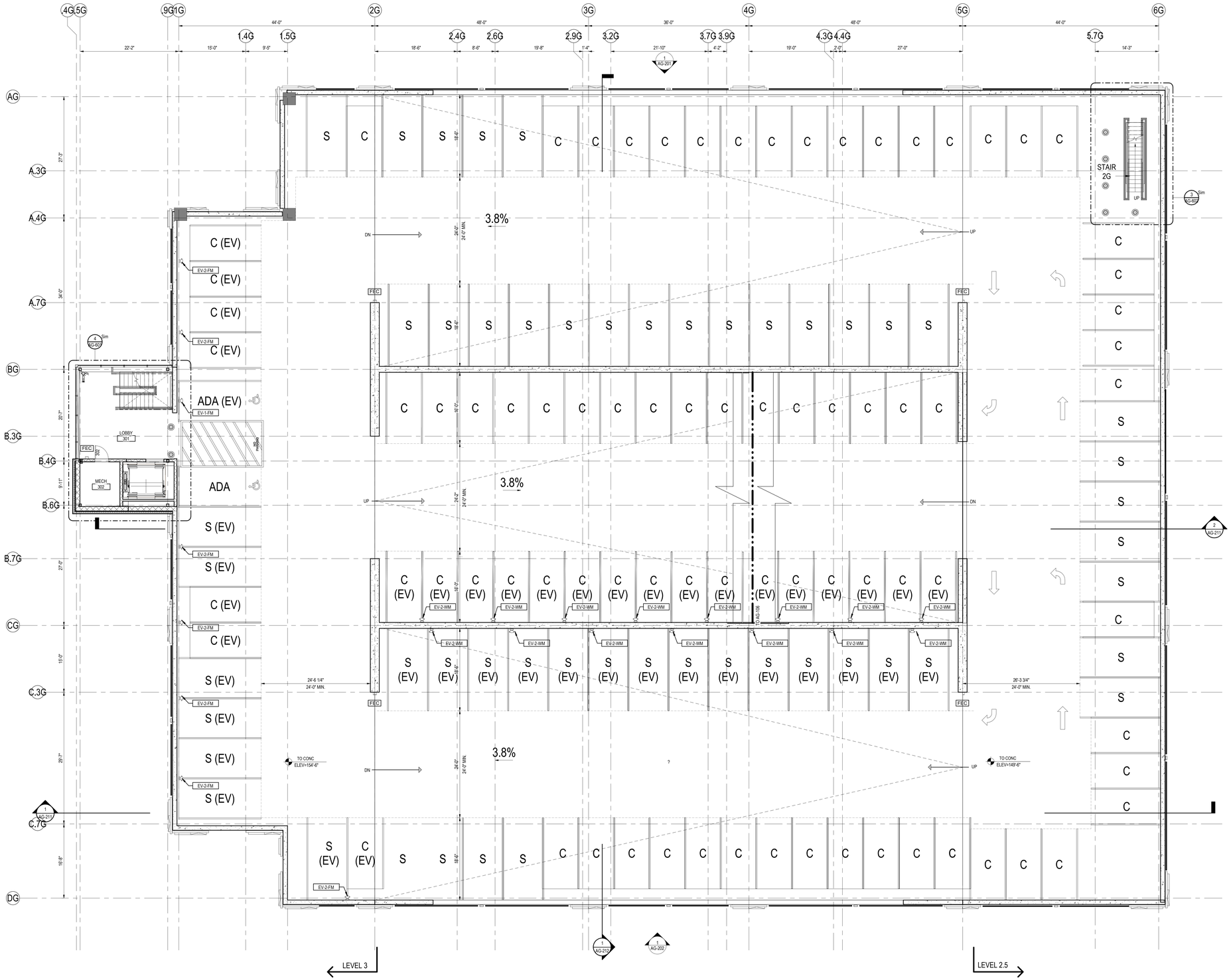
Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL 2

Revision:
Drawing No.
AG-102
GARAGE

ORIGINAL SHEET - ARCH E



1 GARAGE - LEVEL 3 (LEVEL 4-5 SIM.)

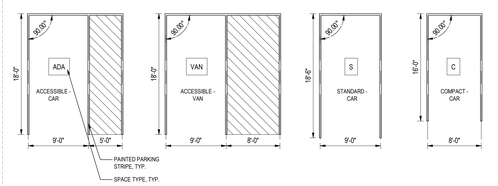
AG-103 1/8" = 1'-0"

LEGEND

FEC SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND



GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
30% DESIGN DEVELOPMENT			2022.03.30
100% SCHEMATIC DESIGN			2022.01.27

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

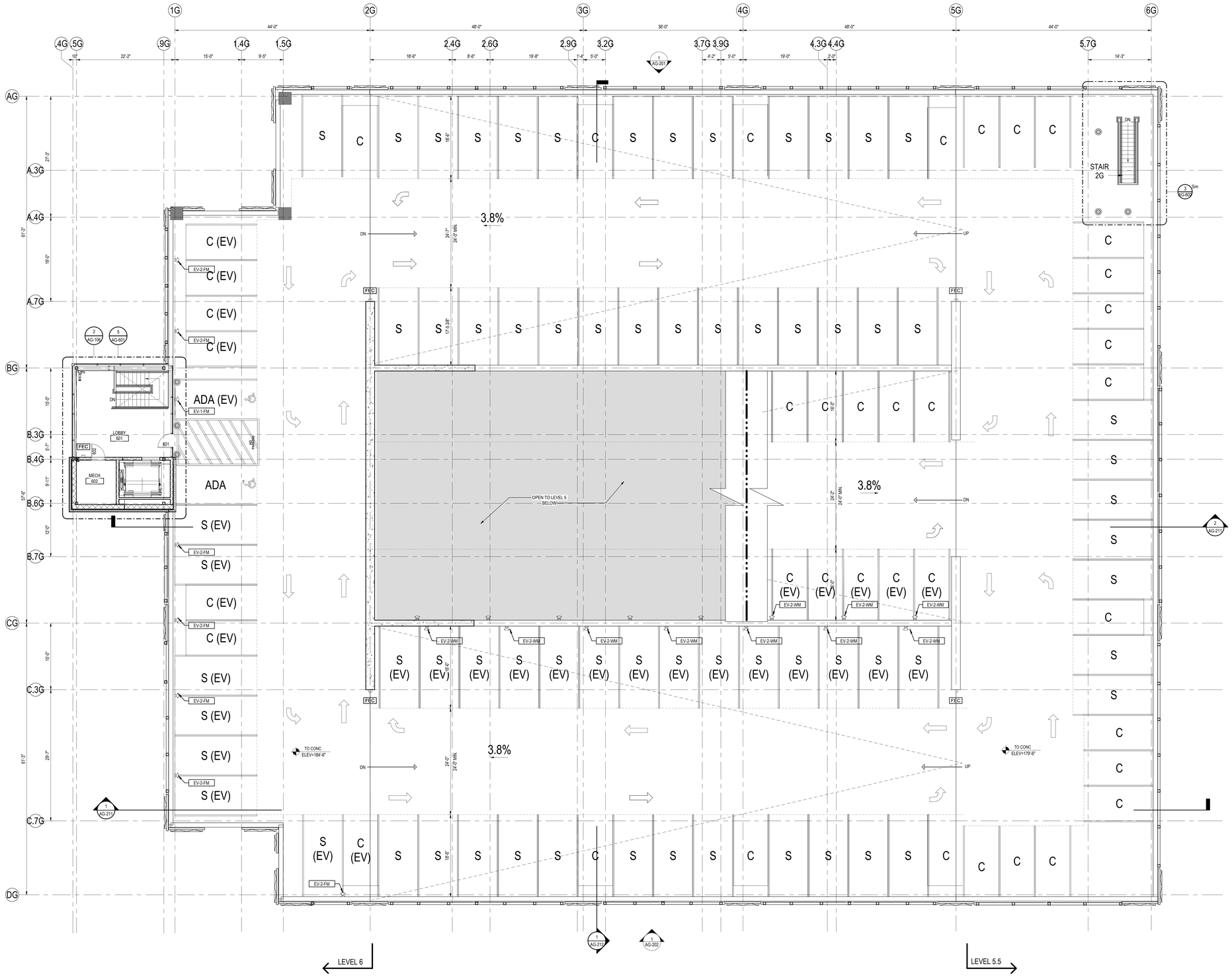
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

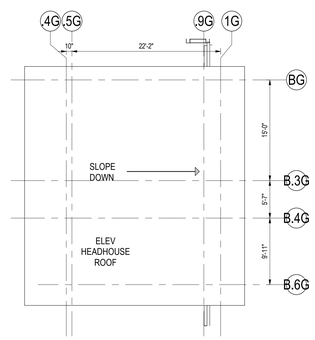
RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL 3 (LEVEL 4-5 SIM.)

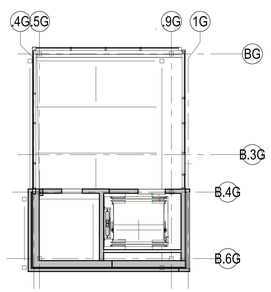
Revision:
Drawing No.
AG-103
GARAGE



1 GARAGE - LEVEL 6
AG-106 — 1/8" = 1'-0"



2 GARAGE - MAIN ENTRY ROOF
AG-106 — 1/8" = 1'-0"



3 GARAGE - LEVEL 6 - RCP
AG-106 — 1/8" = 1'-0"

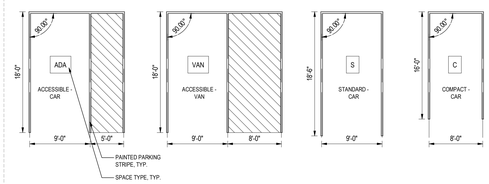
GARAGE PARKING COUNT	
PARKING TYPE	COUNT
GARAGE - LEVEL B2	
ACCESSIBLE	3
COMPACT	52
STANDARD	61
	116
GARAGE - LEVEL B1	
ACCESSIBLE	3
COMPACT	56
STANDARD	60
	119
GARAGE - LEVEL 1	
ACCESSIBLE - EV SPACE	1
ACCESSIBLE VAN	2
ACCESSIBLE VAN - EV SPACE	1
COMPACT	50
COMPACT - EV SPACE	17
STANDARD	37
STANDARD - EV SPACE	18
	126
GARAGE - LEVEL 2	
ACCESSIBLE	2
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	20
STANDARD	30
STANDARD - EV SPACE	22
	131
GARAGE - LEVEL 3	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 4	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 5	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	56
COMPACT - EV SPACE	23
STANDARD	30
STANDARD - EV SPACE	21
	132
GARAGE - LEVEL 6	
ACCESSIBLE	1
ACCESSIBLE - EV SPACE	1
COMPACT	28
COMPACT - EV SPACE	13
STANDARD	46
STANDARD - EV SPACE	21
	110
TOTAL: 998	998

LEGEND

FEC: SURFACE MOUNTED FIRE EXTINGUISHER CABINET W/ 10lb "ABC" TYPE EXTINGUISHER

75'-0" MAX. DISTANCE PER CODE, TYP.

PARKING LEGEND

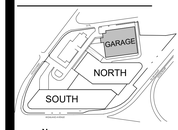


Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd.	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
30% DESIGN DEVELOPMENT SET			2022.03.31
100% SCHEMATIC DESIGN SET			2021.12.17

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

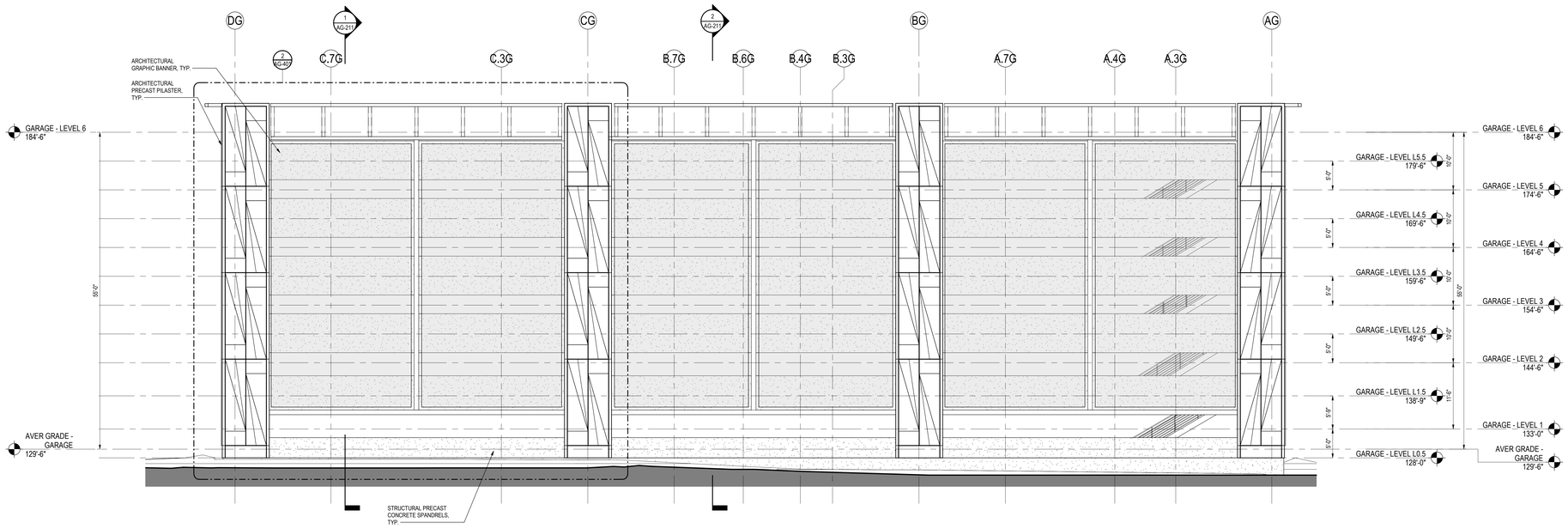
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

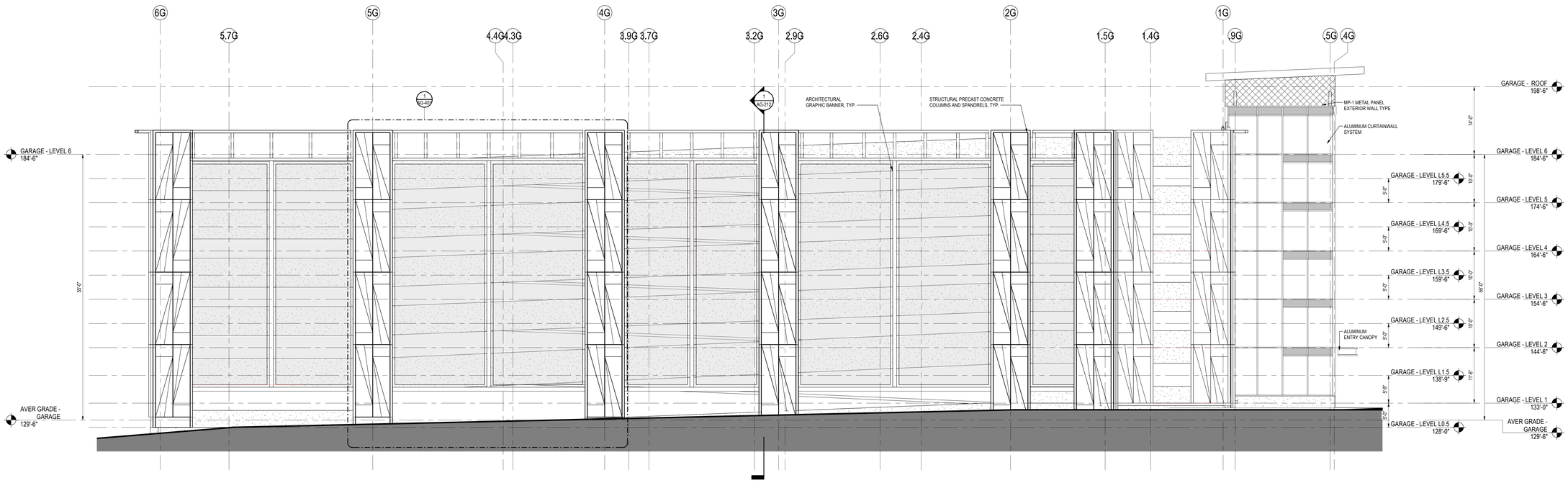
RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL 6

Revision:
Drawing No.
AG-106
GARAGE



2 AG-201 EAST ELEVATION
1/8" = 1'-0"



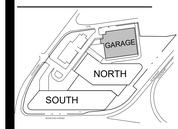
1 AG-201 NORTH ELEVATION
1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 224-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd.	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	90% CD PLAN SUBMITTAL			2022.05.27
3	50% CD PLAN SUBMITTAL			2022.03.25

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

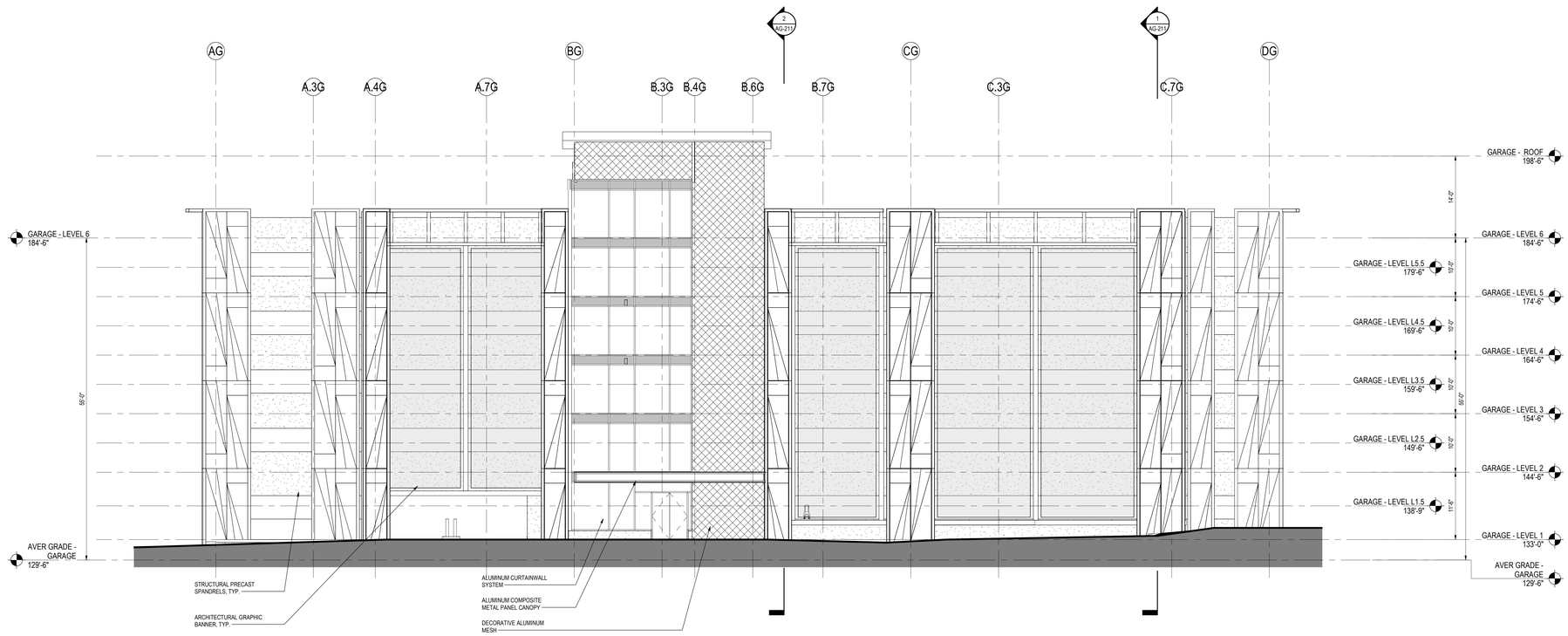
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

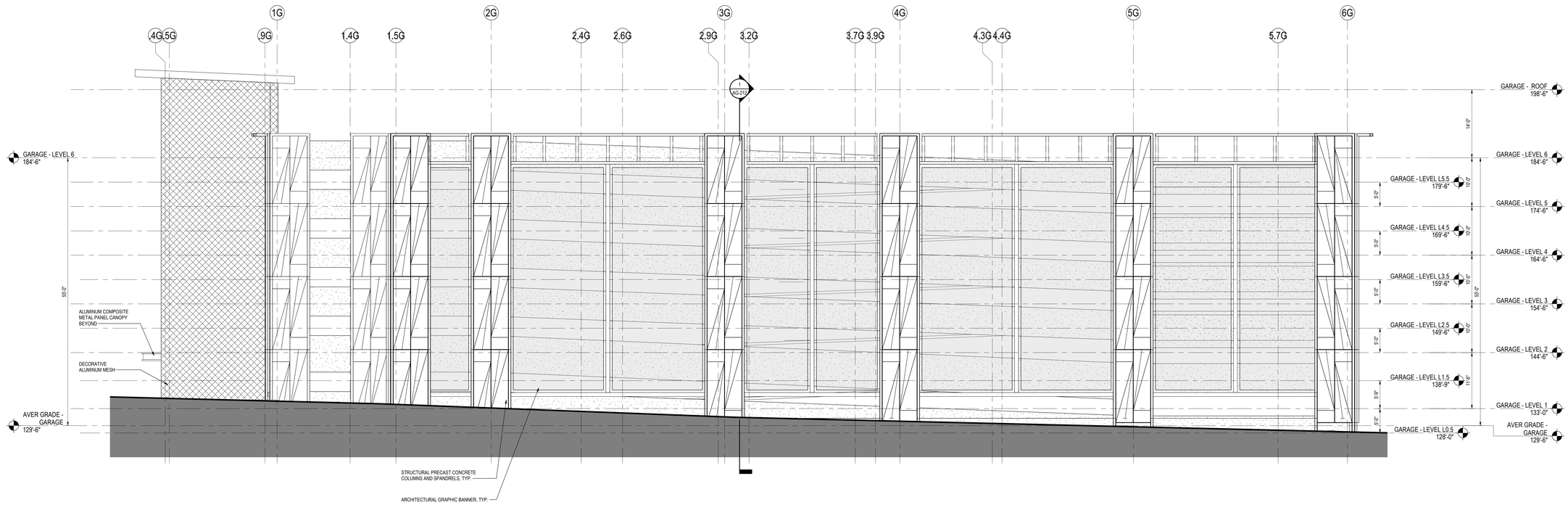
BS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
ELEVATIONS - NORTH & EAST

Revision:
Drawing No.
AG-201
GARAGE



2 AG-202 WEST ELEVATION
1/8" = 1'-0"



1 AG-202 SOUTH ELEVATION
1/8" = 1'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1			2022.08.15
2	SPECIAL PERMIT PACKAGE R2			2022.09.27
3	SPECIAL PERMIT PACKAGE R3			2022.10.27

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

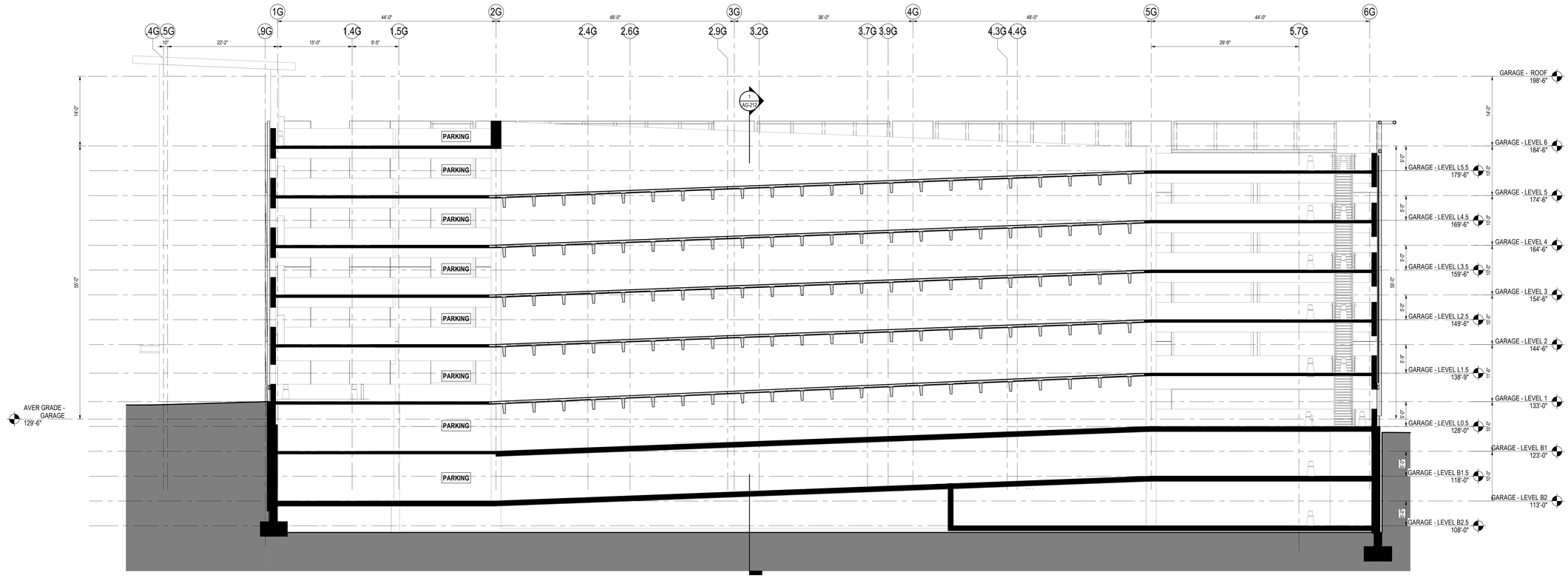
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

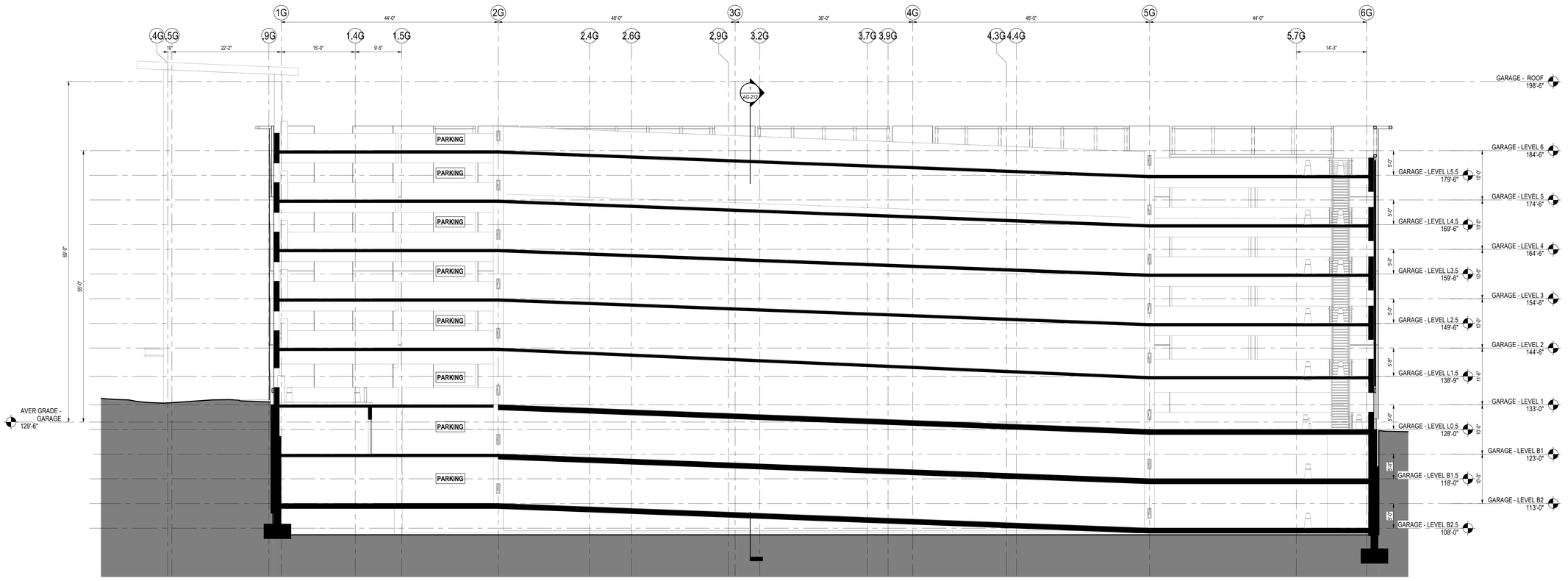
BS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
ELEVATIONS - SOUTH & WEST

Revision:
Drawing No.
AG-202
GARAGE



2 AG-211 GARAGE SECTION BB - CENTRAL RAMP
1/8" = 1'-0"



1 AG-211 GARAGE SECTION AA - OUTER RAMP
1/8" = 1'-0"

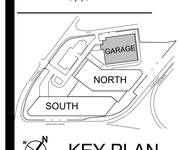
Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

No.	Issued/Revision	By	Appvd	YYYY.MM.DD
1	SPECIAL PERMIT PACKAGE R1		2022.08.15	2022.08.15
2	SPR SPECIAL PERMIT PACKAGE R2		2022.09.27	2022.09.27

Permit/Seal



KEY PLAN

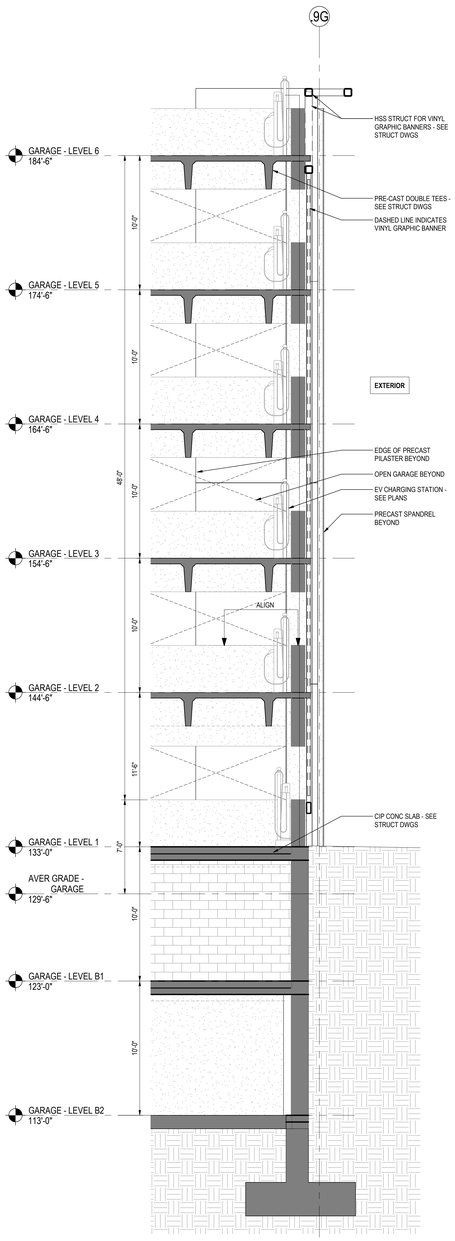
Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: 1/8" = 1'-0"

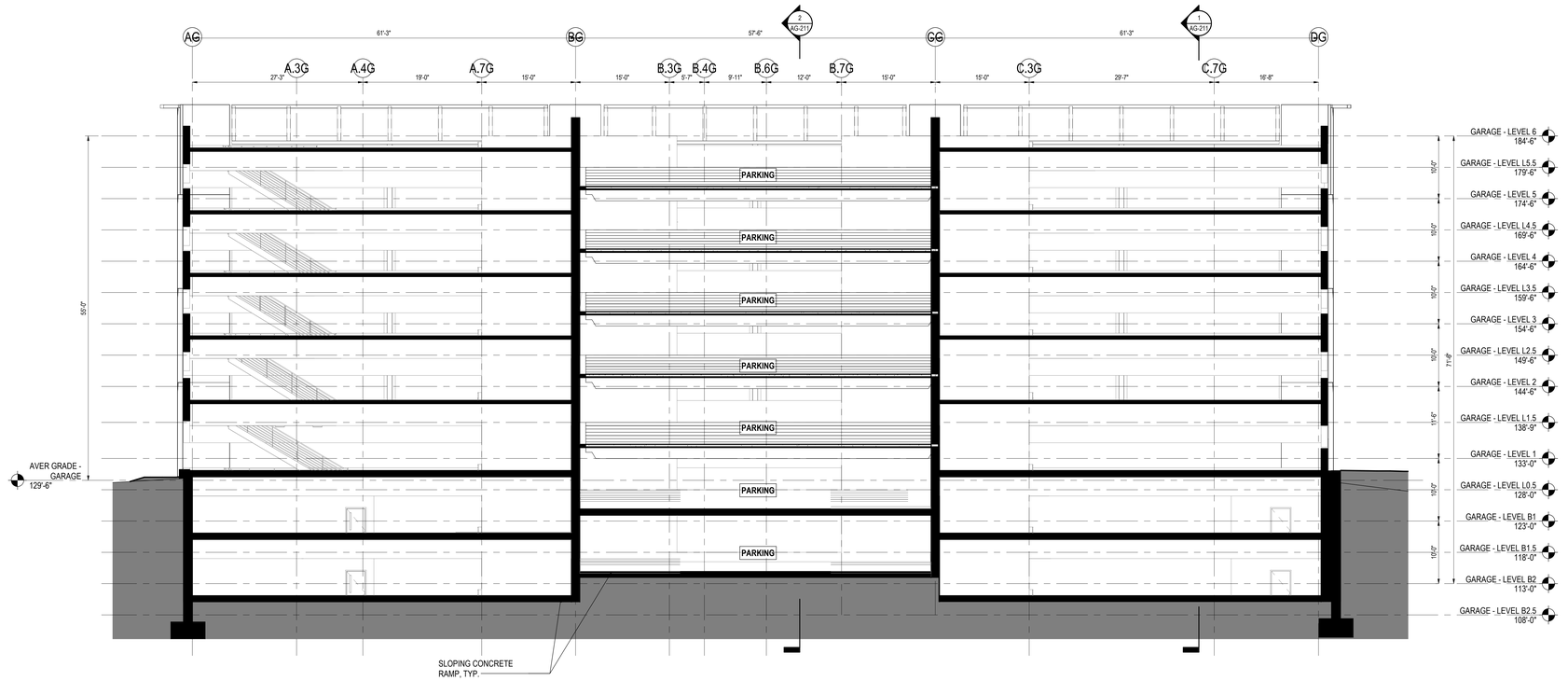
RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE SECTIONS

Revision:
Drawing No.
AG-211
GARAGE



2 AG-212 **TYP. BAY SECTION - FOUNDATION OUTBOARD**
1/4" = 1'-0"



1 AG-212 **GARAGE SECTION CC - Transverse**
1/8" = 1'-0"

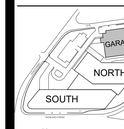
Stantec

Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
SPECIAL PERMIT PACKAGE R1			2022.08.15
30% DESIGN SUBMISSION			2022.05.27

Permit/Seal



KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER - GARAGE
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

RS	Designer	TMU	2022.05.27
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE SECTIONS

Revision:
Drawing No.
AG-212
GARAGE

From:	Eric Joseph
To:	Thomas Ryder
Cc:	David Roche; Tom Conroy; Lee Newman
Subject:	557 Highland Ave - Highland Innovation center - Details
Date:	Wednesday, August 31, 2022 5:44:46 PM
Attachments:	234-1006.00_S-DT-SITE DETAILS-L-5.1 SITE DETAILS.pdf

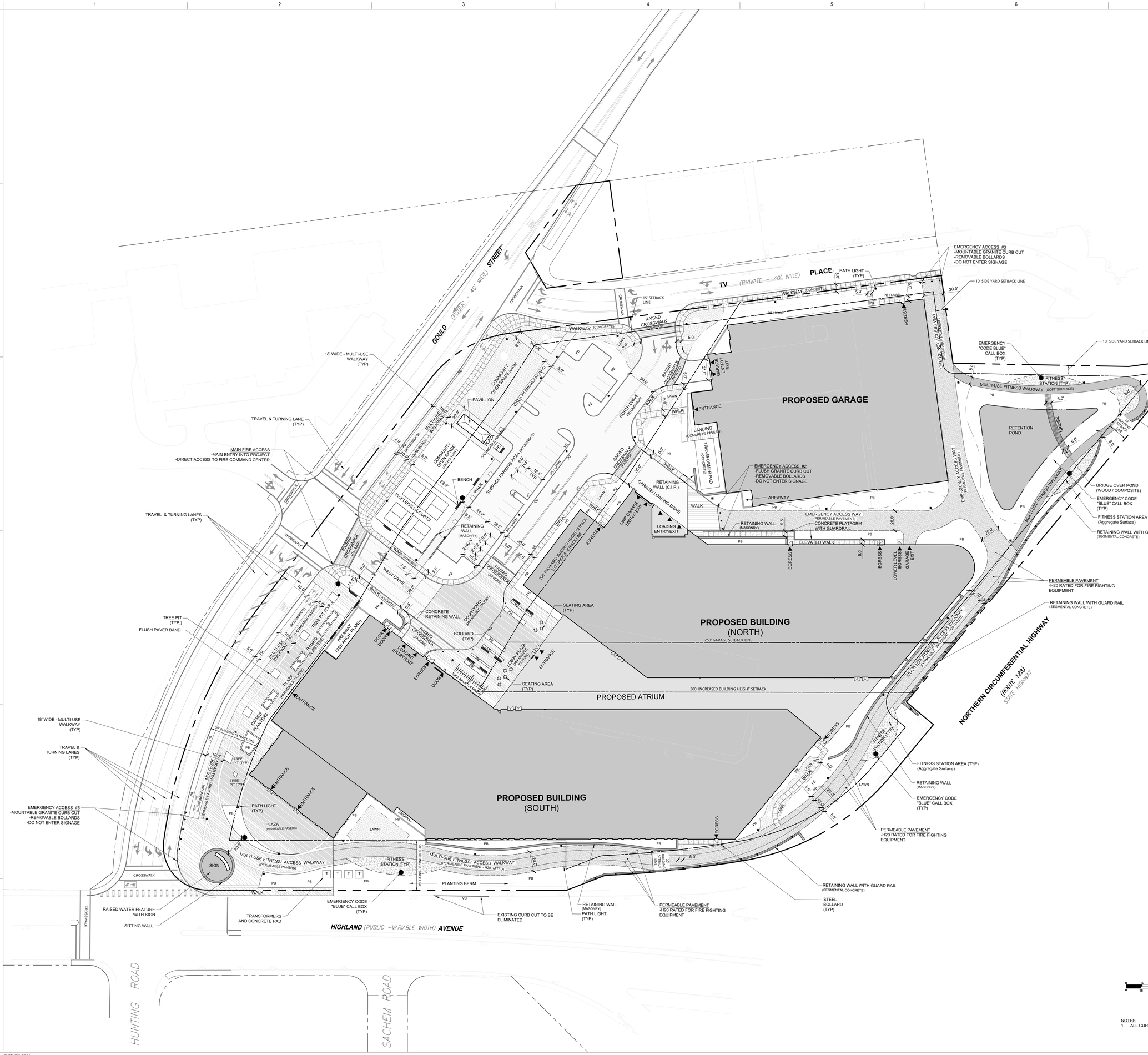
Tom

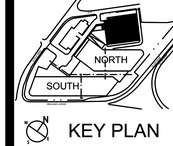
Thank you for your call to discuss the remaining question you have. I have updated the Detail Sheet in the Site Plan Set to provide the additional Emergency Access Way details we discussed, including: Curb cuts, Mountable Curbing, and Permeable paving. Please let me know if you need anything else or have any additional comments.

Eric Joseph,
Landscape Architect

PAUL FINGER ASSOCIATES
LANDSCAPE ARCHITECTS • PLANNERS
CIVIL ENGINEERS • WETLAND SCIENTISTS

14 Spring Street, 2nd Floor
Waltham, Massachusetts 02451-4429
direct: 781.314.0481
main: 781.647.4900 x481
fax: 781.232.6307
ejoseph@pfai.net





KEY PLAN

NOTES:
1. ALL CURB RADII ARE 3' UNLESS OTHERWISE NOTED.

METERS 0 5 10 25 — 0 15 30 60 90 FEET
GRAPHIC SCALE 1" = 30'

ORIGINAL SHEET - ARCH E

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston, MA 02210
Tel: (617) 234-3100 • www.stantec.com

Consultant
Landscape Architects – Planners
Urban Designers – Environmental Consultants
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02444-4429
617 227 8300

Issued/Revision	By	Appd	YYYY.MM.DD
REPONSE TO COMMENTS			2022.08.30
PLANNING BOARD SUBMITTAL			2022.07.15
DRB SUBMISSION			2022.07.15
PLANNING BOARD CONCEPT SET			2022.06.17
SPECIAL PERMIT PACKAGE			2022.03.30

Permit/Seal

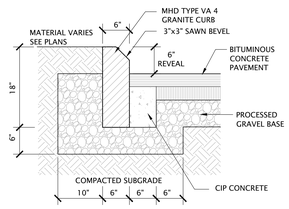
SPECIAL PERMIT PACKAGE R1
09/07/2022

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name:
Scale: 1" = 30'-0"
Dwn. Dgn. Chkd. YYYY.MM.DD

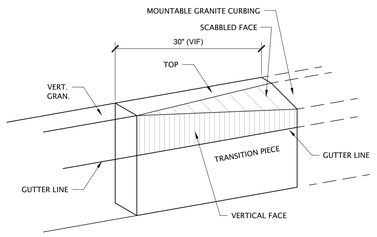
Title
SITE PLAN

Revision:
Drawing No.
L-1.0



EMERGENCY ACCESS WAY: CURB CUT - MOUNTABLE (SLOPED) GRANITE CURB

NOT TO SCALE

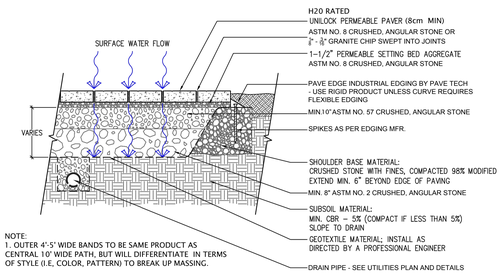


ISOMETRIC

NOT TO SCALE

EMERGENCY ACCESS WAY: CURB CUT - VERTICAL TO MOUNTABLE GRANITE CURB DETAIL

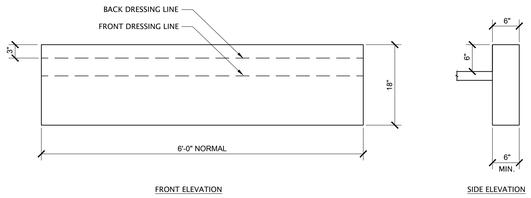
NOT TO SCALE



NOTE:
1. OUTER 4'-5' WIDE BANDS TO BE SAME PRODUCT AS CENTRAL 10' WIDE PATH, BUT WILL DIFFERENTIATE IN TERMS OF STYLE (I.E, COLOR, PATTERN) TO BREAK UP MASSING.

EMERGENCY ACCESS WAY: PERMEABLE PAVEMENT-HEAVY DUTY

NOT TO SCALE

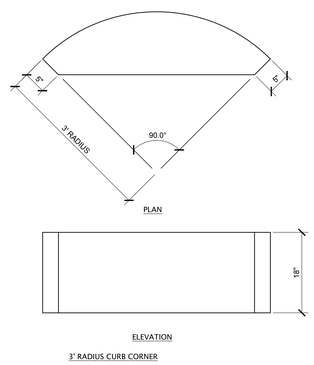


FRONT ELEVATION

SIDE ELEVATION

STRAIGHT CURB

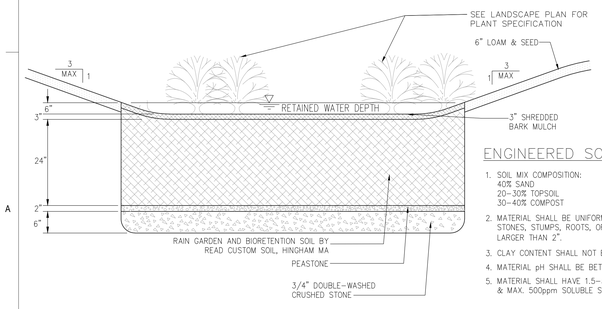
1. GRANITE CURB RETURN NOTES ABOVE ARE APPLICABLE.
2. MINIMUM LENGTH OF STRAIGHT FILLER PIECES TO BE 6'-0".
3. EXPOSED SURFACES TO BE DRESSED BY TOOL OR SAW REMAINDER TO BE QUARRY SPLIT.
4. RETURNS TO BE PLACED WHERE INDICATED ON PLANS.
5. A 6" MINIMUM COMPACTED (95% DENSITY) GRAVEL BASE SHALL BE PLACED BENEATH CURB.



3' RADIUS CURB CORNER

EMERGENCY ACCESS WAY: CURB CUT - GRANITE CURB CORNER DETAIL

NOT TO SCALE



ENGINEERED SOIL MIX SPECIFICATIONS

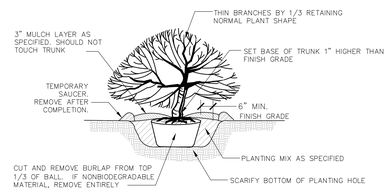
1. SOIL MIX COMPOSITION:
   40% SAND
   20-30% TOPSOIL
   30-40% COMPOST
2. MATERIAL SHALL BE UNIFORM, FREE FROM STONES, STUMPS, ROOTS, OR OBJECTS LARGER THAN 2".
3. CLAY CONTENT SHALL NOT EXCEED 5%
4. MATERIAL pH SHALL BE BETWEEN 5.5-6.5.
5. MATERIAL SHALL HAVE 1.5-3% ORGANIC CONTENT & MAX. 500ppm SOLUBLE SALT.
6. SAND COMPONENT SHALL MEET ASTM D 422 AND THE FOLLOWING GRADATION:

SIEVE SIZE	% PASSING
2-INCH	100
3/4 INCH	70-100
1/4 INCH	50-80
No. 4	15-40
No. 200	0-3

7. TOPSOIL SHALL BE A SANDY LOAM, LOAMY SAND, OR LOAM.
8. COMPOST SHALL BE PROCESSED FROM YARD WASTE IN ACCORDANCE WITH DEP GUIDELINES AND SHALL NOT CONTAIN BIO-SOLIDS.

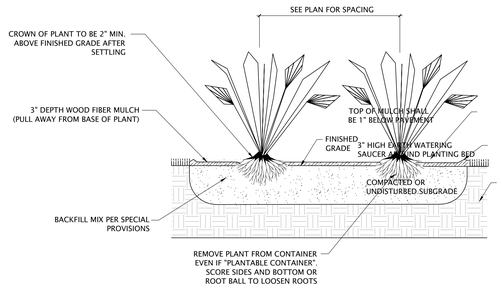
RAIN GARDEN

NOT TO SCALE



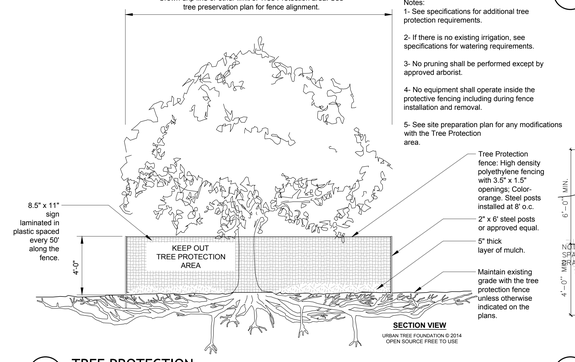
SHRUB PLANTING

NOT TO SCALE



TREE PROTECTION

NOT TO SCALE

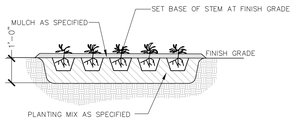


PERENNIAL PLANTING

NOT TO SCALE

TYPICAL SEEDED NO-MOW LAWN

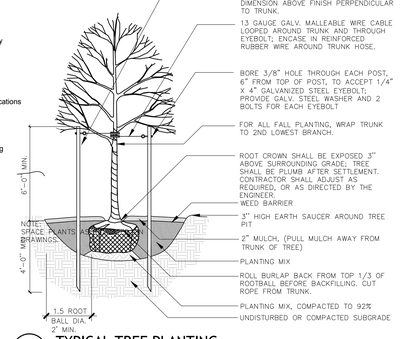
NOT TO SCALE



NOTE:
ON SLOPES GREATER THAN 3:1, 1/2" JUTE MESH SHALL BE PEGGED (24" ON CENTER) OVER BED PRIOR TO PLANTING. SPACE PLANTS AS INDICATED ON DRAWINGS

GROUND COVER PLANTING

NOT TO SCALE



TYPICAL TREE PLANTING

NOT TO SCALE

Stantec
Stantec Architecture and Engineering P.C.
40 Wantz Street, 3rd Floor
Danvers MA 01923
Tel: (617) 234-3100 • www.stantec.com

Consultant

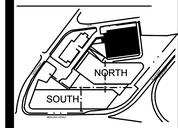
Landscape Architects + Planners
Urban Designers + Preservationists
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02481-4429
617 787 4300
www.pfinger.com

By	Appd	YYYY.MM.DD
		2022.08.30
		2022.09.07
		2022.07.19
		2022.08.12
		2022.03.30

Issued/Revision

RESPONSE TO COMMENTS
SPECIAL PERMIT SUBMISSION #1
DRB SUBMISSION
DRB SUBMISSION #2 (CONDITIONS)
SPECIAL PERMIT PACKAGE

Permit/Seal



KEY PLAN

SPECIAL PERMIT
PACKAGE R1
09/07/2022

Client/Project

Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave
Needham, MA 02494

Project No.: 218421343
File Name: SP-L5.0-SITE DETAILS.dwg
Scale: As Specified

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
SITE
DETAILS #2

Revision:
Drawing No.
L-5.1

ORIGINAL SHEET - ARCH E

From:	Lee Newman
To:	Alexandra Clee
Subject:	FW: Highland Science Center Project- 557 Highland Ave MA DOT TAKING PLANS FINALIZED
Date:	Tuesday, September 6, 2022 8:42:59 AM
Attachments:	image001.png image002.png image003.png image004.png image005.png image007.png 8729.pdf 18000-ALTA-12-15-2021-(SUBMIT).pdf

---

From: Robert Schlager <RAS@Bulfinch.com>
Sent: Friday, September 2, 2022 9:21 AM
To: Lee Newman <LNewman@needhamma.gov>; Alexandra Clee <aclee@needhamma.gov>
Cc: tagurkis@feldmansurveyors.com; Timothy W. Sullivan (tsullivan@goulstonstorrs.com) <tsullivan@goulstonstorrs.com>; Michael Holt <mholt@feldmangeo.com>; rebeccabrown@gpinet.com; Sean Manning (smanning@vhb.com) <smanning@vhb.com>; Eric Weyant (eweyant@stantec.com) <eweyant@stantec.com>; Mark DiOrio <mrd@Bulfinch.com>
Subject: FW: Highland Science Center Project- 557 Highland Ave MA DOT TAKING PLANS FINALIZED

See Below in response to your request.
No new taking Plans or changes affecting 557 Highland from the State according to Feldman Surveyors.

Robert

ROBERT A. SCHLAGER, CPM
President

Bulfinch
116 Huntington Avenue, Ste. 600
Boston, MA 02116
bulfinch.com
T: 781.707.4122
C: 617.921.3588

From: Michael Holt <mholt@feldmangeo.com>
Sent: Friday, September 2, 2022 8:46 AM
To: Robert Schlager <RAS@Bulfinch.com>; Tim Agurkis <TAgurkis@feldmangeo.com>
Cc: Mark DiOrio <mrd@Bulfinch.com>; Timothy Sullivan <tsullivan@goulstonstorrs.com>; Eric Weyant <eweyant@stantec.com>; Eric Joseph <ejoseph@pfai.net>; Nicholas Skoly <NSkoly@VHB.com>; Sean Manning <smanning@vhb.com>
Subject: RE: Highland Science Center Project

[EXTERNAL]

No new taking plans have been recorded. I have attached the last taking plan which is on our current survey attached again for reference.

Thanks,

Mike

Michael Holt
Project Manger
mholt@feldmangeo.com

FELDMAN
GEOSPATIAL
Boston Headquarters 152 Hampden Street, Boston, MA 02119
Worcester 27 Mechanic Street Worcester, MA 01608
Main 617-357-9740
Direct 617-941-5470
www.feldmangeo.com

From: Robert Schlager <RAS@Bulfinch.com>
Sent: Friday, September 2, 2022 6:42 AM
To: Tim Agurkis <TAgurkis@feldmangeo.com>
Cc: Mark DiOrio <mrd@Bulfinch.com>; Michael Holt <mholt@feldmangeo.com>; Timothy Sullivan <tsullivan@goulstonstorrs.com>; Eric Weyant <eweyant@stantec.com>; Eric Joseph <ejoseph@pfai.net>; Nicholas Skoly <NSkoly@VHB.com>; Sean Manning <smanning@vhb.com>
Subject: Re: Highland Science Center Project

Ok thank you.
Pls let me know ASAP
Can u transmit me today the most recent DOT plan along side our survey so I can forward to Town Planner pls?

Thank you and have a great weekend.

Robert

ROBERT A. SCHLAGER, CPM
President

116 Huntington Avenue, Ste. 600

Boston, MA 02116
bulfinch.com
T: 781.707.4122
C: 617.921.3588

On Sep 2, 2022, at 6:32 AM, Tim Agurkis <TAgurkis@feldmangeo.com> wrote:

[EXTERNAL]

We will check to see if anything else has been recorded since the last title commitment. All the takings that were listed for the property are shown.

Tim Agurkis, PLS
Vice President – Director of Survey Operations
tagurkis@feldmangeo.com

FELDMAN
GEOSPATIAL
Boston Headquarters 152 Hampden Street, Boston, MA 02119
Worcester 27 Mechanic Street Worcester, MA 01608
Main 617-357-9740 | **Direct** 617-708-8622
www.feldmangeo.com

From: Robert Schlager <RAS@Bulfinch.com>
Sent: Thursday, September 1, 2022 11:08 PM
To: Tim Agurkis <TAgurkis@feldmangeo.com>
Cc: Mark DiOrio <mrd@Bulfinch.com>
Subject: Fwd: Highland Science Center Project

See middle para
Do we have all the current MA DOT plans incorporated for MA DOT highland ave imps??

Thanks

ROBERT A. SCHLAGER, CPM
President

116 Huntington Avenue, Ste. 600
Boston, MA 02116
bulfinch.com
T: 781.707.4122
C: 617.921.3588

Begin forwarded message:

From: Lee Newman <LNewman@needhamma.gov>
Date: September 1, 2022 at 5:20:56 PM EDT
To: "Timothy W. Sullivan (tsullivan@goulstonstorrs.com)" <tsullivan@goulstonstorrs.com>, Robert Schlager <RAS@bulfinch.com>
Cc: Alexandra Clee <aclee@needhamma.gov>, Lee Newman <LNewman@needhamma.gov>
Subject: Highland Science Center Project

[EXTERNAL]

Tim and Robert,

I am attaching to this email a copy of the most recent comments we have received from Rebecca Brown (GPI), dated August 30, 2022, David Roche (Building Commissioner), dated August 31, 2022, and Stacey Mulroy (Park and Recreation), August 31, 2022, on the Highland Science Center project. These materials will be included in the agenda packet for the public hearing of September 7, 2022. I am still waiting for comments from Tom Ryder which I will email separately when we receive them.

Additionally, as you may recall Jeanne Mcknight had asked for confirmation that the layout out shown on the site plan as relates Highland Avenue represented the final layout for that roadway with the takings associated with the state widening project incorporated. We have asked GPI to confirm this accuracy, but you too should plan to address the question formally at the September 7 hearing.

The packet for the Planning Board meeting of **Wednesday, September 7, 2022, at 7:00 p.m.** can be found at this link: https://needhamma.gov/Archive.aspx?ADID=9878

Let me know if you have any questions.

Thank you,

Lee

Planning Board Meeting #3, September 7, 2022

Meeting #1 June 7, 2022
Meeting #2 July 7, 2022
Meeting #3 Sept 7, 2022

557highland.com
557 Highland Ave, Needham MA
Submitted: August 15, 2022

Bulfinch

HIGHLAND
INNOVATION CENTER

Stantec

PROJECT TEAM

Bulfinch

Stantec

vhb

MORIARTY

pfa Landscape Architects · Planners Civil Engineers · Wetland Scientists PAUL FINGER ASSOCIATES

AHA CONSULTING ENGINEERS

SGH

McPHAIL

ACENTECH

goulston&storrs

Frieze Cramer Rosen & Huber LLP

ATTORNEY AT LAW ROBERT T. SMART, JR.

DAIN | TORPY

DLA PIPER

George Giunta Jr.

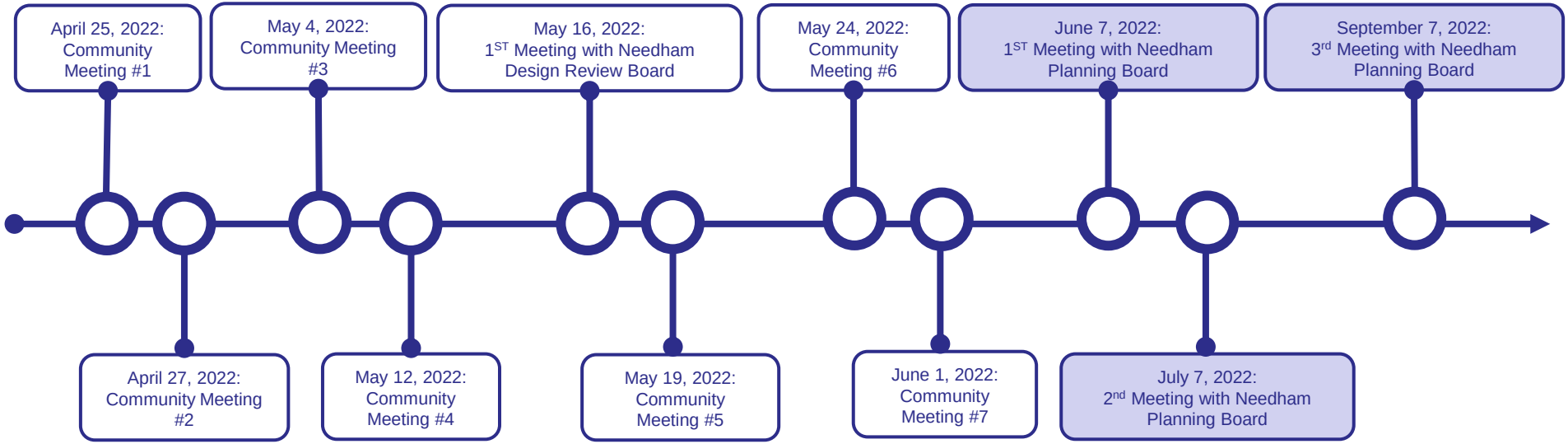
SAFETY PARTNERS Hands-on Workplace Safety

ENVIRONMENTAL HEALTH & ENGINEERING, INC.

Margaret Murphy
Community Resources Group

SLS DELIVERING CREATIVE LIFE SAFETY SOLUTIONS

PROJECT OUTREACH



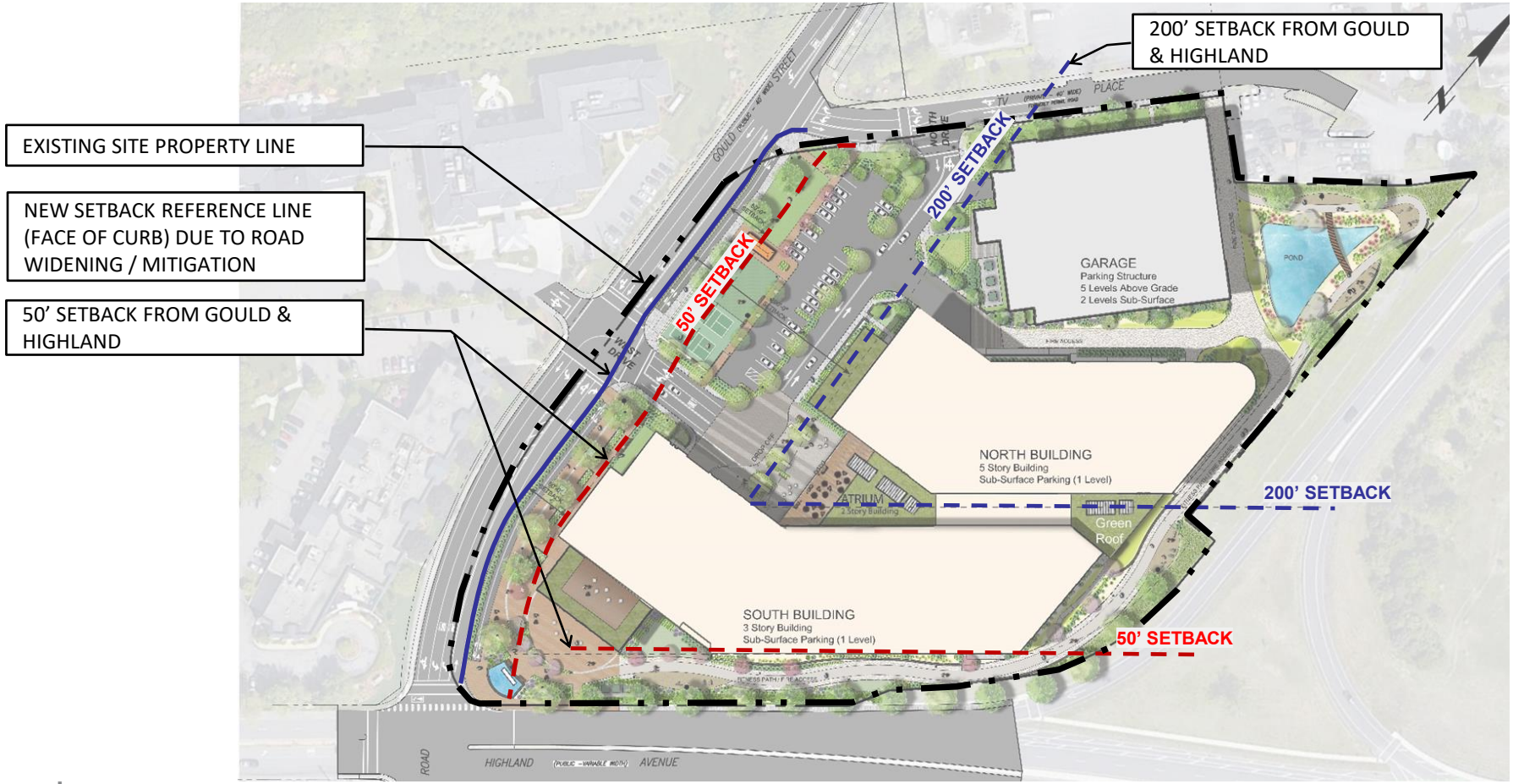
ADDITIONAL PROJECT MEETINGS:

-TOWN PLANNING
-TOWN ENGINEERING
-FIRE DEPARTMENT
-TOWN ARBORIST
-TRAFFIC
-POLICE DEPARTMENT
-PUBLIC WORKS DEPARTMENT

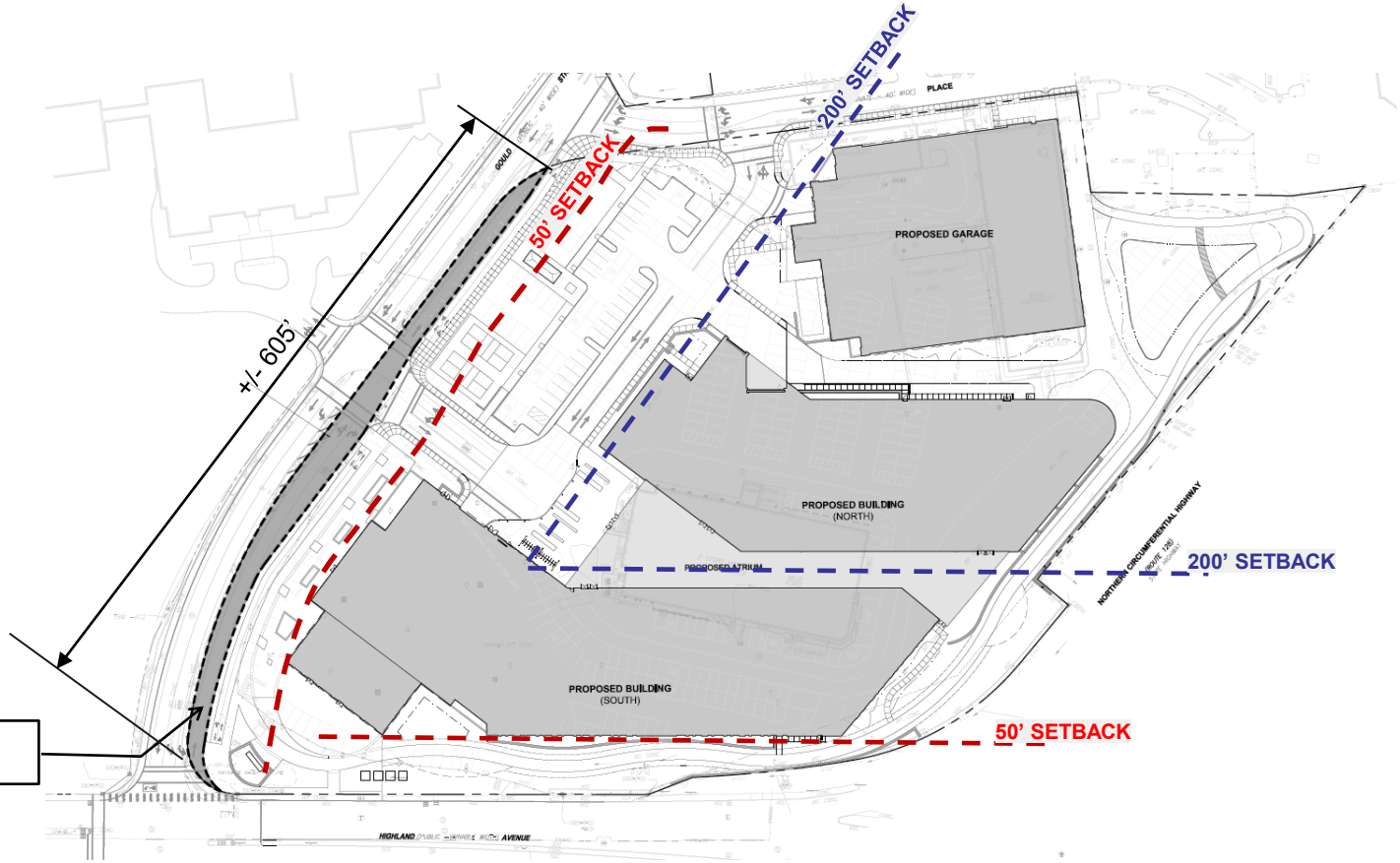
Agenda

1. Site Boundary Updates – New Setback
2. Architectural Plan Updates
3. Transportation Updates
4. Discussion

SITE BOUNDARY ADJUSTMENT



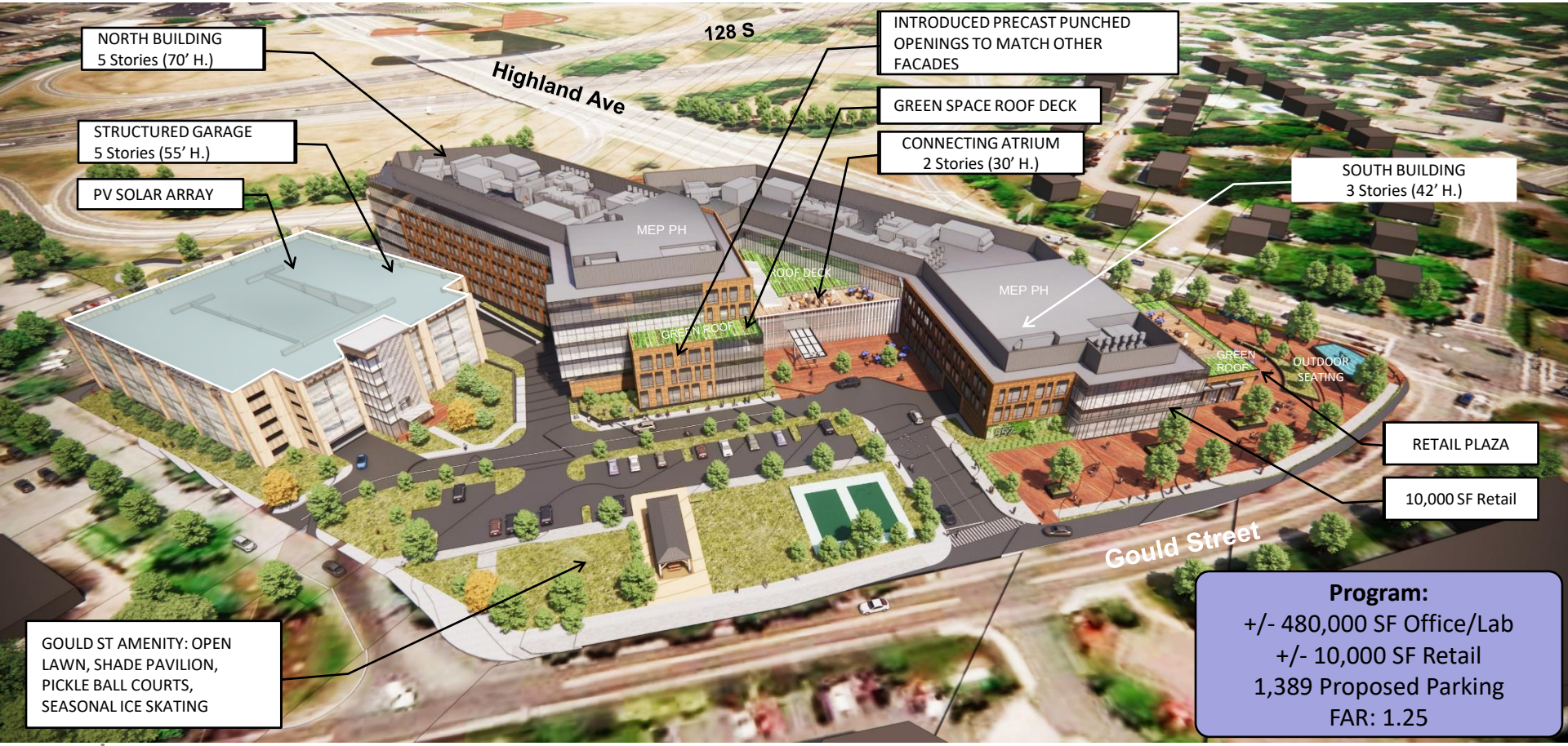
SITE BOUNDARY ADJUSTMENT – ROAD WIDENING



12,087 SF TO BE CONVEYED FOR ROAD WIDENING

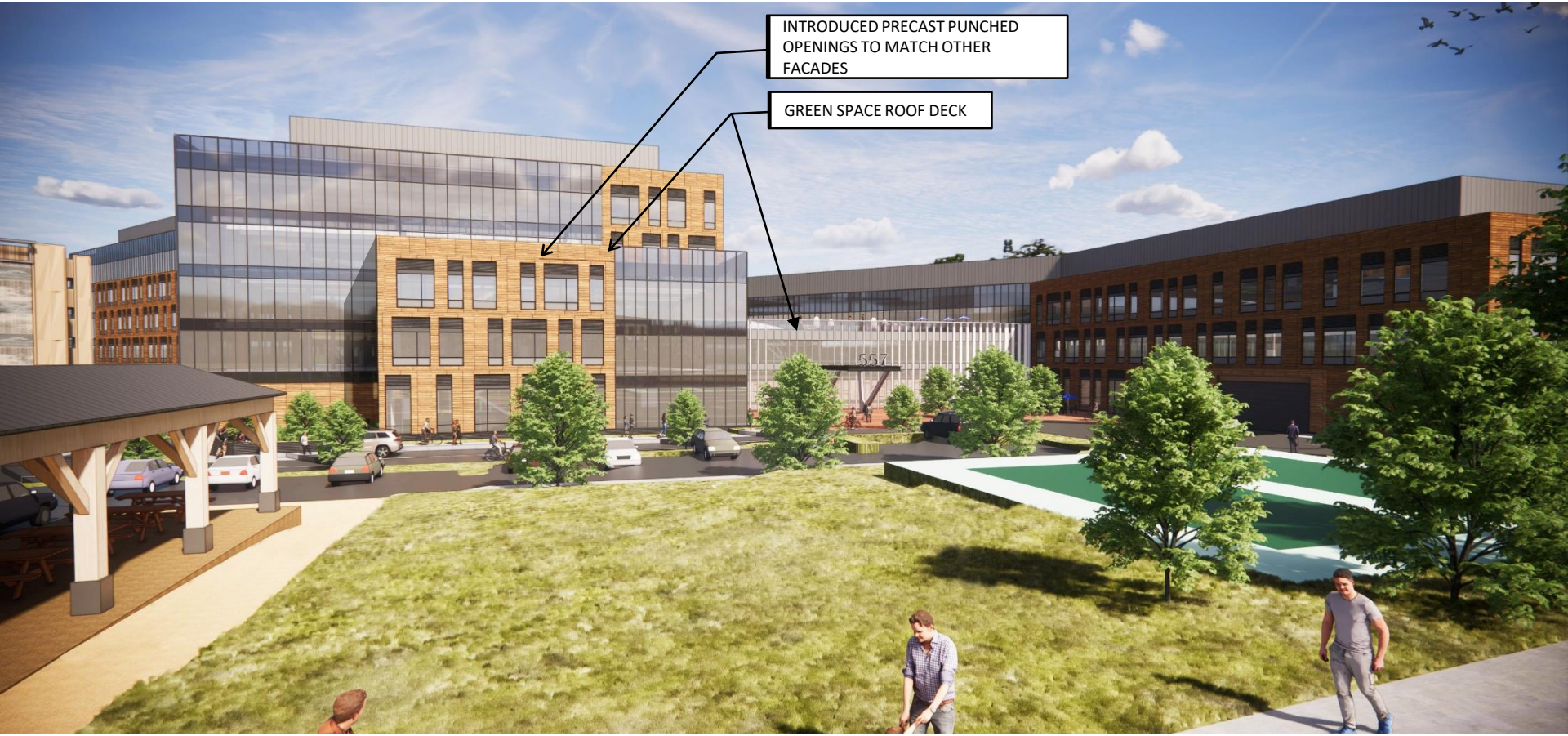
SITE BOUNDARY UPDATES – HC ZONING

PROPOSED DESIGN REV #1: AERIAL LOOKING NORTH

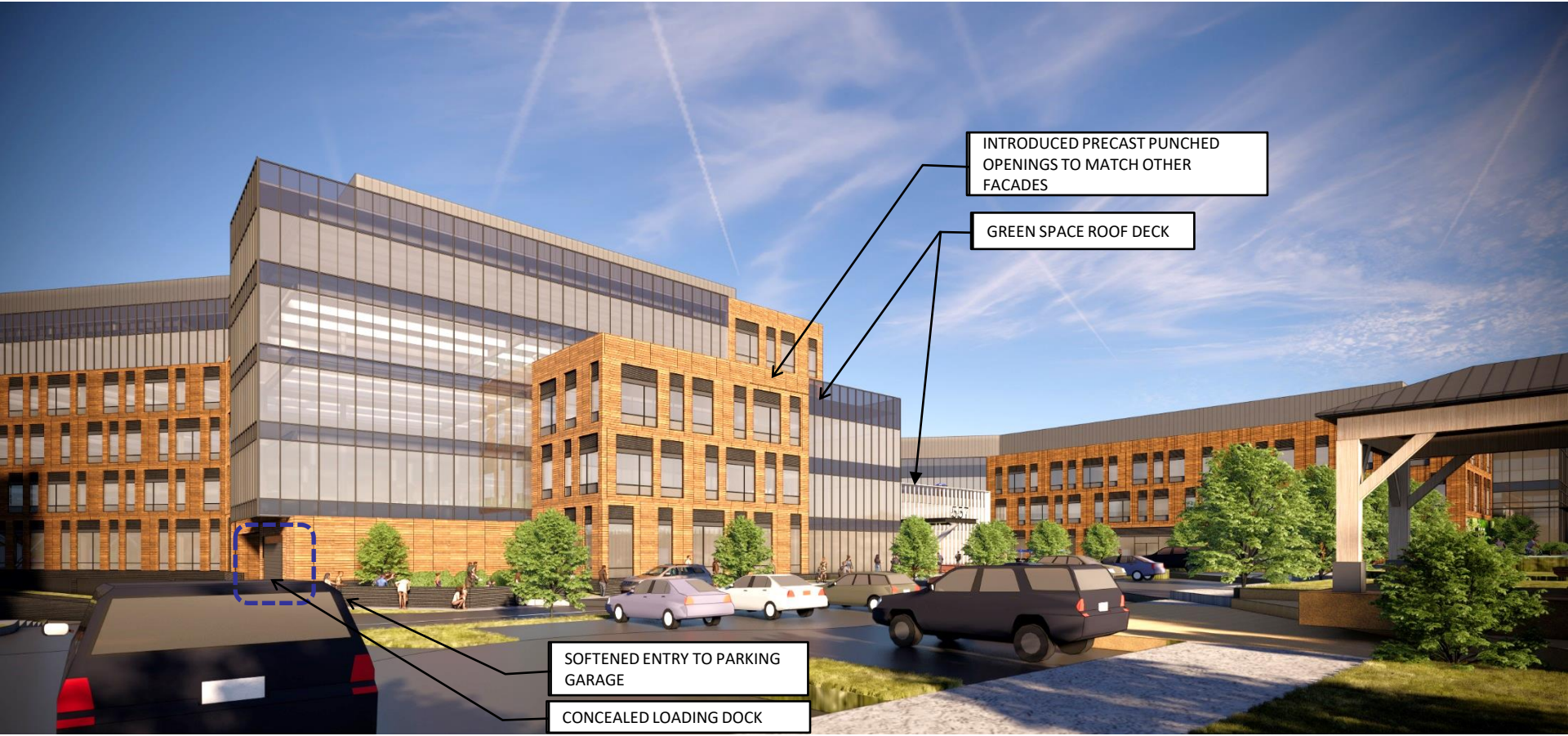


Program:
+/- 480,000 SF Office/Lab
+/- 10,000 SF Retail
1,389 Proposed Parking
FAR: 1.25

PROPOSED DESIGN REV #1: AERIAL LOOKING NORTH



PROPOSED DESIGN REV. #1: PEDESTRIAN VIEW AT NORTH BUILDING



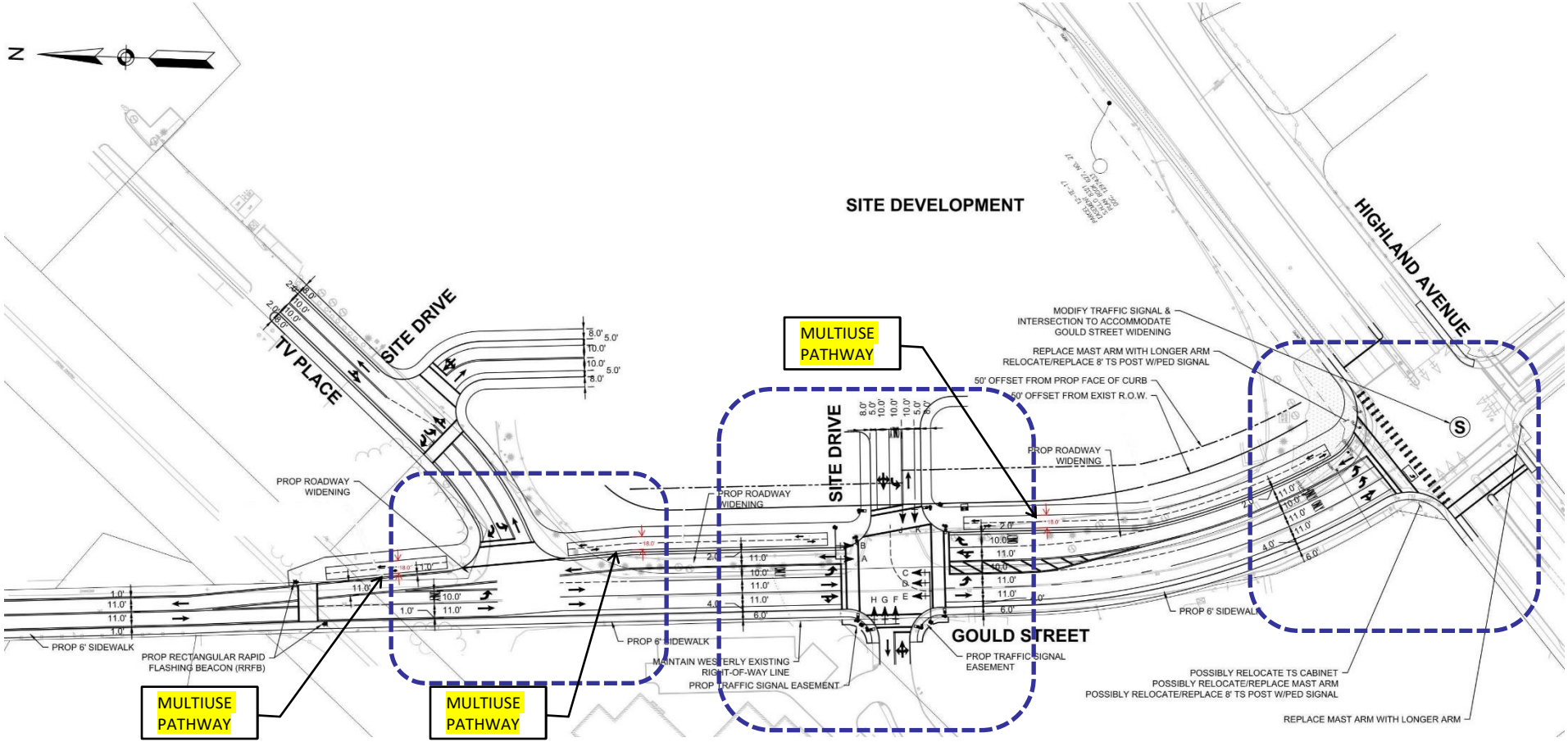
PROPOSED DESIGN REV. #1: PEDESTRIAN VIEW GOULD / WINGATE DRIVEWAY

PROPOSED DESIGN REV. #1: AERIAL LOOKING N-W

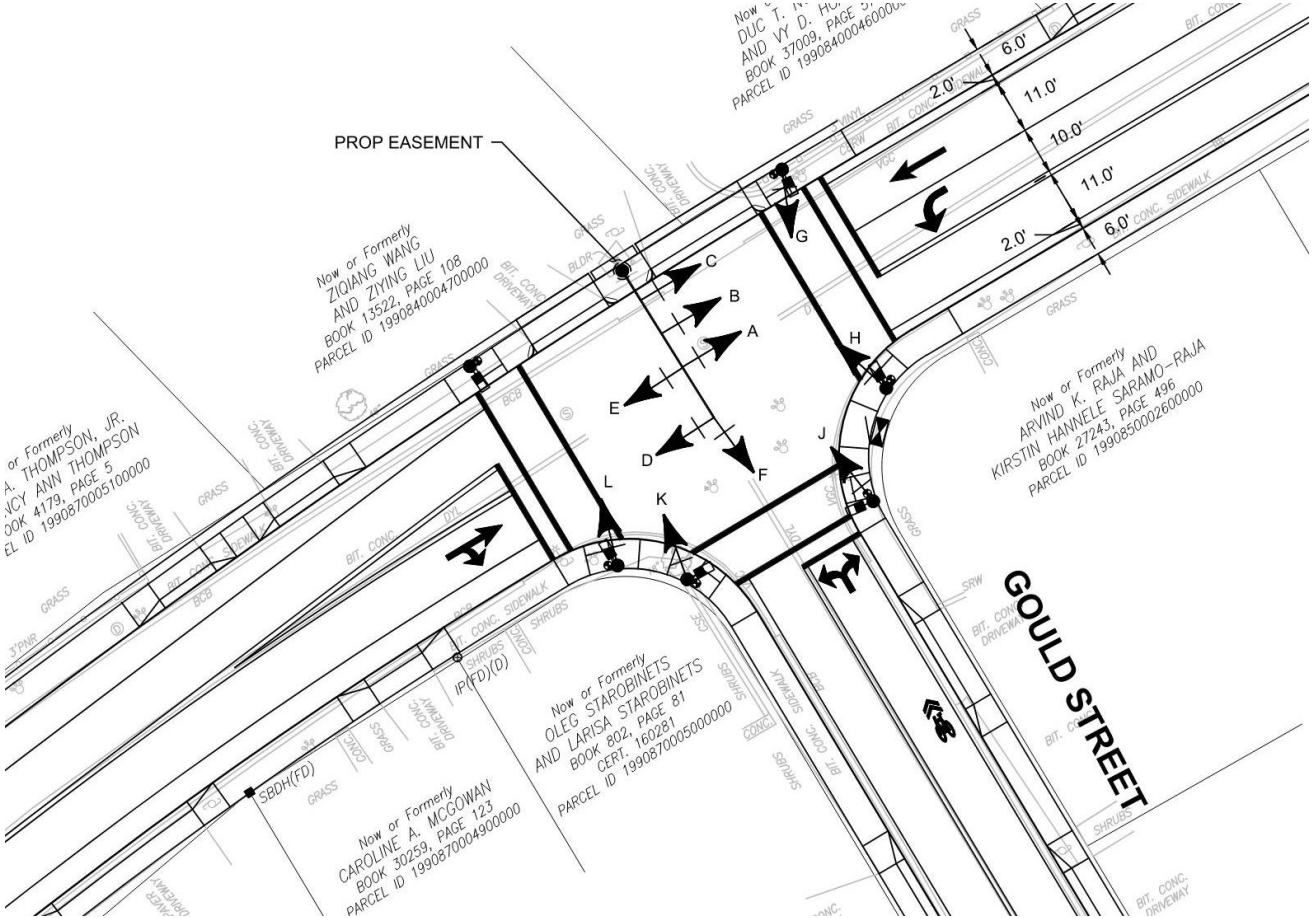
PROPOSED DESIGN REV. #1 AERIAL LOOKING SOUTH – NO CHANGES

PROPOSED DESIGN REV. #1: PEDESTRIAN VIEW LOOKING SOUTH – NO CHANGES

PROPOSED DESIGN REV. #1: TRAFFIC IMPROVEMENTS



PROPOSED DESIGN REV. #1: GOULD & CENTRAL



Q+A


INTRODUCED PRECAST PUNCHED OPENINGS TO MATCH OTHER FACADES
GREEN SPACE ROOF DECK
557
557

THANK YOU

REF.: NEX-2200133.00

May 27, 2022

Ms. Lee Newman
Director of Planning and Community Development
Needham Department of Public Works
500 Dedham Avenue
Needham, MA 02492

SUBJECT: Highland Science Center, Gould Street, Needham, MA
Traffic Peer Review

Dear Ms. Newman:

On behalf of the Town of Needham, ***Greenman-Pedersen Inc.*** (GPI) performed a review of the *Transportation Impact and Access Study*[1] (TIAS) prepared by Vanasse Hangen Brustlin, Inc. (VHB) for review by the Town of Needham for the proposed Highland Science Center in Needham, Massachusetts. The site is located on the northeast corner of the intersection of Highland Avenue and Gould Street, and currently contains a Muzi Ford car dealership, Charles River Media Group and WCVB Channel 5. The site was recently part of a rezoning effort by the Town to allow for the development of up to ±880,000 square feet (SF) of office, research and development, and ancillary retail and service space. GPI has reviewed the TIAS and supporting traffic analysis for consistency with the goals and studies prepared as part of the Town's rezoning, as well as for compliance with the Massachusetts Department of Transportation (MassDOT) guidelines for traffic impact analysis and general engineering practice. The following summarizes GPI's comments related to the TIAS.

General Comments

1. As the project directly abuts the state highway layout (SHLO) on Interstate 95 / Route 128 and is anticipated to generate more than 3,000 vehicle trips per day (vpd), the project will require review by the Massachusetts Environmental Policy Act (MEPA) office in the form of a Environmental Notification Form (ENF) and a mandatory Environmental Impact Report (EIR). An ENF was prepared by the Applicant and noticed in the Environmental Monitor on April 8, 2022. The TIAS was included as a chapter within the ENF. A Certificate on the ENF was issued by MEPA on May 9, 2022. GPI previously provided comments to the MEPA office on behalf of the Town of Needham regarding the ENF, and a copy of these comments in included as an Attachment for reference. Many of GPI's comments were incorporated into the recommendations of the ENF Certificate, which include:
    a) Table 2-9 of the ENF indicates that the traffic operations at the intersections of Highland Avenue / West Street will drop from LOS C to D and the operations of Highland Avenue / Gould Street / Hunting Road will degrade from LOS E to F as a result of the additional traffic generated by the project. The Applicant is requested to explore the feasibility of implementing additional measures to improve operations at these locations, including an additional northbound lane on Hunting Road.
    b) Collision diagrams should be prepared for any study area intersections experiencing an average of more than 3.0 collisions per year and a crash rate higher than the statewide or district-wide average. The Applicant should investigate measures to improve safety and mitigate collision occurrence at any locations where five or more collisions of a similar type have occurred over the analysis period.

[1] *Transportation Impact and Access Study, Highland Science Center, Needham, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); March 2022.

c) The Applicant should perform an estimate of the potential bicycle parking demand generated by the project to ensure adequate bicycle parking is provided for an effective Transportation Demand Management (TDM) program.

2. The project will also require a Vehicular Access Permit from MassDOT for the proposed change-in-use of the property, as well as for the construction of off-site roadway improvements within the SHLO. As such, the ENF was reviewed by the MassDOT District 6 office, as well as the Public-Private Development Unit (PPDU). The following comments from MassDOT were incorporated into the ENF Certificate issued by MEPA:

   a) The Applicant should evaluate queuing at the study area intersections to ensure that lengthier queues do not impact the operation of roadways and railways within the study area.

   b) The Applicant should perform an analysis of the existing and proposed weave conditions on Highland Avenue to ensure that the increased traffic volumes will not lead to degraded safety conditions in the area of the I-95 / Highland Avenue interchange.

   c) The Applicant should coordinate with the Massachusetts Bay Transit Authority (MBTA) to determine the feasibility of additional MBTA Bus Route 59 service closer to the project site and include feasible options in the Draft EIR.

   d) MassDOT requests that the Applicant consider installing bicycle and pedestrian improvements on Highland Avenue at the I-95 Interchange to connect with the proposed Complete Streets improvements being installed as part of MassDOT Project #606635 along Highland Avenue.

   e) The Applicant should provide a description of the methodology to be used to estimate the effectiveness of the proposed Transportation Demand Management (TDM) measures and discuss what remedial measures will be taken if the monitoring program indicates that the TDM program is less effective than anticipated in reducing single-occupant vehicle (SOV) trips and encouraging alternative means of travel to/from the site.

   f) The proposed Transportation Monitoring Program should include a travel survey of employees and patrons of the site. Although MassDOT did not provide any further details on this request, it is assumed that the travel survey will be designed to verify the distribution of site-generated trips and mode share in order to assess the efficacy of the proposed TDM program.

Study Area

3. The TIAS includes an evaluation of the impact to traffic operations associated with the project at a total of twenty (20) intersections, which include all nine of the study intersections included as part of the *Traffic Impact Study*[2] prepared for the original rezoning. GPI concurs that the study area is appropriate for the size and scale of the development and includes those intersections which are likely to experience a measurable impact from the proposed redevelopment.

Existing Conditions

4. The TIAS included an evaluation of the operations of the study area intersections during the weekday AM and PM peak periods, which are consistent with typical commuter peaks on the adjacent roadway networks. GPI concurs that these time periods represent the critical time periods for analysis as they represent the peak hours of both adjacent street traffic and site-generated vehicle trips.

[2] *Traffic Impact Study, Muzi Motors Rezoning, Gould Street & Highland Avenue – Needham, Massachusetts;* prepared by Greenman-Pedersen, Inc. (GPI); October 2020.

5. The Existing Conditions Vehicle Volumes were derived from traffic counts obtained from a number of sources, many of which were collected prior to the COVID-19 pandemic. New traffic counts were collected in July 2021 at the following intersections:
    - Central Avenue at Cedar Street
    - Central Avenue at Webster Street
    - Highland Avenue at Hunnewell Street

   All other traffic counts contained within the traffic study were collected pre-pandemic and adjusted to existing conditions utilizing MassDOT's approved Yearly Growth Factors and balancing between intersections. Regardless of which traffic count was collected more recently, the traffic volumes between intersections were always balanced upward to the higher traffic count. GPI concurs that this methodology is acceptable and will result in the most conservative (highest) estimate of existing traffic conditions through the study area intersections.

6. Traffic counts at many of the study area intersections were obtained from previously seasonally-adjusted traffic volumes from other traffic studies. However, raw traffic counts collected in April 2017 were obtained from the *Highland Avenue Reconstruction Functional Design Report*[3] for the Highland Avenue / Webster Street intersection. Similarly, raw traffic counts collected in January 2018 were obtained from the *Northland Newton Development DEIR*[4] for the Highland Avenue intersections with the I-95 Northbound and Southbound ramps. MassDOT Weekday Seasonal Factors data was provided in the TIAS Appendix for the 2019 year only. Since the traffic counts were collected in 2017 and 2018, it would be expected that seasonal adjustment factors for those years would have been used to seasonally adjust the raw traffic volumes. MassDOT's Weekday Seasonal Factors data for 2017 and 2019 both indicate that traffic volumes in April represent above-average conditions for Group Factors U3-U7. Therefore, no seasonal adjustment would be required for the Highland Avenue / Webster Street intersection. It is unclear what, if any, seasonal adjustment factor was applied to the volumes at the Highland Avenue intersections with the I-95 ramps. However, the MassDOT Weekday Seasonal Factors data for 2018 indicates that January traffic volumes for Factor Group U3 represent above-average month conditions. Therefore, no seasonal adjustment factor would be required for the Highland Avenue intersections with the I-95 ramps.

7. No adjustment was applied to the traffic volumes collected in July 2021 to account for any variations due to COVID-19. However, these traffic counts were balanced upward with traffic counts collected at adjacent intersections under pre-COVID conditions. GPI concurs that this methodology for adjustment is acceptable.

Collision History

8. Per MassDOT guidelines, collision diagrams should be prepared for any locations that experience an average of more than 3 crashes per year or a crash rate higher than the state or district-wide average. The intersection of Highland Avenue / West Street experienced an average of 4.4 crashes per year and a crash rate higher than the state and district-wide averages. Similarly, the Highland Avenue / Second Avenue intersection experiences an average of 6.6 collisions per year and a crash rate above the state and district-wide averages. Therefore, the Applicant should obtain detailed collision reports for these intersections and prepare collision diagrams to identify any collision patterns occurring at these locations, as well as potential measures to reduce the occurrence of such collisions.

9. The following additional intersections also experienced an average of more than three (3) collisions per year, and collision diagrams should be prepared to identify any collision patterns or potential mitigating measures at these intersections:
    - Highland Avenue / First Avenue
    - Hunting Road / Kendrick Street

[3] *Highland Avenue Reconstruction Functional Design Report*; Prepared by Stantec, Inc.; August 2017.
[4] *The Northland Newton Draft Environmental Impact Report*; Prepared by Vanasse Hangen Brustlin, Inc. (VHB); August 2020.

10. Although the intersection of Highland Avenue / Gould Street / Hunting Road also experienced more than three collisions per year, the crash rate was well below the state and district-wide averages. In addition, significant improvements were recently constructed by MassDOT that may reduce collisions at this location. Further, additional improvements are proposed at this intersection as mitigation for the proposed development, which may also impact collision occurrence. Therefore, preparation of a collision diagram for this location is not required. However, GPI recommends that the proposed Post-Occupancy Monitoring Program include a review of collisions occurring at this location following construction of the proposed mitigation measures to ensure that a new safety issue is not introduced.

2029 No-Build Conditions

11. The Applicant has projected traffic volumes to a seven-year design horizon consistent with MassDOT guidelines utilizing a background growth rate of 1.0 percent per year and adding traffic to be generated by other proposed or approved developments in the surrounding area. GPI concurs with this methodology.

Trip Generation

12. Table 3 of the TIAS notes that the existing site-generated trips were estimated based on empirical traffic counts collected at the site driveways, which show only 887 daily trips are currently generated by the site. It is important to note that these empirical counts were collected in the fall of 2021, during COVID, and as a result, may under-estimate the trips generated by the site pre-COVID when it was fully operational. The use of the lower existing site-generated trips will result in a more conservative (higher) estimate of the net increase in trips generated by the proposed redevelopment.

13. The Applicant has estimated the site-generated vehicle trips based on Institute of Transportation Engineers (ITE) trip generation rates for Land Use Codes (LUC) 710 (General Office Building), 760 (Research and Development Center) and 822 (Strip Retail Plaza (<40,000 sf)) and applied a modest credit for internal capture of trips shared between uses on the site. In addition, the Applicant has assumed that 25 to 40 percent of the retail trips will be from pass-by trips (vehicles already on the adjacent roadway network passing by the site while traveling to another destination). GPI concurs with this methodology.

14. Although the Applicant has proposed a significant Transportation Demand Management (TDM) program, the Applicant has not applied any reduction in vehicle trips generated by the project for the implementation of the TDM program. While GPI agrees that this methodology will result in the most conservative (worst case) estimate of project's impacts on traffic operations through the study area, it should not excuse the Applicant from developing an effective TDM program or identify target mode share goals for the proposed TDM program. The Applicant should estimate the potential mode share and vehicle trip reduction anticipated from implementing the proposed TDM program and identify mode share goals to be monitored and evaluated as part of the Post-Occupancy Monitoring Program.

Transportation Demand Management (TDM) Measures

15. The Applicant has proposed the following transit-related measures as part of the TDM program:
    - Explore the feasibility of providing shuttle service connectivity to nearby public transportation nodes (commuter rail and Green Line);
    - Require tenants to provide a 50 percent transit pass subsidy for their employees;
    - Carpool assistance and incentives;
    - Emergency ride home;
    - Display in the Main Lobby transportation-related information for tenants' employees and visitors; and

- Promotional efforts.

The Applicant should provide additional information on how carpool assistance and emergency ride home services will be provided, as well as what incentive program may be implemented. In addition to providing shuttle service to nearby commuter rail and Green Line services, the Applicant should explore the possibility of extending bus service to the site.

Bicycle Accommodations

16. Section 2.3.4.1 of the ENF notes that a total of 89 bicycle parking spaces will be provided indoors and outdoors, while the TIAS describes a total of only 70 bicycle parking spaces proposed on the site. The Applicant should clarify this discrepancy.

17. No description has been provided within the ENF or TIAS on how many bicycle parking spaces will be indoors and how many will be outdoors. The studies also do not contain any assessment of the potential bicycle parking demand that could be generated and the adequacy of the number of bicycle parking spaces provided to accommodate this demand. The Applicant should provide an evaluation of the potential bicycle parking demand to ensure that adequate bicycle parking is provided to encourage use of bicycle as a means of traveling to/from the site.

Proposed Mitigation

18. The TIAS describes geometric improvements that are proposed at the intersection of Highland Avenue / Gould Street / Hunting Road as mitigation for the project, which are shown graphically in Figure 16. The widening of the roadway that will be required to accommodate the additional lanes at this location will also likely require reconstruction of the traffic signal at this intersection to accommodate new signal indications and mast arms, as well as vehicle detection and pedestrian signal equipment. No mention of the signal upgrades was provided in the TIAS and no signal improvements are shown in Figure 16.

19. Figure 16 of the TIAS provides a graphic depiction of the roadway geometry proposed at the intersection of Highland Avenue / Gould Street / Hunting Road and along Gould Street fronting the site. The Figure does not include the Highland Avenue eastbound or Hunting Road northbound approaches to the intersection, so it is difficult to identify what, if any, improvements are proposed on those approaches. However, Figure 1.4 of the ENF also provides a similar graphic that includes all approaches to the intersection. While the geometry on the majority of the approaches appears consistent with the conceptual improvement sketches prepared as part of the former rezoning effort, the Hunting Road northbound approach to Highland Avenue and the receiving approach on Gould Street are inconsistent with the rezoning plans. The analysis and plans prepared as part of the rezone indicated that two through lanes would be required on Hunting Road with two receiving lanes on Gould Street to accommodate the traffic generated by the project. The capacity and queue analysis summarized in Table 15 of the TIAS indicates that even with the mitigation measures proposed by the Applicant, the Hunting Road northbound movement will operate over capacity at level-of-service (LOS) F during the weekday AM and PM peak hours under 2029 Build with Mitigation conditions. The Highland Avenue eastbound left-turn movement will also operate at LOS F during the weekday AM peak hour. Therefore, the Applicant should consider the feasibility of providing an additional northbound lane on Hunting Road to improve the capacity and operations of this intersection.

20. Figure 15 of the TIAS depicts improvements to be constructed at the Central Avenue / Gould Street intersection as mitigation for the project, which include restriping of Central Avenue to provide a westbound left-turn lane and installation of a fully-actuated traffic signal. The proposed signal equipment is not depicted on the plans. The Applicant should obtain survey information at this location to verify whether the proposed improvements can be constructed within the publicly-available right-of-way and whether any easements will

be required for the proposed signal equipment. In addition, the Applicant should perform vehicle turning movement analysis to verify that that the proposed curb radii and STOP line locations will allow emergency vehicles and trucks to safely navigate the intersection without encroaching on opposing traffic flows.

Transportation Operations Analysis

21. According to Table 9, the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

22. The Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

23. Although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. GPI recommends the Applicant consider measures to reduce delay and improve operations at this location.

24. Similarly, the Hunting Road northbound approach to Kendrick Street will be well over capacity during the weekday AM peak hour under 2029 No-Build and Build conditions. GPI recommends the Applicant consider options for reducing delay and improving operations at this location.

25. The Webster Street and Cedar Street approaches to Central Avenue are expected to operate well over capacity with long delays and queues under 2029 No-Build and Build conditions, particularly during the weekday AM peak hour. The Applicant should investigate options for improving the operations of these intersections, including conducting a signal warrant analysis to assess whether a warrant for installation of traffic signal will be met at either of these locations.

26. As noted in Comment 19, even with the proposed mitigation at the Highland Avenue / Gould Street / Hunting Road intersection, some movements will continue operating at LOS F under 2029 Build with Mitigation conditions. Therefore, the Applicant should investigate the feasibility of providing additional capacity at this location to accommodate 2029 Build traffic volumes.

Traffic Monitoring Program

27. The TIAS describes a transportation monitoring program that will be conducted post-occupancy to monitor parking occupancy and traffic operations at four of the study area intersections, including the site driveway. The Applicant should also provide monitoring of the effectiveness of the proposed TDM program in encouraging walking/biking, carpooling, and public transportation travel to/from the site.

28. The proposed traffic monitoring program will include the collection of vehicle turning movement counts during the weekday AM and PM peak periods at the following study area intersections:
    - Central Avenue / Gould Street
    - Gould Street / TV Place
    - Gould Street / Project Site Driveway
    - Highland Avenue / Gould Street / Hunting Road

GPI agrees that these represent the critical locations that would experience the greatest increase in traffic due to the project. However, should the result of the monitoring study indicate that the actual traffic increase generated by the project exceeds the traffic projections contained within the ENF by ten percent or more, the study area for the monitoring program should be expanded to include additional locations to verify that the project's impacts does not create any operation deficiencies at nearby locations. In addition, the monitoring programs should include a capacity and queue analysis to verify the operations of each of the study area intersections under post-occupancy conditions. The monitoring program should also include the collection of daily traffic volumes on TV Place and the Project Site driveway to verify the daily traffic generated by the project.

Site Access and Circulation

29. Figure 2 of the TIAS provides a site plan depicting the proposed layout and traffic circulation on the site. The plan appears to indicate that a loading/unloading area will be provided at the front of the site between Buildings A and B. This loading area is located in close proximity of the signalized intersection of the main site driveway and Gould Street. Vehicles, particularly trucks, stopped in this area could cause a back up of traffic into Gould Street. The Applicant should consider modifications to the site plan that provide a clear separation of loading/unloading areas and through traffic access to the parking fields to ensure traffic does not back up onto Gould Street. In addition, the Applicant should consider limiting hours of deliveries to the site, as a condition of approval, to avoid deliveries occurring between 7:00 AM and 9:00 AM when a high volume of traffic may be entering the site from Gould Street to access the parking garage.

30. A large parking garage is proposed at the northerly end of the site, as well as a small surface parking lot near Gould Street. The Applicant should clearly define who will utilize the surface parking lot. In order to avoid congestion along the main drive aisle through the site, the surface parking lot should be restricted to use by accessible parking spaces, visitors, and brewery patrons (if a brewery is provided) only. All employees of both buildings, including brewery employees, should be directed to park in the parking garage.

31. The site plan included in Figure 2 does not depict any pedestrian connections between the proposed surface parking lot and the buildings. The Applicant should modify the site plan to provide fully accessible pedestrian routes between the surface parking lot and both buildings, as well as to the pedestrian loops around the site.

32. The entering travel lane on TV Place is aligned with the sidewalk as it passes by the proposed site driveway. In addition, the exiting lane west of the site driveway is aligned with the entering lane east of the driveway. This has the potential to create a head-on collision between drivers entering and exiting the site as they cross between lanes through the site driveway intersection with TV Place. It also has the potential for entering vehicles on TV Place to drive onto the sidewalk. The Applicant should modify the layout of TV Place to provide better alignment of entering and exiting travel lanes, which may involve additional widening of TV Place to the east of the site driveway and introduction of a raised or striped median island.

33. The Applicant should perform a vehicle turning movement analysis to verify that emergency vehicles and trucks can safely access and navigate the site. This includes delivery, postal, and trash removal vehicles. The Applicant should provide this turning analysis to the Needham Police and Fire Departments for verification that safe and adequate access is provided.

34. Table 15 of the TIAS indicates that queues of nearly 200 feet (eight vehicles) could occur in each lane exiting the site driveway during the weekday PM peak hour. Although the provided plan on Figure 2 is not scaled to be able to accurately measure the available stacking distance, it appears that only 60 feet of stacking distance is proposed in each lane on the site driveway approaching Gould Street before reaching the loading area. Therefore, the queues exiting the site will regularly back up into the loading area and around the corner beyond the driveway to the surface parking lot during the weekday PM peak hour. The Applicant should consider

modifications to the site plan to provide additional vehicle stacking exiting the site without interference with the loading area, parking areas, or on-site circulation.

Should you have any questions regarding these comments, please contact me directly at 603-766-5223.

Sincerely,

GREENMAN–PEDERSEN, INC.

Rebecca L. Brown, P.E.
Senior Project Manager

Attachments:

- MEPA ENF – Traffic Peer Review Comment Letter
- MassDOT Weekly Seasonal Factors

REF.: NEX-2200133.00

April 25, 2022

Ms. Lee Newman
Director of Planning and Community Development
Needham Department of Public Works
500 Dedham Avenue
Needham, MA 02492

SUBJECT: Highland Science Center, Gould Street, Needham, MA
MEPA ENF – Traffic Peer Review

Dear Ms. Newman:

On behalf of the Town of Needham, ***Greenman-Pedersen Inc.*** (GPI) performed a review of the *Environmental Notification Form*[1] (ENF) prepared by Vanasse Hangen Brustlin, Inc. (VHB) for review by the Massachusetts Environmental Policy Act (MEPA) office for the proposed Highland Science Center in Needham, Massachusetts. The site is located on the northeast corner of the intersection of Highland Avenue and Gould Street, and currently contains a Muzi Ford car dealership, Charles River Media Group and WCVB Channel 5. The site was recently part of a rezoning effort by the Town to allow for the development of up to ±880,000 square feet (SF) of office, research and development, and ancillary retail and service space. GPI has reviewed the ENF and supporting traffic analysis for consistency with the goals and studies prepared as part of the Town's rezoning, as well as for compliance with the Massachusetts Department of Transportation (MassDOT) guidelines for traffic impact analysis and general engineering practice. The following summarizes GPI's comments related to the ENF.

Transportation Section (Traffic Generation)

1. In Section 1.B on page 18 of the ENF, the Applicant notes that a MassDOT Vehicular Access Permit will be required for the potential need to modify roadway geometry within the state highway layout (SHLO). It should be noted that MassDOT will require a minimum of two permits for this development. One permit will be for the change-in-use of the property as the property directly abuts land owned by the Commonwealth of Massachusetts (Interstate 95 / Route 128) and the project will generate more than 2,000 daily vehicle trips. A separate MassDOT access permit will be required for the construction of any off-site roadway improvements within the SHLO.

2. The table in Section 11.A on page 19 of the ENF Form notes that the existing site-generated trips were estimated based on empirical traffic counts collected at the site driveways, which show only 887 daily trips are currently generated by the site. It is important to note that these empirical counts were collected in the fall of 2021, during COVID, and as a result, may under estimate the trips generated by the site pre-COVID when it was fully operational. The use of the lower existing site-generated trips will result in a more conservative (higher) estimate of the net increase in trips generated by the proposed redevelopment.

3. In Section III on page 19 of the ENF Form, the Applicant is requested to describe any transportation demand management measures (TDM) to be implemented to reduce single-occupant vehicle trips to the site, including any transit-related measures. The Applicant has not described any TDM measures related to transit services in this section. However, these measures are described in Section 2.7.2 if the *Transportation* chapter, which notes that the Applicant will:

[1] *Environmental Notification Form, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); March 2022.

- Explore the feasibility of providing shuttle service connectivity to nearby public transportation nodes (commuter rail and Green Line);
- Require tenants to provide a 50 percent transit pass subsidy for their employees;
- Carpool assistance and incentives;
- Emergency ride home;
- Display in the Main Lobby transportation-related information for tenants' employees and visitors; and
- Promotional efforts.

The Applicant should provide additional information on how carpool assistance and emergency ride home services will be provided, as well as what incentive program may be implemented. In addition to providing shuttle service to nearby commuter rail and Green Line services, the Applicant should explore the possibility of extending bus service to the site.

Transportation Section (Roadways and Other Transportation Facilities)

4. In Section 1.B on page 21 of the ENF Form, the Applicant has stated that no permits will be required related to roadways or other transportation facilities. However, a MassDOT access permit will be required for the construction of off-site roadway improvements within the SHLO. Therefore, the Applicant should complete the *Transportation Facility Impacts* section of the ENF Form.

Air Quality Section

5. In Section 1.A on page 23 of the ENF Form, the Applicant notes that the project does not exceed any of the thresholds related to air quality. However, MEPA requires that an *Air Quality and Greenhouse Gas Emissions* study be conducted for all projects that require a mandatory Environmental Impact Report (EIR). As the project is anticipated to generate more than 3,000 daily vehicle trips and provide more than 300 parking spaces, a mandatory EIR will be required. Therefore, the project will exceed the thresholds for an Air Quality analysis, which will include an evaluation of impacts from both stationary and mobile sources of emissions.

Project Description

6. Section 1.3 of the ENF notes that geometric improvements are proposed at the intersection of Highland Avenue / Gould Street / Hunting Road. The widening of the roadway that will be required to accommodate the additional lanes at this location will also likely require reconstruction of the traffic signal at this intersection to accommodate new signal indications and mast arms, as well as vehicle detection and pedestrian signal equipment. No mention of the signal upgrades were provided in this section.

7. Figure 1.4 provides a graphic depiction of the roadway geometry proposed at the intersection of Highland Avenue / Gould Street / Hunting Road and along Gould Street fronting the site. While the geometry on the majority of the approaches appears consistent with the conceptual improvement sketches prepared as part of the former rezoning effort, the Hunting Road northbound approach to Highland Avenue and the receiving approach on Gould Street are inconsistent with the rezoning plans. The analysis and plans prepared as part of the rezone indicated that two through lanes would be required on Hunting Road with two receiving lanes on Gould Street to accommodate the traffic generated by the project. The capacity and queue analysis summarized in Table 2-15 of the ENF indicates that even with the mitigation measures proposed by the Applicant, the Hunting Road northbound movement will operate over capacity at level-of-service (LOS) F during the weekday AM and PM peak hours under 2029 Build with Mitigation conditions. The Highland Avenue eastbound left-turn movement will also operate at LOS F during the weekday AM peak hour. Therefore, the Applicant should consider the feasibility of providing an additional northbound lane on Hunting Road to improve the capacity and operations of this intersection.

Bicycle Accommodations

8. Section 2.3.4.1 of the ENF notes that a total of 89 bicycle parking spaces will be provided indoors and outdoors, but no description is given on how many spaces will be indoors and how many will be outdoors. The study also does not contain any assessment of the potential bicycle parking demand that could be generated and the adequacy of the number of bicycle parking spaces provided to accommodate this demand.

Collision History

9. Table 2-2 of the ENF does not provide a calculation of the crash rates (in crashes per million entering vehicles) experienced at any of the study area intersections. The crash rate is utilized to assess the significance of the crash occurrence at a study intersection by comparing the crash rate experienced to the statewide and district-wide averages for similar intersections and/or roadway segments. In addition, per MassDOT guidelines, collision diagrams should be prepared for any locations that experience an average of more than 3 crashes per year or a crash rate higher than the state or district-wide average. The Applicant should calculate the crash rates for all study area intersections and prepare collision diagrams, as necessary, to identify collision patterns at the study area intersections. For any location where 5 or more crashes of a similar type occurred over the analysis period, the Applicant should investigate measures to improve safety and mitigate collision occurrence.

Transportation Operations Analysis

10. According to Table 2-9, the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

11. The Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

12. Although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. GPI recommends the Applicant consider measures to reduce delay and improve operations at this location.

13. Similarly, the Hunting Road northbound approach to Kendrick Street will be well over capacity during the weekday AM peak hour under 2029 No-Build and Build conditions. GPI recommends the Applicant consider options for reducing delay and improving operations at this location.

14. The Webster Street and Cedar Street approaches to Central Avenue are expected to operate well over capacity with long delays and queues under 2029 No-Build and Build conditions, particularly during the weekday AM peak hour. The Applicant should investigate options for improving the operations of these intersections, including conducting a signal warrant analysis to assess whether a warrant for installation of traffic signal will be met at either of these locations.

15. As noted in Comment 7, even with the proposed mitigation at the Highland Avenue / Gould Street / Hunting Road intersection, some movements will continue operating at LOS F under 2029 Build with Mitigation conditions. Therefore, the Applicant should investigate the feasibility of providing additional capacity at this location to accommodate 2029 Build traffic volumes.

Traffic Monitoring Program

16. Section 2.7.3 of the ENF describes a transportation monitoring program that will be conducted post-occupancy to monitor parking occupancy and traffic operations at four of the study area intersections, including the site driveway. The Applicant should also provide monitoring of the effectiveness of the proposed TDM program in encouraging walking/biking, carpooling, and public transportation travel to/from the site.

17. The proposed traffic monitoring program will include the collection of vehicle turning movement counts during the weekday AM and PM peak periods at the following study area intersections:
    - Central Avenue / Gould Street
    - Gould Street / TV Place
    - Gould Street / Project Site Driveway
    - Highland Avenue / Gould Street / Hunting Road

    GPI agrees that these represent the critical locations that would experience the greatest increase in traffic due to the project. However, should the result of the monitoring study indicate that the actual traffic increase generated by the project exceeds the traffic projections contained within the ENF by ten percent or more, the study area for the monitoring program should be expanded to include additional locations to verify that the project's impacts does not create any operation deficiencies at nearby locations. In addition, the monitoring programs should include a capacity and queue analysis to verify the operations of each of the study area intersections under post-occupancy conditions. The monitoring program should also include the collection of daily traffic volumes on TV Place and the Project Site driveway to verify the daily traffic generated by the project.

Should you have any questions regarding these comments, please contact me directly at 603-766-5223.

Sincerely,

GREENMAN–PEDERSEN, INC.

Rebecca L. Brown, P.E.
Senior Project Manager

Massachusetts Highway Department

Statewide Traffic Data Collection

2017 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.30	1.23	1.21	1.04	0.98	0.92	0.86	0.81	0.95	0.99	1.03	1.10	0.80
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.05	1.01	1.04	0.99	0.94	0.93	0.91	0.92	0.96	0.94	1.01	1.03	0.97
R4-R7	1.10	1.07	1.09	1.00	0.95	0.89	0.88	0.87	0.92	0.95	1.04	1.09	0.93
U1-Boston	1.01	1.04	0.99	0.94	0.93	0.92	0.96	0.93	0.94	0.93	0.95	0.98	0.95
U1-Essex	1.04	1.05	1.00	0.96	0.93	0.89	0.90	0.90	0.93	0.93	0.98	1.03	0.90
U1-Southeast	1.07	1.05	1.02	0.97	0.95	0.90	0.89	0.88	0.92	0.94	0.98	1.01	0.97
U1-West	1.00	0.96	0.94	0.92	0.93	0.92	0.95	0.93	0.92	0.92	0.97	0.97	0.89
U1-Worcester	1.10	1.10	1.04	0.97	0.95	0.94	0.93	0.91	0.95	0.96	0.98	1.04	0.89
U2	1.01	1.03	0.98	0.95	0.93	0.91	0.94	0.92	0.95	0.95	0.95	0.97	0.98
U3	1.03	1.05	1.01	0.95	0.92	0.90	0.94	0.93	0.93	0.92	0.96	0.99	0.96
U4-U7	1.06	1.05	1.02	0.96	0.92	0.89	0.95	0.95	0.92	0.92	0.98	1.03	0.98
Rec - East	1.18	1.17	1.08	1.03	0.95	0.87	0.83	0.83	0.97	0.98	1.19	1.19	0.98
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.95

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

5/26/2020

Massachusetts Highway Department

Statewide Traffic Data Collection

2018 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.37	1.26	1.30	1.08	0.97	0.93	0.87	0.83	0.96	0.98	1.05	1.13	0.78
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.98
R4-R7	1.10	1.07	1.03	1.00	0.90	0.92	0.94	0.94	0.96	0.94	1.03	1.02	0.93
U1-Boston	1.05	0.98	1.01	0.93	0.92	0.91	0.95	0.93	0.94	0.92	0.96	0.99	0.96
U1-Essex	1.05	1.01	1.04	0.93	0.92	0.89	0.90	0.90	0.94	0.93	0.98	1.01	0.91
U1-Southeast	1.11	1.05	1.07	0.99	0.93	0.89	0.88	0.87	0.93	0.95	1.01	1.05	0.98
U1-West	1.15	1.08	1.07	0.98	0.94	0.92	0.92	0.88	0.92	0.91	1.00	1.06	0.83
U1-Worcester	1.18	1.11	1.09	0.99	0.95	0.94	0.95	0.91	0.97	0.97	1.01	1.05	0.87
U2	1.04	0.99	0.99	0.94	0.92	0.90	0.93	0.91	0.94	0.92	0.96	0.98	0.99
U3	0.99	1.00	1.02	0.96	0.91	0.89	0.92	0.90	0.95	0.92	1.01	0.97	0.97
U4-U7	1.03	1.02	0.97	0.95	0.88	0.89	0.96	0.93	0.94	0.93	1.00	1.00	0.99
Rec - East	1.22	1.15	1.09	1.12	0.90	0.89	0.82	0.83	0.92	0.98	1.06	1.08	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.97

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

5/26/2020

Massachusetts Highway Department

Statewide Traffic Data Collection

2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

5/26/2020

Planning Board Members
June 30, 2022

EXHIBIT C

RESPONSE TO GPI COMMENTS ON TRANSPORTATION IMPACT AND ACCESS STUDY (557 HIGHLAND AVENUE)

[see attached]

Memorandum

To: Lee Newman
Director of Community Planning and Development
Town of Needham, MA

Date: June 29, 2022

Project #: 15306.00

From: Sean Manning, PE, PTOE
Matthew Duranleau, PE

Re: Response to Transportation Impact and Access Study
Traffic Peer Review Comments dated May 27, 2022
By Greenman-Pedersen Inc. (GPI)
557 Highland Avenue
Needham, Massachusetts

Overview

VHB has received and reviewed the Transportation Impact and Access Study (TIAS) Transportation Engineering Peer Review submitted to the Town of Needham by the Town's traffic review firm, Greenman-Pederson, Inc (GPI), dated May 27, 2022, for the proposed 557 Highland Avenue redevelopment in Needham, Massachusetts. This memorandum summarizes VHB's responses to the comments. Each comment raised by the reviewer is listed below followed by the response by VHB. The comments follow the format and structure outlined in the Transportation Engineering Peer Review.

Since the submittal of the Transportation Engineering Peer Review, the Proponent has received feedback from the community and the Town of Needham on the proposed Gould Street off-site improvements, including the desire for more family-friendly bicycle accommodations and the wish to reduce the amount of new pavement added on Gould Street. Based on this feedback, the following roadway improvement concepts have been developed:

- Option 1: Previously Proposed Concept
- Option 2: Two-Way Separated Bicycle Lanes on East Side with Reduced Gould Street Cross-Section
- Option 3: Two-Way Separated Bicycle Lanes on West Side with Reduced Gould Street Cross-Section

Concept plans for the three improvement alternatives along Gould Street as well as for the intersection of Central Avenue at Gould Street are included in the Attachments to this memorandum.

The two additional improvement concept plans include dedicated sidewalk-level bicycle facilities in each direction along Gould Street between Highland Avenue and just north of TV Place. In addition, the two additional concepts eliminate the Gould Street dedicated northbound right-turn lane into TV Place and the dedicated southbound right-turn lane onto Highland Avenue based on feedback from the Town of Needham to reduce the amount of pavement. While these turn lanes were included in the initial concept design, the lanes are not required to provide an adequate level of operations for vehicles. Intersection traffic analyses for the new concepts are included in the Attachments to this memorandum.

Peer Review Comments

General Comments

1. As the project directly abuts the state highway layout (SHLO) on Interstate 95 / Route 128 and is anticipated to generate more than 3,000 vehicle trips per day (vpd), the project will require review by the Massachusetts Environmental Policy Act (MEPA) office in the form of an Environmental Notification Form (ENF) and a

mandatory Environmental Impact Report (EIR). An ENF was prepared by the Applicant and noticed in the Environmental Monitor on April 8, 2022. The TIAS was included as a chapter within the ENF. A Certificate on the ENF was issued by MEPA on May 9, 2022. GPI previously provided comments to the MEPA office on behalf of the Town of Needham regarding the ENF, and a copy of these comments in included as an Attachment for reference. Many of GPI's comments were incorporated into the recommendations of the ENF Certificate, which include:

a. Table 2-9 of the ENF indicates that the traffic operations at the intersections of Highland Avenue / West Street will drop from LOS C to D and the operations of Highland Avenue / Gould Street / Hunting Road will degrade from LOS E to F as a result of the additional traffic generated by the project. The Applicant is requested to explore the feasibility of implementing additional measures to improve operations at these locations, including an additional northbound lane on Hunting Road.

b. Collision diagrams should be prepared for any study area intersections experiencing an average of more than 3.0 collisions per year and a crash rate higher than the statewide or district-wide average. The Applicant should investigate measures to improve safety and mitigate collision occurrence at any locations where five or more collisions of a similar type have occurred over the analysis period.

c. The Applicant should perform an estimate of the potential bicycle parking demand generated by the project to ensure adequate bicycle parking is provided for an effective Transportation Demand Management (TDM) program.

Applicant Response: The Draft Environmental Impact Report (DEIR) will incorporate all comments received on the ENF and will include a response to comments chapter that will provide written responses to each respective comment. The DEIR is expected to be submitted on July 15, 2022.

2. The project will also require a Vehicular Access Permit from MassDOT for the proposed change-in-use of the property, as well as for the construction of off-site roadway improvements within the SHLO. As such, the ENF was reviewed by the MassDOT District 6 office, as well as the Public-Private Development Unit (PPDU). The following comments from MassDOT were incorporated into the ENF Certificate issued by MEPA:

   a. The Applicant should evaluate queuing at the study area intersections to ensure that lengthier queues do not impact the operation of roadways and railways within the study area.

      Applicant Response: To understand the queueing impacts of operations at each study area intersection under the 2022 Existing Conditions, 2029 No Build Conditions, and 2029 Build Conditions, queue diagrams have been developed for the weekday morning and weekday evening peak hours. The queue diagrams for each study area intersection are provided in the Attachments to this memorandum.

      As shown in the queue diagrams, the addition of the Project-generated vehicle trips is expected to result in minimal changes in queue lengths at most of the study area intersections. For intersections where there is a noticeable impact in queue caused by the Project, mitigation has been proposed to try and offset those impacts.

      While the maximum queues on the Highland Avenue westbound approach are expected to extend beyond the I-95 southbound off-ramp under the 2029 Build Conditions with mitigation during both

peak hours, this situation is expected to occur as well under the 2029 No Build Conditions without the Project. As the I-95 southbound off-ramp is over 1,500 feet in length, any queue on the I-95 southbound off-ramp is not expected to spill back onto the I-95 southbound mainline. In addition, the queues on Highland Avenue westbound are not expected to extend back far enough in the 2029 Build Condition to impact the weaving operations between the I-95 northbound off-ramp and the I-95 southbound on-ramp, which are expected to operate at LOS B or better.

b. The Applicant should perform an analysis of the existing and proposed weave conditions on Highland Avenue to ensure that the increased traffic volumes will not lead to degraded safety conditions in the area of the I-95 / Highland Avenue interchange.

Applicant Response: Weaving analyses based on methodology from the Highway Capacity Manual (HCM) were conducted on Highland Avenue at the I-95 interchange and presented in the TIA. For informational purposes, the weaving analyses results are presented below as well.

Weaving segment analyses were conducted at the following ramp junction locations:

- Highland Avenue Eastbound between the I-95 Southbound Off-Ramp and the I-95 Northbound On-Ramp
- Highland Avenue Westbound between the I-95 Northbound Off-Ramp and the I-95 Southbound On-Ramp

Analyses were conducted during the weekday morning and weekday evening peak hours under the 2022 Existing, 2029 No Build, and 2029 Build Conditions. A summary of the weave segment analyses is presented in Table 1 and the detailed analysis worksheets are provided in the Attachments to this memorandum.

Table 1 Weave Segment Capacity Analysis Summary

	2022 Existing Conditions			2029 No Build Conditions			2029 Build Conditions		
Location/Period	v/c[a]	Density[b]	LOS[c]	Demand	Density	LOS	Demand	Density	LOS
Highland Avenue EB between I-95 SB Off-Ramp and I-95 NB On-Ramp									
Weekday Morning	0.53	18.5	B	0.66	24.3	C	0.66	24.7	C
Weekday Evening	0.30	10.2	A	0.38	13.0	B	0.44	15.2	B
Highland Avenue WB between I-95 NB Off-Ramp and I-95 SB On-Ramp									
Weekday Morning	0.22	6.5	A	0.26	7.9	A	0.34	10.1	A
Weekday Evening	0.31	10.9	A	0.38	13.9	B	0.40	14.3	B

a volume to capacity ratio
b density, in passenger cars per mile per lane
c level of service

As shown in Table 1, the weaving locations for the interchange of Highland Avenue at I-95 are expected to operate at LOS C or better during the weekday morning and weekday evening peak hours under the 2022 Existing, 2029 No Build, and 2029 Build Conditions. The addition of Site-

generated traffic is not expected to result in a degrade in level of service for either Highland Avenue weaving location.

c. The Applicant should coordinate with the Massachusetts Bay Transit Authority (MBTA) to determine the feasibility of additional MBTA Bus Route 59 service closer to the project site and include feasible options in the Draft EIR.

Applicant Response: Prior to the submittal of the FEIR, the Proponent will reach out to the MBTA to understand if there are opportunities to modify bus access in the area to better support transit connectivity to the Project site. As noted in the TIA, the nearest MBTA bus stop to the Site for MBTA Route 59 is nearly a half-mile away on Webster Street. Since the publication of the ENF, the MBTA released a draft plan of the Bus Network Redesign in May 2022. The Bus Network Redesign is a full review and overhaul of all bus routes operated by the MBTA with the goal to create a better experience for current and future bus riders. The MBTA spent several years developing the draft Bus Network Redesign plan based on demographics, employment districts, traffic congestion, and travel patterns. As shown in the draft plan of the Bus Network Redesign, Route 59 is proposed to maintain its existing alignment through Needham while eliminating different variations of the route through Newton to simplify operations. Route 59 is expected to operate every 60 minutes or less between at least 6:00 AM and 7:00 PM, seven days a week.

The Proponent was requested in the ENF certificate to review the feasibility of providing additional MBTA Bus Route 59 service closer to the Site. As currently proposed, Route 59 will not travel closer to the Site than it does under existing conditions and will continue to operate along Webster Street and Central Avenue. As one of the goals of the Bus Network Redesign is to simplify operations, it is unlikely that a new variation of Route 59 would be supported that stops at the Site for some routes and continues to serve the residential areas along Webster Street and Central Avenue for other routes. If Route 59 was revised to directly serve the Site, it would no longer provide access to the residential areas along Webster Street and Central Avenue.

To maintain transit service to the residential areas along Webster Street and Central Avenue while also providing transit connection to the Site, the Proponent is committed to providing a dedicated shuttle service that will run between the Site and nearby public transportation stations, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. This will provide a direct connection between the Site and the public transportation network throughout greater Boston without negatively impacting transit service to the existing residential areas in Needham served by Route 59.

d. MassDOT requests that the Applicant consider installing bicycle and pedestrian improvements on Highland Avenue at the I-95 Interchange to connect with the proposed Complete Streets improvements being installed as part of MassDOT Project #606635 along Highland Avenue.

Applicant Response: Portions of Highland Avenue within the study area are currently under construction as part of the MassDOT Needham-Newton Corridor Project (MassDOT Project No. 606635). As part of this project, new raised bicycle lanes will be constructed in each direction along

Highland Avenue between Webster Street and just east of Gould Street / Hunting Road and between Wexford Street and the Charles River.

The segment of Highland Avenue within the I-95 interchange (including the bridge over I-95) was recently rebuilt and reconstructed as part of the Route 128/I-95 add-a-lane project. Construction was completed in 2018 and included significant improvements to the pedestrian and bicycle accommodations, including new sidewalks and buffered bicycle lanes on each side of Highland Avenue. The buffered bicycle lanes in each direction are separated from the general-purpose travel lanes on Highland Avenue by a painted buffer 2-4 feet in width which provides greater separation between vehicles and bicyclists than provided by traditional bicycle lanes. In addition, pedestrian and bicycle crossings were provided across all the interstate on-ramps and off-ramps, with signage and pavement markings included to enhance the visibility of the crossing pedestrians and bicyclists, with green paint used for the bicycle crossings.

The Proponent will coordinate with MassDOT to ensure the proposed improvements along Gould Street will tie into the accommodations along Highland Avenue. As the design for Highland Avenue went through many years of review and coordination, the Proponent will respect the recent and ongoing work on Highland Avenue and enhance the connections between Highland Avenue, the Site, and the nearby residential areas.

e. The Applicant should provide a description of the methodology to be used to estimate the effectiveness of the proposed Transportation Demand Management (TDM) measures and discuss what remedial measures will be taken if the monitoring program indicates that the TDM program is less effective than anticipated in reducing single-occupant vehicle (SOV) trips and encouraging alternative means of travel to/from the site.

Applicant Response: The success of the TDM plan will be measured based on the results of the transportation monitoring program. The transportation monitoring program will include annual 24-hour driveway and parking garage counts on-Site, peak hour turning movement counts and operational capacity analyses at four nearby intersections, and a travel survey for employees and customers on-Site. The transportation monitoring program will begin six months after full occupancy of the proposed development and continue for a period of five years. The results of each transportation monitoring program will be summarized in a report and provided to MassDOT and to the Town of Needham.

Based on the results of the transportation monitoring program, the Proponent will evaluate the TDM program to see if any modifications are necessary to further engage the employees and patrons of the Site to encourage the use of walking/biking, carpooling, and public transportation. If the transportation monitoring program indicates that the actual traffic increase generated by the Project exceeds the traffic projections contained within the TIA by ten percent or more , the Proponent will increase funding for the TDM program and add more measures to try and reduce the share of single occupancy vehicles accessing the Site. The Proponent will coordinate with the Town of Needham and MassDOT to determine potential additional TDM measures that could be implemented if the actual Site-generated volumes exceeds the projections in the TIA by 10-percent or more.

Memorandum

f. The proposed Transportation Monitoring Program should include a travel survey of employees and patrons of the site. Although MassDOT did not provide any further details on this request, it is assumed that the travel survey will be designed to verify the distribution of site-generated trips and mode share in order to assess the efficacy of the proposed TDM program.

Applicant Response: The proposed transportation monitoring program will include an annual travel survey of employees and patrons of the Site. The survey will be conducted by the Proponent and will include details on the mode of transportation employees and patrons use to access the Site as well as the effectiveness of the proposed TDM programs. The survey will also ask about hybrid work schedules to determine how frequently employees commute to the Site versus working from home. The results of the survey will be used to review the current TDM program and decide if any tweaks are necessary to further engage the employees and patrons of the Site to encourage the use of walking/biking, carpooling, and public transportation.

Study Area

3. The TIAS includes an evaluation of the impact to traffic operations associated with the project at a total of twenty (20) intersections, which include all nine of the study intersections included as part of the Traffic Impact Study prepared for the original rezoning. GPI concurs that the study area is appropriate for the size and scale of the development and includes those intersections which are likely to experience a measurable impact from the proposed redevelopment.

   Applicant Response: No response needed

Existing Conditions

4. The TIAS included an evaluation of the operations of the study area intersections during the weekday AM and PM peak periods, which are consistent with typical commuter peaks on the adjacent roadway networks. GPI concurs that these time periods represent the critical time periods for analysis as they represent the peak hours of both adjacent street traffic and site-generated vehicle trips.

   Applicant Response: No response needed

5. The Existing Conditions Vehicle Volumes were derived from traffic counts obtained from a number of sources, many of which were collected prior to the COVID-19 pandemic. New traffic counts were collected in July 2021 at the following intersections:

   - Central Avenue at Cedar Street
   - Central Avenue at Webster Street
   - Highland Avenue at Hunnewell Street

All other traffic counts contained within the traffic study were collected pre-pandemic and adjusted to existing conditions utilizing MassDOT's approved Yearly Growth Factors and balancing between intersections. Regardless of which traffic count was collected more recently, the traffic volumes between intersections were always balanced upward to the higher traffic count. GPI concurs that this methodology is acceptable and will result in the most conservative (highest) estimate of existing traffic conditions through the study area intersections.

Applicant Response: No response needed

6. Traffic counts at many of the study area intersections were obtained from previously seasonally-adjusted traffic volumes from other traffic studies. However, raw traffic counts collected in April 2017 were obtained from the Highland Avenue Reconstruction Functional Design Report for the Highland Avenue / Webster Street intersection. Similarly, raw traffic counts collected in January 2018 were obtained from the Northland Newton Development DEIR for the Highland Avenue intersections with the I-95 Northbound and Southbound ramps. MassDOT Weekday Seasonal Factors data was provided in the TIAS Appendix for the 2019 year only. Since the traffic counts were collected in 2017 and 2018, it would be expected that seasonal adjustment factors for those years would have been used to seasonally adjust the raw traffic volumes. MassDOT's Weekday Seasonal Factors data for 2017 and 2019 both indicate that traffic volumes in April represent above-average conditions for Group Factors U3-U7. Therefore, no seasonal adjustment would be required for the Highland Avenue / Webster Street intersection. It is unclear what, if any, seasonal adjustment factor was applied to the volumes at the Highland Avenue intersections with the I-95 ramps. However, the MassDOT Weekday Seasonal Factors data for 2018 indicates that January traffic volumes for Factor Group U3 represent above-average month conditions. Therefore, no seasonal adjustment factor would be required for the Highland Avenue intersections with the I-95 ramps.

   Applicant Response: No seasonal adjustments were applied to the intersection of Highland Avenue at Webster Street, as both the 2017 and 2019 MassDOT seasonal adjustment factors indicate that April represents a month with above-average traffic volumes. To provide a conservative analysis, the volumes at the Highland Avenue intersection with the I-95 ramps were seasonally adjusted by six percent based on the 2019 MassDOT seasonal adjustment factors, which indicate that traffic volumes in the month of January were approximately six-percent lower than average conditions for U3 roadways (principal arterials). While it would have been more accurate to use the 2018 MassDOT seasonal adjustment factors (since the counts were conducted in January 2018), using the 2019 MassDOT seasonal adjustment factors results in a more conservative analysis as the 2018 factors would have resulted in no seasonal adjustment.

7. No adjustment was applied to the traffic volumes collected in July 2021 to account for any variations due to COVID-19. However, these traffic counts were balanced upward with traffic counts collected at adjacent intersections under pre-COVID conditions. GPI concurs that this methodology for adjustment is acceptable.

   Applicant Response: No response needed

Memorandum

Collision History

8. Per MassDOT guidelines, collision diagrams should be prepared for any locations that experience an average of more than 3 crashes per year or a crash rate higher than the state or district-wide average. The intersection of Highland Avenue / West Street experienced an average of 4.4 crashes per year and a crash rate higher than the state and district-wide averages. Similarly, the Highland Avenue / Second Avenue intersection experiences an average of 6.6 collisions per year and a crash rate above the state and district-wide averages. Therefore, the Applicant should obtain detailed collision reports for these intersections and prepare collision diagrams to identify any collision patterns occurring at these locations, as well as potential measures to reduce the occurrence of such collisions.

   Applicant Response: Based on a review of the crash data, the following five intersections either have a crash rate above the district average or experienced an average of three or crashes per year:

   - Highland Avenue at West Street
   - Highland Avenue at Gould Street / Hunting Road
   - Highland Avenue at 1st Avenue
   - Highland Avenue at 2nd Avenue
   - Hunting Road at Kendrick Street

   Of these five intersections signalized intersections, only the intersection of Highland Avenue at West Street has a crash rate higher than the state and district-wide averages. Table 2 summarizes the crash rate for each intersection as compared to the district and state averages:

Table 2 Intersection Crash Rate Comparison

Location	Highland Ave at West St	Highland Ave at Gould St / Hunting Rd	Highland Ave at 1st Ave	Highland Ave at 2nd Ave	Hunting Rd at Kendrick St
Intersection Crash Rate [a]	0.86	0.44	0.41	0.64	0.63
District Average Crash Rate [b]	0.71	0.71	0.71	0.71	0.71
Statewide Average Crash Rate [c]	0.78	0.78	0.78	0.78	0.78
Exceeds District/ State Averages?	Yes	No	No	No	No

a intersection crash rates as reported in Table 2 (Vehicular Crash Summary) in the TIA.
b Average crash rate for signalized intersections in District 6 (the district in which Needham is located) based on MassDOT website.
c Statewide crash rate for signalized intersections based on MassDOT website.

It should be noted that several of these intersections are currently being reconstructed or have recently been reconstructed in connection with ongoing roadway improvements being led by MassDOT. The intersections of Highland Avenue at Gould Street/Hunting Road and Highland Avenue at 2nd Avenue are both currently being reconstructed as part of the MassDOT roadway improvements, and the intersection of Highland Avenue at 1st Avenue was reconstructed in 2018. Since the crash data reviewed was between 2015 and 2019, these improvements are expected to address some of the safety concerns and are not reflected in the crash data.

Collision diagrams have been developed at the identified intersections above, expect for the intersections of Highland Avenue at 1st Avenue and 2nd Avenue, as the crash data does not reflect roadway improvements

and the project-related impacts are smaller at those two intersections. The collision diagrams are included in the Attachments to this memorandum.

As shown in the collision diagrams, angle crashes were most prevalent at the three intersections studied. At Highland Avenue and West Street, 6 angle crashes and 3 side-swipe, same direction crashes occurred at the intersection and 2 crashes involved bicyclists. At Highland Avenue and Gould Street/Hunting Road, 6 angle and 4 side-swipe, same direction crashes occurred. At Hunting Road and Kendrick Street, 7 angle crashes occurred.

The high prevalent of angle crashes may indicate conflicts between turning vehicles and through vehicles. This could be caused by drivers becoming frustrated with congestion and trying to turn when there are insufficient gaps in opposing traffic. To improve operations and reduce congestion at the three intersections where collision diagrams were developed, signal timing modifications are proposed as mitigation.

9. The following additional intersections also experienced an average of more than three (3) collisions per year, and collision diagrams should be prepared to identify any collision patterns or potential mitigating measures at these intersections:

   - Highland Avenue / First Avenue
   - Hunting Road / Kendrick Street

   Applicant Response: As noted in the response to Comment 8, a collision diagram was developed for the intersection of Hunting Road at Kendrick Street. A collision diagram was not developed for the intersection of Highland Avenue at 1st Avenue, as that location was recently reconstructed which is not fully reflected in the crash data.

10. Although the intersection of Highland Avenue / Gould Street / Hunting Road also experienced more than three collisions per year, the crash rate was well below the state and district-wide averages. In addition, significant improvements were recently constructed by MassDOT that may reduce collisions at this location. Further, additional improvements are proposed at this intersection as mitigation for the proposed development, which may also impact collision occurrence. Therefore, preparation of a collision diagram for this location is not required. However, GPI recommends that the proposed Post-Occupancy Monitoring Program include a review of collisions occurring at this location following construction of the proposed mitigation measures to ensure that a new safety issue is not introduced.

    Applicant Response: Since the Project is expected to impact operations at the intersection of Highland Avenue at Gould Street/Hunting Road and the proposed mitigation will include geometric and signal changes at this location, a collision diagram was developed, as noted in the response to Comment 8. If requested by the Town of Needham and MassDOT, the Proponent will review crash data at the intersection as part of the proposed Post-Occupancy Monitoring Program to ensure that a new safety issue is not introduced.

Memorandum

2029 No-Build Conditions

11. The Applicant has projected traffic volumes to a seven-year design horizon consistent with MassDOT guidelines utilizing a background growth rate of 1.0 percent per year and adding traffic to be generated by other proposed or approved developments in the surrounding area. GPI concurs with this methodology.

    Applicant Response: No response needed

Trip Generation

12. Table 3 of the TIAS notes that the existing site-generated trips were estimated based on empirical traffic counts collected at the site driveways, which show only 887 daily trips are currently generated by the site. It is important to note that these empirical counts were collected in the fall of 2021, during COVID, and as a result, may under-estimate the trips generated by the site pre-COVID when it was fully operational. The use of the lower existing site-generated trips will result in a more conservative (higher) estimate of the net increase in trips generated by the proposed redevelopment.

    Applicant Response: Due to a lack of data for traffic volume entering and exiting the existing driveways on-Site prior to the beginning of the pandemic, the existing site-generated trips were counted on July 14, 2021. While this represents a condition during the COVID-19 pandemic, the counts were conducted after the Commonwealth was beginning to enter a "new normal" phase and after the emergency order was rescinded.

    To see if the site-generated trips observed in July 2021 generally aligns with the trip generation levels of a car wash and a car dealership, the empirical counts have been compared against the expected rates from the Institute of Transportation Engineers (ITE). Table 3 provides a comparison of the empirical rates for the previous uses and the ITE-generated rates (based on data provided in the ITE Trip Generation Manual). The ITE worksheets for the previous uses on-Site are included in the Attachments to this memorandum.

Table 3 Comparison of Empirical and ITE Trips for Existing Site Uses

	Empirical Counts (July 2021) [a]			ITE Trip Generation		
	Car Dealership	Car Wash	Total	Car Dealership [b]	Car Wash [c]	Total
Weekday Daily						
Enter	233	177	**410**	489	n/a	**n/a**
Exit	300	177	**477**	489	n/a	**n/a**
Total	533	354	**887**	978	n/a	**n/a**
Weekday Morning						
Enter	27	10	**37**	40	n/a	**n/a**
Exit	19	5	**24**	34	n/a	**n/a**
Total	46	15	**61**	75	n/a	**n/a**
Weekday Evening						
Enter	8	21	**29**	42	27	**69**
Exit	33	24	**57**	50	27	**77**
Total	41	45	**86**	92	54	**146**

a Based on actual counts by VHB in July 2021.
b Based on ITE LUC 840 (Automobile Car Sales (New)), using regression equation for daily trips and peak hour of generator trips.
c Based on ITE LUC 948 (Automated Car Wash), using average rates for peak hour of generator trips. No data provided for daily or weekday morning peak hour trips.

As shown in the table above, the empirical counts conducted in July 2021 are measurably lower than what would be expected based on ITE rates. The summer is generally a slower time for the previous uses on Site, especially for a car wash that commonly is busiest in the Winter and early Spring. Since the ITE trip rates are based on data collected at sites across the country over several decades and most-likely from different times of the year, it is not surprising that the empirical volumes do not exactly match the ITE-projected volumes and variation between the two sets of data is generally to be expected.

While July 2021 empirical data may represent a slightly lower volume of existing Site-generated trips than the Site may have generated on an average non-summer weekday prior to the pandemic, no adjustments have been made to the trip generation or the analyses presented in the TIA. Since the Site-generated volumes presented in the TIA include a credit for the trips currently generated by the Site, using the lower empirical data provides a much more conservative analysis for the trip generation and intersection operational analyses. Therefore, no changes have been made to the analyses to take further credit for the higher volume of trips that the Site may have generated by the previous uses on-Site.

13. The Applicant has estimated the site-generated vehicle trips based on Institute of Transportation Engineers (ITE) trip generation rates for Land Use Codes (LUC) 710 (General Office Building), 760 (Research and Development Center) and 822 (Strip Retail Plaza (<40,000 sf)) and applied a modest credit for internal capture of trips shared between uses on the site. In addition, the Applicant has assumed that 25 to 40 percent of the retail trips will be from pass-by trips (vehicles already on the adjacent roadway network passing by the site while traveling to another destination). GPI concurs with this methodology.

Applicant Response: No response needed

14. Although the Applicant has proposed a significant Transportation Demand Management (TDM) program, the Applicant has not applied any reduction in vehicle trips generated by the project for the implementation of the TDM program. While GPI agrees that this methodology will result in the most conservative (worst case) estimate of project's impacts on traffic operations through the study area, it should not excuse the Applicant from developing an effective TDM program or identify target mode share goals for the proposed TDM program. The Applicant should estimate the potential mode share and vehicle trip reduction anticipated from implementing the proposed TDM program and identify mode share goals to be monitored and evaluated as part of the Post-Occupancy Monitoring Program.

    Applicant Response: The Proponent is strongly committed to implementing the TDM measures to the greatest extend feasible to reduce single-occupancy vehicle travel to and from the Site. The Proponent will use the 128 Business Council as a resource when implementing the TDM measures as the 128 Business Council has many years of experience with TDM plans as a Transportation Management Association.

    As presented in the TIA, the trip generation estimates were developed assuming 100-percent of the Site-generated traffic would use private vehicles to access the Site. This was a conservative analysis used to identify the "worst-case" scenario of vehicular impacts that the Site could generate. With the proposed TDM program, the investment in pedestrian and bicycle infrastructure, and the dedicated shuttle between the Site and nearby transit stations, the Proponent is committed to ensuring that the percentage of Site-generated traffic using private vehicles is measurably less than 100-percent. With the future of hybrid work schedules and employees working from home, it is also likely that not all employees who work on-Site will commute to the workplace five days a week.

    Data from the US Census Bureau was reviewed to determine the actual mode share characteristics for employees who commute to workplaces in the Town of Needham. Based on the data, approximately 95-percent of all employees who commute to workplaces in the Town of Needham do so via private automobile while two percent use public transit and three percent walk or bike. With the strong TDM program and mitigation measures, the percentage of employees that take alternative forms of transportation is anticipated to be higher than that generated by other workplaces within the Town of Needham. The existing mode share data is included in the Attachments to this memorandum.

    The success of the TDM plan will be measured based on the results of the transportation monitoring program. The Proponent will use the results of the transportation monitoring program to review the current TDM program and decide if any tweaks are necessary to further engage the employees and patrons of the Site to encourage the use of walking/biking, carpooling, and public transportation.

Transportation Demand Management (TDM) Measures

15. The Applicant has proposed the following transit-related measures as part of the TDM program:

    - Explore the feasibility of providing shuttle service connectivity to nearby public transportation nodes (commuter rail and Green Line);

- Require tenants to provide a 50 percent transit pass subsidy for their employees;
- Carpool assistance and incentives;
- Emergency ride home;
- Display in the Main Lobby transportation-related information for tenants' employees and visitors; and
- Promotional efforts.

The Applicant should provide additional information on how carpool assistance and emergency ride home services will be provided, as well as what incentive program may be implemented. In addition to providing shuttle service to nearby commuter rail and Green Line services, the Applicant should explore the possibility of extending bus service to the site.

Applicant Response: The Proponent is committed to having an on-Site Employee Transportation Coordinator. Part of the job of the Employee Transportation Coordinator may be to assist in helping employees coordinate carpools, such as by creating a database of employees interested in carpooling and linking them with other employees interested in carpooling who live in the same direction. The Employee Transportation Coordinator may also provide incentives such as raffles with small prizes and other events to promote carpooling and commuting via transit, walking, and biking.

In addition, the Proponent is committed to joining the 128 Business Council, which serves as the Transportation Management Association (TMA) for the local area. As members of the 128 Business Council, employees on-Site will be able to take advantage of their emergency ride home program. The program provides commuters who use alternative transportation with a guaranteed ride home in the event of an emergency. To use this program, employees can be reimbursed for a taxi or ride-share ride for trips within 10 miles of the Site or be reimbursed for the cost of a rental car for trips more than 10 miles away from the Site. Details of the 128 Business Council's emergency ride home program can be found at the link below:

https://128bc.org/resources/emergency-ride-home/

As noted in the traffic study, the nearest MBTA bus stop to the Site is nearly a half-mile away on Webster Street along MBTA Route 59. The MBTA in May 2022 released a draft plan of the Bus Network Redesign which proposes to keep Route 59 on its existing alignment through Needham while eliminating variations of Route 59 through Newton to simplify operations. If Route 59 was revised to directly serve the Site, it would no longer provide access to the residential areas along Webster Street and Central Avenue. To maintain transit service to the residential areas along Webster Street and Central Avenue while also providing transit connection to the Site, the Proponent is committed to providing a dedicated shuttle service that will run between the Site and nearby public transportation stations, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. This will provide a direct connection between the Site and the public transportation network throughout greater Boston without negatively impacting the existing MBTA bus service through Needham.

Bicycle Accommodations

16. Section 2.3.4.1 of the ENF notes that a total of 89 bicycle parking spaces will be provided indoors and outdoors, while the TIAS describes a total of only 70 bicycle parking spaces proposed on the site. The Applicant should clarify this discrepancy.

    Applicant Response: The number of bicycle parking spaces to be provided on-Site has increased since the submittal of the TIA. As currently proposed, the Project will provide covered and secured bicycle parking spaces within its buildings and in outdoor spaces, where public bicycle racks will be installed near building entrances for Project visitors. Specifically, the Project will include up to 104 indoor and secure bicycle parking spaces on-Site for employees and up to 50 outdoor bicycle parking spaces on public bicycle racks for visitors and customers for a total of up to 154 bicycle parking spaces on-Site.

17. No description has been provided within the ENF or TIAS on how many bicycle parking spaces will be indoors and how many will be outdoors. The studies also do not contain any assessment of the potential bicycle parking demand that could be generated and the adequacy of the number of bicycle parking spaces provided to accommodate this demand. The Applicant should provide an evaluation of the potential bicycle parking demand to ensure that adequate bicycle parking is provided to encourage use of bicycle as a means of traveling to/from the site.

    Applicant Response: The Project will include up to 104 indoor and secure bicycle parking spaces on-Site for employees and up to 50 outdoor bicycle parking spaces on public bicycle racks for visitors and customers to the Site.

    As presented in the TIA, the trip generation estimates were developed assuming 100-percent of the Site-generated traffic would use private vehicles to access the Site. This was a conservative analysis used to identify the "worst-case" scenario of vehicular impacts that the Site could generate. The actual percentage of employees commuting by private vehicle will be less than 100-percent.

    To determine if the proposed bicycle parking supply is sufficient for the anticipated bicycle demand, data from the US Census Bureau was reviewed to determine the existing mode share characteristics for employees who commute to workplaces in the Town of Needham. Based on the data, approximately one percent of all existing employees who commute to workplaces in the Town of Needham do so by bicycle (the existing mode share data is included in the Attachments). With the proposed TDM program and the investment in pedestrian and bicycle infrastructure, the percentage of employees arriving and departing by alternative modes of transportation, including by bicycle, is expected to exceed the rates for existing workplaces in the Town of Needham. For the purposes of determining if the proposed bicycle parking supply is sufficient for the anticipated bicycle demand, a conservative five-percent bicycle mode share has been assumed.

    Table 4 summarizes the proposed bicycle parking demand for the Project Site based on the trip generation presented in the TIA.

Table 4 Proposed Bicycle Parking Spaces

Period	Vehicle Trips [a]	Bike Mode Share Estimate [b]	Bike Trip Estimate [c]	Proposed Bicycle Parking: Long-term Spaces	Proposed Bicycle Parking: Short-term Spaces	Proposed Bicycle Parking: Total Bike Spaces
Weekday Daily						
Enter	2,536	5% enter	**127**	104	50	**154**
Exit	2,469	5% exit	124			

a Total Net New Vehicle Trips expected to be generated by the Project, as presented in Table 2-5 of the TIA.
b Conservative bicycle mode share of five percent based on area projects.
c Estimated daily bike trips generated by the Project assuming a five-percent bike share.

Using a conservative estimated bicycle trip rate, a maximum of 127 entering bicycle trips would be expected to be generated by the Project over the course of an average weekday. As shown in Table 4, up to 154 bicycle parking spaces will be provided on-Site. Since the total number of bicycle parking spaces on-Site will exceed the maximum daily bicycle trips generated by the Site, the bicycle parking supply is expected to be sufficient for the anticipated bicycle parking demand. This is true without considering that not all bicyclists will be on-Site at the same time and thus not all bicyclists will need their own dedicated bicycle parking spaces.

In addition, the Proponent will monitor the actual level of bicycle demand on-Site once the Project opens. If it is determined that the bicycle mode share exceeds the five percent assumed in the bicycle parking demand and additional bicycle parking is required, the Proponent will install additional bicycle parking spaces on-Site.

Proposed Mitigation

18. The TIAS describes geometric improvements that are proposed at the intersection of Highland Avenue / Gould Street / Hunting Road as mitigation for the project, which are shown graphically in Figure 16. The widening of the roadway that will be required to accommodate the additional lanes at this location will also likely require reconstruction of the traffic signal at this intersection to accommodate new signal indications and mast arms, as well as vehicle detection and pedestrian signal equipment. No mention of the signal upgrades was provided in the TIAS and no signal improvements are shown in Figure 16.

    Applicant Response: The widening of Gould Street will likely require the reconstruction of the traffic signal at the intersection of Highland Avenue at Gould Street/Hunting Road to accommodate new signal indications, mast arms, vehicle detection, and pedestrian signal equipment. The Proponent will coordinate with MassDOT and the Town of Needham on this additional construction work as the off-Site mitigation design progresses.

19. Figure 16 of the TIAS provides a graphic depiction of the roadway geometry proposed at the intersection of Highland Avenue / Gould Street / Hunting Road and along Gould Street fronting the site. The Figure does not include the Highland Avenue eastbound or Hunting Road northbound approaches to the intersection, so it is difficult to identify what, if any, improvements are proposed on those approaches. However, Figure 1.4 of the ENF also provides a similar graphic that includes all approaches to the intersection. While the geometry on the majority of the approaches appears consistent with the conceptual improvement sketches prepared as part of the former rezoning effort, the Hunting Road northbound approach to Highland Avenue and the

receiving approach on Gould Street are inconsistent with the rezoning plans. The analysis and plans prepared as part of the rezone indicated that two through lanes would be required on Hunting Road with two receiving lanes on Gould Street to accommodate the traffic generated by the project. The capacity and queue analysis summarized in Table 15 of the TIAS indicates that even with the mitigation measures proposed by the Applicant, the Hunting Road northbound movement will operate over capacity at level-of-service (LOS) F during the weekday AM and PM peak hours under 2029 Build with Mitigation conditions. The Highland Avenue eastbound left-turn movement will also operate at LOS F during the weekday AM peak hour. Therefore, the Applicant should consider the feasibility of providing an additional northbound lane on Hunting Road to improve the capacity and operations of this intersection.

Applicant Response: The conceptual improvements proposed as part of the rezoning of the Site were reviewed when developing the mitigation for the Project. The traffic study submitted by GPI for the rezoning of the Site included a conceptual improvement plan at the intersection of Highland Avenue at Gould Street/Hunting Road that included two lanes on the Hunting Road northbound approach, a shared left-turn/through lane and a right-turn lane, and one receiving lane on Gould Street north of the intersection. This geometry matches what is currently proposed by the Proponent. As noted in the ENF, the only difference between the previous concept plan and the plan proposed in the TIA is the exclusion of a dedicated right-turn lane on the Highland Avenue westbound approach, as adding a right-turn lane would introduce a weaving conflict between vehicles on Highland Avenue westbound and vehicles on the I-95 southbound off-ramp that would cause safety concerns. A figure of the concept plan from the GPI traffic study supporting the rezoning of the Site is included in the Attachments of this memorandum for reference.

While expanding the Hunting Road cross-section would provide additional capacity at the intersection, an additional northbound lane cannot be implemented without taking significant property outside of the right-of-way. This would have a major impact on the property at 580 Highland Avenue and could require the razing of the existing house on that property. Therefore, to limit the right-of-way impacts, no expansion of Hunting Road is proposed.

To improve operations on the Hunting Road approach, the proposed signal cycle lengths and/or phase splits during the weekday morning and weekday evening peak hours were further reviewed and adjusted from what was proposed in the previously submitted traffic study. Since the new signalized intersection of Gould Street at the Site driveway is proposed to be coordinated with the intersection of Highland Avenue at Gould Street/Hunting Road, timing adjustments and operation changes at one intersection will also impact operations at the second intersection.

As noted previously, based on feedback from the community and from the Town of Needham, the Proponent has revised the design for the proposed improvements on Gould Street and developed two additional concept plans. The new concept plans both includes sidewalk-level bicycle facilities to provide a family-friendly bicycle accommodation and eliminates the dedicated southbound right-turn lane from Gould Street to Highland Avenue and the dedicated northbound right-turn lane from Gould Street to TV Place to reduce the amount of pavement. The removal of the dedicated southbound right-turn lane also has the added benefit of shortening the pedestrian crossing. The wider Gould Street cross-section was proposed in the 2020 traffic study to support the rezoning of the site based on the "worst-case" scenario for the full buildout of the site and the adjacent Channel 5 property, which included up to 130,000 SF of retail space. As the actual

Project will generate fewer trips than what was evaluated when the cross-section was designed, Gould Street no longer needs to be as expansive to accommodate the Site-generated traffic.

Table 5 summarizes the intersection capacity analyses at the intersections of Highland Avenue at Gould Street/Hunting Road and Gould Street at Site driveway during the weekday morning and weekday evening peak hours with the revised southbound geometry and the revised signal timings in place. The intersection capacity worksheets are included in the Attachments to this memorandum. It should be noted that the elimination of the Gould Street northbound right-turn lane onto TV Place is not expected to impact operations as the northbound approach is under free-flow conditions.

Memorandum

Table 5 Intersection Capacity Analysis Summary – Highland Avenue at Gould Street/Hunting Road

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at Gould Street and Hunting Road															
Weekday Morning															
Highland Ave EB L	1.04	>120	F	~93	#234	>1.20	>120	F	~190	#353	0.96	115.7	F	153	#330
Highland Ave EB T/R	0.86	40.2	D	364	#512	0.79	36.6	D	364	#512	0.66	30.2	C	363	503
Highland Ave WB L	0.58	58.6	E	36	83	0.61	65.3	E	38	83	0.42	61.4	E	42	83
Highland Ave WB T/R	0.94	52.1	D	362	#545	1.15	117.8	F	~616	#841	0.97	54.3	D	587	#797
Hunting Rd NB L/T	0.96	89.0	F	206	#434	1.13	>120	F	~263	#480	0.96	96.8	F	265	#433
Hunting Rd NB R	0.48	39.8	D	48	102	0.51	44.0	D	52	102	0.53	46.1	D	93	136
Gould St SB L	0.82	64.8	E	145	#281	0.91	84.5	F	182	#347	0.70	71.7	E	136	180
Gould St SB L/T/R	0.78	59.4	E	137	#264	0.88	77.3	E	175	#335	0.57	72.7	E	107	166
Overall	**0.98**	**55.1**	**E**	-	-	**1.20**	**100.2**	**F**	-	-	**0.95**	**55.5**	**E**	-	-
Weekday Evening															
Highland Ave EB L	>1.20	>120	F	19	57	>1.20	>120	F	27	72	0.60	58.2	E	24	57
Highland Ave EB T/R	0.81	42.3	D	287	440	0.81	42.4	D	290	442	0.74	32.8	C	252	#373
Highland Ave WB L	0.86	83.3	F	100	194	0.87	84.5	F	101	196	0.78	61.6	E	89	#182
Highland Ave WB T/R	1.00	61.7	E	~535	#774	1.07	84.0	F	~599	#861	1.02	61.3	E	~527	#702
Hunting Rd NB L/T	0.56	51.4	D	66	127	0.58	52.2	D	70	134	0.73	61.0	E	65	#126
Hunting Rd NB R	0.10	35.7	D	4	24	0.10	35.7	D	4	24	0.07	34.2	C	0	5
Gould St SB L	0.91	61.1	E	295	#574	>1.20	>120	F	~681	#1051	0.97	61.6	E	310	#376
Gould St SB L/T/R	0.88	56.9	E	284	#554	>1.20	>120	F	~653	#1022	0.76	45.5	D	228	#239
Overall	**1.03**	**59.5**	**E**	-	-	**>1.20**	**>120**	**F**	-	-	**1.05**	**52.9**	**D**	-	-
Gould Street at Wingate Driveway / Project Site Driveway															
Weekday Morning															
Wingate Dwy EB L/T/R	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.01	61.9	E	0	0
Site Dwy WB L											0.50	65.0	E	46	90
Site Dwy WB L/T/R											0.29	62.1	E	25	68
Gould St NB L/T											0.57	5.0	A	153	m273
Gould St NB R											0.31	4.0	A	22	m78
Gould St SB L											0.08	3.1	A	3	24
Gould St SB T/R											0.15	3.0	A	20	88
Overall											**0.54**	**7.8**	**A**		
Weekday Evening															
Wingate Dwy EB L/T/R	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.03	43.4	D	0	12
Site Dwy WB L											0.75	44.2	D	174	187
Site Dwy WB L/T/R											0.70	41.6	D	163	176
Gould St NB L/T											0.31	10.7	B	56	m252
Gould St NB R											0.07	13.2	B	1	m30
Gould St SB L											0.03	8.8	A	4	21
Gould St SB T/R											0.37	11.4	B	124	270
Overall											**0.44**	**21.8**	**C**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

As shown in the table above, the southbound shared through/right-turn lane is expected to operate at acceptable levels of service without providing dedicated through and right-turn lanes and queues are not expected to spill back to the upstream intersection at the Site driveway. The shared lane is expected to operate at LOS E during the weekday morning peak hour and LOS D during the weekday evening peak hour with volume-to-capacity ratios of less than 0.80 during both peak hours.

During the weekday morning peak hour, while the Hunting Road northbound left-turn/through movements and the Highland Avenue eastbound left-turn movements are still expected to operate at LOS F under the 2029 Build Conditions with the proposed mitigation, the amount of delay and volume-to-capacity ratios are expected to be better than or similar to operations under the 2029 No Build Conditions and the overall intersection delay is expected to be nearly the same as under the 2029 No Build Conditions. During the weekday evening peak hour, the Hunting Road northbound left-turn/through movement is expected to operate at LOS E with the proposed mitigation, which is similar to operations for movements on the other approaches. The intersection of Gould Street at the Site driveway is expected to operate at overall LOS C or better under the 2029 Build Conditions with mitigation.

As noted in the traffic study, construction is currently ongoing on the MassDOT Needham-Newton corridor project along Highland Avenue to improve safety and pedestrian/bicycle accommodations. The project includes geometric and signal improvements along the corridor and new sidewalks and separated bicycle lanes. The roadway redesign project has been in the works for many years and has gone through several rounds of public comments to reach the current construction plan. It should be noted that the MassDOT reconstruction project does not include a significant enhancement of capacity at the intersections along Highland Avenue, as the design prioritizes safety and active transportation enhancements over additional vehicle capacity and several movements are expected to operate at LOS F with the roadway project in place. Since the 2029 No Build Conditions reflect the completed MassDOT roadway design at the intersection of Highland Avenue at Gould Street/Hunting Road, the proposed mitigation at the intersection has been designed to accommodate the additional Site-generated traffic while operating similarly to the 2029 No Build Conditions, which reflects the MassDOT vision of the corridor.

20. Figure 15 of the TIAS depicts improvements to be constructed at the Central Avenue / Gould Street intersection as mitigation for the project, which include restriping of Central Avenue to provide a westbound left-turn lane and installation of a fully-actuated traffic signal. The proposed signal equipment is not depicted on the plans. The Applicant should obtain survey information at this location to verify whether the proposed improvements can be constructed within the publicly-available right-of-way and whether any easements will be required for the proposed signal equipment. In addition, the Applicant should perform vehicle turning movement analysis to verify that that the proposed curb radii and STOP line locations will allow emergency vehicles and trucks to safely navigate the intersection without encroaching on opposing traffic flows.

    Applicant Response: An updated concept plan has been developed for the proposed improvements at the intersection of Central Avenue at Gould Street and is included in the Attachments to this memorandum. The updated concept plan is based on survey data and includes the proposed location of the signal equipment. As noted on the modified concept plan, a small easement is likely to be required for the installation of a mast arm on the north side of Central Avenue between the driveways for 153 Gould Street and 161 Gould Street. All other signal equipment is proposed to be located within the existing roadway right of-way.

The intersection has been designed to accommodate the turning radii of a WB-40 turning from Central Avenue onto Gould Street without encroaching on opposing traffic flows. This is an improvement over existing conditions where the largest vehicles that can make the turning maneuver without encroaching on opposing traffic flow is a SU-30. Larger vehicles will be able to perform turning maneuvers at the intersection but may result in slight encroachment into the opposing travel lane, which is similar to existing turning movements at intersections along Central Avenue and Gould Street.

It should be noted that the proposed improvements at the intersection of Central Avenue at Gould Street are still in the early design phases and the Proponent will coordinate with the Town of Needham on the specific details of the final design.

Transportation Operations Analysis

21. According to Table 9, the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

    Applicant Response: The Proponent has reviewed the signal timings at the intersection of Highland Avenue at West Street during the weekday evening peak hour and determined that if the following signal timing adjustments were made, operations would improve for the southbound approach without adversely impacting movements on the other approaches:

    - Increase cycle length to 125 seconds
    - Provide the following splits for each movement:
        - 51 seconds for the West Street eastbound/westbound approaches, with a 17 second leading eastbound left-turn phase
        - 54 seconds for the Highland Avenue northbound/southbound approaches
        - 20 seconds for exclusive pedestrian crossings

    Table 6 summarizes the intersection capacity analyses at the intersection of Highland Avenue at West Street during the weekday evening peak hour with the revised signal timings in place and the intersection capacity worksheets are included in the Attachments to this memorandum.

Memorandum

Table 6 Intersection Capacity Analysis Summary – Highland Avenue at West Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at West Street															
Weekday Evening															
West St EB L	0.60	26.2	C	70	154	0.61	26.7	C	73	159	0.64	31.4	C	87	178
West St EB T/R	0.46	20.9	C	123	251	0.46	20.9	C	123	251	0.48	24.9	C	148	281
West St WB L	0.36	30.7	C	35	88	0.36	30.7	C	35	88	0.39	36.2	D	42	98
West St WB T/R	0.66	36.3	D	117	229	0.66	36.3	D	117	229	0.71	44.3	D	140	256
Highland Ave NB L/T/R	0.82	28.1	C	225	#664	0.83	29.0	C	229	#675	0.78	26.2	C	254	#669
Highland Ave SB L/T/R	0.97	50.7	D	320	#889	1.05	72.0	E	369	#978	0.98	53.4	D	408	#994
Overall	**0.81**	**35.3**	**D**	-	-	**0.85**	**43.3**	**D**	-	-	**0.84**	**38.4**	**D**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
95th percentile volume exceeds capacity, queue may be longer.

As shown in the table above, modifying the signal timings at this location would reduce the delay for the Highland Avenue southbound movements from 72 seconds to 53 seconds, which nearly offsets the increase in delay caused by the additional Site-generated traffic through the intersection. With the modified signal timings, the overall intersection delay of 38 seconds under the 2029 Build Conditions would be similar to the overall intersection delay of 35 seconds under the 2029 No Build Conditions without the Project in place. In addition, the signal timing adjustments results in volume-to-capacity ratios of less than 1.00 for all movements.

22. The Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has not proposed any measures to mitigate this impact. The Applicant should investigate measures to mitigate this significant impact to operations.

Applicant Response: The Proponent has reviewed the signal timings at the intersection of Highland Avenue at Webster Street during the weekday morning peak hour and determined that if the following signal timing adjustments were made, operations would improve for the eastbound approach without adversely impacting movements on the other approaches:

› Increase cycle length to 130 seconds
› Provide the following splits for each movement:
  - 65 seconds for the Highland Avenue eastbound/westbound approaches, with a 16 second leading westbound left-turn phase
  - 28 seconds for exclusive pedestrian crossings
  - 37 seconds for the Webster Avenue northbound/southbound approaches

Memorandum

Table 7 summarizes the intersection capacity analyses at the intersection of Highland Avenue at Webster Street during the weekday morning peak hour with the revised signal timings in place and the intersection capacity worksheets are included in the Attachments to this memorandum.

Table 7 Intersection Capacity Analysis Summary – Highland Avenue at Webster Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Ave at Webster Street															
Weekday Morning															
Highland Ave EB L	0.14	22.7	C	13	50	0.14	22.7	C	13	50	0.12	22.1	C	14	52
Highland Ave EB T/R	1.00	67.6	E	290	#745	1.08	93.4	F	330	#830	0.92	49.1	D	366	#861
Highland Ave WB L	0.55	20.9	C	32	109	0.55	21.5	C	32	109	0.63	27.0	C	39	#152
Highland Ave WB T/R	0.64	18.5	B	180	473	0.64	18.6	B	182	480	0.61	19.1	B	223	531
Webster St NB L/T	0.90	56.0	E	189	#471	0.90	56.0	E	189	#471	0.86	54.6	D	223	#474
Webster St NB R	0.40	24.4	C	25	122	0.40	24.4	C	25	122	0.47	30.2	C	51	177
Webster St SB L/T/R	>1.20	35.0	D	69	#160	>1.20	35.0	D	69	#160	>1.20	39.1	D	82	164
Overall	**0.91**	**39.2**	**D**	-	-	**0.95**	**46.3**	**D**	-	-	**0.87**	**36.8**	**D**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
95th percentile volume exceeds capacity, queue may be longer.

As shown in the table above, modifying the signal timings at this location would reduce the delay for the Highland Avenue eastbound through/right movements from 93 seconds to 49 seconds, which more than offsets the increase in delay caused by the additional Site-generated traffic through the intersection. With the modified signal timings, the overall intersection delay of 37 seconds under the 2029 Build Conditions would be lower than the overall intersection delay of 39 seconds under the 2029 No Build Conditions without the Project in place.

23. Although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. GPI recommends the Applicant consider measures to reduce delay and improve operations at this location.

Applicant Response: The Proponent has reviewed the signal timings at the intersection of Highland Avenue at 1st Avenue during the weekday evening peak hour and determined that if the following signal timing adjustments were made, operations would improve for the westbound approach without adversely impacting movements on the other approaches:

Memorandum

› Increase cycle length to 115 seconds
› Provide the following splits for each movement:
  - 50 seconds for the Highland Avenue eastbound/westbound approaches, with 3 second leading pedestrian intervals
  - 29 seconds for the southbound driveway approach and the crosswalk across Highland Avenue
  - 36 seconds for the 1st Avenue northbound approach

Table 8 summarizes the intersection capacity analyses at the intersection of Highland Avenue at 1st Avenue during the weekday evening peak hour with the revised signal timings in place and the intersection capacity worksheets are included in the Attachments to this memorandum.

Table 8 Intersection Capacity Analysis Summary – Highland Avenue at 1st Avenue

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at 1st Avenue															
Weekday Evening															
Highland Ave EB L/T	0.65	23.6	C	192	#418	0.68	24.2	C	203	#444	0.58	22.0	C	231	427
Highland Ave EB R	0.19	2.4	A	0	12	0.19	2.4	A	0	12	0.19	2.7	A	0	24
Highland Ave WB L/T	>1.20	>120	F	~626	#975	>1.20	>120	F	~630	#980	1.08	76.8	E	~651	#1090
1st Ave NB L	0.69	27.3	C	222	296	0.69	27.3	C	222	296	0.82	46.4	D	291	#532
1st Ave NB L/T/R	0.55	23.9	C	144	216	0.55	23.9	C	144	216	0.68	37.6	D	207	#396
Driveway SB L/T/R	0.10	44.5	D	2	15	0.10	44.5	D	2	15	0.06	52.1	D	3	13
Overall	**0.99**	**81.5**	**F**	-	-	**0.99**	**82.0**	**F**	-	-	**0.95**	**50.1**	**D**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

As shown in the table above, modifying the signal timings at this location would reduce the delay for the Highland Avenue eastbound through/right movements from over 120 seconds to 77 seconds, which is better than the operations under the 2029 No Build Conditions without the Project in place. The overall intersection level of service would improve from LOS F to LOS D with the signal timing adjustments.

24. Similarly, the Hunting Road northbound approach to Kendrick Street will be well over capacity during the weekday AM peak hour under 2029 No-Build and Build conditions. GPI recommends the Applicant consider options for reducing delay and improving operations at this location.

Applicant Response: The Proponent has reviewed the signal timings at the intersection of Hunting Road at Kendrick Street during the weekday morning peak hour and determined that if the following signal timing adjustments were made, operations would improve for the northbound approach without adversely impacting movements on the other approaches:

Memorandum

› Maintain cycle length of 90 seconds
› Provide the following splits for each movement:
  - 29 seconds for the Kendrick Street eastbound/westbound approaches, with a 12 second leading westbound left-turn phase
  - 37 seconds for the Hunting Road northbound/southbound approaches, with an 11 second lagging southbound left-turn phase
  - 24 seconds for exclusive pedestrian crossings

Table 9 summarizes the intersection capacity analyses at the intersection of Hunting Road at Kendrick Street during the weekday morning peak hour with the revised signal timings in place and the intersection capacity worksheets are included in the Attachments to this memorandum.

Table 9 Intersection Capacity Analysis Summary – Hunting Road at Kendrick Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Hunting Road at Kendrick Street															
Weekday Morning															
Kendrick St EB L/T/R	0.43	19.5	B	109	#252	0.43	19.6	B	110	#253	0.49	23.5	C	124	#298
Kendrick St WB L	0.23	11.0	B	20	71	0.23	11.0	B	20	71	0.26	13.6	B	23	77
Kendrick St WB T/R	0.31	12.4	B	72	213	0.33	12.7	B	78	227	0.37	15.8	B	93	249
Hunting Rd NB T/R	>1.20	>120	F	~285	#461	>1.20	>120	F	~285	#461	0.93	60.3	E	219	#386
Hunting Rd NB R	0.39	0.7	A	0	0	0.39	0.7	A	0	0	0.39	0.7	A	0	0
Hunting Rd SB L	0.42	38.0	D	32	65	0.45	38.2	D	34	69	0.39	34.1	C	31	63
Hunting Rd SB T/R	0.14	24.3	C	28	60	0.14	24.3	C	27	60	0.11	20.8	C	24	54
Overall	**0.68**	**41.7**	**D**	-	-	**0.68**	**42.1**	**D**	-	-	**0.67**	**22.3**	**C**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

As shown in the table above, modifying the signal timings at this location would reduce the delay for the Hunting Road northbound movements from over 120 seconds to 60 seconds, which is better than the operations under the 2029 No Build Conditions without the Project in place. The overall intersection level of service would improve from LOS D to LOS C with the signal timing adjustments.

It should be noted that the traffic signal at this intersection is coordinated with the intersection of Kendrick Street at the I-95 Southbound Ramps to the east, which was not included as a study area intersection in the TIA. It should be confirmed that modifying the splits at the Hunting Road at Kendrick Street intersection will not adversely impact operations at the adjacent signalized intersection before implementing the signal timing adjustments.

25. The Webster Street and Cedar Street approaches to Central Avenue are expected to operate well over capacity with long delays and queues under 2029 No-Build and Build conditions, particularly during the weekday AM peak hour. The Applicant should investigate options for improving the operations of these intersections,

including conducting a signal warrant analysis to assess whether a warrant for installation of traffic signal will be met at either of these locations.

Applicant Response: As requested, signal warrants have been conducted at the intersections of Central Avenue at Cedar Street and Central Avenue at Webster Street. The warrants have been conducted for the 2022 Existing Conditions, 2029 No Build Conditions, and 2029 Build Conditions. The warrants are based on peak hour data projected throughout the day based on the hourly distribution of traffic at a nearby MassDOT count station on Highland Avenue. Table 10 presents the results of the signal warrant analyses and the warrant analysis worksheets are included in the Attachments to this memorandum.

Table 10 Traffic Signal Warrants Analysis Summary

Location	Condition	Warrant 1 (8-Hour) Met	Warrant 2 (4-Hour) Met	Warrant 3 (Peak Hour) Met
Central Avenue at Cedar Street	2022 Existing	Yes	Yes	No
	2029 No Build	Yes	Yes	No
	2029 Build	Yes	Yes	Yes
Central Avenue at Webster Street	2022 Existing	Yes	No	No
	2029 No Build	Yes	Yes	No
	2029 Build	Yes	Yes	No

Note: Based on 85th-percentile speeds under 40 miles per hour, per posted speed limits on Central Avenue

As shown in the table above, both intersections are warranted by at least one warrant under the 2022 Existing, 2029 No Build, and 2029 Build Conditions. The addition of Site-generated traffic does not trigger an intersection from not having a traffic signal being warranted to warranting a traffic signal.

Since both intersections are warranted under Existing and No Build Conditions and since less than 10-percent of the Project-generated trips are expected to travel through these two intersections, the Proponent is not proposing to signalize either of these intersections. Mitigation for the proposed Project is focused on locations that are expected to carry a higher proportion of Site-generated traffic. However, the signal warrants conducted provide knowledge to the Town of Needham that a signal is warranted to be installed at each of these locations. In addition, the Proponent is proposing to fund the installation of a traffic signal at the intersection of Central Avenue at Gould Street, which is expected to also help operations at these two unsignalized intersections by creating additional gaps in the traffic flow along Central Avenue that will help create additional opportunities for vehicles turning from Cedar Street and Webster Street onto Central Avenue.

26. As noted in Comment 19, even with the proposed mitigation at the Highland Avenue / Gould Street / Hunting Road intersection, some movements will continue operating at LOS F under 2029 Build with Mitigation conditions. Therefore, the Applicant should investigate the feasibility of providing additional capacity at this location to accommodate 2029 Build traffic volumes.

Applicant Response: As noted in the response to Comment 19, additional capacity cannot be provided on the Hunting Road northbound approach without impacting the existing property at 580 Highland Avenue and

potentially requiring the razing of the building. However, the signal timings were reviewed to try and improve operations expected to operate at LOS F.

With the proposed mitigation and signal timing adjustments, the intersection will operate similar to the 2029 No Build Conditions. The 2029 No Build Conditions include the completion of the MassDOT Needham-Newton corridor project along Highland Avenue, which does not include a significant enhancement of capacity at the intersections along Highland Avenue, as the design prioritizes safety and active transportation enhancements over additional vehicle capacity. As the roadway redesign project has been in the works for many years and has gone through several rounds of public comments to reach the current construction plan, the design reflects state and local vision of the Highland Avenue corridor, which allows for occasional movements operating at LOS F in the future.

In addition, the design of the Gould Street cross-section has been revised since receiving the Transportation Engineering Peer Review and two additional alternatives have been created. In response to The Town of Needham directing the Proponent to evaluate concepts that would result in less additional pavement, the revised concepts include a three-lane cross section on the Gould Street southbound approach to Highland Avenue; two left-turn lanes and one shared through/right-turn lane. These concepts result in less pavement and a shorter crossing distance for pedestrians while still providing adequate capacity for the existing and future traffic volumes on Gould Street.

Traffic Monitoring Program

27. The TIAS describes a transportation monitoring program that will be conducted post-occupancy to monitor parking occupancy and traffic operations at four of the study area intersections, including the site driveway. The Applicant should also provide monitoring of the effectiveness of the proposed TDM program in encouraging walking/biking, carpooling, and public transportation travel to/from the site.

    Applicant Response: The proposed transportation monitoring program will be expanded to include a travel survey of employees and patrons of the Site. The survey will be conducted by the Proponent and will include details on the mode of transportation employees and patrons use to access the Site as well as the effectiveness of the proposed TDM programs. The survey will also ask about hybrid work schedules to determine how frequently employees commute to the Site versus working from home. The results of the survey will be used to review the current TDM program and decide if any tweaks are necessary to further engage the employees and patrons of the Site to encourage the use of walking/biking, carpooling, and public transportation.

28. The proposed traffic monitoring program will include the collection of vehicle turning movement counts during the weekday AM and PM peak periods at the following study area intersections:

    - Central Avenue / Gould Street
    - Gould Street / TV Place
    - Gould Street / Project Site Driveway
    - Highland Avenue / Gould Street / Hunting Road

GPI agrees that these represent the critical locations that would experience the greatest increase in traffic due to the project. However, should the result of the monitoring study indicate that the actual traffic increase generated by the project exceeds the traffic projections contained within the ENF by ten percent or more, the study area for the monitoring program should be expanded to include additional locations to verify that the project's impacts does not create any operation deficiencies at nearby locations. In addition, the monitoring programs should include a capacity and queue analysis to verify the operations of each of the study area intersections under post-occupancy conditions. The monitoring program should also include the collection of daily traffic volumes on TV Place and the Project Site driveway to verify the daily traffic generated by the project.

Applicant Response: The proposed transportation monitoring program will include simultaneous automatic traffic recorder (ATR) counts at each Site driveway for a continuous 48-hour period during a typical week as well as a capacity and queue analyses to verify the operations at the four intersections listed above under post-occupancy condition. If the results of the monitoring study indicate that the actual traffic increase generated by the Project exceeds the traffic projections contained within the ENF by ten percent or more, the Proponent will work with the Town of Needham and MassDOT to determine if the monitoring program should be expanded, and if so, which additional intersections should be included. The Proponent will also further evaluate the TDM program to see if any tweaks are necessary to further engage the employees and patrons of the Site to encourage the use of walking/biking, carpooling, and public transportation if the actual traffic increase generated by the Project exceeds the traffic projections contained within the ENF by ten percent or more.

Site Access and Circulation

29. Figure 2 of the TIAS provides a site plan depicting the proposed layout and traffic circulation on the site. The plan appears to indicate that a loading/unloading area will be provided at the front of the site between Buildings A and B. This loading area is located in close proximity of the signalized intersection of the main site driveway and Gould Street. Vehicles, particularly trucks, stopped in this area could cause a back up of traffic into Gould Street. The Applicant should consider modifications to the site plan that provide a clear separation of loading/unloading areas and through traffic access to the parking fields to ensure traffic does not back up onto Gould Street. In addition, the Applicant should consider limiting hours of deliveries to the site, as a condition of approval, to avoid deliveries occurring between 7:00 AM and 9:00 AM when a high volume of traffic may be entering the site from Gould Street to access the parking garage.

Applicant Response: The Project Site will include two dedicated loading docks, one in each building. The loading docks will allow trucks to load and unload safely within the loading dock area and will not impede traffic flow on the circulating Site roadway. The area in front of the atrium is intended to be used as a pick-up/drop-off area and will likely be used as well by small deliveries, such as food deliveries and UPS/FedEx. The pick-up/drop-off area will be wide enough so that vehicles idling along the curbside will not impede through movements on the circulating Site roadway. Signage and pavement markings will be provided on-Site indicating the use of this area as a pick-up/drop-off zone and directing employees and visitors to the parking fields.

30. A large parking garage is proposed at the northerly end of the site, as well as a small surface parking lot near Gould Street. The Applicant should clearly define who will utilize the surface parking lot. In order to avoid congestion along the main drive aisle through the site, the surface parking lot should be restricted to use by accessible parking spaces, visitors, and brewery patrons (if a brewery is provided) only. All employees of both buildings, including brewery employees, should be directed to park in the parking garage.

    Applicant Response: The small surface parking lot is proposed to be used by accessible parking spaces, visitors, and patrons to the retail establishments on Site (the retail tenants for the Site are currently unknown). All employees on-Site (including those for the retail establishment) will be directed to the parking garage and the underground parking area.

31. The site plan included in Figure 2 does not depict any pedestrian connections between the proposed surface parking lot and the buildings. The Applicant should modify the site plan to provide fully accessible pedestrian routes between the surface parking lot and both buildings, as well as to the pedestrian loops around the site.

    Applicant Response: The plan has been revised to include a crosswalk and accessible access from the parking lot to the buildings as well as access to the pedestrian loop.

32. The entering travel lane on TV Place is aligned with the sidewalk as it passes by the proposed site driveway. In addition, the exiting lane west of the site driveway is aligned with the entering lane east of the driveway. This has the potential to create a head-on collision between drivers entering and exiting the site as they cross between lanes through the site driveway intersection with TV Place. It also has the potential for entering vehicles on TV Place to drive onto the sidewalk. The Applicant should modify the layout of TV Place to provide better alignment of entering and exiting travel lanes, which may involve additional widening of TV Place to the east of the site driveway and introduction of a raised or striped median island.

    Applicant Response: The geometry of TV Place has been modified to better align the entering and exiting travel lanes. In addition, a dashed lane line extension pavement marking will be installed for the through movements on TV Place at the Site driveway to better align eastbound and westbound traffic on TV Place. The modified TV Place geometry is included in the revised Gould Street concept plan included in the Attachments to this memorandum.

33. The Applicant should perform a vehicle turning movement analysis to verify that emergency vehicles and trucks can safely access and navigate the site. This includes delivery, postal, and trash removal vehicles. The Applicant should provide this turning analysis to the Needham Police and Fire Departments for verification that safe and adequate access is provided.

    Applicant Response: Turning diagrams within the site have been studied and are provided in the Attachments to this memorandum. The emergency vehicles as well as delivery vehicles can safely access and navigate the site.

Memorandum

34. Table 15 of the TIAS indicates that queues of nearly 200 feet (eight vehicles) could occur in each lane exiting the site driveway during the weekday PM peak hour. Although the provided plan on Figure 2 is not scaled to be able to accurately measure the available stacking distance, it appears that only 60 feet of stacking distance is proposed in each lane on the site driveway approaching Gould Street before reaching the loading area. Therefore, the queues exiting the site will regularly back up into the loading area and around the corner beyond the driveway to the surface parking lot during the weekday PM peak hour. The Applicant should consider modifications to the site plan to provide additional vehicle stacking exiting the site without interference with the loading area, parking areas, or on-site circulation.

Applicant Response: The Site driveway will be designed to accommodate the queues waiting at the traffic signal at Gould Street. The garage entrance closest to the traffic signal will only provide access to the loading dock, which will be designed so that loading and unloading vehicles will not block the circulating Site roadway. The development is not expected to receive many deliveries during the weekday evening peak hour, but if a delivery truck needs to leave the loading dock and the queue at the signal extends past the loading dock, the delivery truck will be able to turn right onto the circulating Site roadway and exit the Site via TV Place. The entrances to the underground parking area and the free-standing parking garage are around the corner and more than 200 feet away from the signal, providing sufficient room for vehicles to queue without spilling back into the main parking areas. While a queue of 200 feet may extend past the pick-up/drop-off area, that should not be an operational issue as the pick-up/drop-off area will be located on the other side of the circulating Site roadway. Drivers using the pick-up/drop-off area are expected to enter the Site at the signalized driveway and exit the Site at TV Place, traveling in a counterclockwise direction.

Attachments

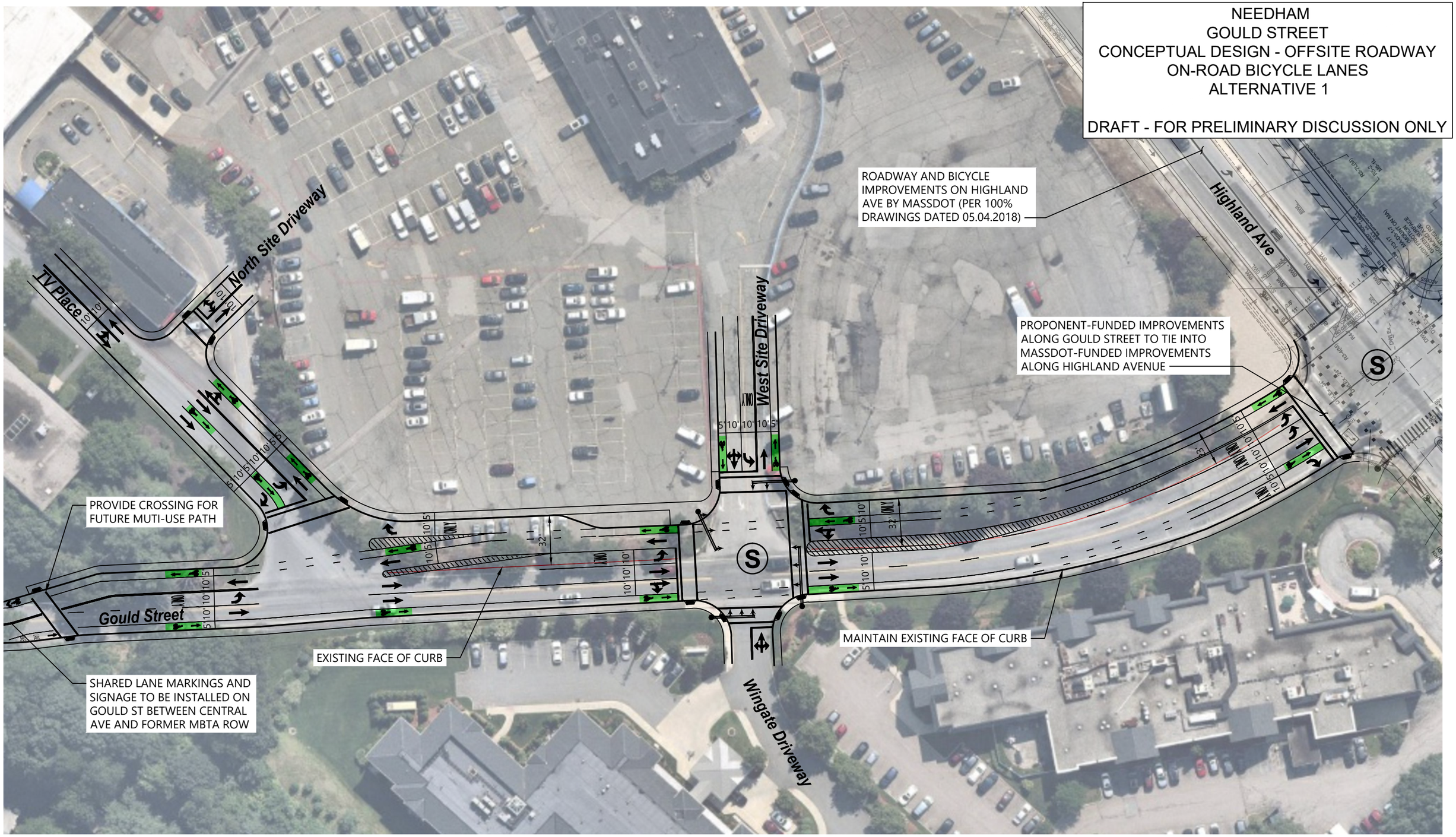
- Updated Off-Site Mitigation Roadway Concept Plans
- Queue Diagrams *(Comment 2a)*
- Weave Segment Capacity Analysis Worksheets *(Comment 2b)*
- Collision Diagrams *(Comment 8)*
- Existing Site Trip Generation Calculations *(Comment 12)*
- Existing Town of Needham Mode Share Data *(Comment 14)*
- GPI Gould Street Improvement Concept Plan *(Comment 19)*
- Intersection Capacity Analysis Worksheets *(Comments 19 and 21-24)*
- Traffic Signal Warrant Analysis Worksheets *(Comment 25)*
- Turning Movement Diagrams *(Comment 33)*

Updated Off-Site Mitigation Roadway Concept Plans

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Intersection Improvements_May2022.dwg

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
ON-ROAD BICYCLE LANES
ALTERNATIVE 1

DRAFT - FOR PRELIMINARY DISCUSSION ONLY



NOT FOR CONSTRUCTION

0 30 60 120 Feet

vhb

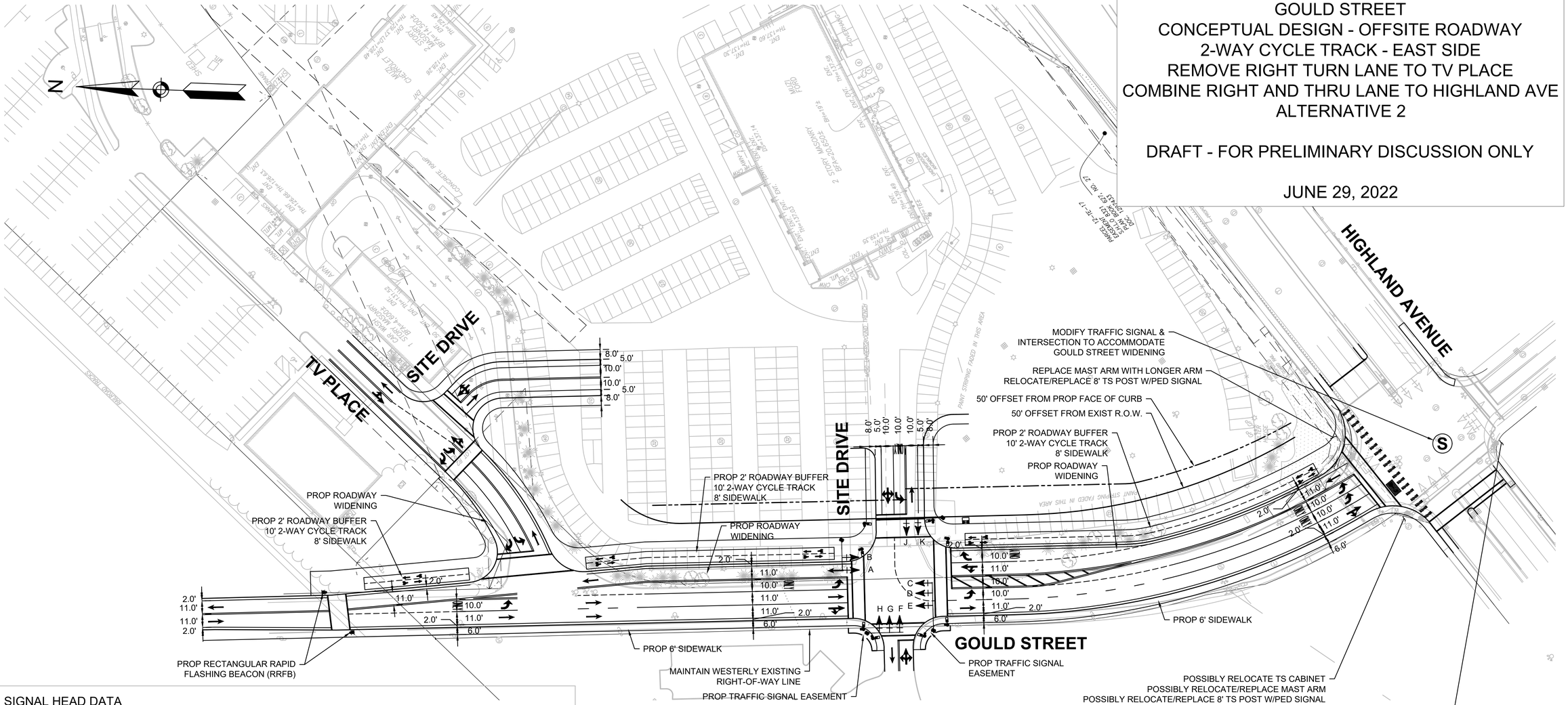
Highland Innovation Center
Needham, Massachusetts

04.19.22

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
2-WAY CYCLE TRACK - EAST SIDE
REMOVE RIGHT TURN LANE TO TV PLACE
COMBINE RIGHT AND THRU LANE TO HIGHLAND AVE
ALTERNATIVE 2

DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 29, 2022

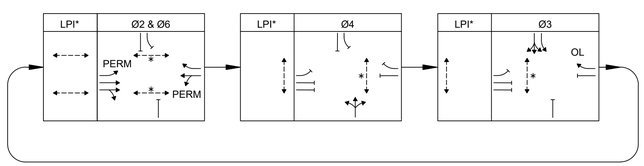


SIGNAL HEAD DATA

A,D,E,H,K	B	C	F	G,J	ALL
R Y G	R Y Y G G	R Y FY	R Y G	R Y G G	W/COUNTDOWN TIMER
ALL 12" LENS					

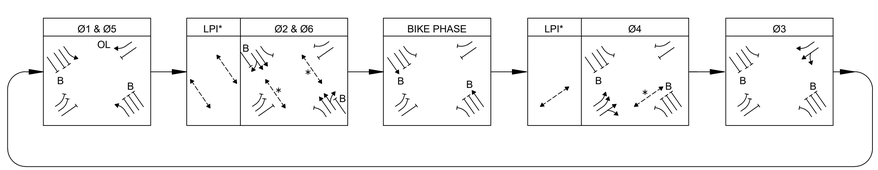
NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

SITE DRIVEWAY
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
LPI = LEADING PEDESTRIAN INTERVAL

HIGHLAND AVENUE
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
OL = OVERLAP
LPI = LEADING PEDESTRIAN INTERVAL
B = HIGHLAND AVENUE SEPARATED BIKE LANE

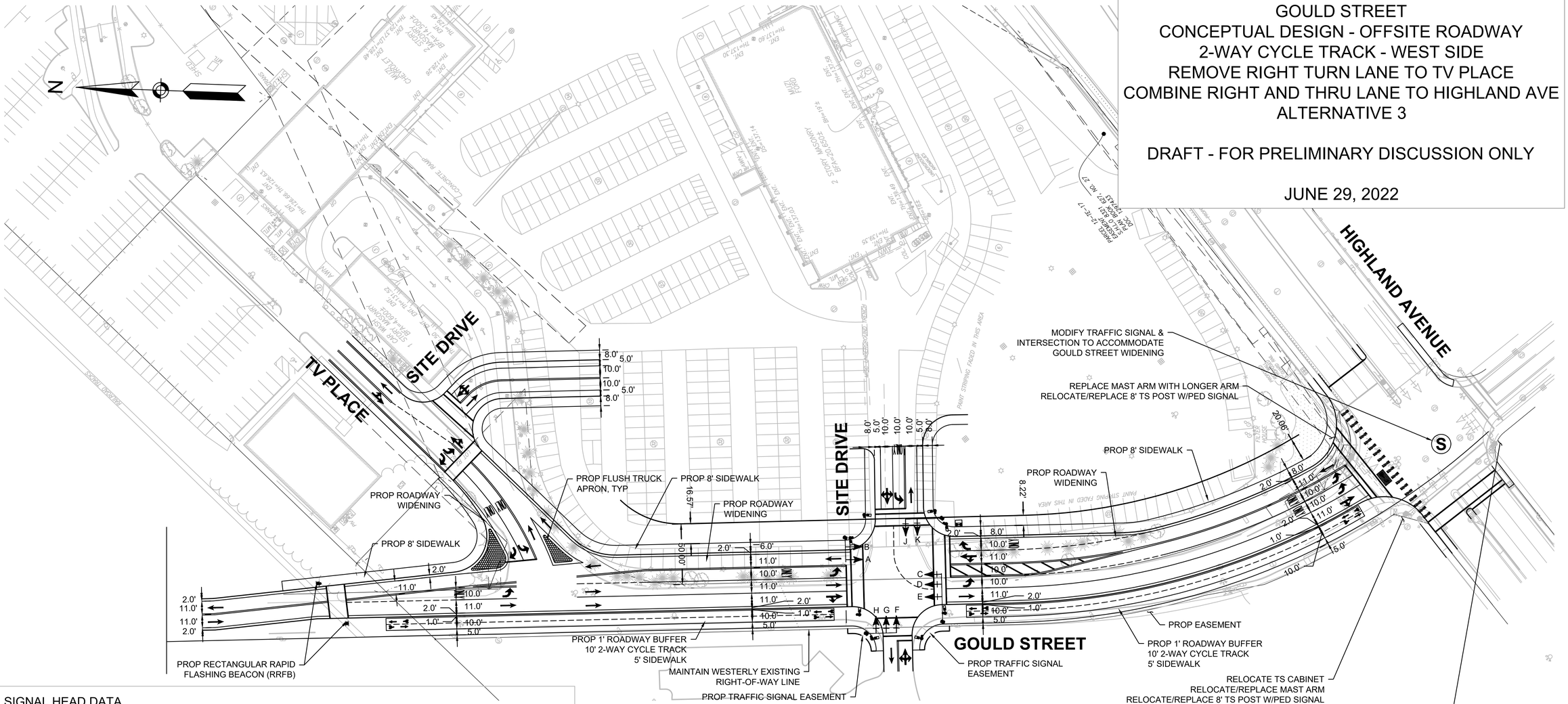
0 40 100 160
SCALE: 1" = 40'

15306.00 - CONCEPT - ALT5 - 2WAY CT & WALK EAST - V2.DWG Plotted on 29-Jun-2022 1:56 PM

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
2-WAY CYCLE TRACK - WEST SIDE
REMOVE RIGHT TURN LANE TO TV PLACE
COMBINE RIGHT AND THRU LANE TO HIGHLAND AVE
ALTERNATIVE 3

DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 29, 2022

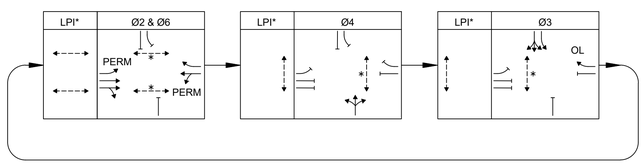


SIGNAL HEAD DATA

A,D,E,H,K	B	C	F	G,J	ALL
R Y G	R Y Y G G	R Y FY	R Y G	R Y G G	W/COUNTDOWN TIMER
ALL 12" LENS					

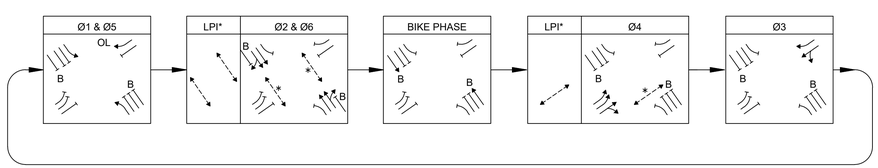
NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

SITE DRIVEWAY
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
LPI = LEADING PEDESTRIAN INTERVAL

HIGHLAND AVENUE
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
OL = OVERLAP
LPI = LEADING PEDESTRIAN INTERVAL
B = HIGHLAND AVENUE SEPARATED BIKE LANE

0 40 100 160

SCALE: 1" = 40'

15306.00 - CONCEPT - ALT2C - 2WAY CT & WALK WEST - V1.DWG Plotted on 29-Jun-2022 1:53 PM

NEEDHAM
GOULD STREET @ CENTRAL AVENUE
CONCEPTUAL LAYOUT

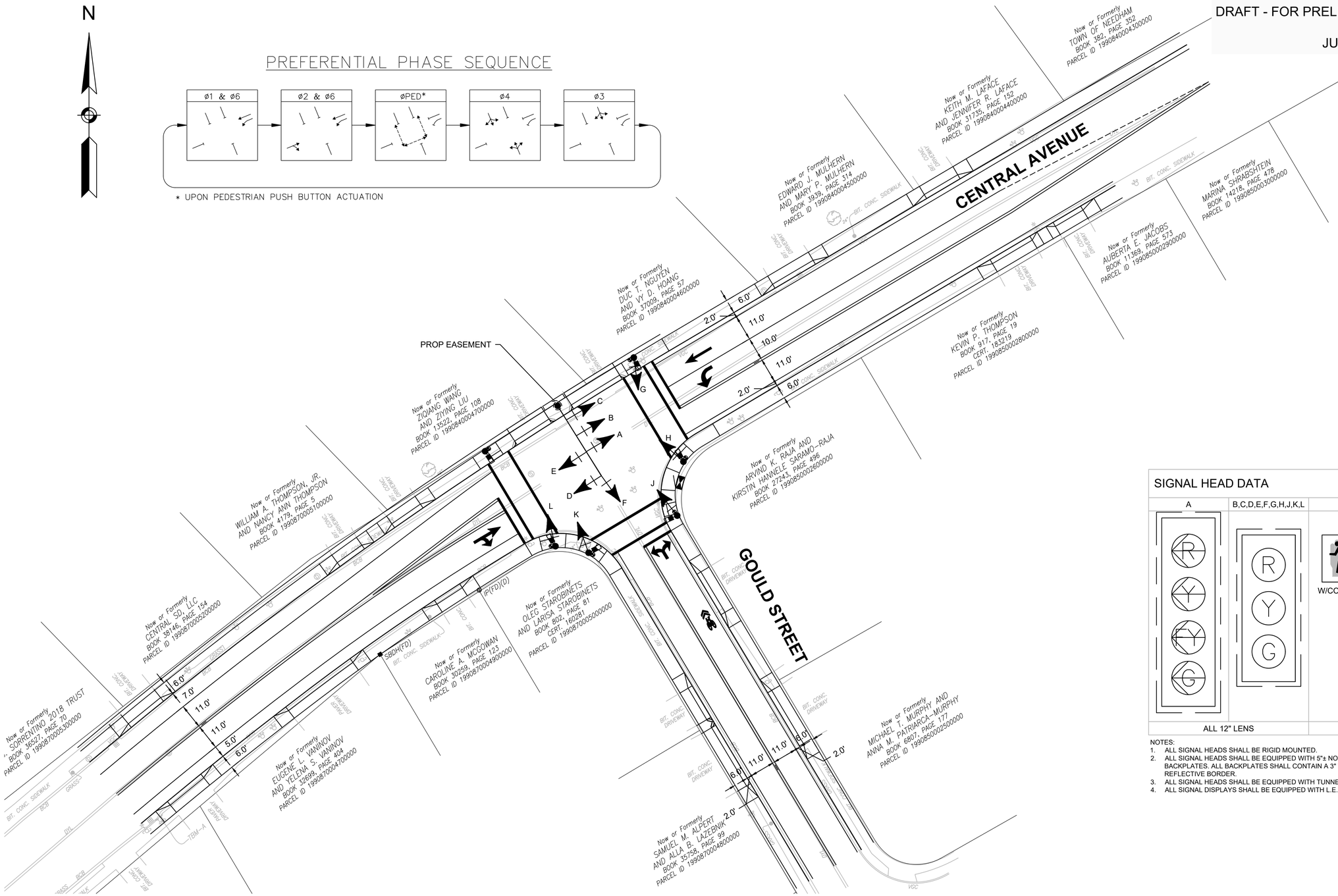
DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 27, 2022

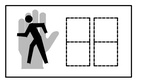
N

PREFERENTIAL PHASE SEQUENCE

* UPON PEDESTRIAN PUSH BUTTON ACTUATION



SIGNAL HEAD DATA

A	B,C,D,E,F,G,H,J,K,L	ALL
		 W/COUNTDOWN TIMER
ALL 12" LENS		

NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

0 20 50 100

SCALE: 1" = 20'

Queue Diagrams

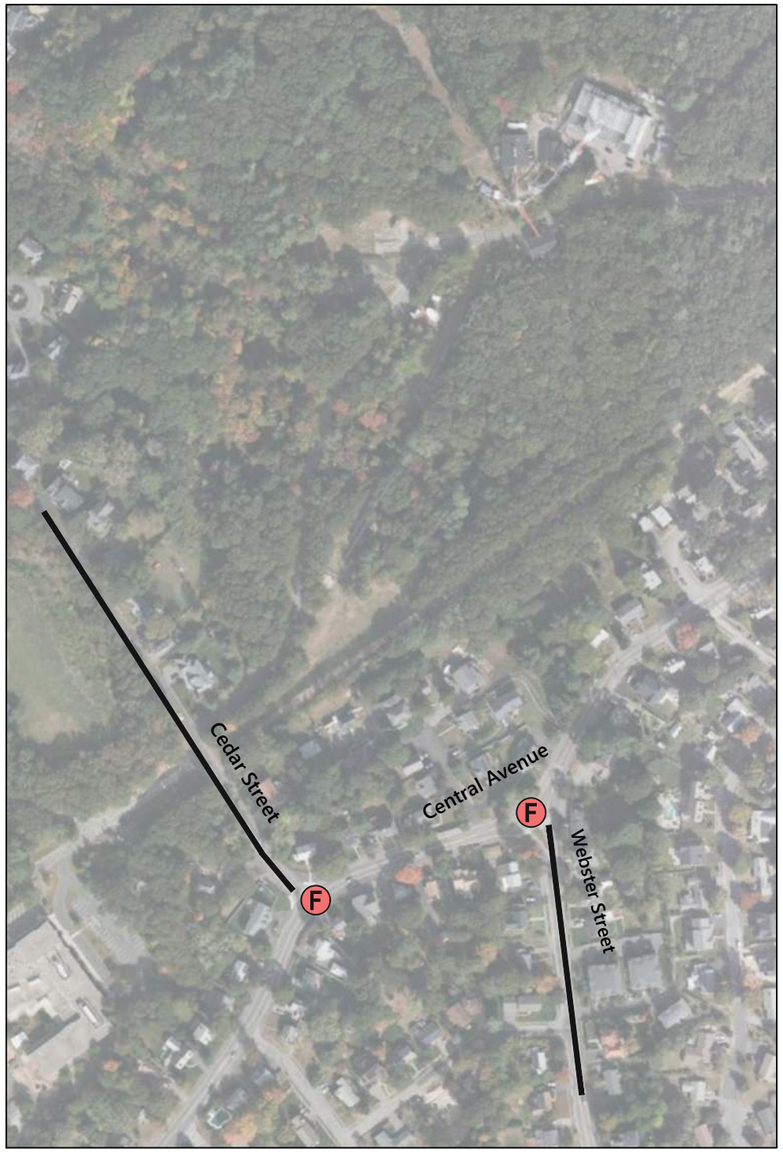
Comment 2a

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

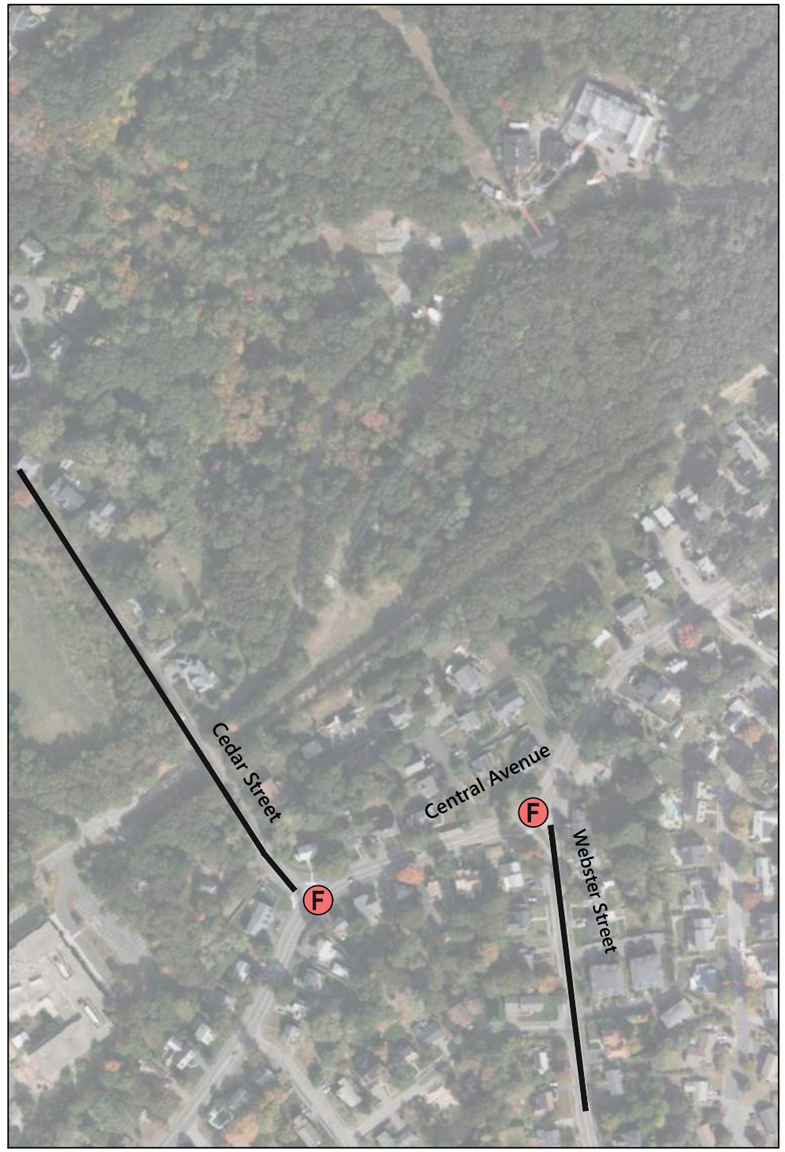
Central Avenue at Cedar Street and Webster Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing



2029 No-Build



2029 Build

0 150 300 Feet

vhb

Queue Diagrams
Weekday Morning Peak Hour

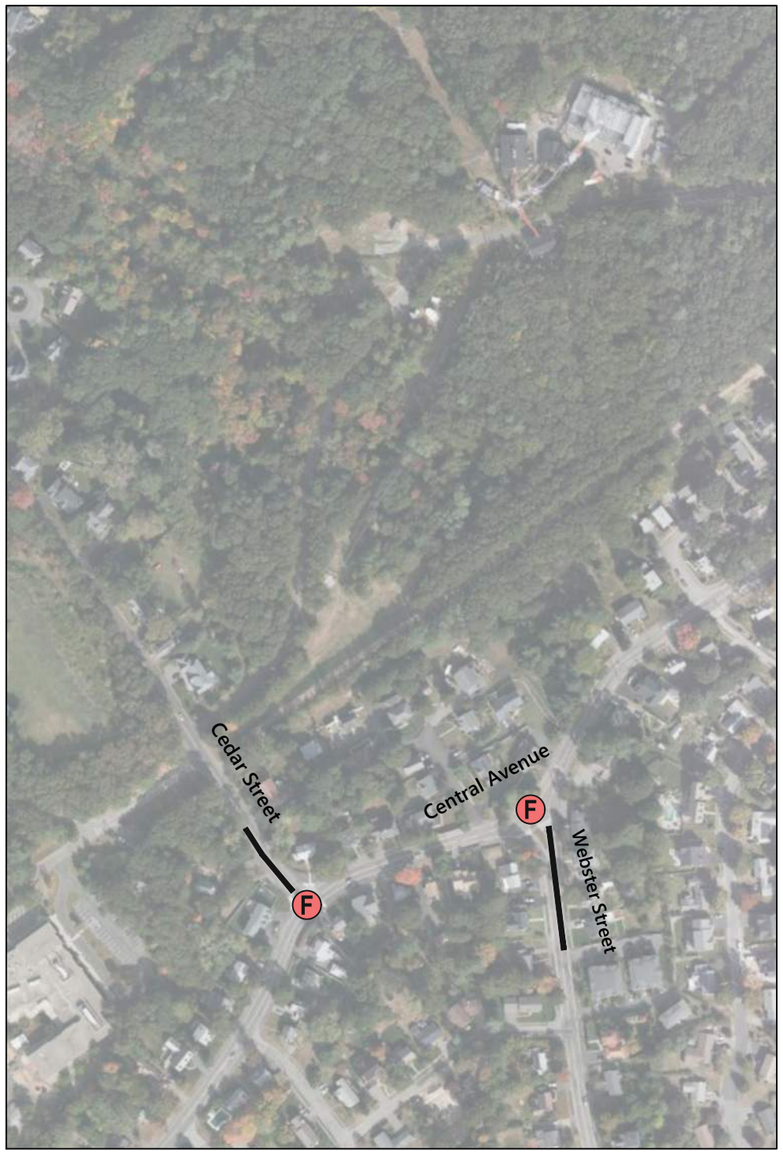
557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

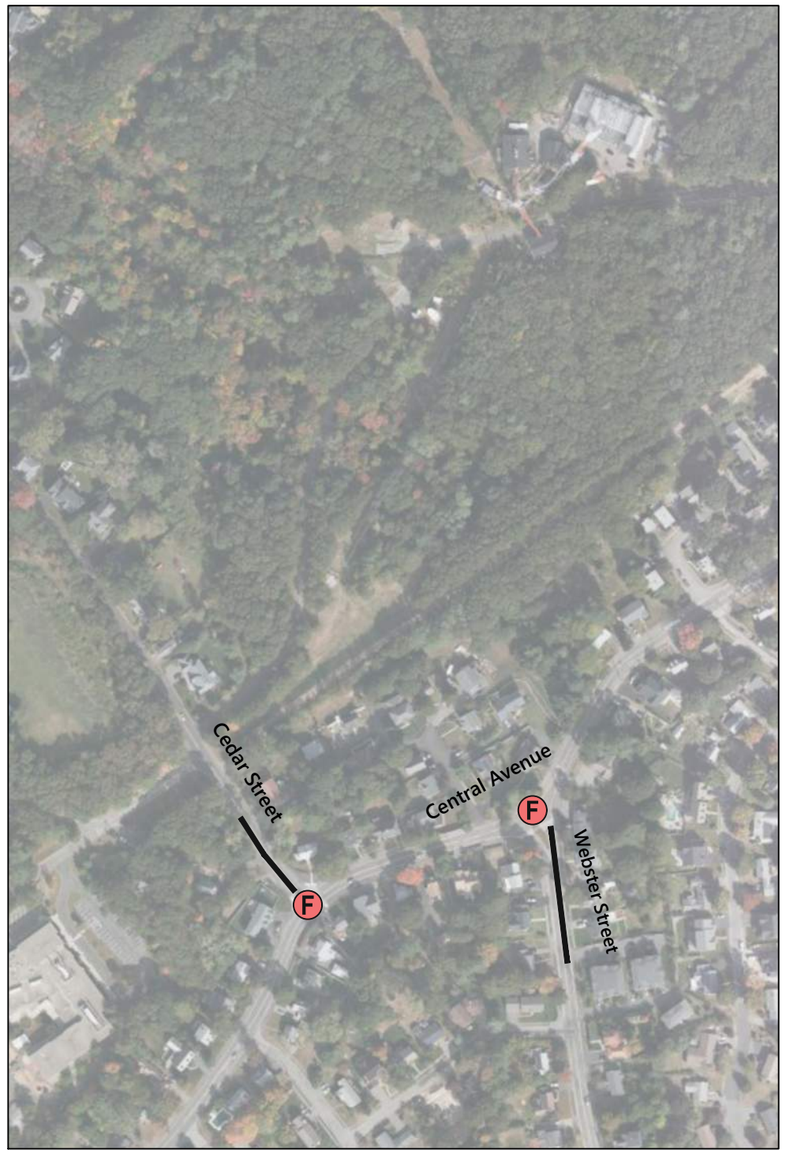
Central Avenue at Cedar Street and Webster Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing



2029 No-Build



2029 Build

0 150 300 Feet

Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Central Avenue at Gould Street, Hampton Avenue, and River Park Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing

2029 No-Build

2029 Build Without Mitigation

Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

0 150 300 Feet

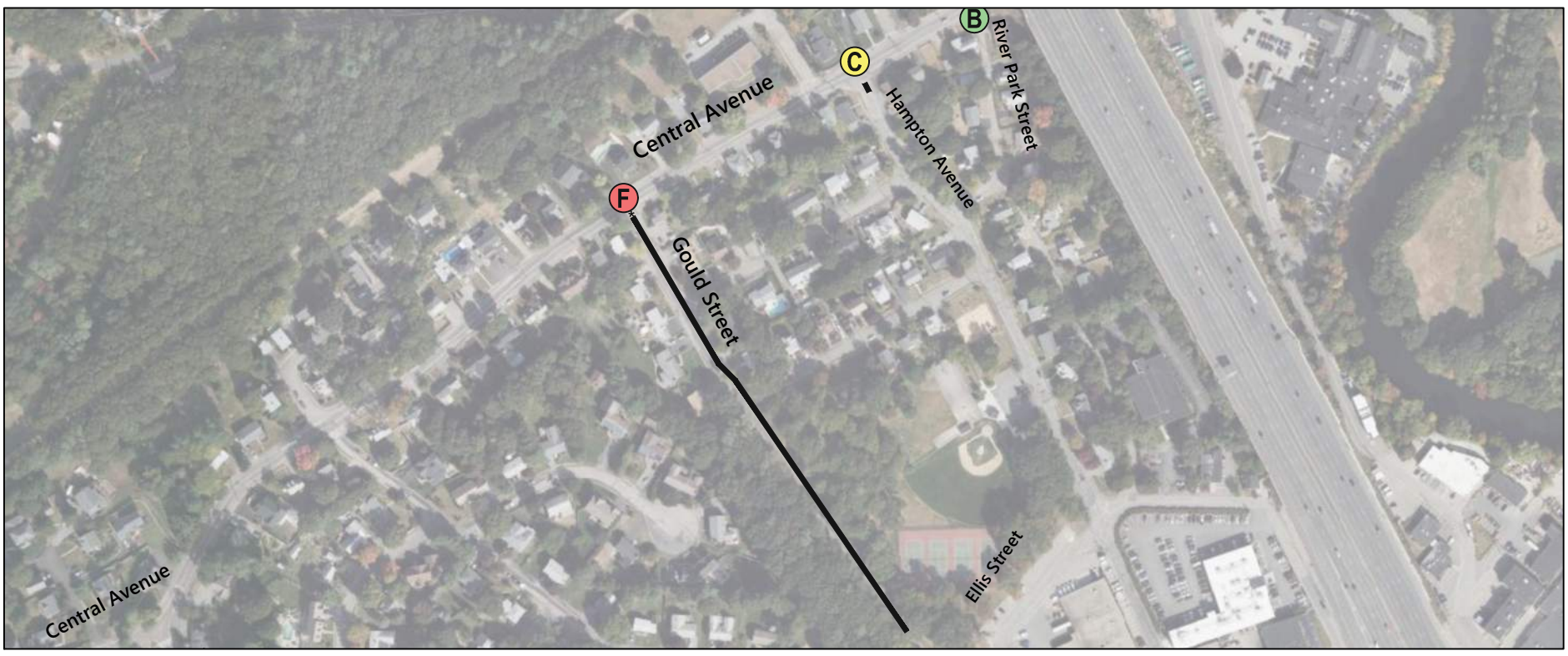
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Central Avenue at Gould Street, Hampton Avenue, and River Park Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing

2029 No-Build



2029 Build Without Mitigation

* Movement beyond capacity, no results reported.

0 150 300 Feet

Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Central Avenue at Gould Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2029 No-Build

2029 Build Without Mitigation

2029 Build With Mitigation

Central Avenue at Gould Street signalized under mitigation conditions.

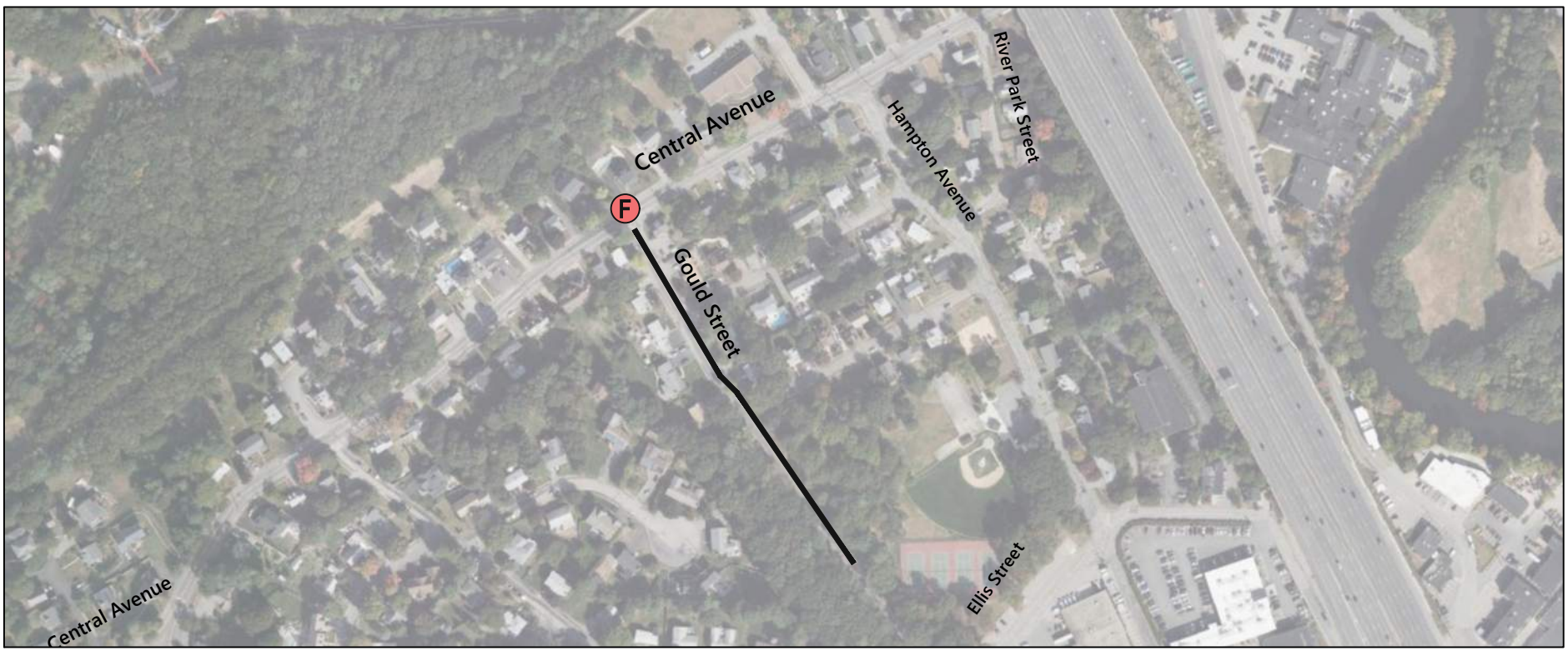
0 150 300 Feet

Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

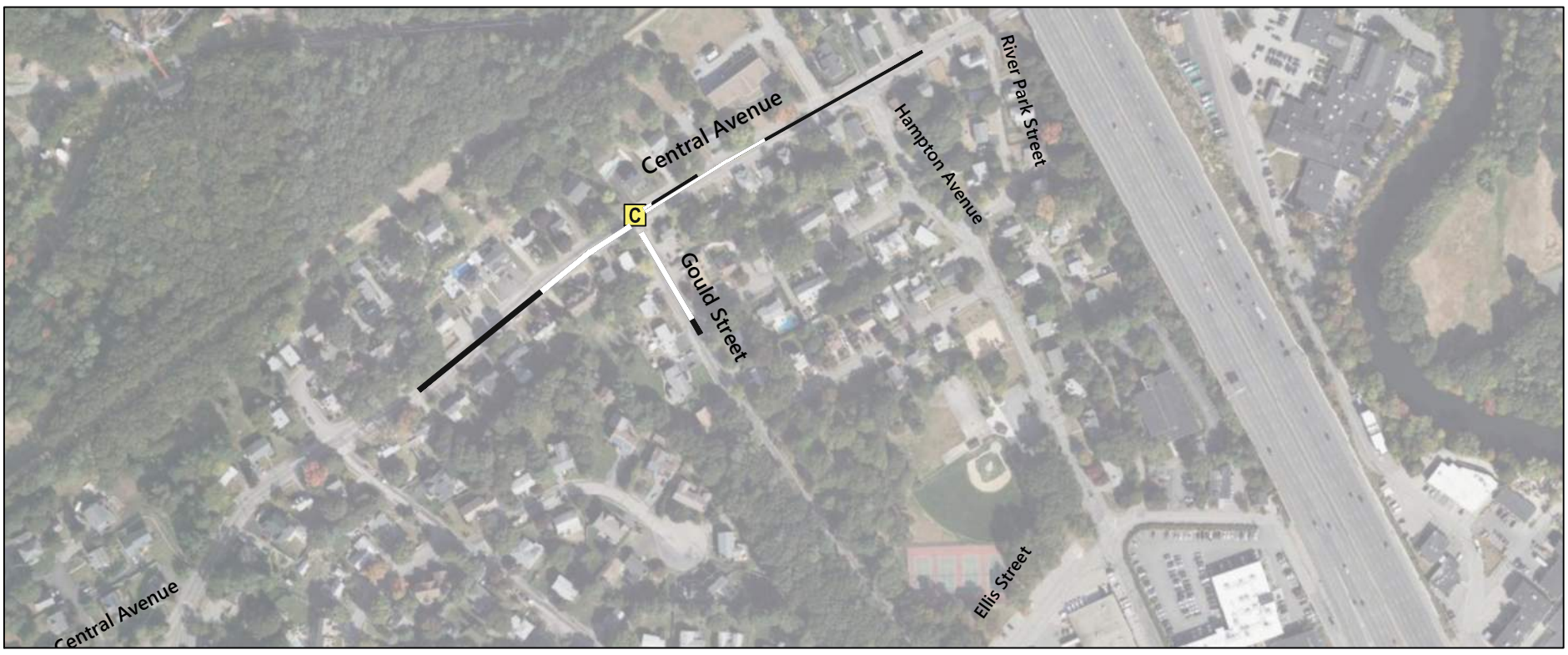
Central Avenue at Gould Street (Unsignalized)

[X] Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build

2029 Build Without Mitigation



2029 Build With Mitigation

* Movement beyond capacity, no results reported.

Central Avenue at Gould Street signalized under mitigation conditions.

0 150 300 Feet

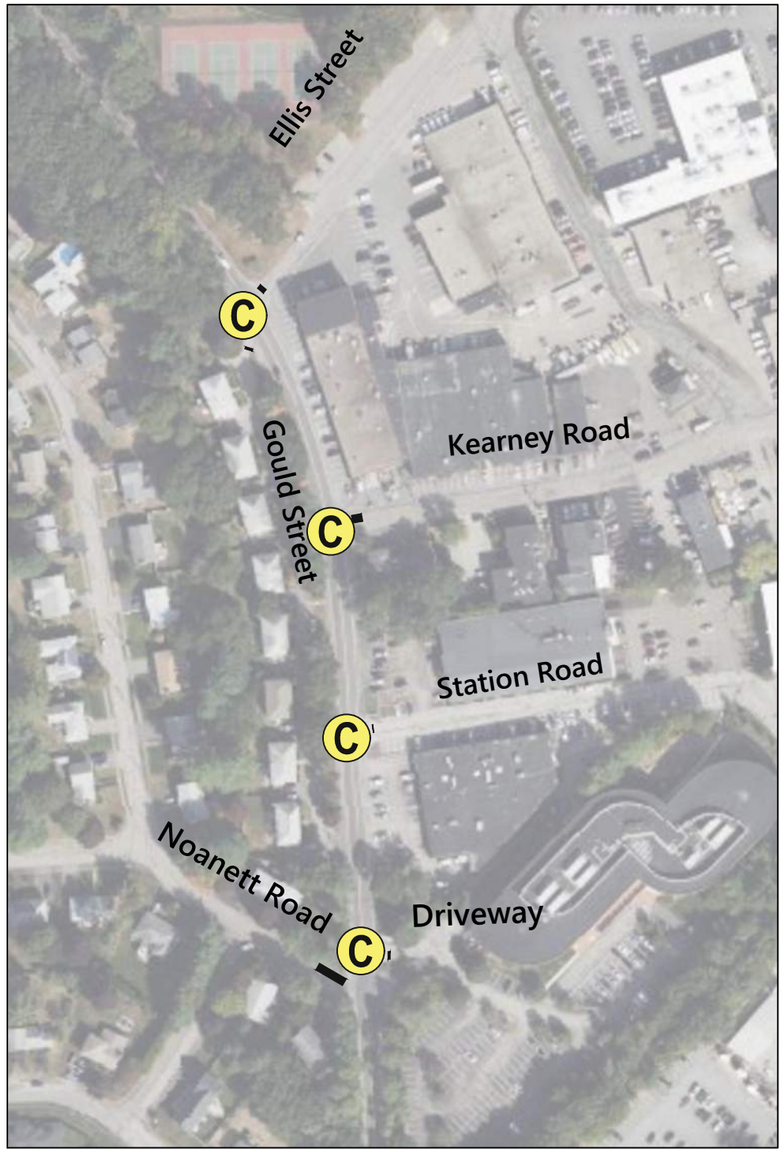
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

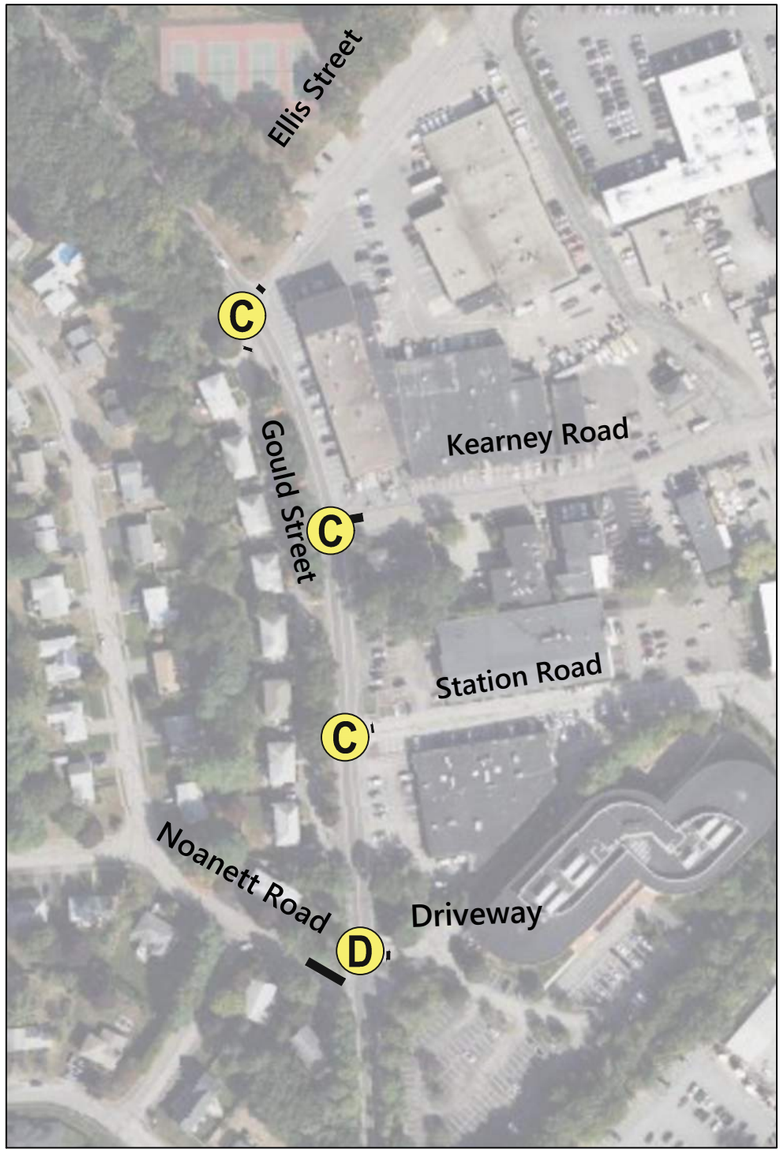
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Gould Street at Ellis Treet, Kearney Road, Station Road, and Noanett Road (Unsignalized)

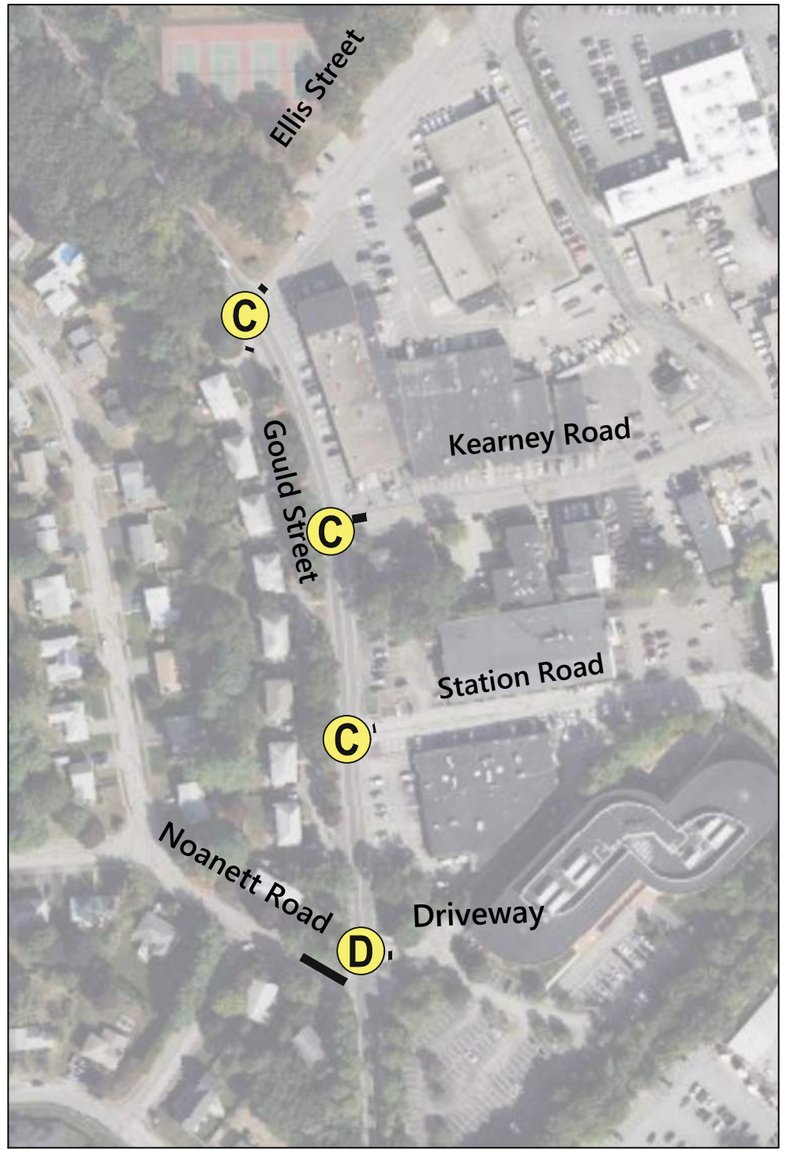
X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build

0 100 200 Feet

vhb

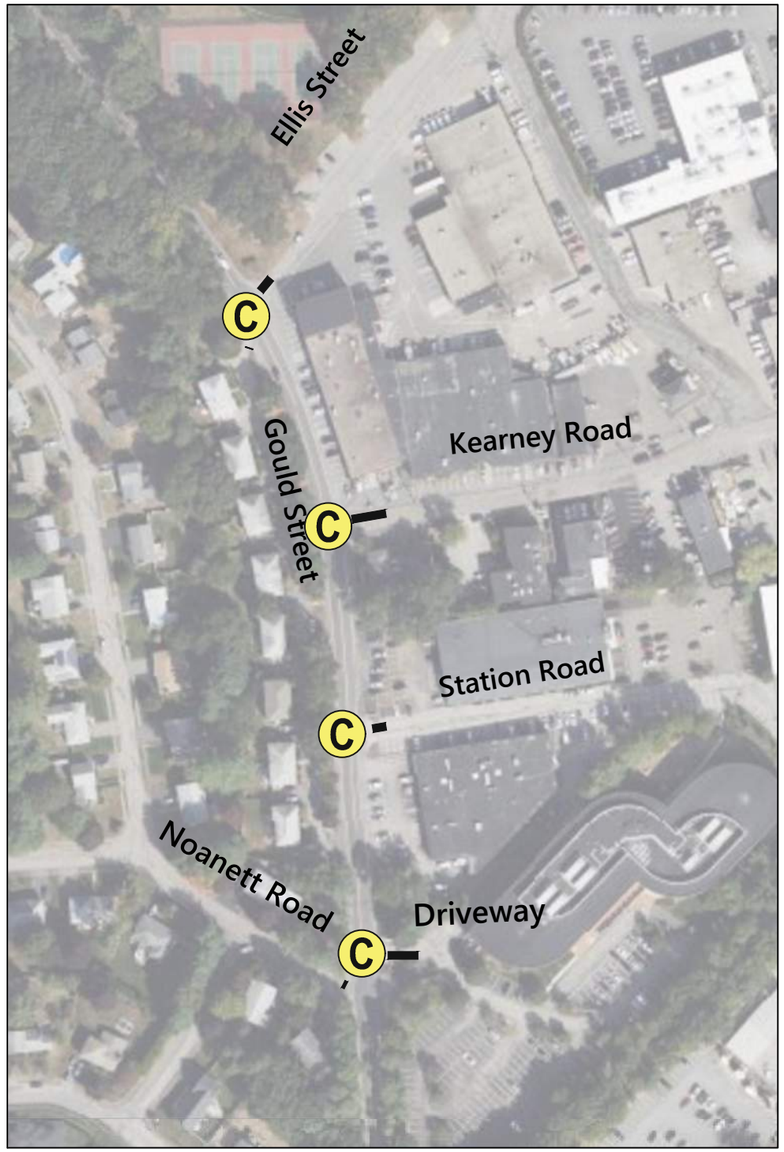
Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

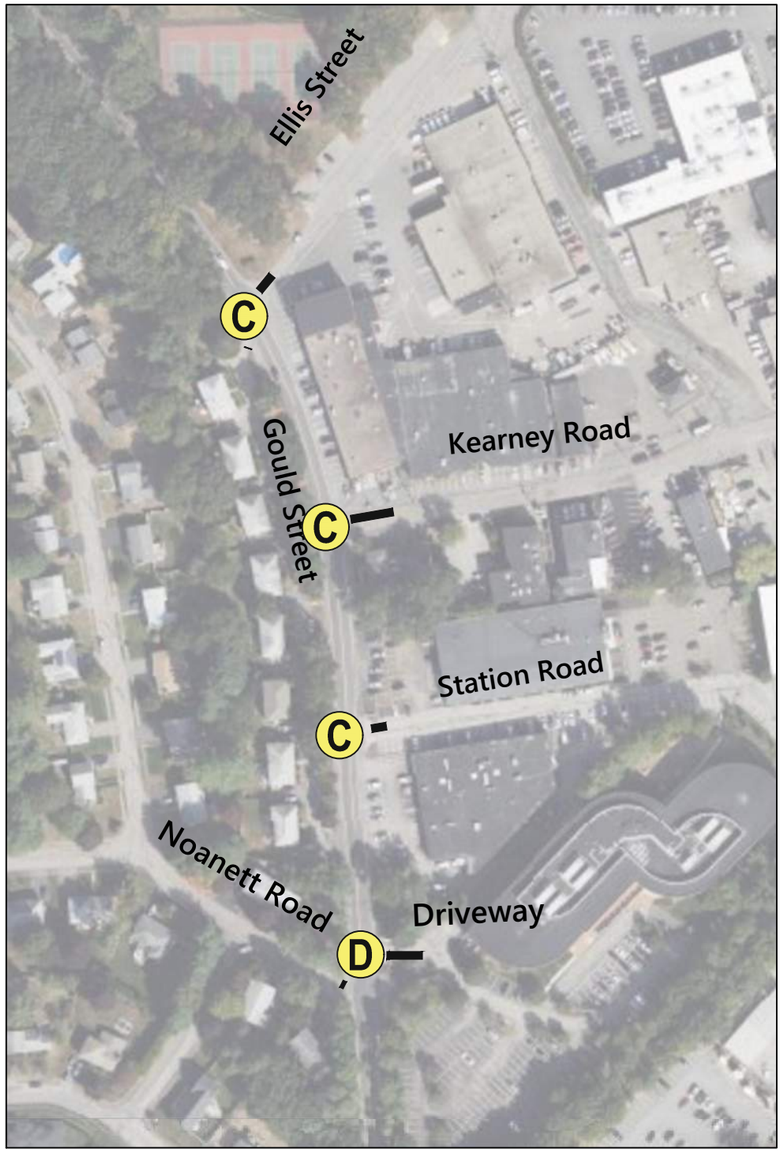
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Gould Street at Ellis Treet, Kearney Road, Station Road, and Noanett Road (Unsignalized)

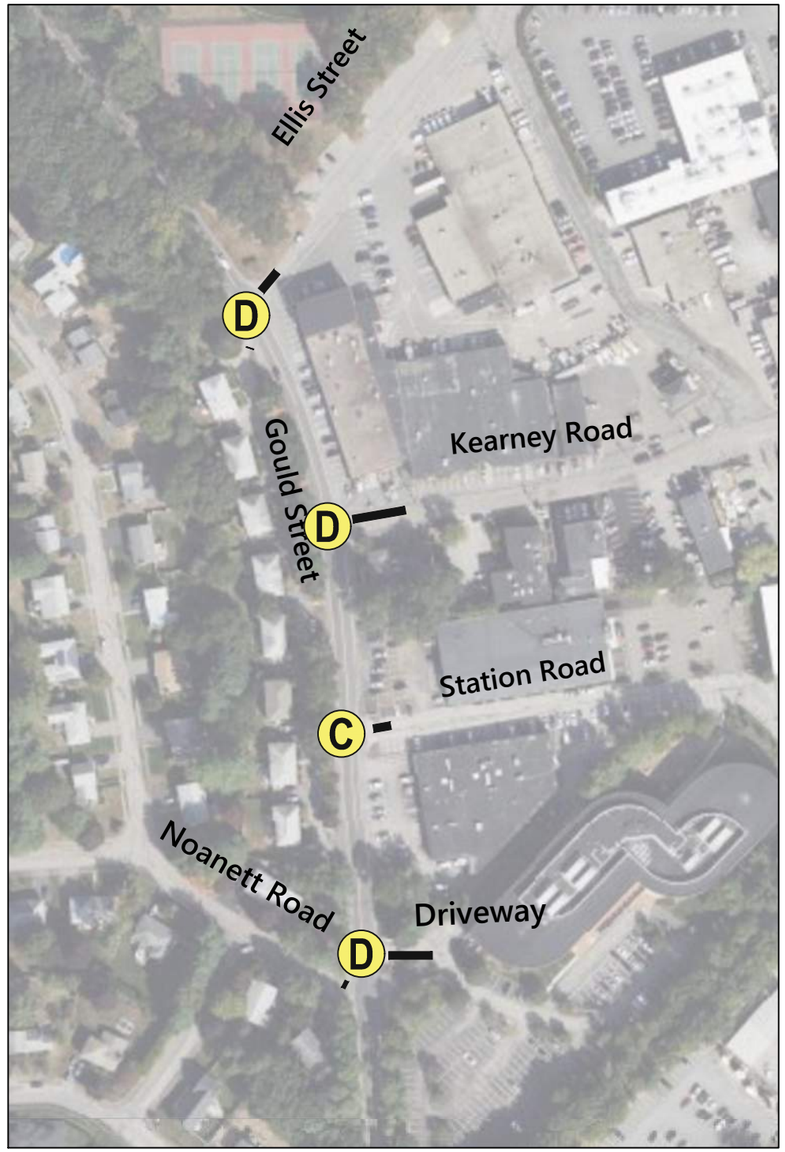
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build

0 100 200 Feet

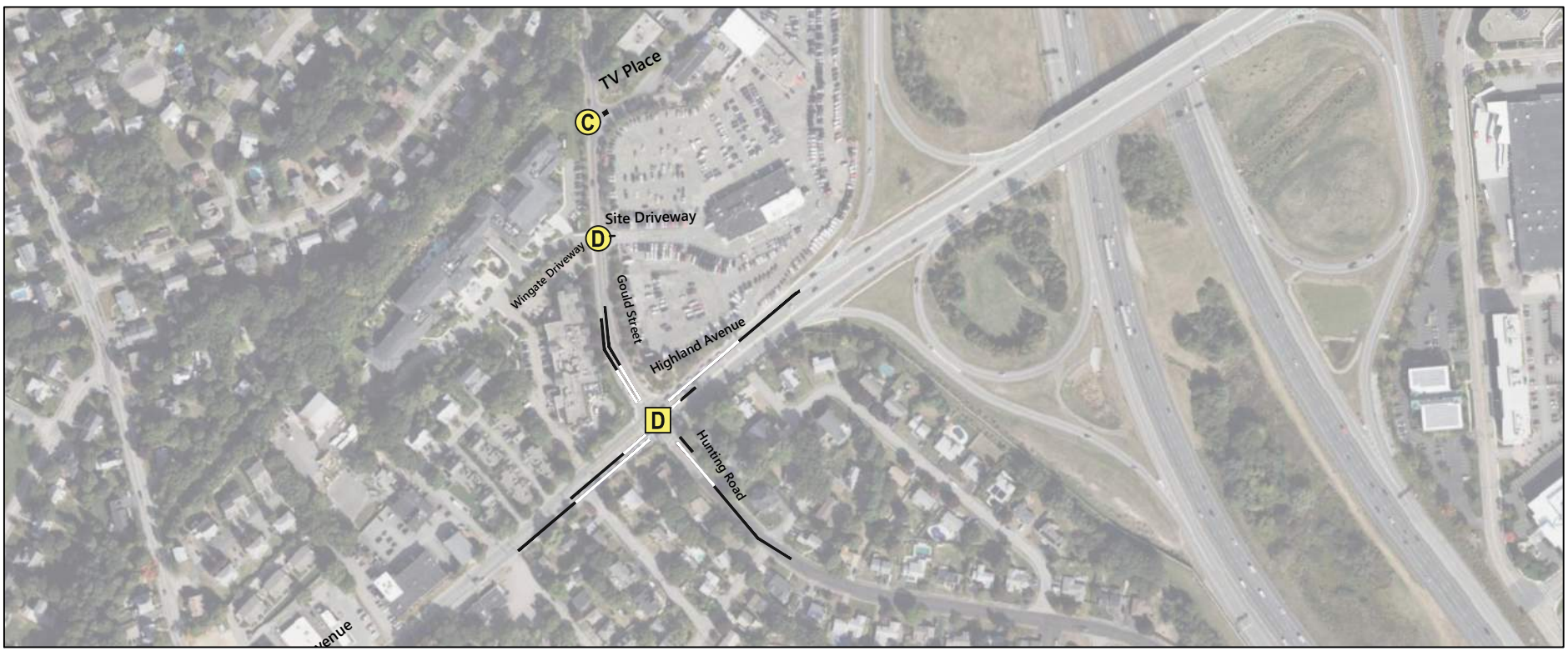
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

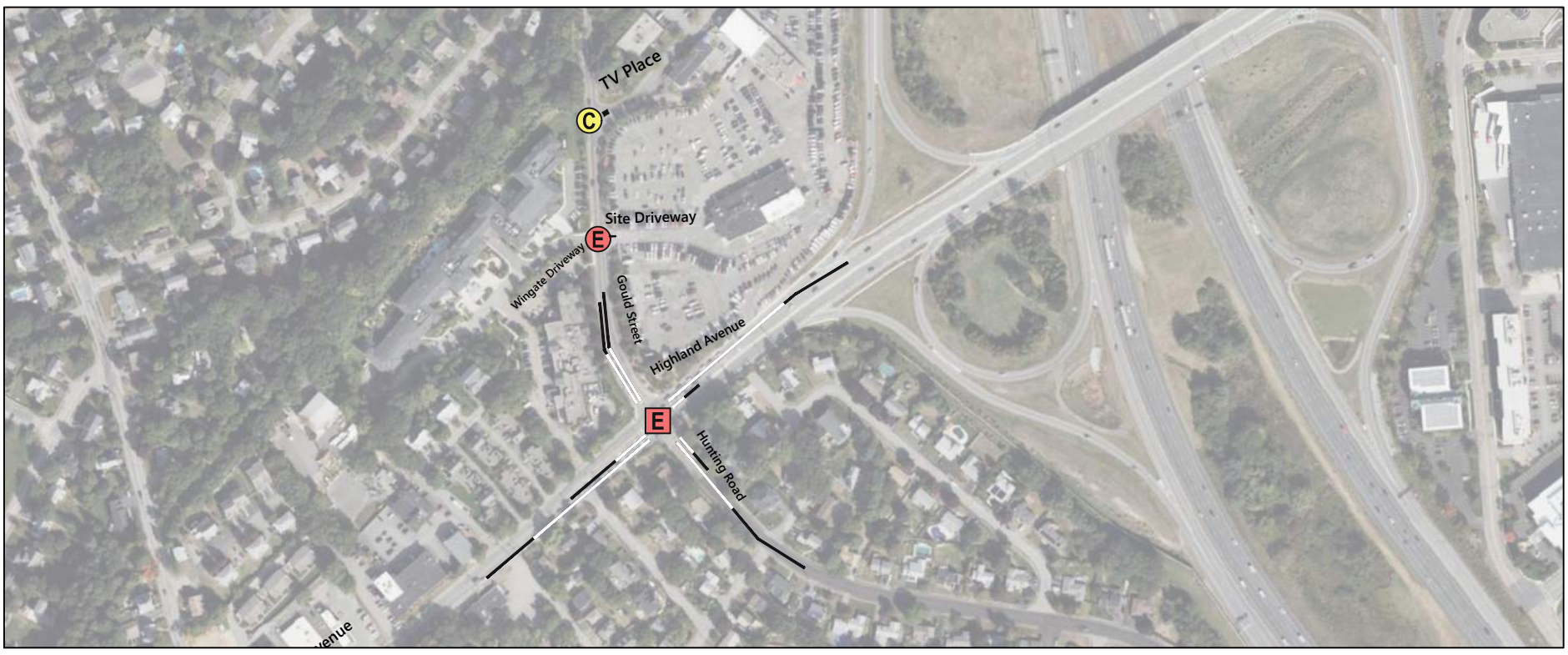
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Gould Street at Highland Avenue (Signalized), Site Driveway (Unsignalized), and TV Place (Unsignalized)

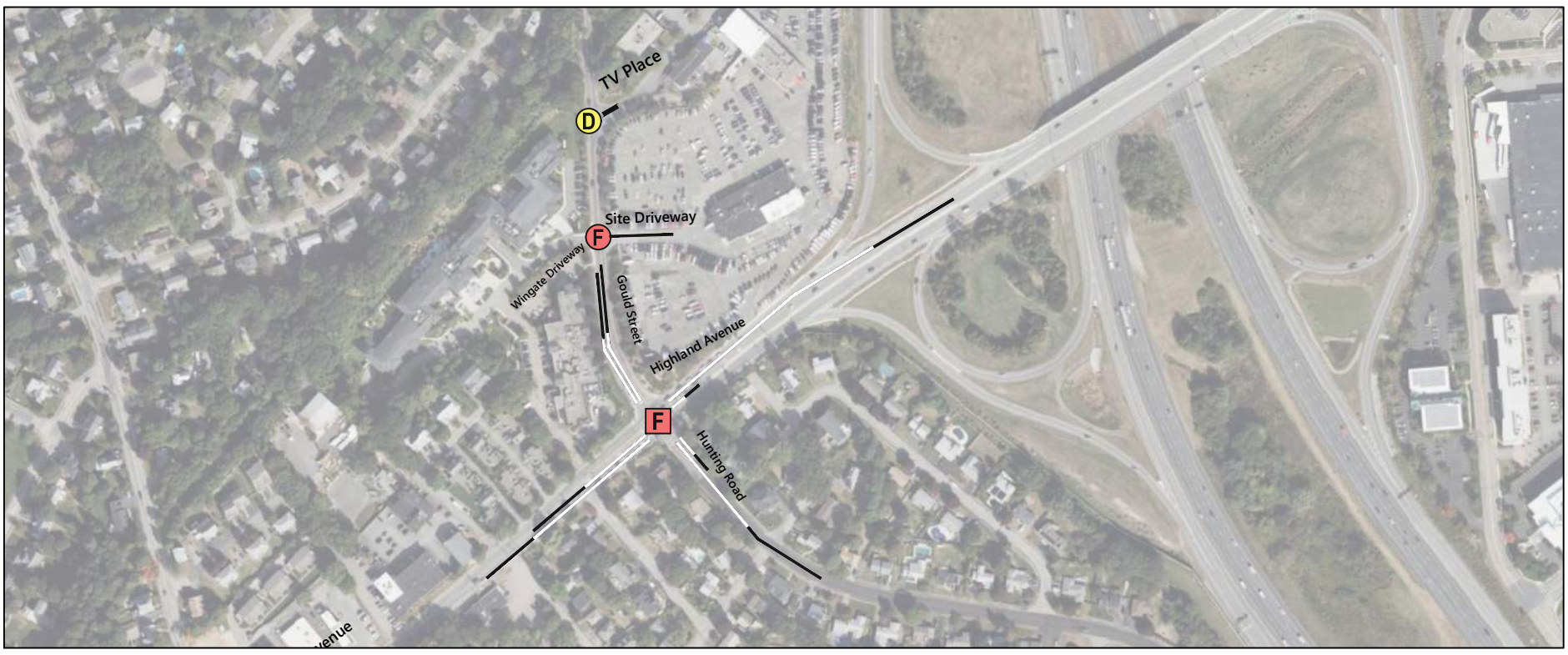
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

Queue Diagrams
Weekday Morning Peak Hour

0 200 400 Feet

557 Highland Avenue
Needham, Massachusetts

Gould Street at Highland Avenue (Signalized), Site Driveway (Unsignalized), and TV Place (Unsignalized)

X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing

2029 No-Build

2029 Build Without Mitigation

* Movement beyond capacity, no results reported.

Queue Diagrams
Weekday Evening Peak Hour

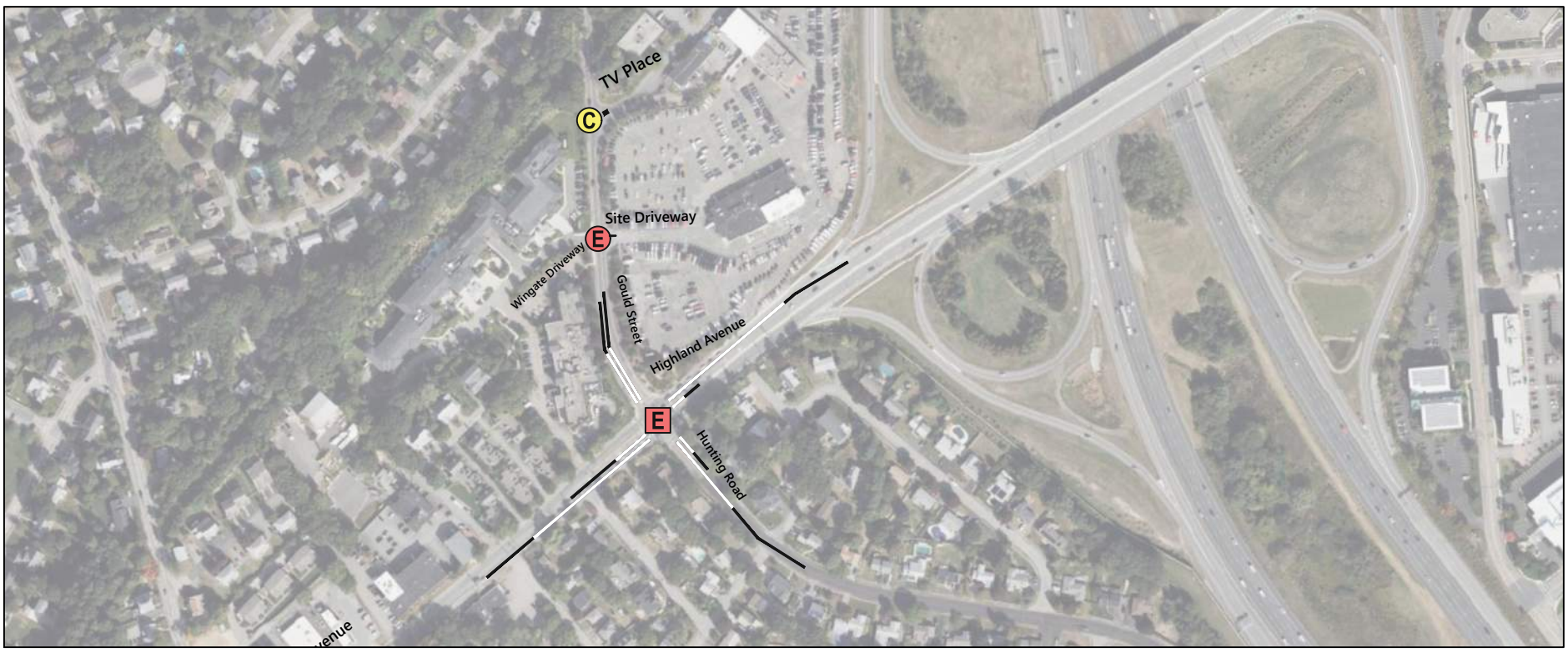
0 200 400 Feet

557 Highland Avenue
Needham, Massachusetts

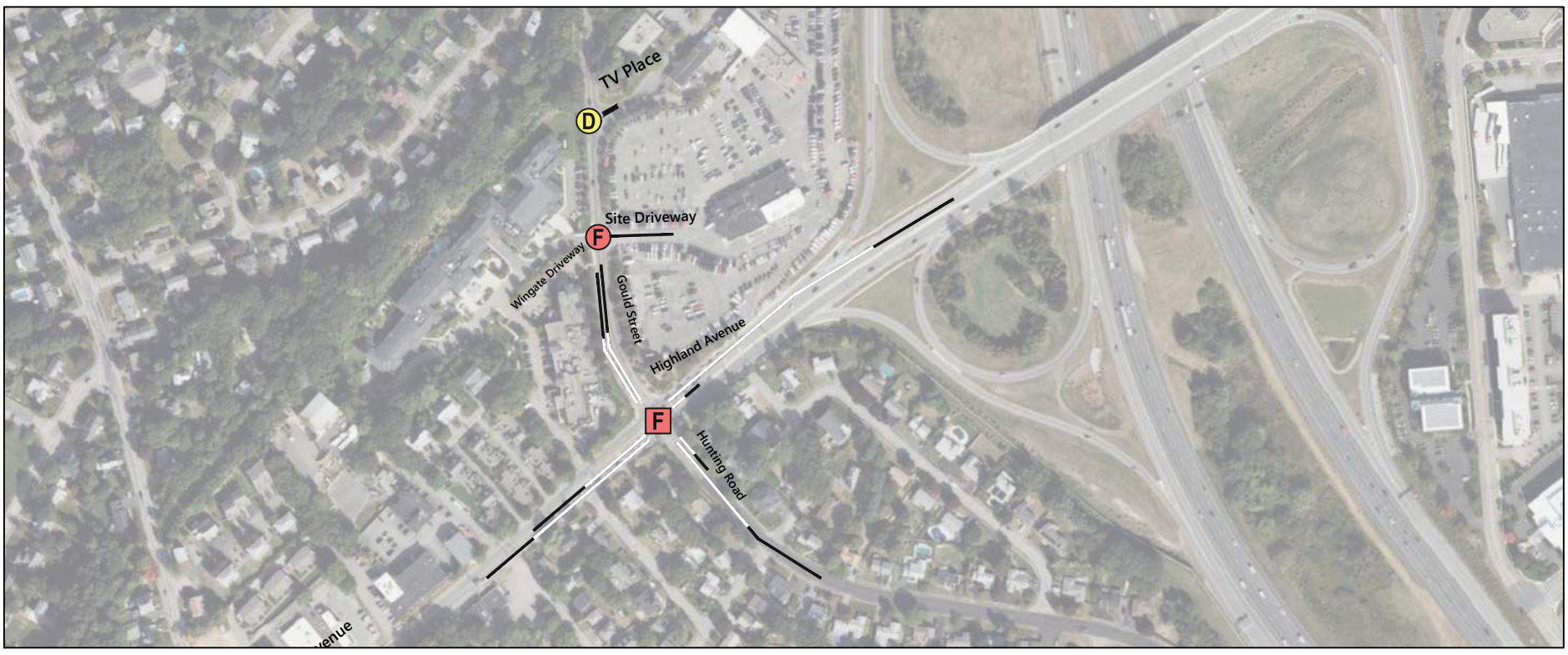
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues\Queues_AM.dwg

Gould Street at Highland Avenue (Signalized), Site Driveway (Unsignlaized), and TV Place (Unsignalized)

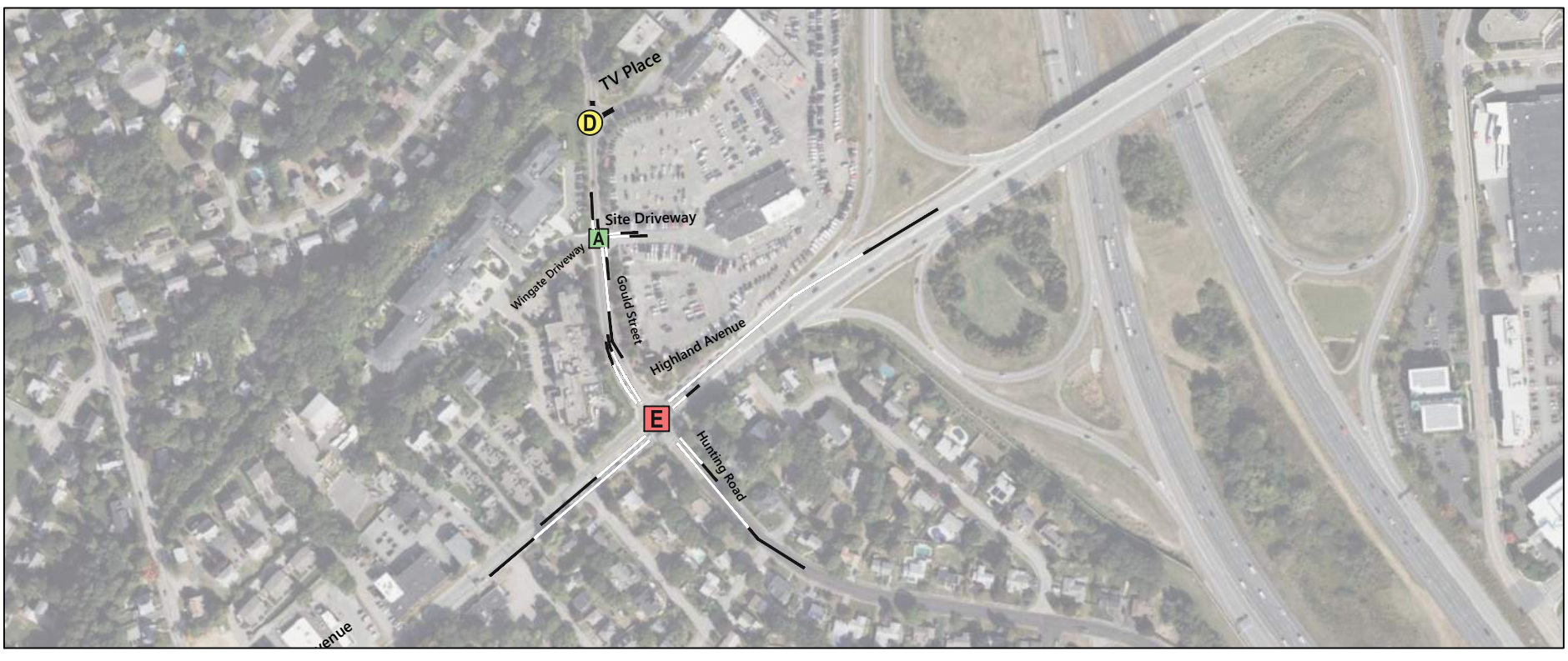
[X] Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build



2029 Build Without Mitigation



2029 Build With Mitigation

Gould Street at Site Driveway signalized under Mitigation Condition

Queue Diagrams
Weekday Morning Peak Hour

0 200 400 Feet

557 Highland Avenue
Needham, Massachusetts

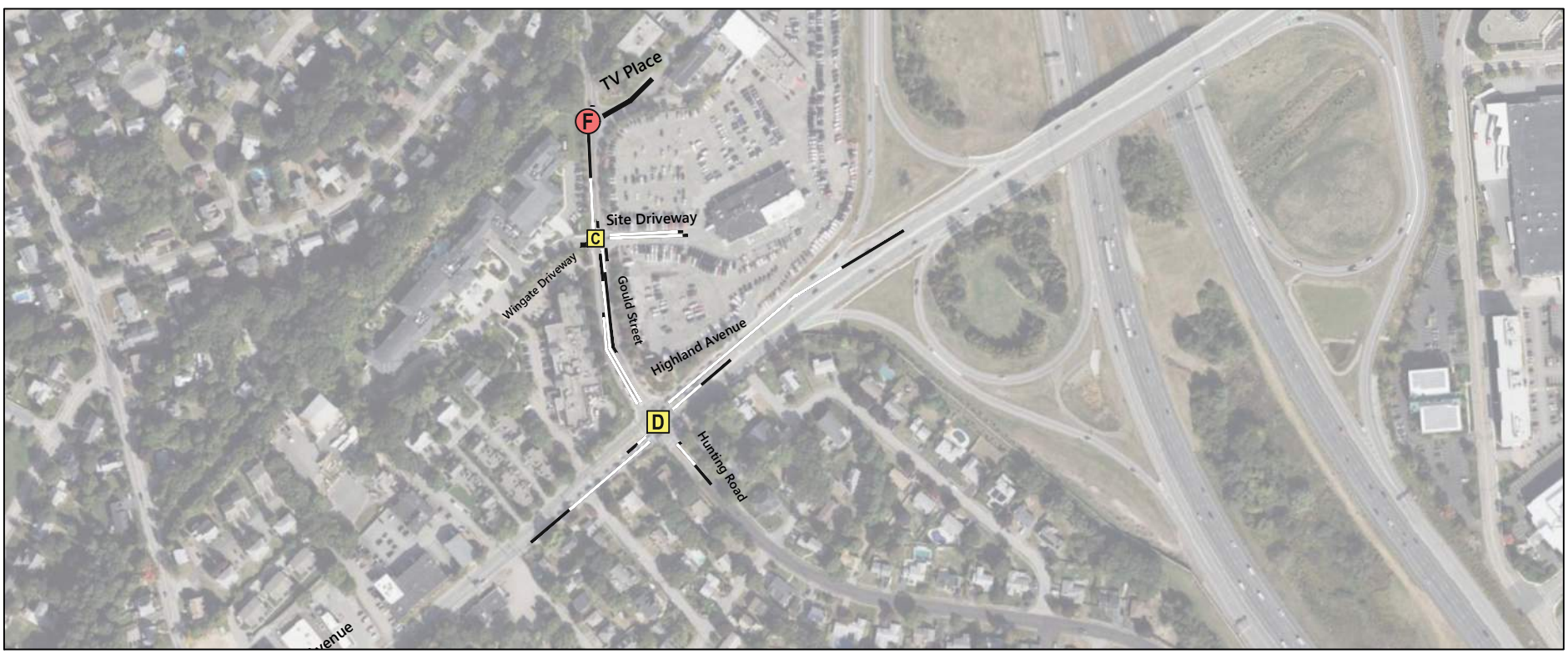
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues\Queues_PM.dwg

Gould Street at Highland Avenue (Signalized), Site Driveway (Unsignlaized), and TV Place (Unsignalized)

X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2029 No-Build

2029 Build Without Mitigation



2029 Build With Mitigation

* Movement beyond capacity, no results reported.

Gould Street at Site Driveway signalized under Mitigation Condition

Queue Diagrams
Weekday Evening Peak Hour

0 200 400 Feet

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Highland Avenue at West Street (Signalized) and Hunnewell Street (Unsignalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing

2029 No-Build

2029 Build Without Mitigation

* Movement beyond capacity, no results reported.

0 150 300 Feet

vhb

Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Highland Avenue at West Street (Signalized) and Hunnewell Street (Unsignalized)

X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing

2029 No-Build

2029 Build Without Mitigation

0 150 300 Feet

Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Highland Avenue at West Street (Signalized)

X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2029 No-Build

2029 Build Without Mitigation

2029 Build With Mitigation

Signal timings modified under Mitigation Conditions

0 150 300 Feet

Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Highland Avenue at West Street (Signalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2029 No-Build

2029 Build Without Mitigation

2029 Build With Mitigation

Signal timings modified under Mitigation Conditions

0 150 300 Feet

vhb

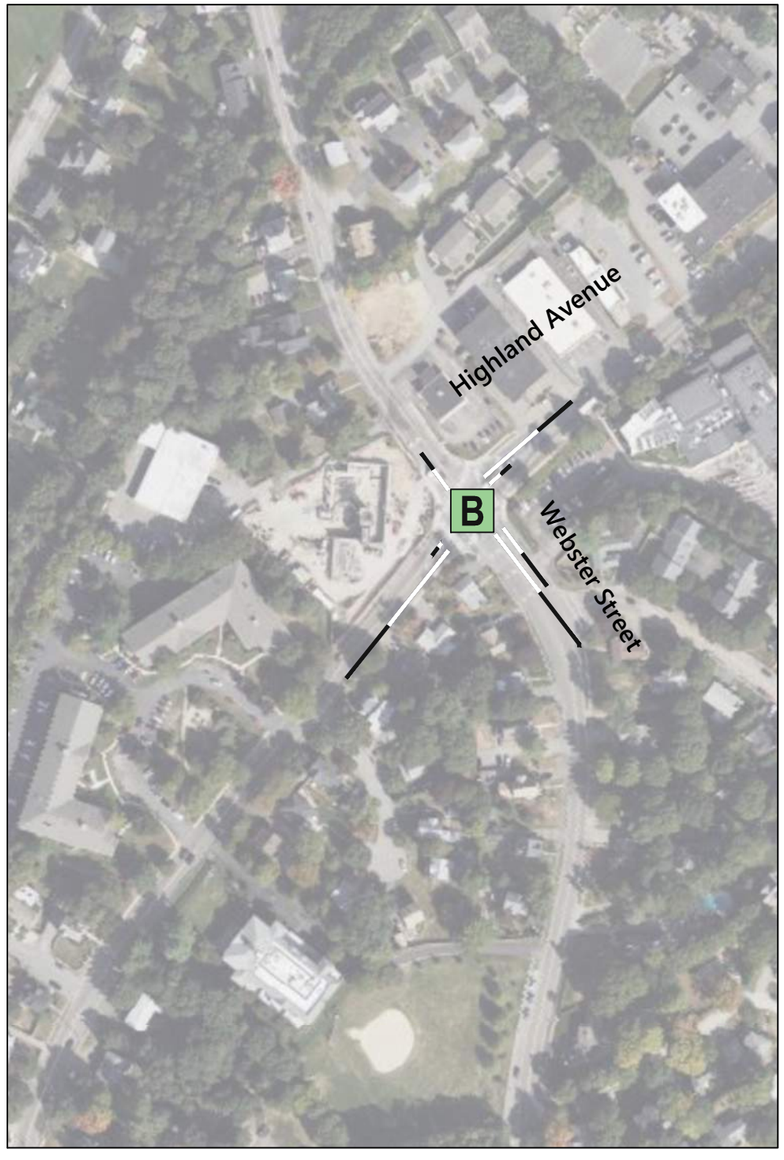
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

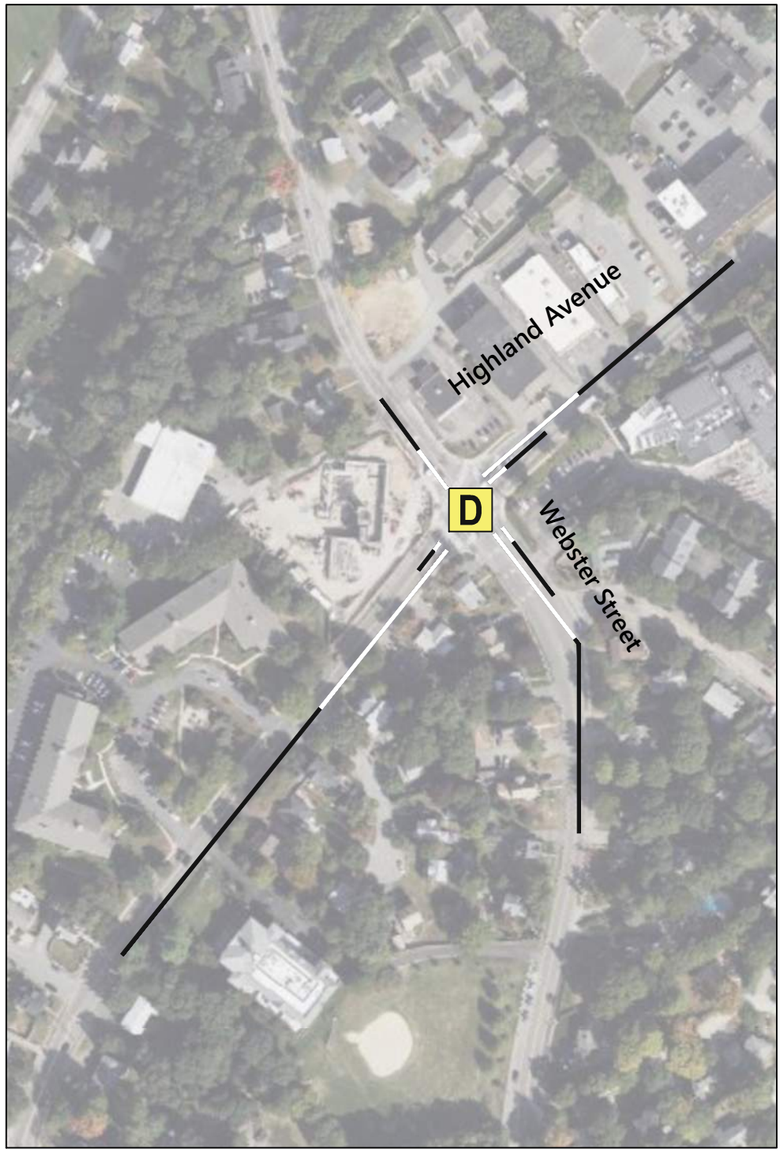
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Highland Avenue at Webster Street (Signalized)

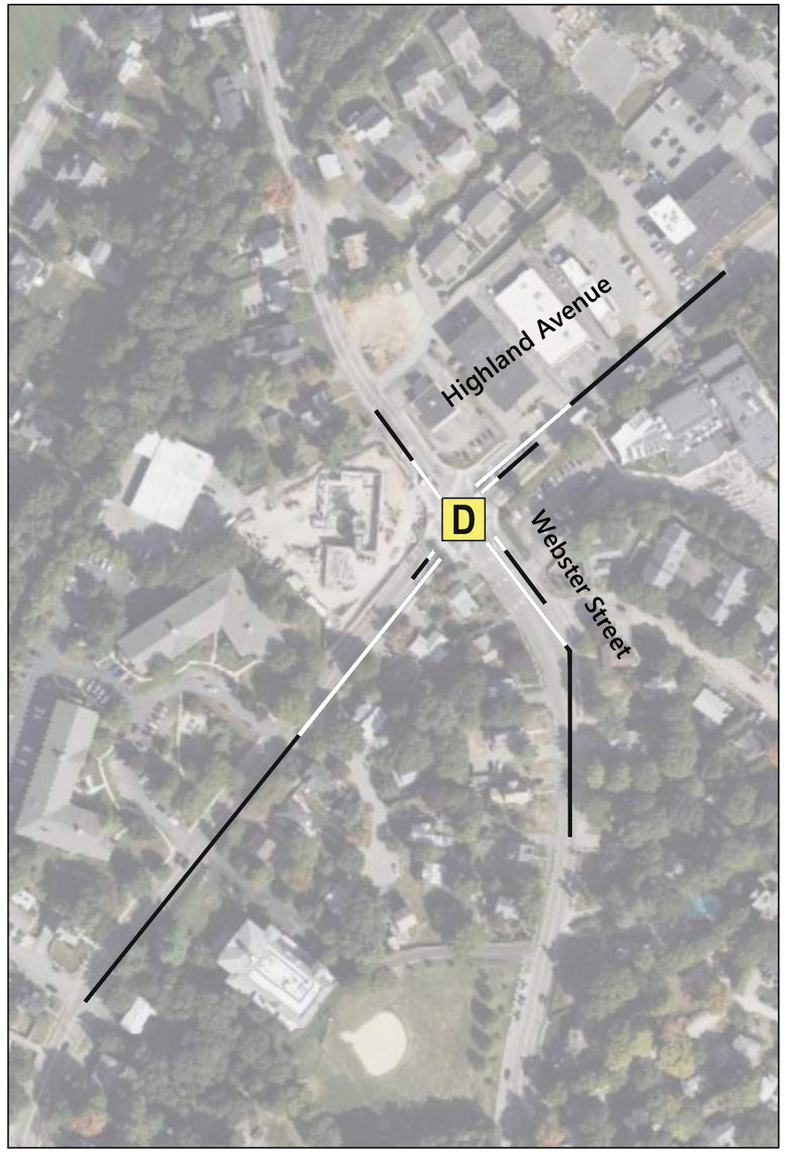
X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

0 100 200 Feet

vhb

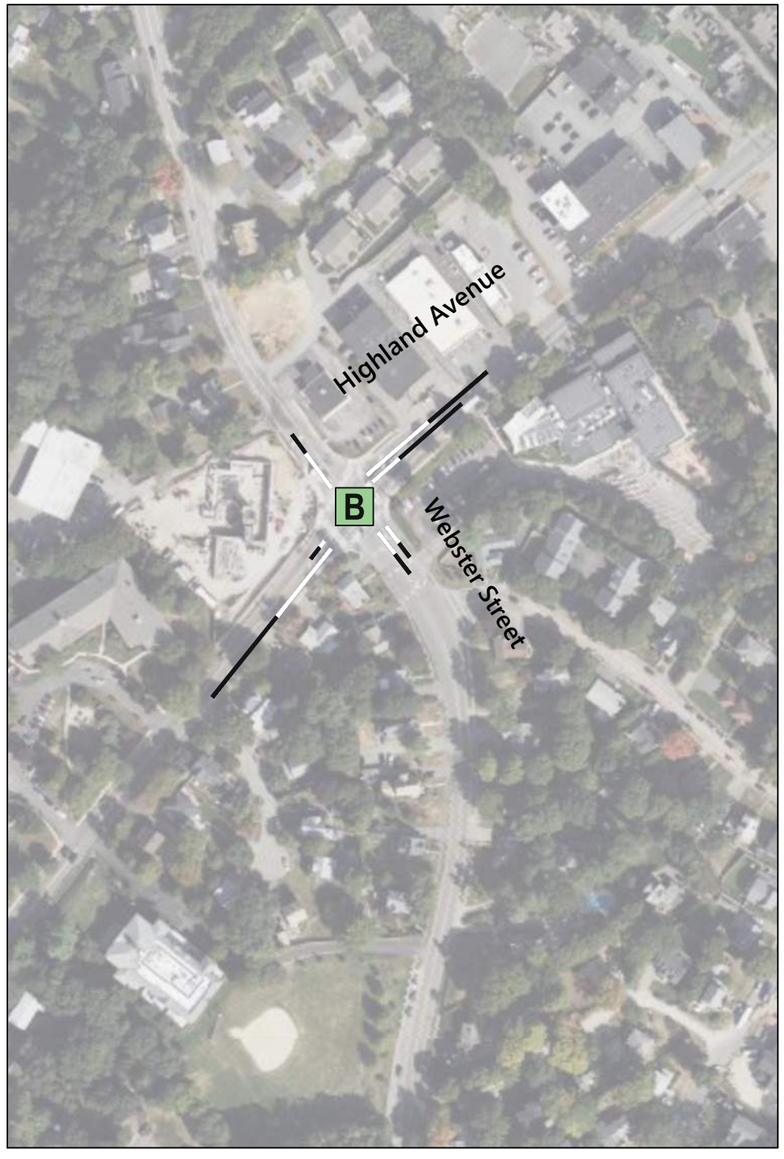
Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

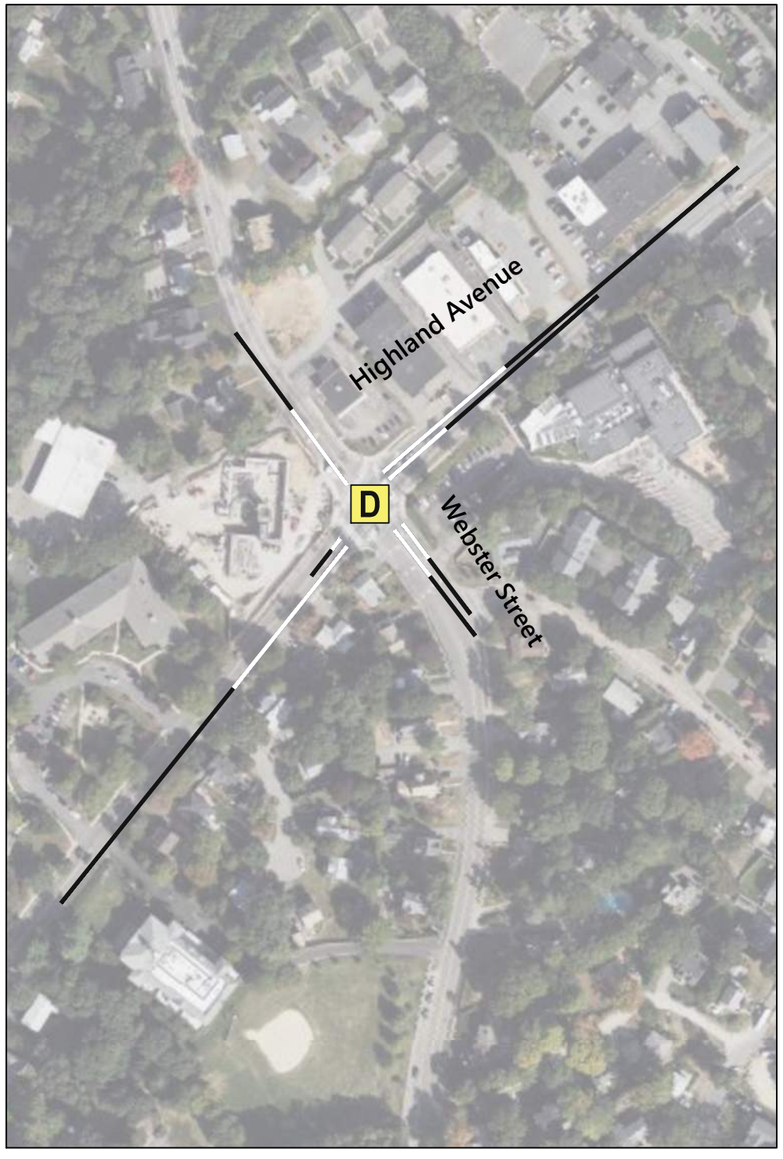
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Highland Avenue at Webster Street (Signalized)

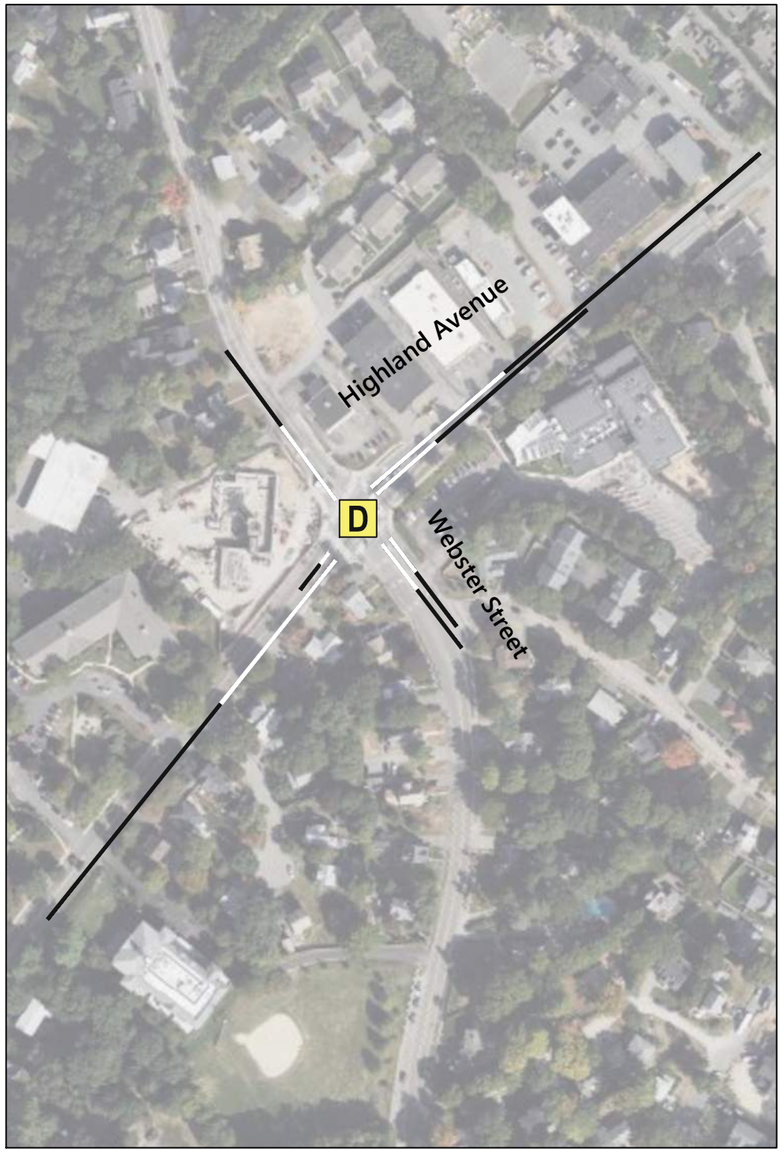
X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

0 100 200 Feet

vhb

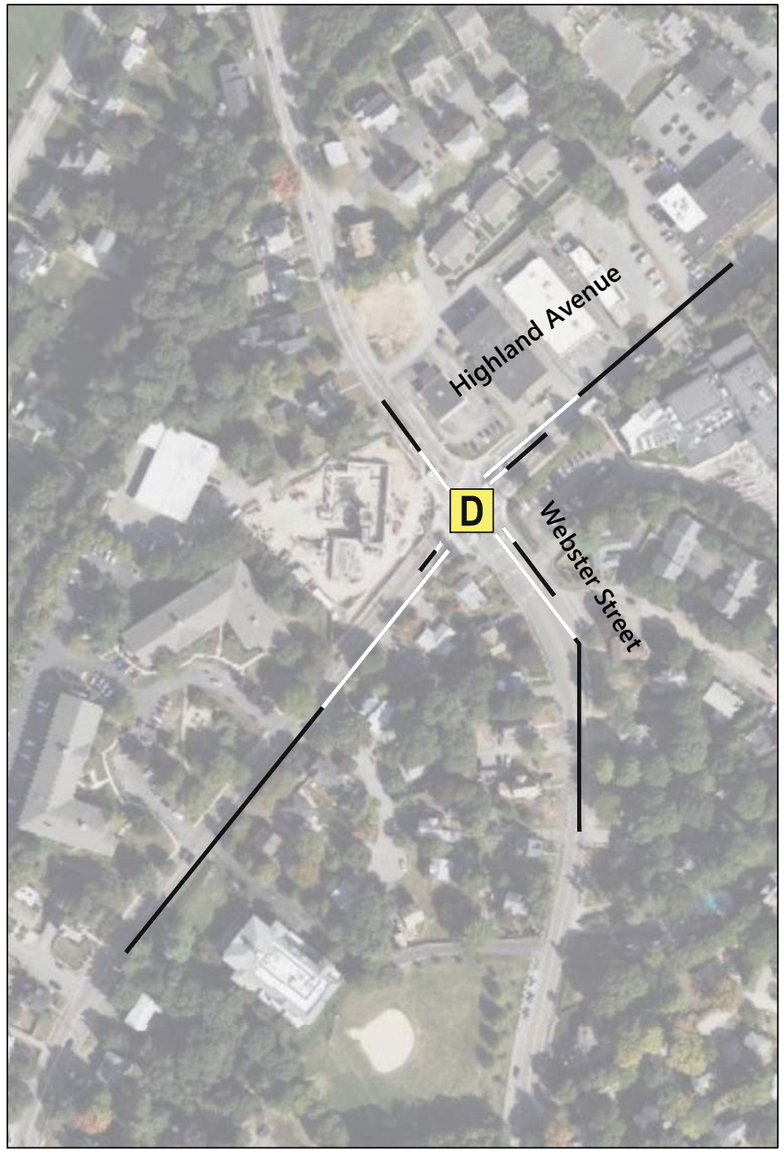
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

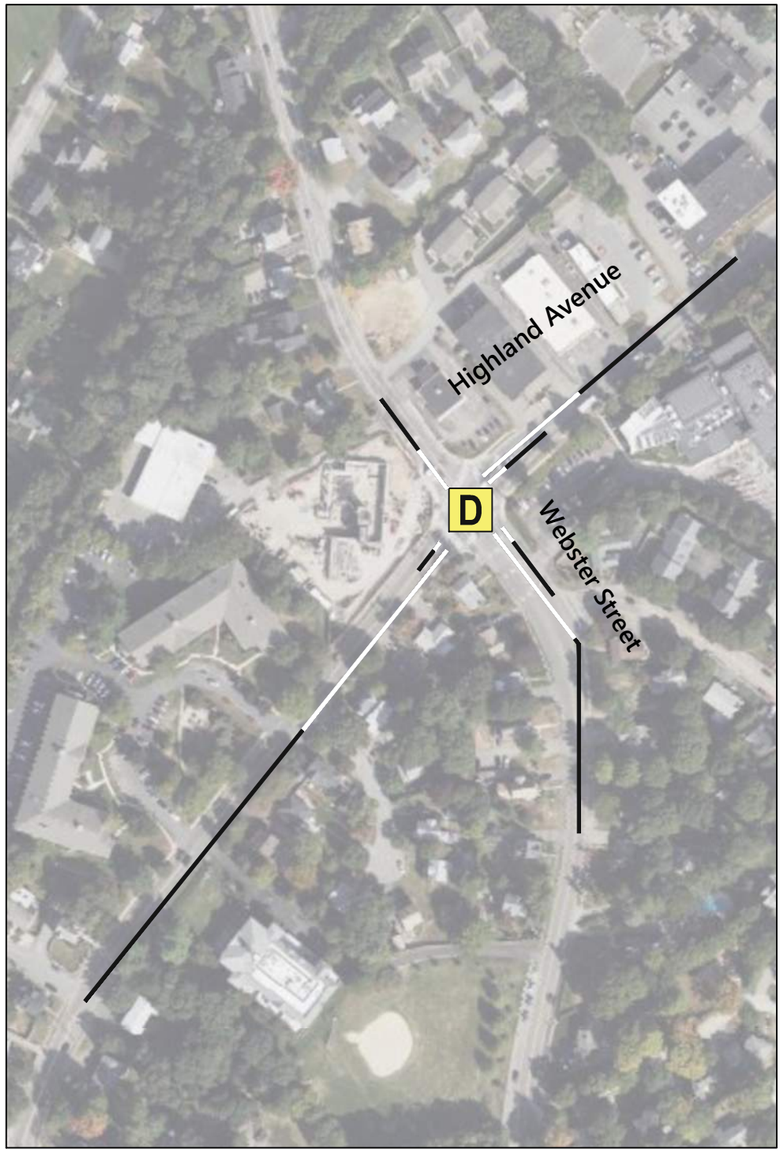
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Highland Avenue at Webster Street (Signalized)

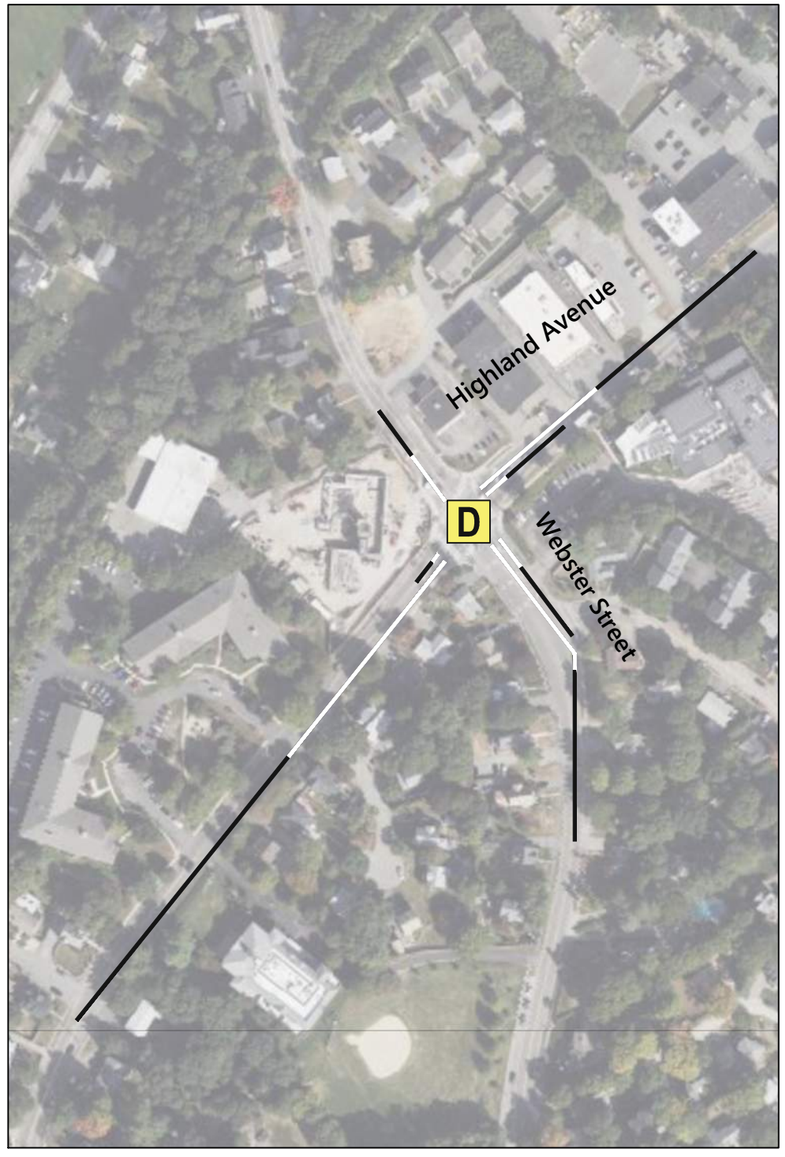
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build



2029 Build Without Mitigation



2029 Build With Mitigation

Signal Timings modified under Mitigation Conditions

0 100 200 Feet

vhb

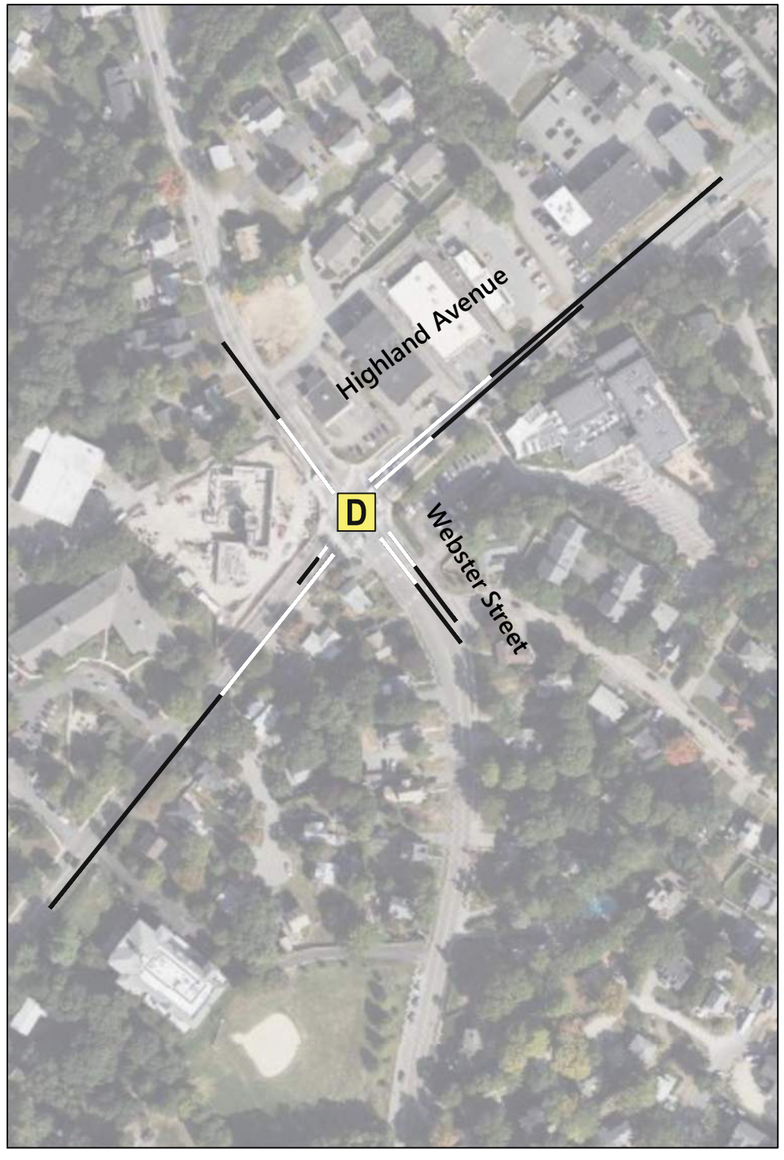
Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

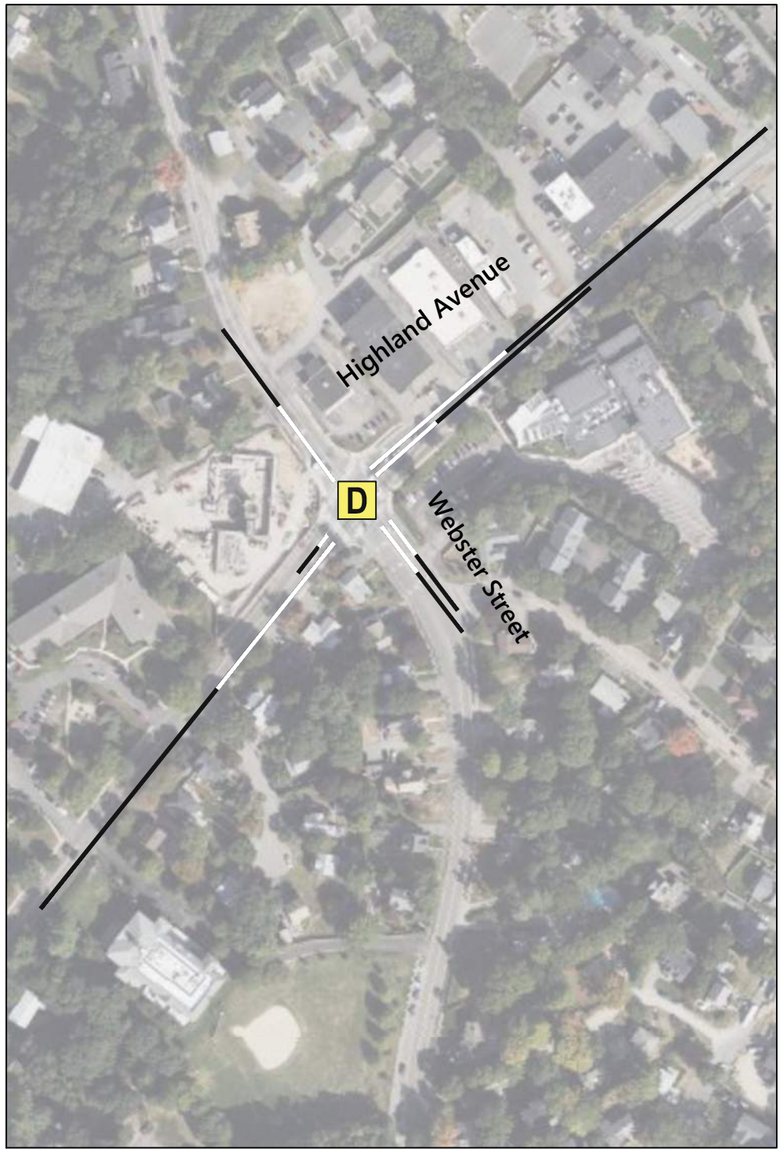
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Highland Avenue at Webster Street (Signalized)

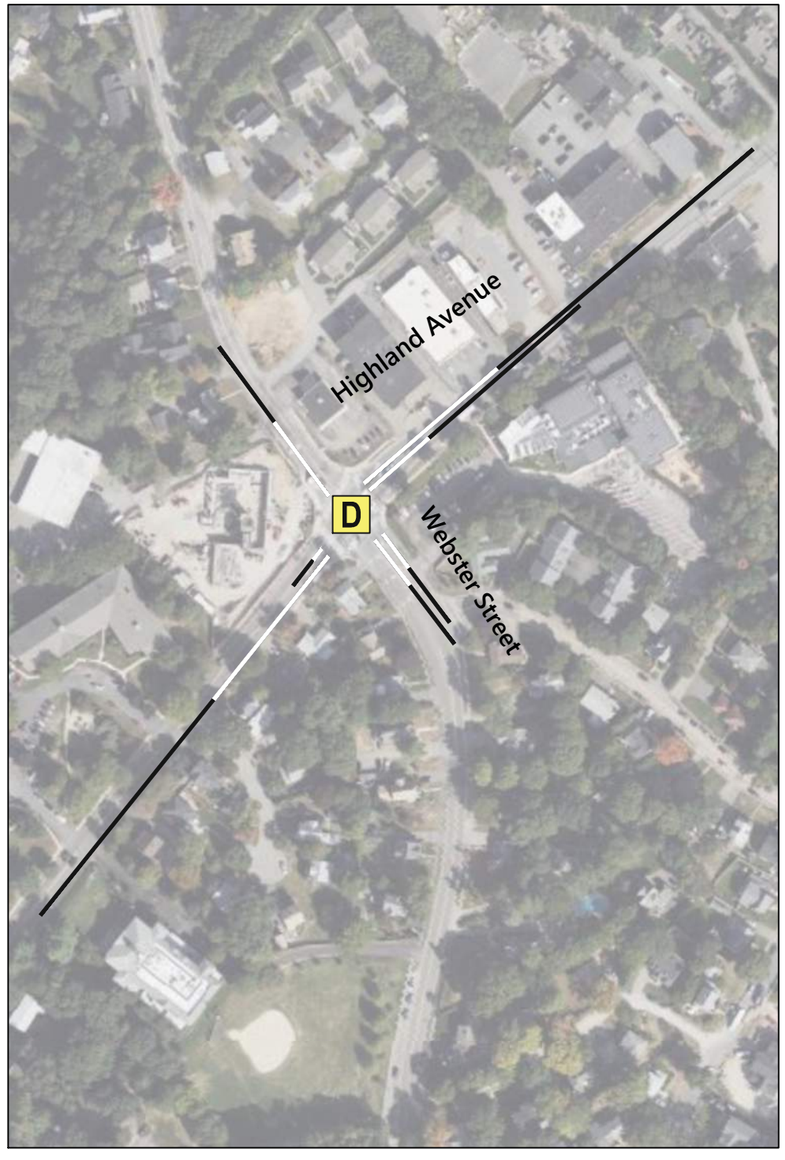
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build



2029 Build Without Mitigation



2029 Build With Mitigation

Signal Timings modified under Mitigation Conditions

0 100 200 Feet

vhb

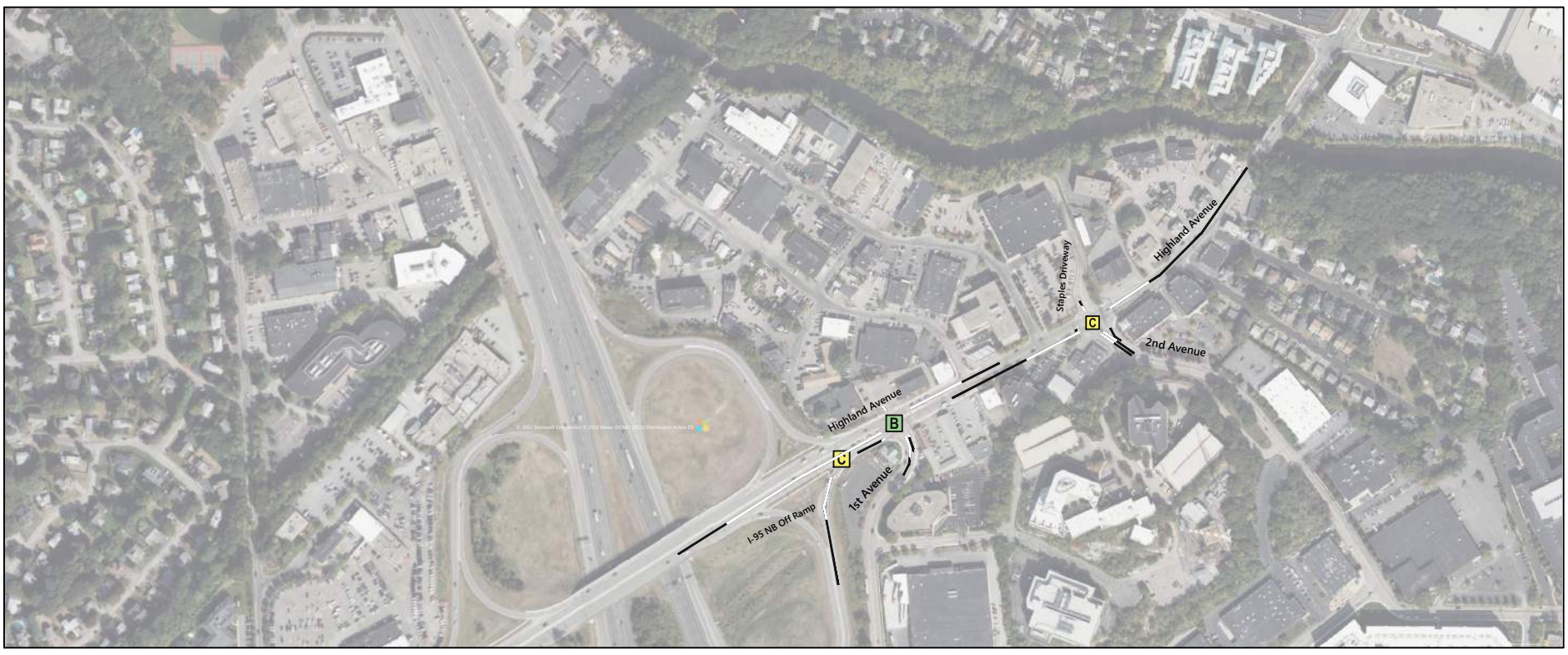
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

Highland Avenue at I-95 Ramps, 1st Avenue, and 2nd Avenue (Signalized)

X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2022 Existing



2029 No-Build

2029 Build Without Mitigation

Queue Diagrams
Weekday Morning Peak Hour

0 275 550 Feet

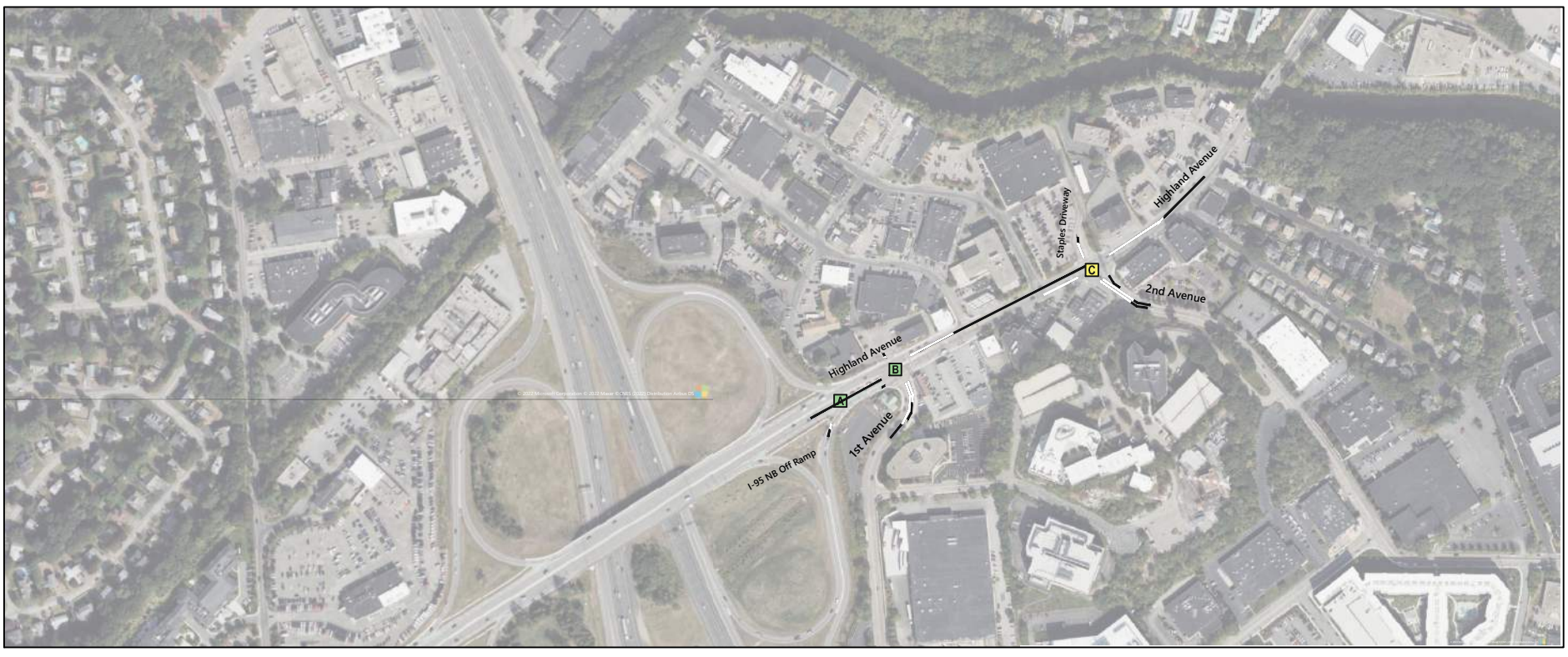
557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

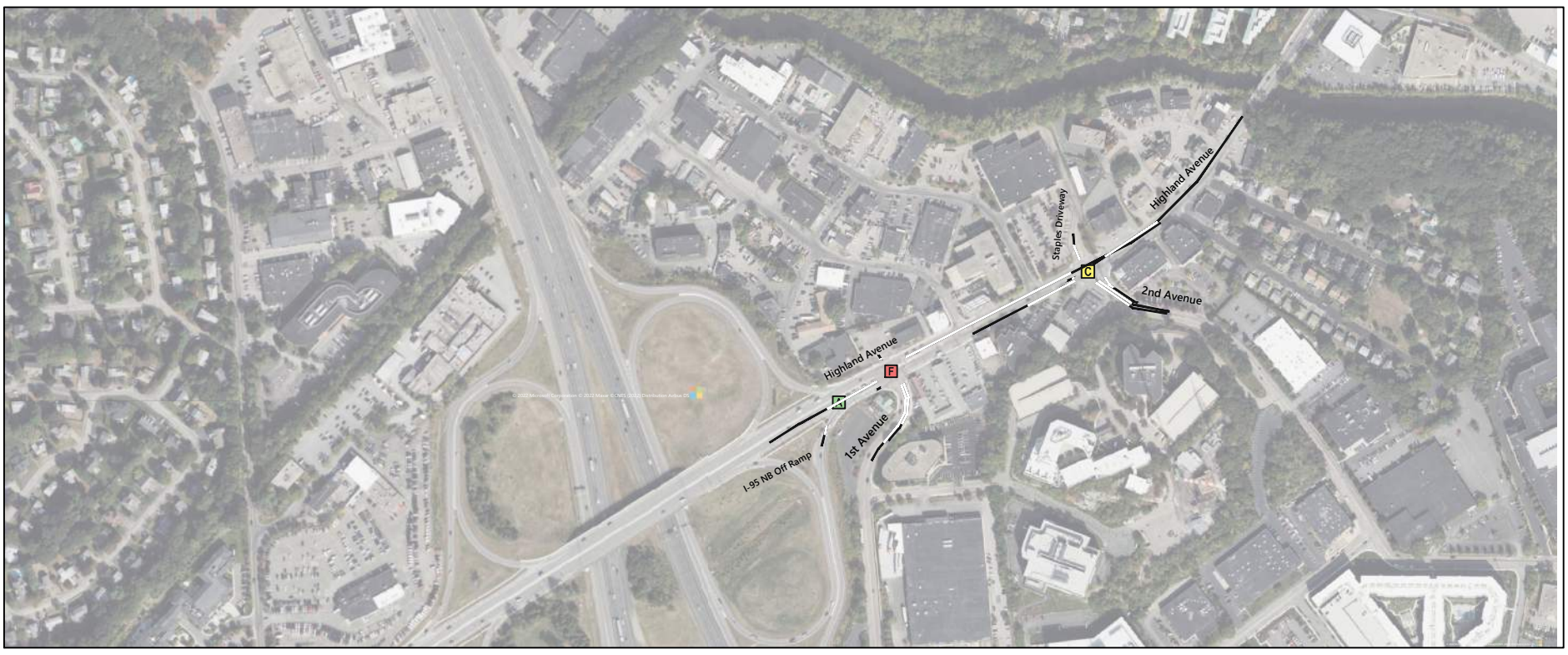
Highland Avenue at I-95 Ramps, 1st Avenue, and 2nd Avenue (Signalized)

[X] Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service

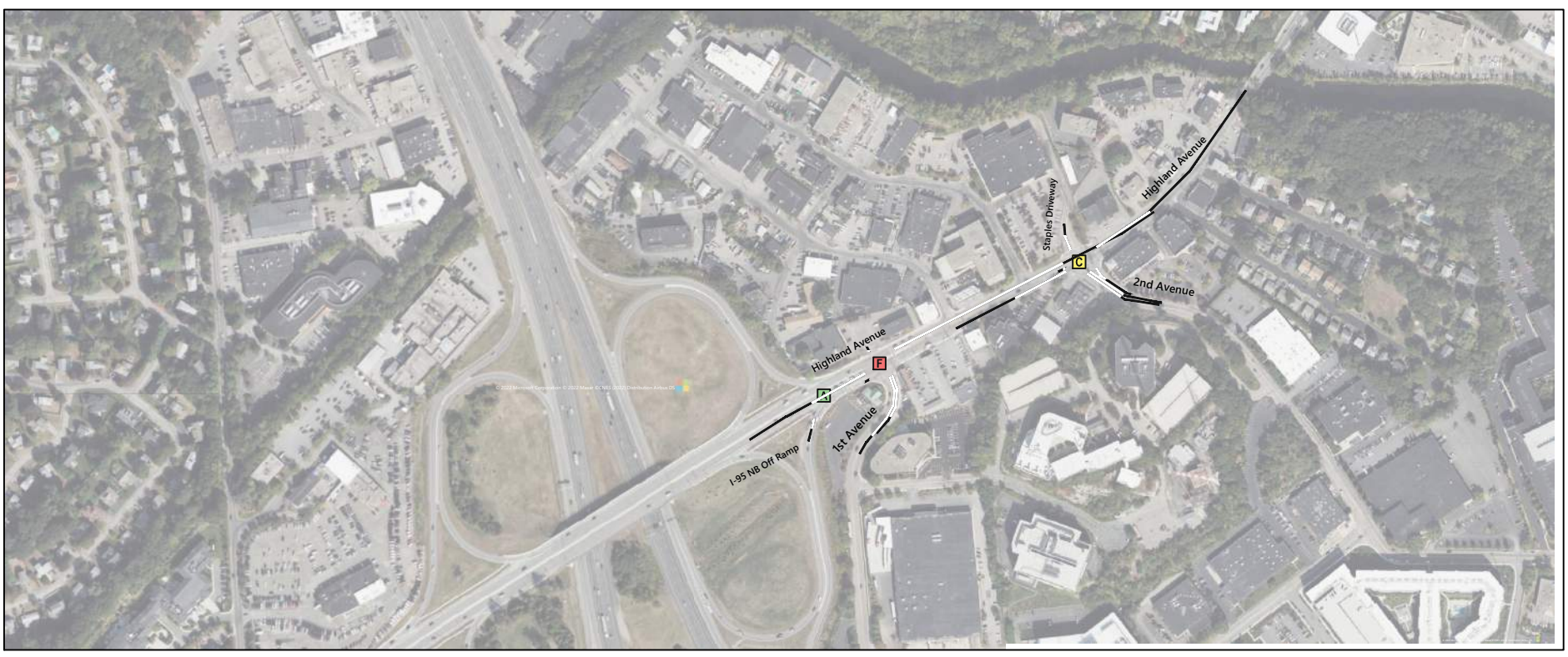
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

Queue Diagrams
Weekday Evening Peak Hour

0 275 550 Feet

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Highland Avenue at 1st Avenue (Signalized)

X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue

2029 No-Build

2029 Build Without Mitigation

2029 Build With Mitigation

Signal Timings modified under Mitigation Conditions

Queue Diagrams
Weekday Morning Peak Hour

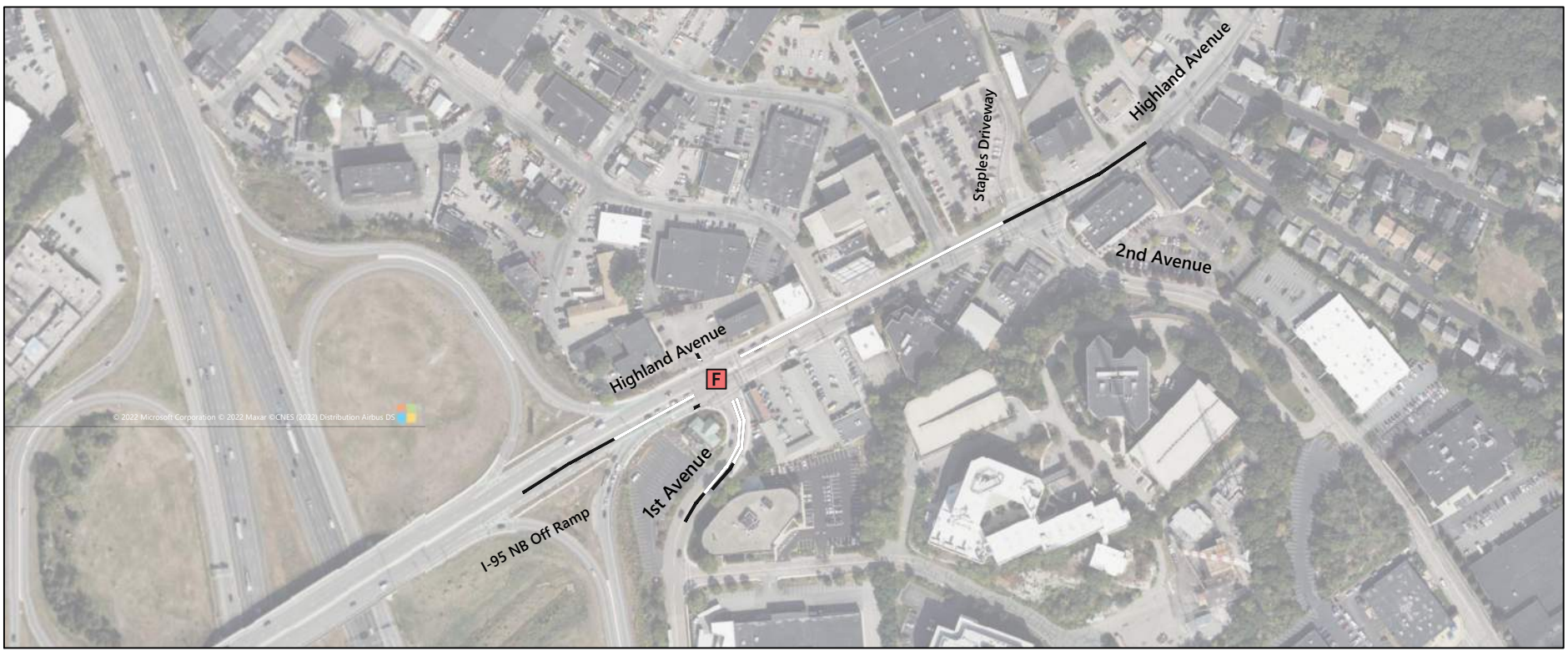
0 175 350 Feet

557 Highland Avenue
Needham, Massachusetts

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Highland Avenue at 1st Avenue (Signalized)

[X] Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build

2029 Build Without Mitigation

2029 Build With Mitigation

Signal Timings modified under Mitigation Conditions

Queue Diagrams
Weekday Evening Peak Hour

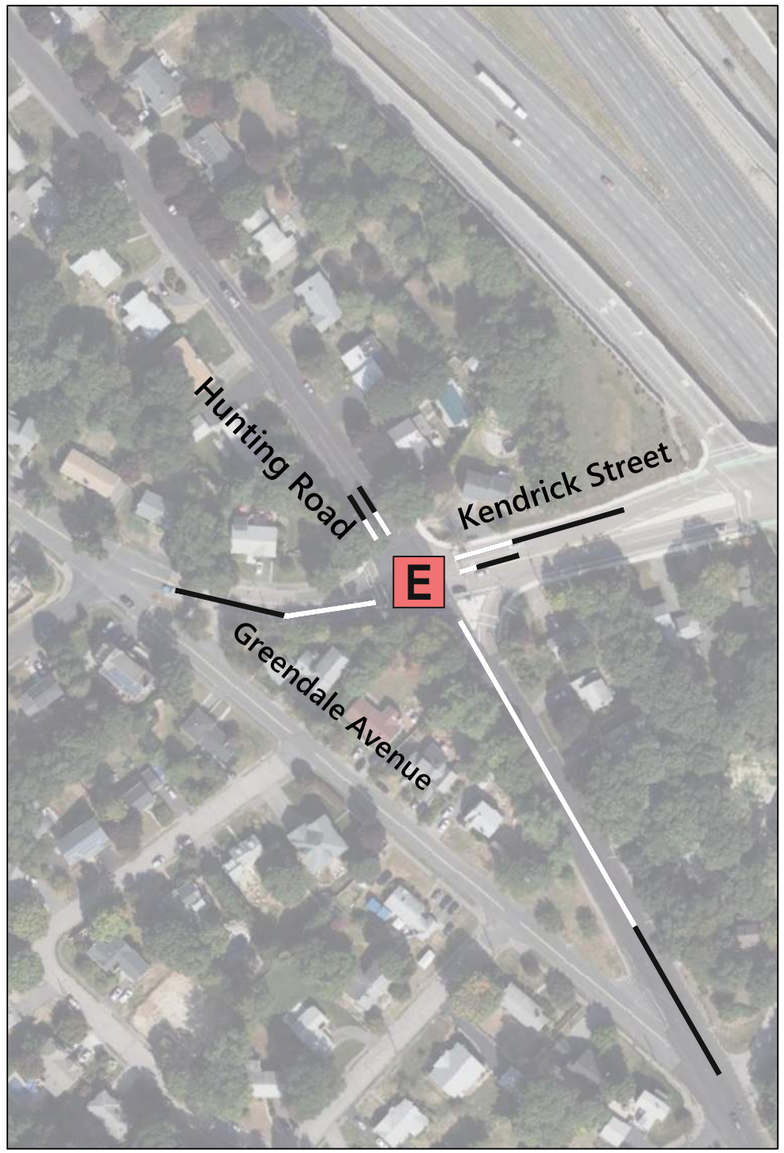
0 175 350 Feet

557 Highland Avenue
Needham, Massachusetts

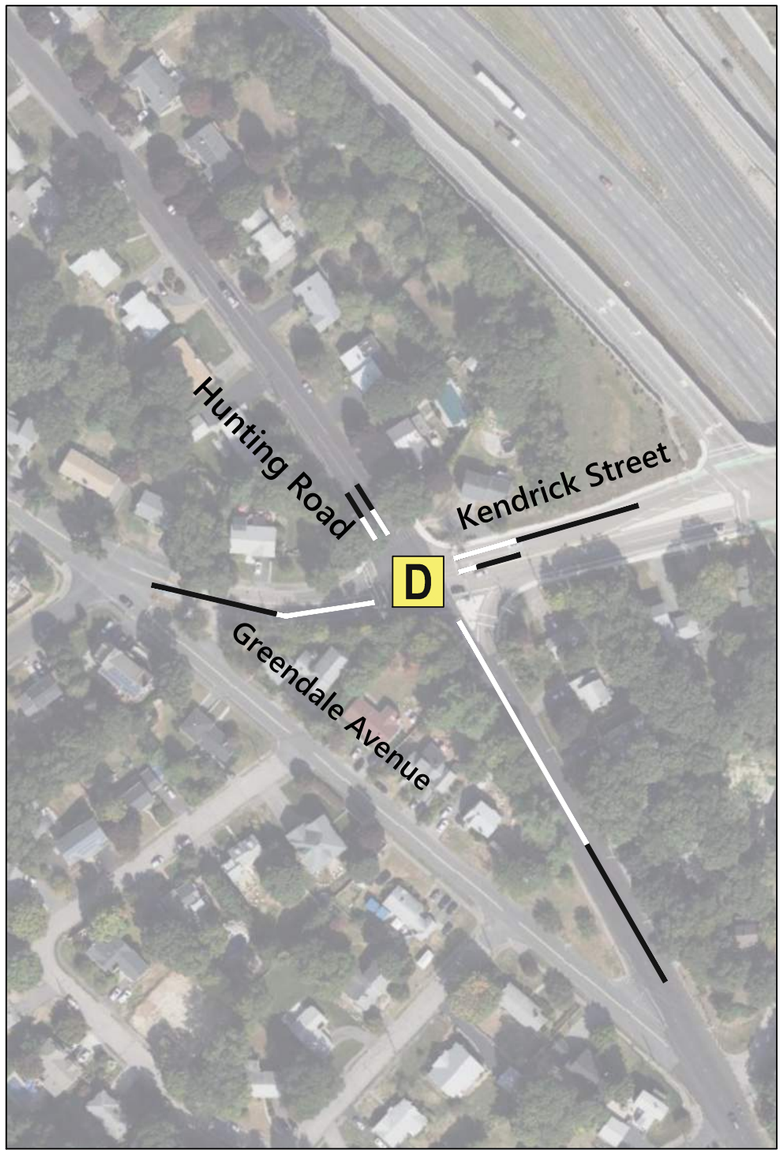
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Hunting Road at Kendrick Street (Signalized)

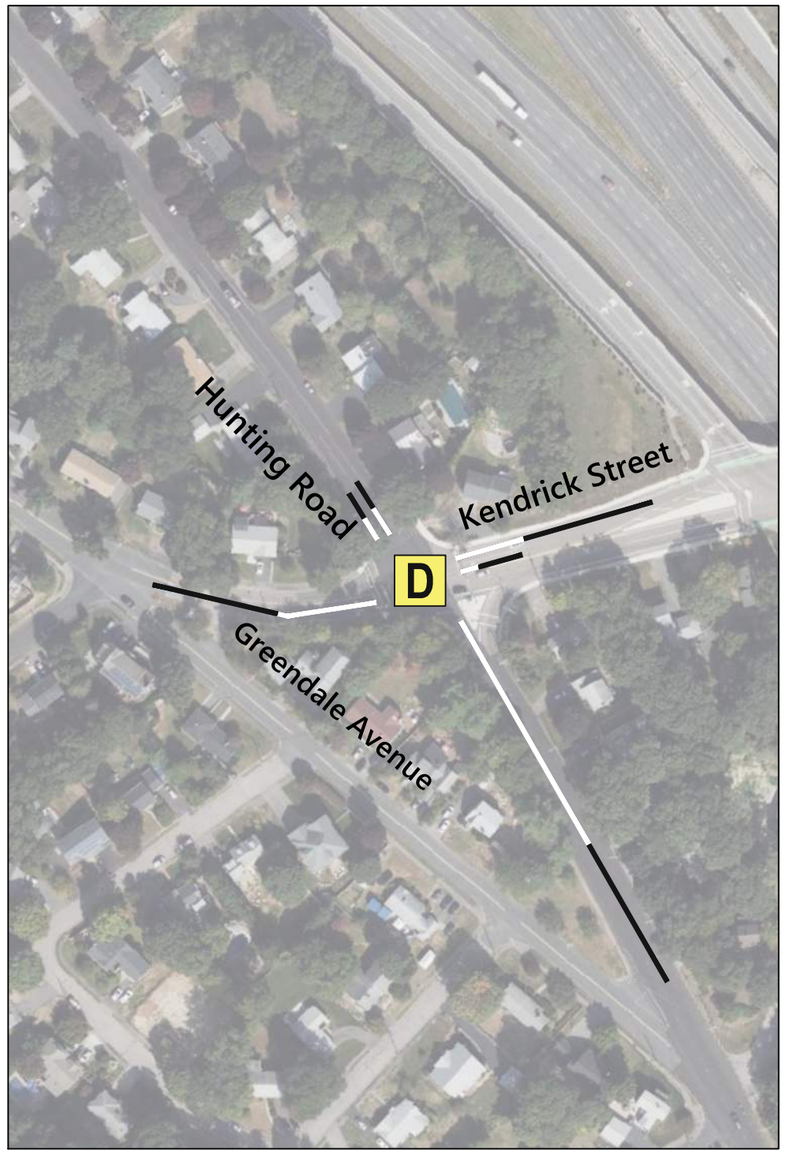
X Signalized Intersection Level of Service
(X) Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

vhb

Queue Diagrams
Weekday Morning Peak Hour

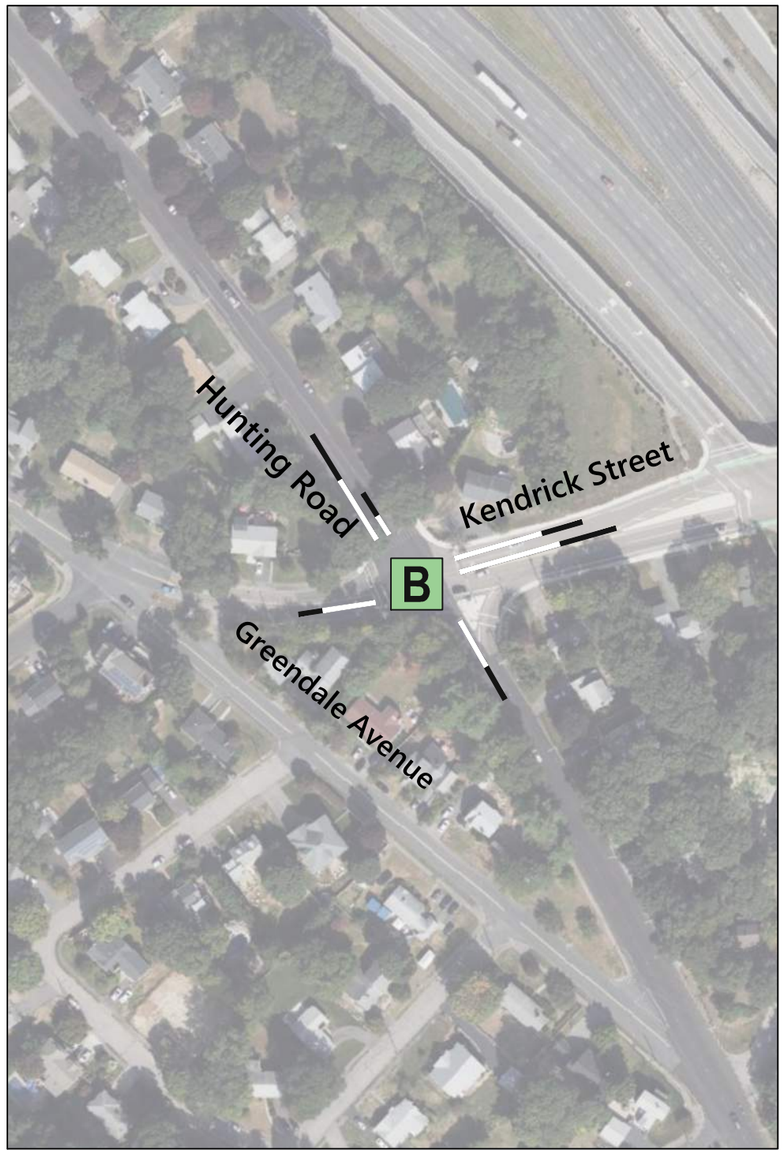
557 Highland Avenue
Needham, Massachusetts

0 100 200 Feet

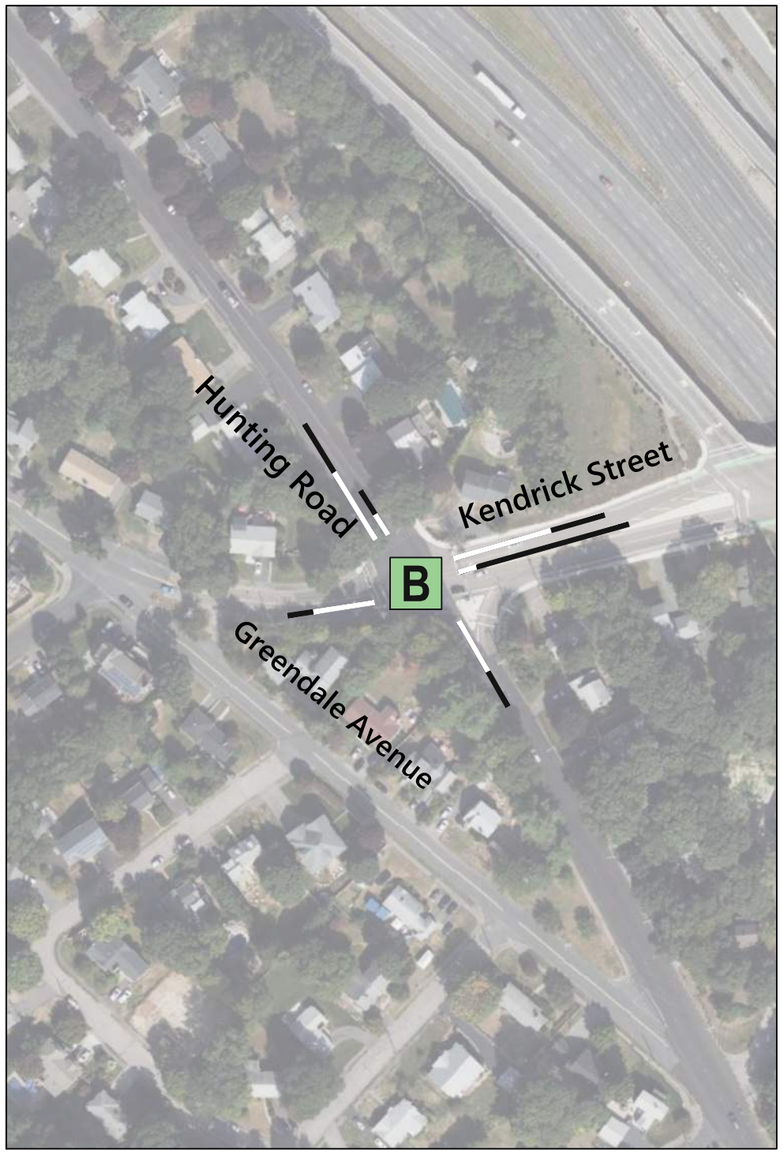
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Hunting Road at Kendrick Street (Signalized)

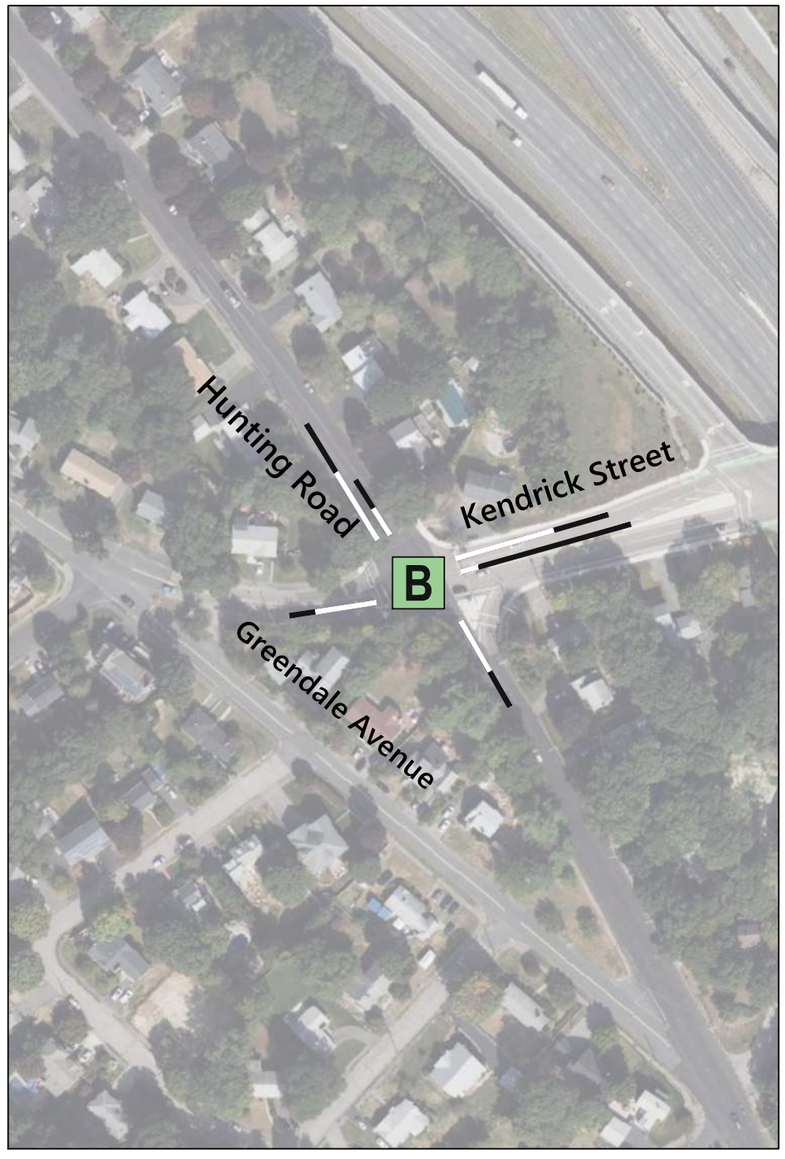
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2022 Existing



2029 No-Build



2029 Build Without Mitigation

0 100 200 Feet

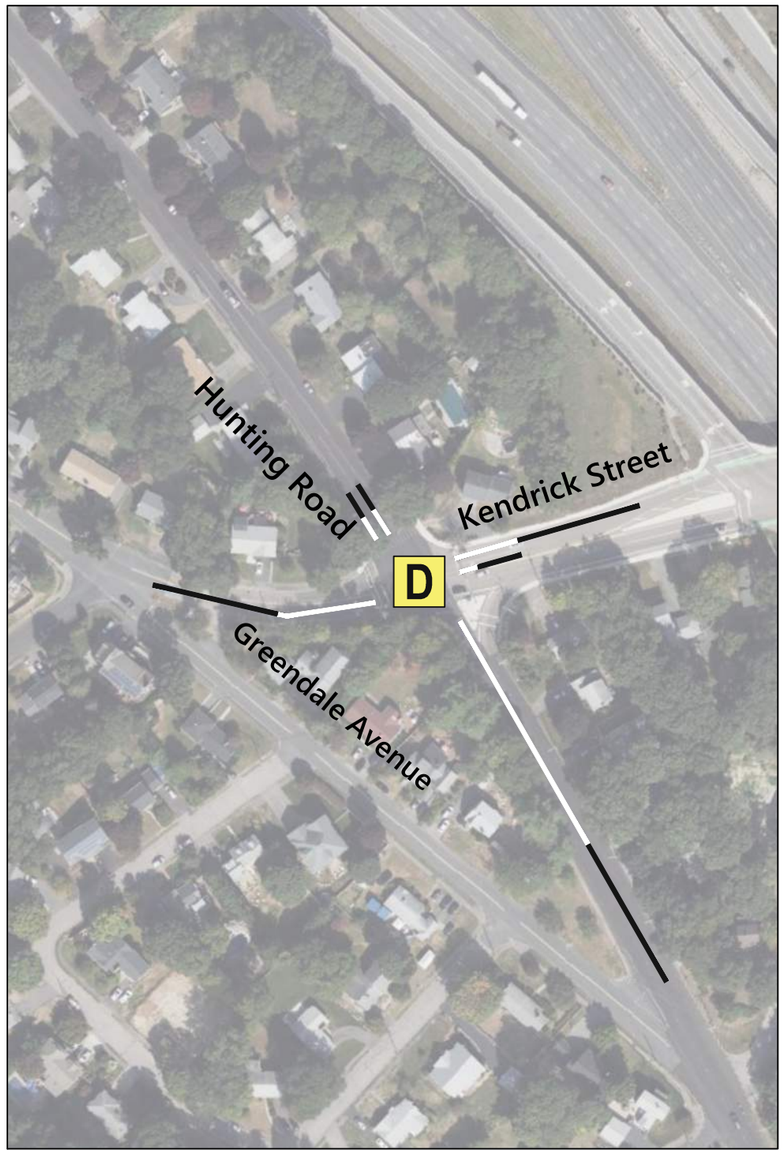
Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

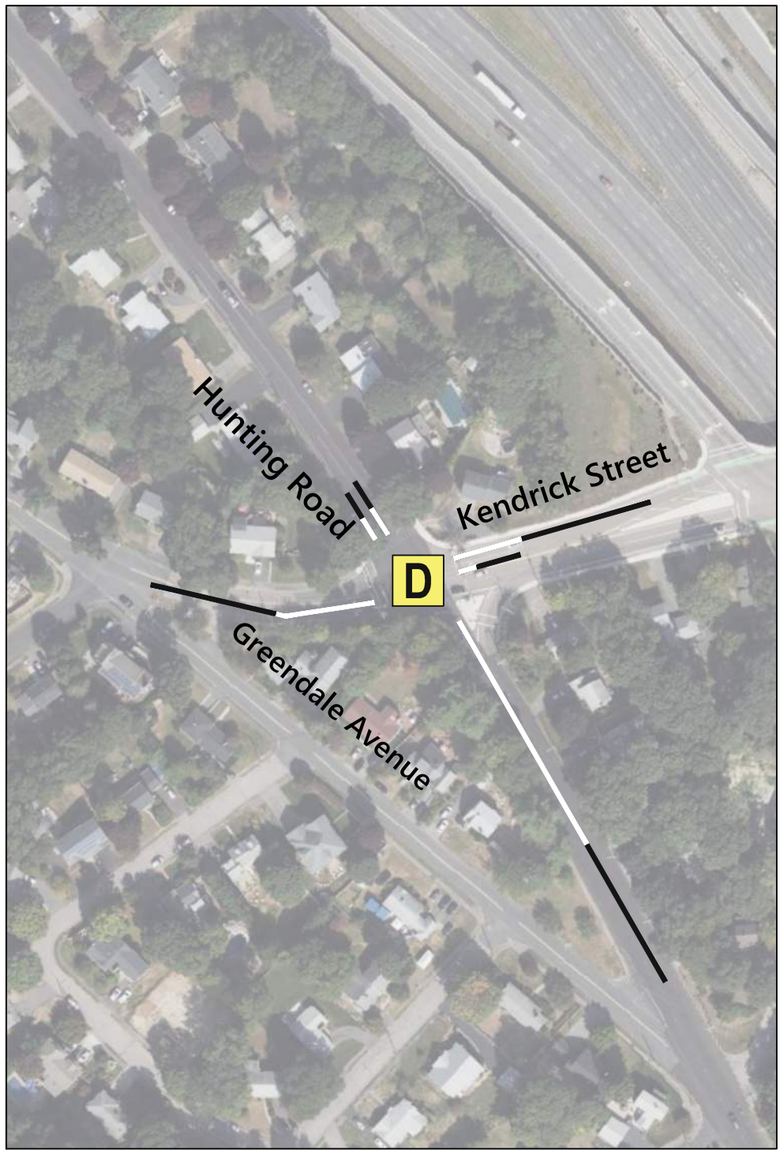
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_AM.dwg

Hunting Road at Kendrick Street (Signalized)

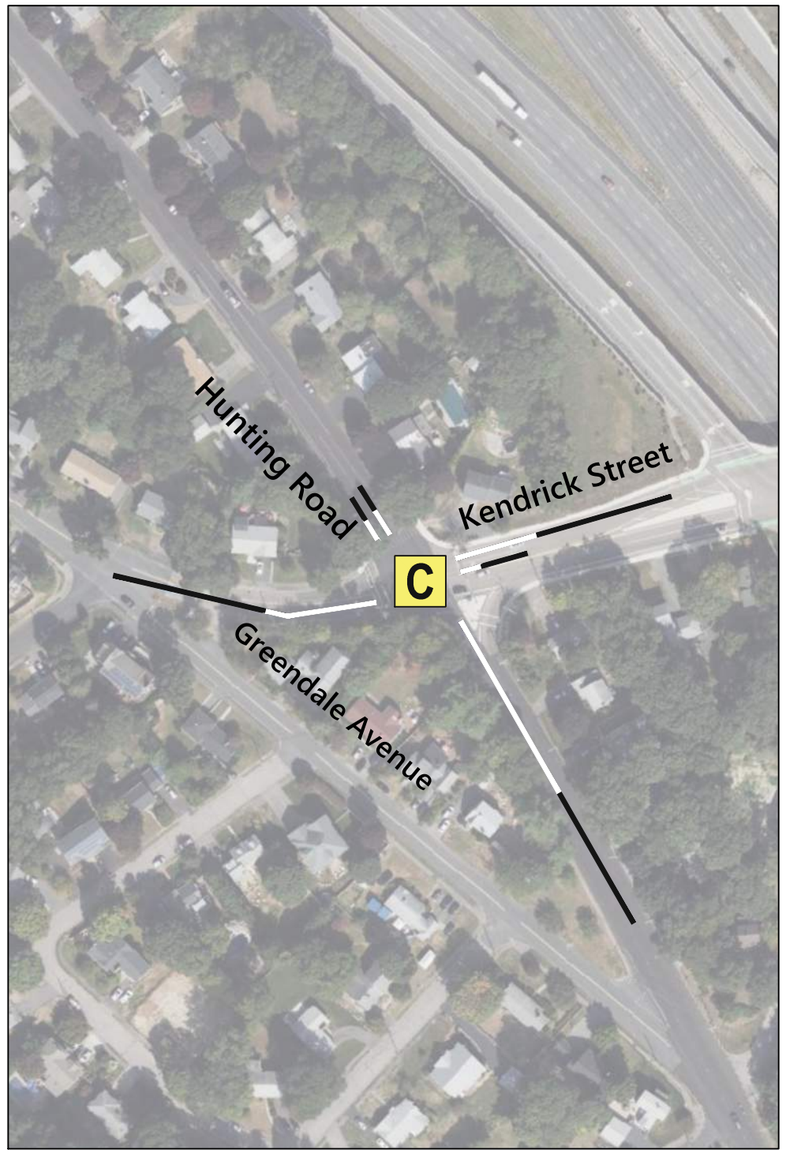
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build



2029 Build Without Mitigation



2029 Build With Mitigation

Signal timings modified under Mitigation Conditions

0 100 200 Feet

vhb

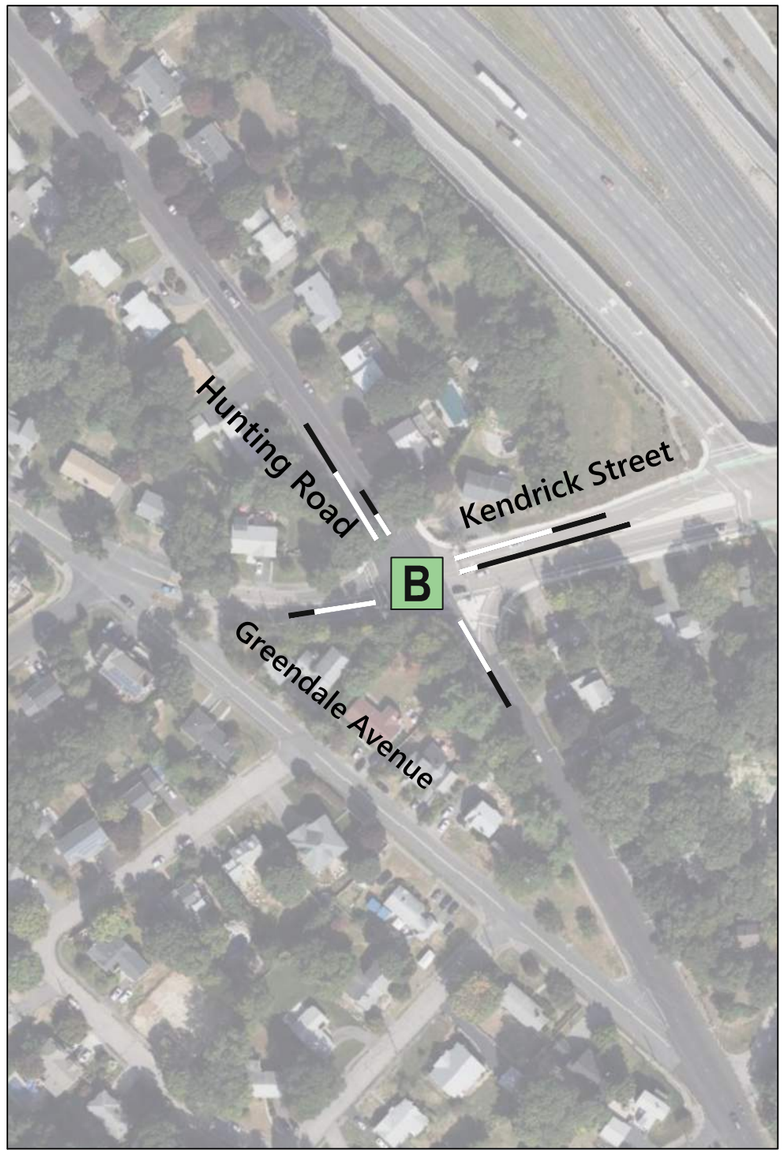
Queue Diagrams
Weekday Morning Peak Hour

557 Highland Avenue
Needham, Massachusetts

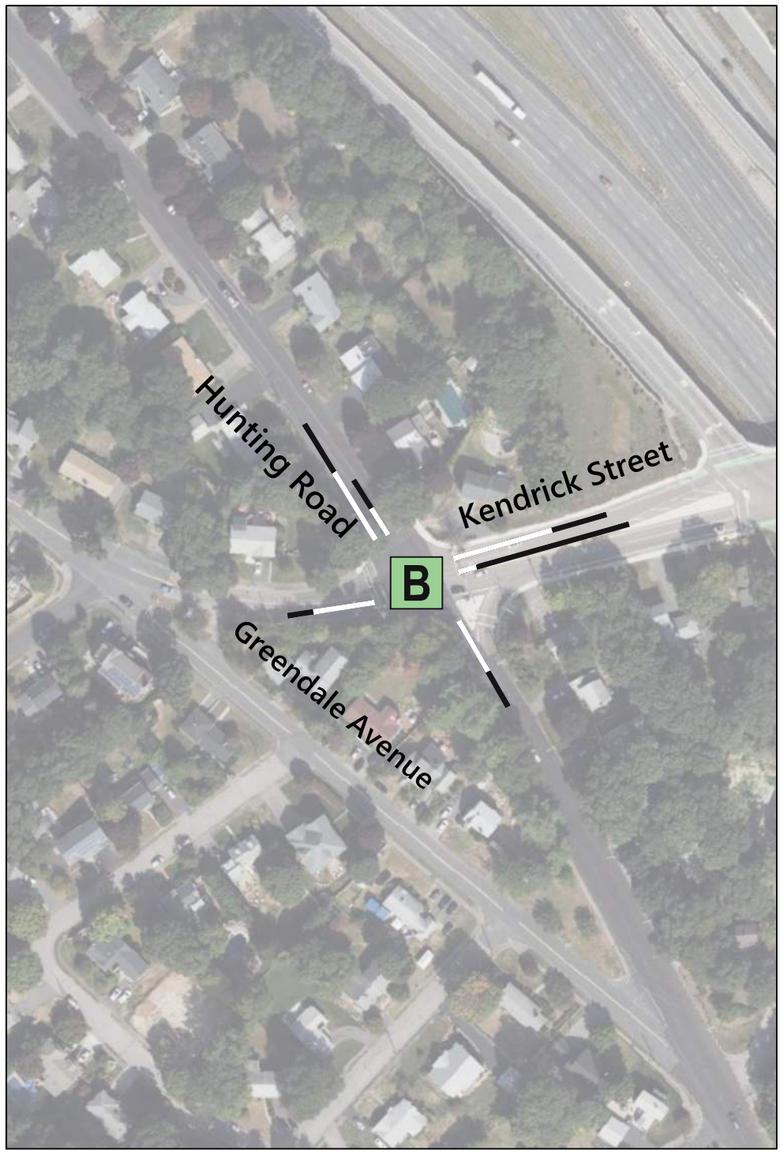
\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Queues_PM.dwg

Hunting Road at Kendrick Street (Signalized)

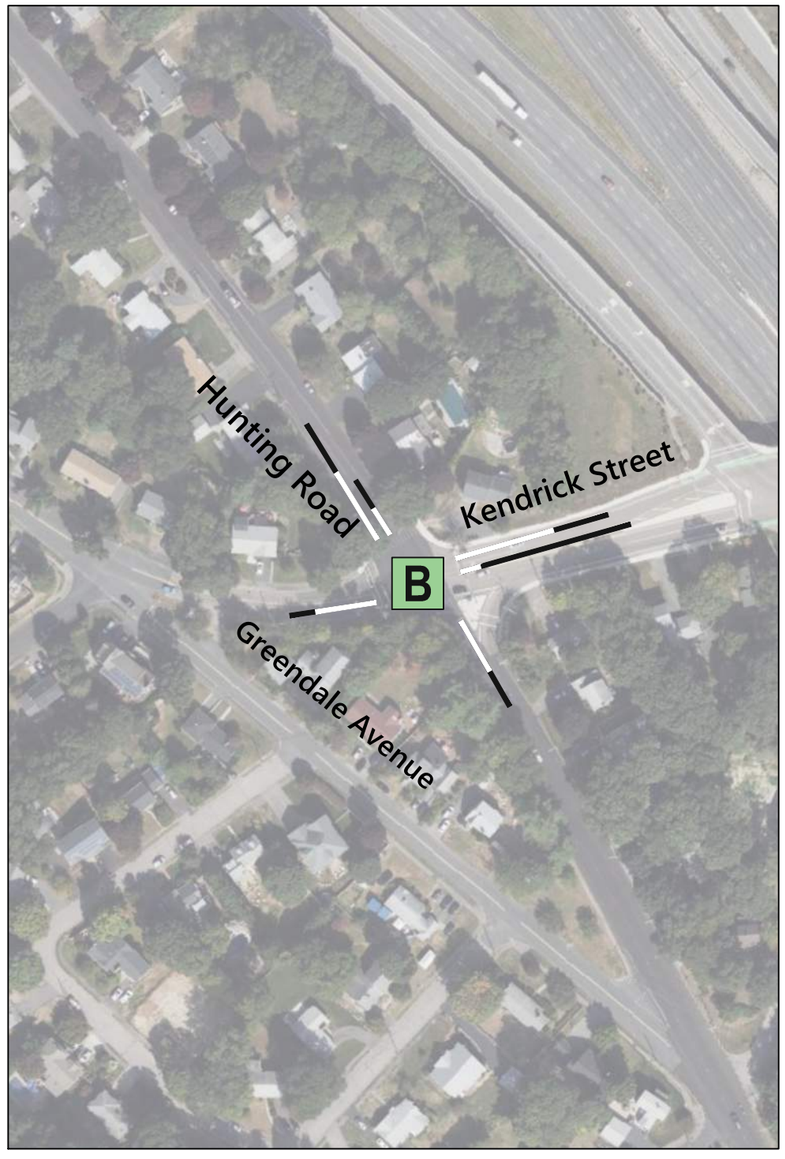
X Signalized Intersection Level of Service
X Unsignalized Intersection Level of Service
50th Percentile Queue
95th Percentile Queue



2029 No-Build



2029 Build Without Mitigation



2029 Build With Mitigation

Signal timings modified under Mitigation Conditions

0 100 200 Feet

vhb

Queue Diagrams
Weekday Evening Peak Hour

557 Highland Avenue
Needham, Massachusetts

Weave Segment Capacity Analysis Worksheets

Comment 2b

557 Highland Avenue TIS
Weaving Segment Analysis

1.

Scenario	Direction	Road	Start	End	Freeway or Highway/C-D Road	Number of lanes within the weaving segment, N	One-sided vs two-sided Weave	Short length of weaving segment, L_S	Number of lane changes, LC_{RF}	Number of lane changes, LC_{FR}	Number of lane changes, LC_{RR}	Number of weaving lanes	Interchanges within 3 miles up/downstream	Terrain type	Free-flow speed	Equivalent capacity of basic freeway segment	Hourly demand volume, V_{FF} (Freeway-to-Freeway)	PHF_{FF}	$HV\%_{FF}$	Hourly demand volume, V_{RF} (Ramp-to-Freeway)	PHF_{RF}	$HV\%_{RF}$	Hourly demand volume, V_{FR} (Freeway-to-Ramp)	PHF_{FR}	$HV\%_{FR}$	Hourly demand volume, V_{RR} (Ramp-to-Ramp)	PHF_{RR}	$HV\%_{RR}$
Step 1: Input Data																												
					Geometric Inputs												**Volume Characteristics for Each Movement**												
2022 EXISTING ANALYSIS																												
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	685	0.98	0.01	725	0.91	0.02	410	0.98	0.01	15	0.91	0.02
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	215	0.97	0.03	90	0.93	0.01	410	0.97	0.03	5	0.93	0.01
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	505	0.98	0.01	265	0.96	0.02	365	0.98	0.01	5	0.96	0.02
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	625	0.95	0.01	110	0.94	0.01	450	0.95	0.01	5	0.94	0.01
2029 NO BUILD ANALYSIS																												
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	810	0.92	0.01	945	0.92	0.02	440	0.92	0.01	20	0.92	0.02
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	250	0.92	0.03	100	0.92	0.01	470	0.92	0.03	5	0.92	0.01
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	575	0.92	0.01	360	0.92	0.02	395	0.92	0.01	5	0.92	0.02
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	730	0.92	0.01	120	0.92	0.01	575	0.92	0.01	5	0.92	0.01
2029 BUILD ANALYSIS																												
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	815	0.92	0.01	945	0.92	0.02	460	0.92	0.01	20	0.92	0.02
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	285	0.92	0.03	265	0.92	0.01	470	0.92	0.03	5	0.92	0.01
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	Highway	3	One-sided	750	1	1	0	2	12	Level	45	1900	610	0.92	0.01	360	0.92	0.02	545	0.92	0.01	5	0.92	0.02
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	Highway	3	One-sided	670	1	1	0	2	12	Level	45	1900	735	0.92	0.01	150	0.92	0.01	575	0.92	0.01	5	0.92	0.01

Source: Based on methodology presented in the Highway Capacity Manual: 6th Edition (HCM 6)

2.

Scenario	Direction	Road	Start	End	Passenger Car Equivalent of Heavy Vehicle for Freeway, E_T	Heavy Vehicle Adjustment Factor, $f_{HV,FF}$	Heavy Vehicle Adjustment Factor, $f_{HV,RF}$	Heavy Vehicle Adjustment Factor, $f_{HV,FR}$	Heavy Vehicle Adjustment Factor, $f_{HV,RR}$	Freeway-to-freeway demand flow rate, v_{FF}	Ramp-to-freeway demand flow rate, v_{RF}	Freeway-to-ramp demand flow rate, v_{FR}	Ramp-to-ramp demand flow rate, v_{RR}	Weaving demand flow rate, v_W	Nonweaving demand flow rate, v_{NW}	Total demand flow rate, v	Volume ratio, VR	Number of lanes within the weaving segment, N	Number of lanes from which a weaving maneuver may be made with one or no lane changes, N_{WL}	Minimum number of lane changes from on-ramp to freeway, LC_{RF}	Minimum number of lane changes from freeway to off-ramp, LC_{FR}	Equation 13-2 or 13-3 Minimum rate of lane changing, LC_{MIN}	Geometrics Length of weaving segment, L_S	Equation 13-4 Maximum weaving segment length, L_{MAX}	Check Check that Weave Analysis is Warranted
Step 2: Adjust Volume																	**Step 3: Determine Configuration Characteristics**					**Step 4: Determine Maximum Weaving Length**		
					Heavy Vehicle Volume Adjustment Factors					**Equation 13-1**				**Combined Volumes**				**Geometrics**				**Equation 13-2 or 13-3**	**Geometrics**	**Equation 13-4**	**Check**
2022 EXISTING ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	706	813	423	17	1235	723	1958	0.63	3	2	1	1	1235	750	9396	OK
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.97	0.99	0.97	0.99	228	98	435	5	533	234	767	0.70	3	2	1	1	533	670	10196	OK
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	520	282	376	5	658	526	1184	0.56	3	2	1	1	658	750	8485	OK
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.99	0.99	0.99	0.99	664	118	478	5	597	670	1266	0.47	3	2	1	1	597	670	7490	OK
2029 NO BUILD ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	889	1048	483	22	1531	911	2442	0.63	3	2	1	1	1531	750	9346	OK
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.97	0.99	0.97	0.99	280	110	526	5	636	285	921	0.69	3	2	1	1	636	670	10134	OK
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	631	399	434	6	833	637	1470	0.57	3	2	1	1	833	750	8616	OK
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.99	0.99	0.99	0.99	801	132	631	5	763	807	1570	0.49	3	2	1	1	763	670	7663	OK
2029 BUILD ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	895	1048	505	22	1553	917	2470	0.63	3	2	1	1	1553	750	9369	OK
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.97	0.99	0.97	0.99	319	291	526	5	817	325	1142	0.72	3	2	1	1	817	670	10455	OK
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	2	0.99	0.98	0.99	0.98	670	399	598	6	997	675	1673	0.60	3	2	1	1	997	750	8974	OK
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	2	0.99	0.99	0.99	0.99	807	165	631	5	796	812	1608	0.49	3	2	1	1	796	670	7767	OK

Source: Based on methodology presented in the Highway Capacity Manual: 6th Edition (HCM 6)

3.

Scenario	Direction	Road	Start	End	Capacity per lane of the weaving segment under equivalent ideal conditions, c_{IWL}	Capacity per lane of a basic freeway segment with the same FFS under equivalent ideal conditions, c_{IFL}	Total capacity under prevailing conditions, c_W	Capacity of all lanes, c_{IW}	Capacity of all lanes under prevailing conditions, c_W	Final capacity, c_W	Volume-to-capacity ratio, v/c	LOS F Check	Geometrics Interchange density, ID	Equation 13-11 Total rate of lane changing by weaving vehicles, LC_W	Equation 13-12 Nonweaving vehicle index, I_{NW}	Equation 13-13 Total rate of lane changing by nonweaving vehicles, LC_{NW1}	Equation 13-14 Total rate of lane changing by nonweaving vehicles, LC_{NW2}	Equation 13-15 Total rate of lane changing by nonweaving vehicles, LC_{NW3}	Equation 13-16 Total rate of lane changing by nonweaving vehicles, LC_{NW}	Equation 13-17 Total rate of lane changing by all vehicles, LC_{ALL}	Equation 13-18/13-19 Average speed of weaving vehicles, S_W	Equation 13-20 Weaving intensity factor, W	Equation 13-21 Average speed of nonweaving vehicles, S_{NW}	Equation 13-22 Average speed of all vehicles, S	Equation 13-23 Average density of all vehicles, D	Exhibit 13-6 LOS
Step 5: Determine Weaving Segment Capacity													**Step 6: Determine Lane-Changing Rates**								**Step 7: Determine Average Speeds of Weaving and**				**Step 8: Determine LOS**	
					Weaving Segment Capacity Determined by Density Equations 13-5 & 13-6)			**Weaving Segment Capacity Determined by Weaving Demand Flows (Equations 13-7 & 13-8)**		**Final Capacity**	**Volume-to-Capacity Ratio (Equation 13-10)**	**LOS F**	**Geometrics**	**Equation 13-11**	**Equation 13-12**	**Equation 13-13**	**Equation 13-14**	**Equation 13-15**	**Equation 13-16**	**Equation 13-17**	**Equation 13-18/13-19**	**Equation 13-20**	**Equation 13-21**	**Equation 13-22**	**Equation 13-23**	**Exhibit 13-6**
2022 EXISTING ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1239	1900	3679	3804	3767	3679	0.53	NOT F	2.00	1415	108	0	1850	-3392	0	1415	36.9	0.37	33.0	35.3	**18.5**	**B**
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1171	1900	3411	3452	3352	3352	0.22	NOT F	2.00	696	31	0	1741	-3398	0	696	39.3	0.23	39.9	39.5	**6.5**	**A**
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1308	1900	3886	4318	4276	3886	0.30	NOT F	2.00	837	79	0	1806	-3393	0	837	39.1	0.25	38.4	38.8	**10.2**	**A**
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1378	1900	4094	5095	5044	4094	0.31	NOT F	2.00	759	90	0	1838	-3423	0	759	39.0	0.25	38.7	38.8	**10.9**	**A**
2029 NO BUILD ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1242	1900	3690	3829	3791	3690	0.66	NOT F	2.00	1710	137	16	1892	-3341	16	1727	35.9	0.44	30.1	33.5	**24.3**	**C**
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1176	1900	3425	3477	3376	3376	0.26	NOT F	2.00	799	38	0	1753	-3402	0	799	38.8	0.26	38.9	38.9	**7.9**	**A**
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1298	1900	3856	4235	4193	3856	0.38	NOT F	2.00	1012	96	0	1831	-3393	0	1012	38.3	0.29	36.7	37.6	**13.0**	**B**
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1365	1900	4054	4938	4889	4054	0.38	NOT F	2.00	926	108	0	1869	-3427	0	926	38.2	0.29	37.0	37.6	**13.9**	**B**
2029 BUILD ANALYSIS																									
Existing AM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1241	1900	3685	3817	3779	3685	0.66	NOT F	2.00	1732	138	18	1893	-3337	18	1750	35.8	0.44	29.9	33.4	**24.7**	**C**
Existing AM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1151	1900	3354	3353	3256	3256	0.34	NOT F	2.00	980	43	0	1761	-3405	0	980	38.0	0.31	37.3	37.8	**10.1**	**A**
Existing PM	EB	Highland Avenue EB	I-95 SB Off-Ramp	I-95 NB On-Ramp	1271	1900	3775	4025	3985	3775	0.44	NOT F	2.00	1177	101	0	1840	-3393	0	1177	37.7	0.32	35.1	36.6	**15.2**	**B**
Existing PM	WB	Highland Avenue WB	I-95 NB Off-Ramp	I-95 SB On-Ramp	1357	1900	4031	4850	4802	4031	0.40	NOT F	2.00	959	109	0	1870	-3427	0	959	38.1	0.30	36.7	37.4	**14.3**	**B**

Source: Based on methodology presented in the Highway Capacity Manual: 6th Edition (HCM 6)

Collision Diagrams

Comment 8

\\vhb.com\gbl\proj\Boston\15306.00\tech\Crash Data\Crash Diagrams.dwg

SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle

Involved	Non-Involved	
		Pedestrian
		Bicycle
		Animal
		Direction of Motion
		Parked Vehicle
		Fixed Object

TYPES OF CRASH

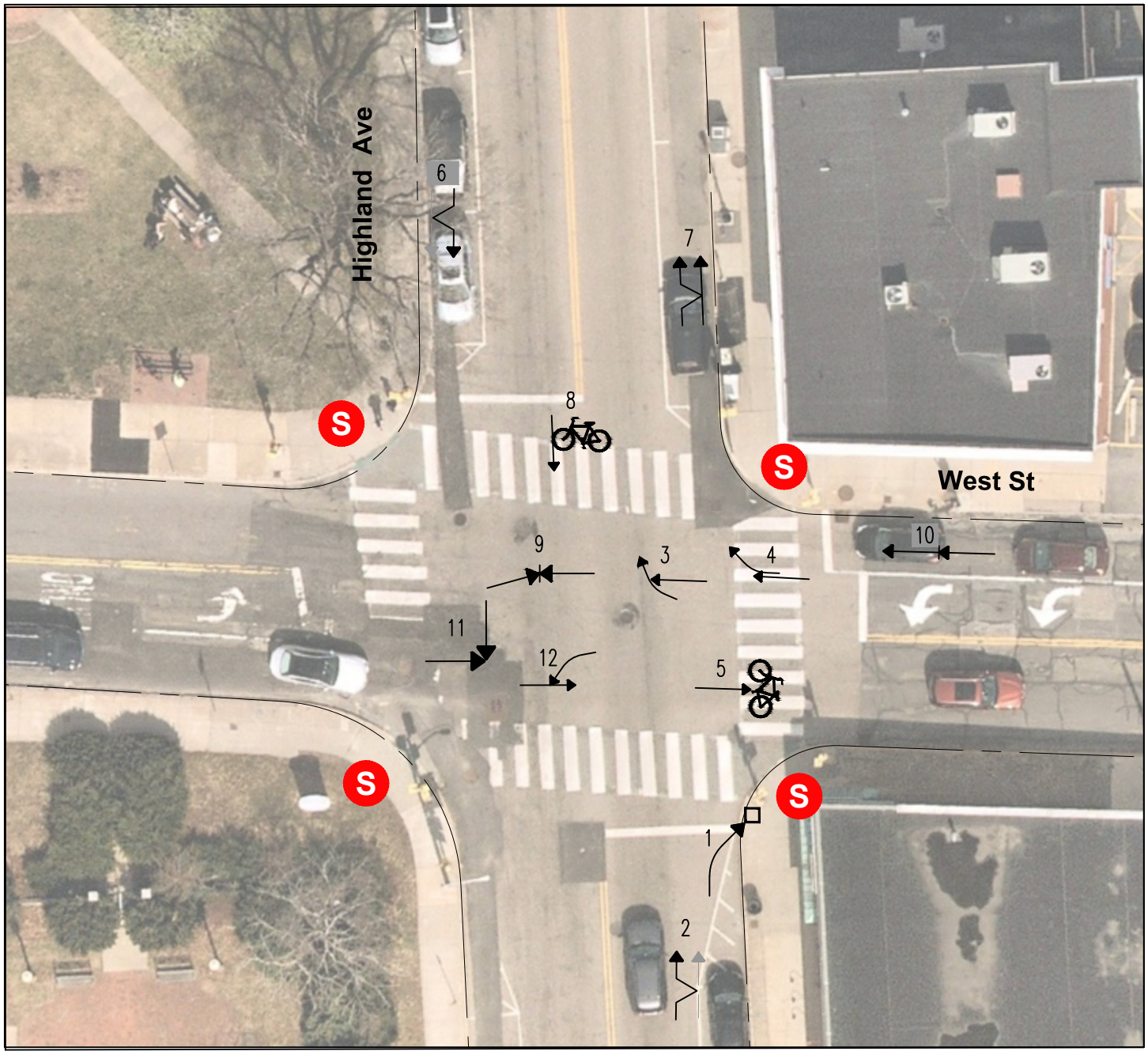
- Head on
- Rear End
- Angle
- Turning Movement
- Sideswipe
- Out of Control
- Night Time Crash

SEVERITY

- Injury
- Fatal

TRAFFIC CONTROL

- Traffic Signal Post
- Stop Sign
- Yield Sign
- One Way Sign



Not to Scale

TIME PERIOD ANALYZED: 2017-2019
SOURCE OF CRASH REPORTS: Needham Police Dept.

vhb

Collision Diagram
Highland Avenue at
West Street
Needham, MA

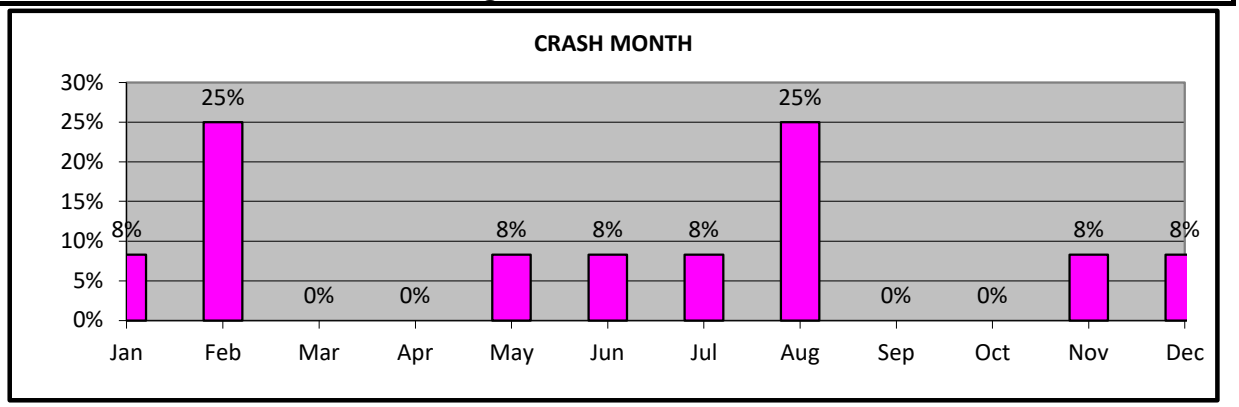
Crash Data Summary Table

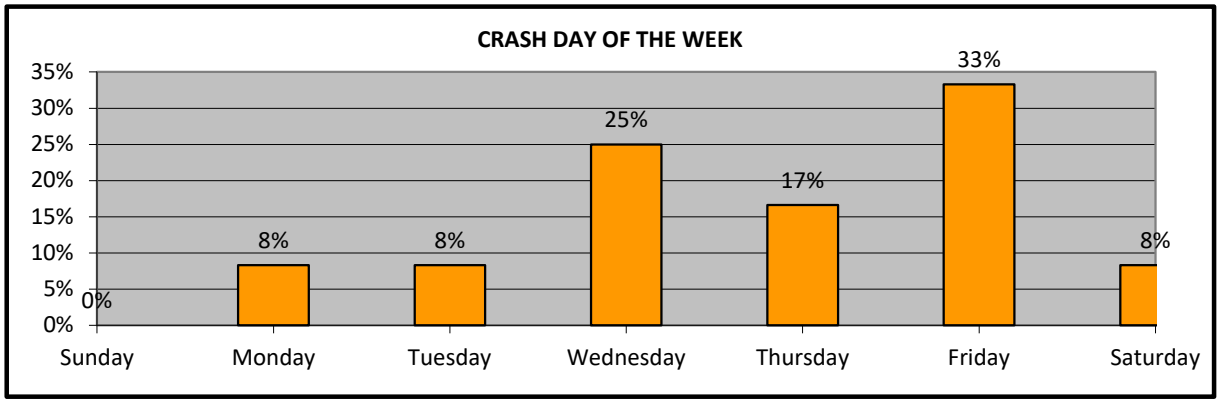
Highland Ave at West St
2017 - 2019

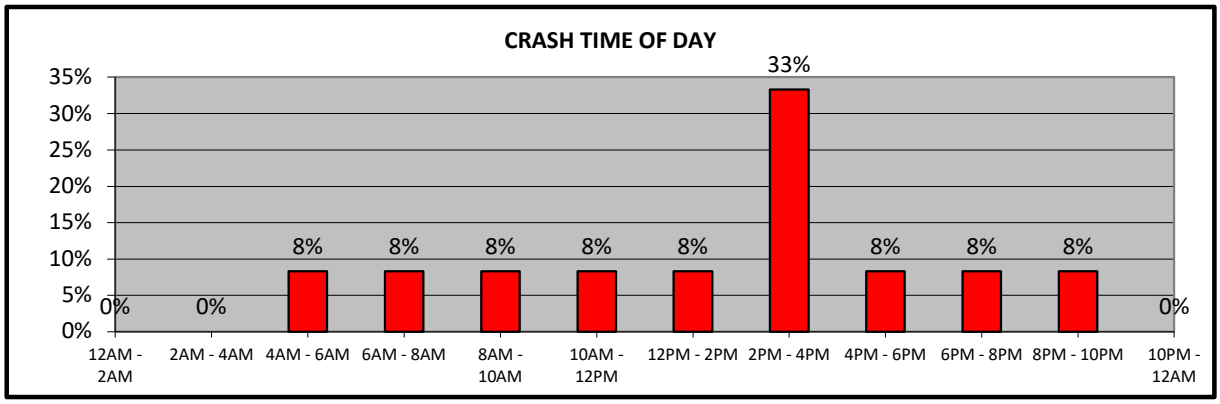
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	#	#	#	#	
1	02/03/17	Friday	4:11 PM	Single vehicle crash	Daylight	Clear	Dry	Inattention	Unknown	Unknown			Tractor trailer struck and knocked down a light post, then continued driving. Truck took a right from Highland Ave onto West St. Light portion of the traffic pole was knocked down and hanging on pole by 3 wires.
2	02/08/17	Wednesday	5:45 AM	Sideswipe, same direction	Daylight	Clear	Ice	No improper driving	Unknown	Unknown			Vehicle #2 was traveling north on Highland Ave. Flash freeze on the roads at the time. Vehicle #2 stopped for red light signal and its trailer slid sideways stricking Vehicle #1 which was parked.
3	05/19/17	Friday	2:09 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #2 was stopped at red light at the intersection of Highland Ave and West St. Vehilce #2 was in a marked left turn only lane. To the right of Vehicle #2 is a separate lane for right turns and for traffic going straight. When the ligh turned green, Vehicle #2 took a right turn, failing to follow the marked lane, and caused a collision with Vehicle #1. Vehicle #1 was to the right of Vehicle #2 at the red light. Property damage, no injury.
4	07/19/17	Wednesday	3:59 PM	Sideswipe, same direction	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Bus turning right from West St to Highland Ave. Rear of Bus struck the right side of Vehicle that was sitting to the left of it. No injuries.
5	08/28/17	Monday	10:45 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle crash involving a cyclist. Vehicle #1 was moving eastbound on West St towards Highland Ave with a green light. Cyclist entered crosswalk to cross the intersection. Property damaged, no injury.
6	02/07/19	Thursday	8:41 PM	Angle	Dark - lighted roadway	Clear	Dry	Unknown	Unknown	Unknown			Hit and run crash to a parked vehicle. Vehicle parked on Corner of Highland Ave facing south, truck hit her vehicle while taking a left turn into Trader Joes.
7	08/15/19	Thursday	2:57 PM	Sideswipe, same direction	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Hit and run. No injuries were reported. Vehicle #1 was attempting to park on Highland Ave, tractor trailer truck was turning onto Highland Ave from West St and clipped the driver's side of Vehicle #1.
8	08/23/19	Friday	12:09 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle #1 was stopped at the red light ton West St in the left turn only lane. The cyclist entered the crosswalk just before the walk signal ended and was proceding thru the crosswalk. The light turned to green and Vehicle #1 started the left turn and was about half way through the crosswalk when the cyclist ran into the passenger side of vehicle #1. The cyclist fell off the bicycle on the ground. No injuries or damages.
9	12/07/19	Saturday	8:00 AM	Head on	Daylight	Clear	Dry	Other improper action	Unknown	Unknown			Vehicle #1 was turning left to go northbound onto Highland Ave from West St. Vehicle #2 was travelling westbound on West St crossing over Highland Ave. Vehicle #2 was struck vehicle #1 as it was making the turn. Both vehicles sustained moderate damage, but did not have to be towed from the scene. No injuries were reported.
10	01/25/17	Wednesday	6:11 PM	Rear-end	Dark - lighted roadway	Clear	Dry	Unknown	Unknown	Unknown			No injuries. Vehicle #1 was unable to stop when Vehicle #2 in front of her stopped. Vehicle #1 had heavy front end damage, there was damage to the rear of vehicle #2.
11	06/01/18	Friday	6:38 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #2 was traveling north on Highland Ave and was struck by Vehicle #1 that was traveling WB on West St.
12	11/13/18	Tuesday	3:49 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			No injuries. Vehicle #1 was traveling down West St and turning left. Vehicle #2 was on West St going towards Webster St when the operator of Vehicle #1 turned left and hit vehicle #2. Vehicle #1 was removed by tow.

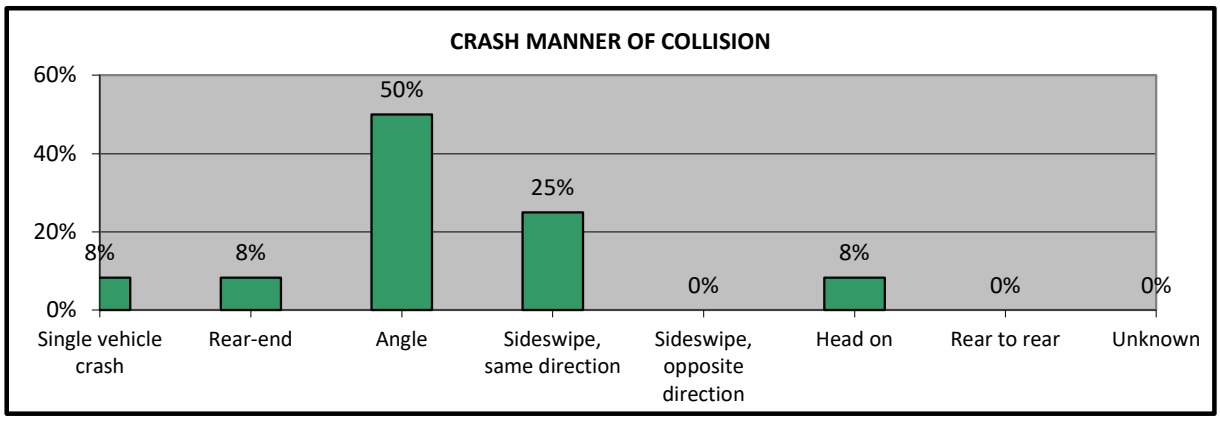
Crash Data Summary Charts

Highland Ave at West St



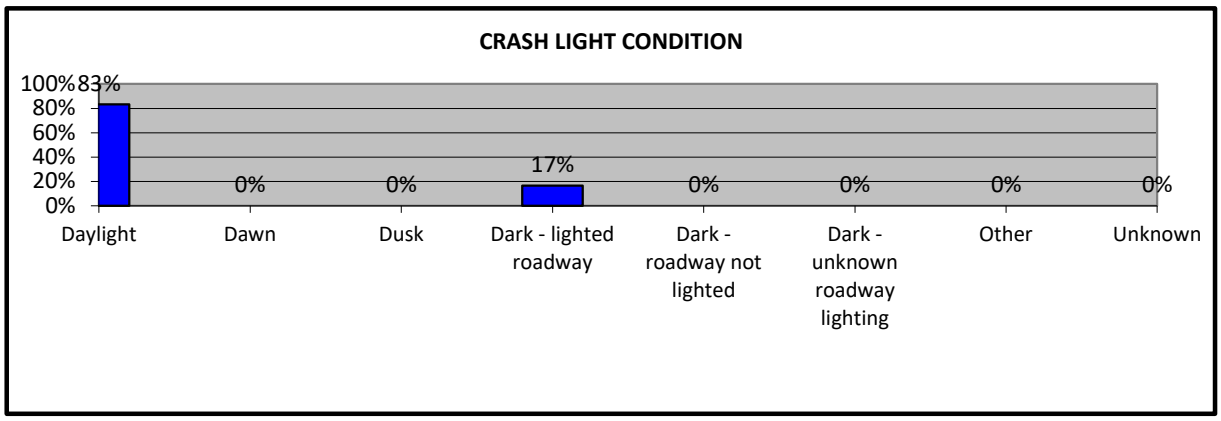


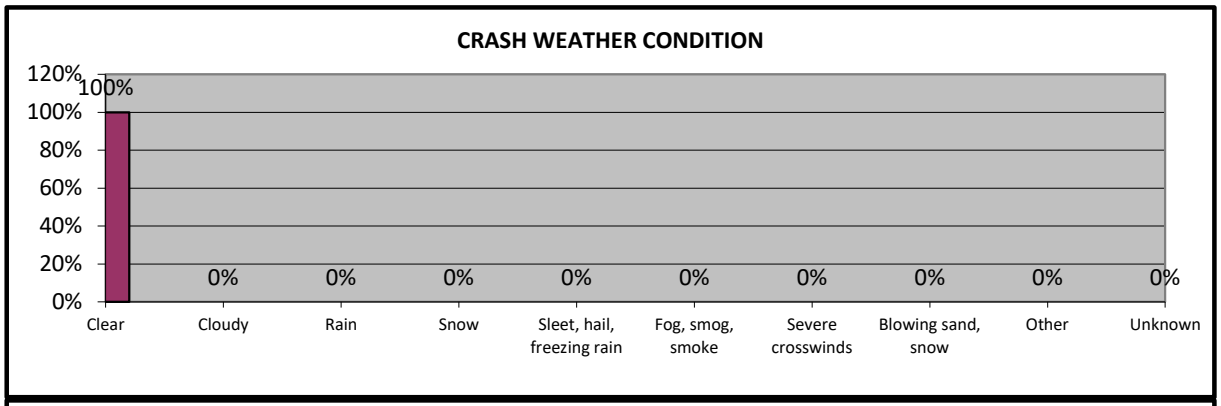


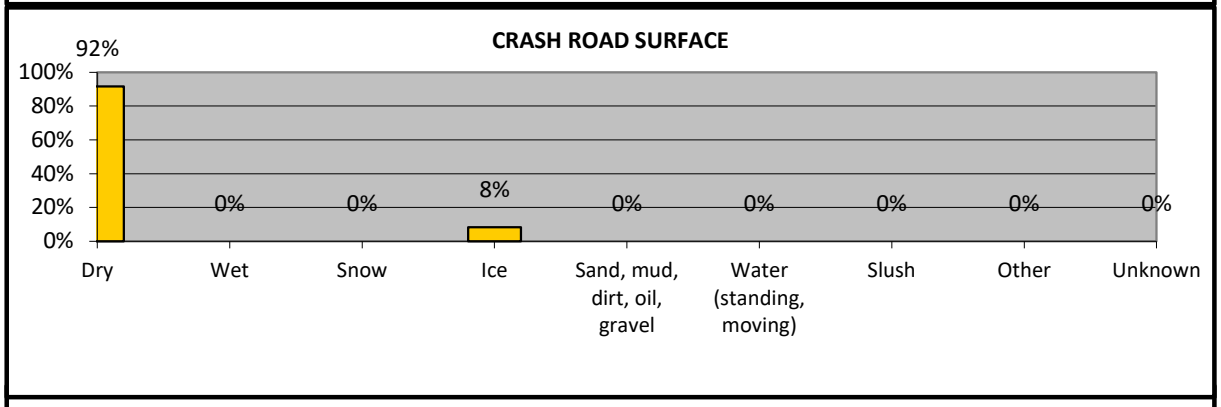


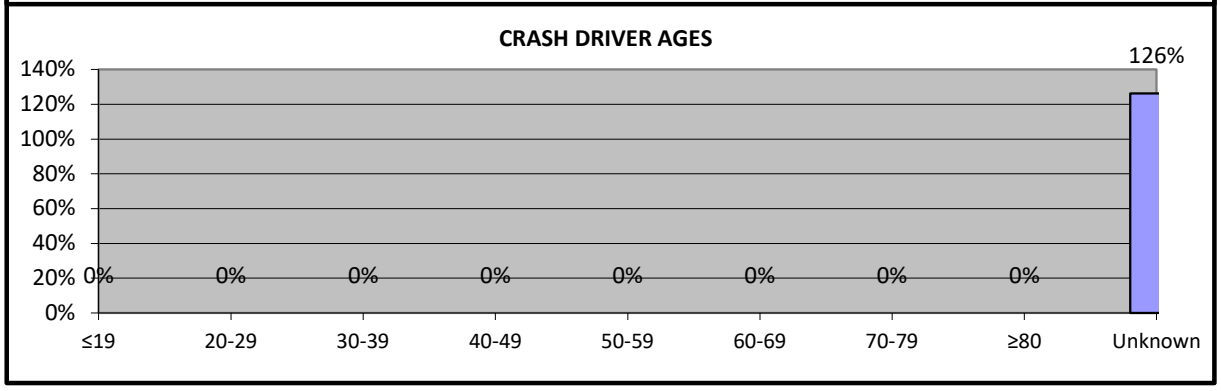
Crash Data Summary Charts

Highland Ave at West St









\\vhb\gbl\proj\Boston\15306.00\tech\Crash Data\Crash Diagrams.dwg

SYMBOLS

Moving Vehicle
Backing Vehicle
Non-Involved Vehicle

Involved	Non-Involved	
		Pedestrian
		Bicycle
		Animal
		Direction of Motion
		Parked Vehicle
		Fixed Object

TYPES OF CRASH

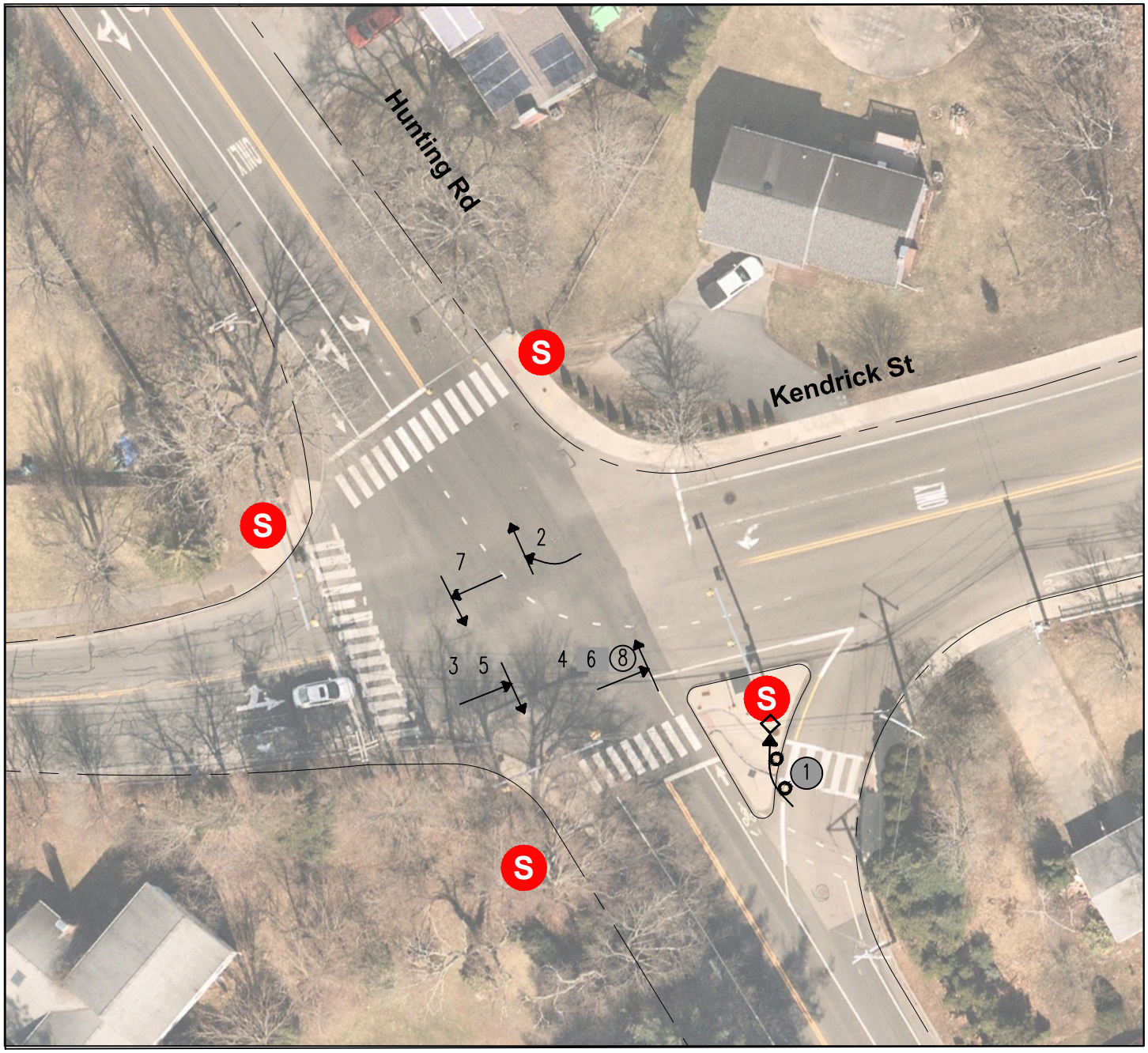
Head on
Rear End
Angle
Turning Movement
Sideswipe
Out of Control
Night Time Crash

SEVERITY

Injury
Fatal

TRAFFIC CONTROL

Traffic Signal Post
Stop Sign
Yield Sign
One Way Sign



Not to Scale

TIME PERIOD ANALYZED: 2017-2019
SOURCE OF CRASH REPORTS: Needham Police Dept.

vhb

Collision Diagram
Hunting Road at
Kendrick Street
Needham, MA

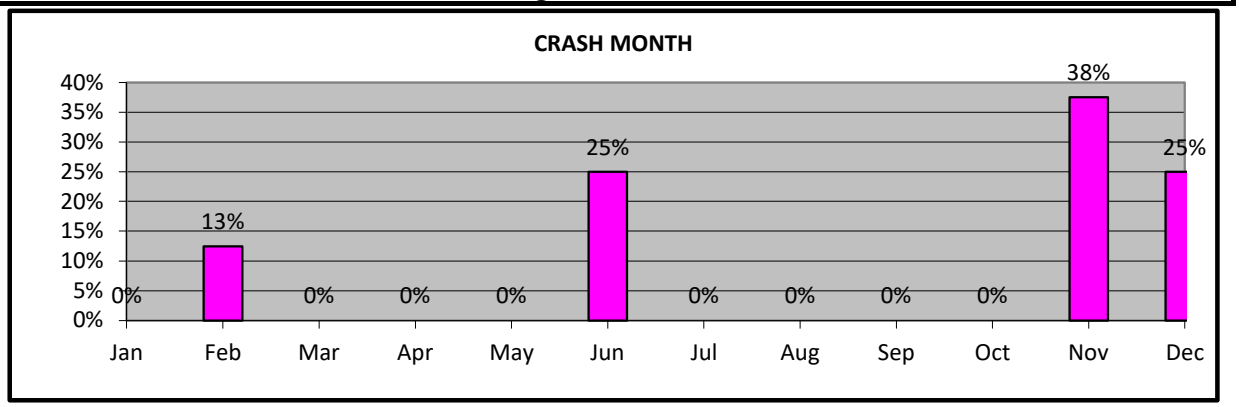
Crash Data Summary Table

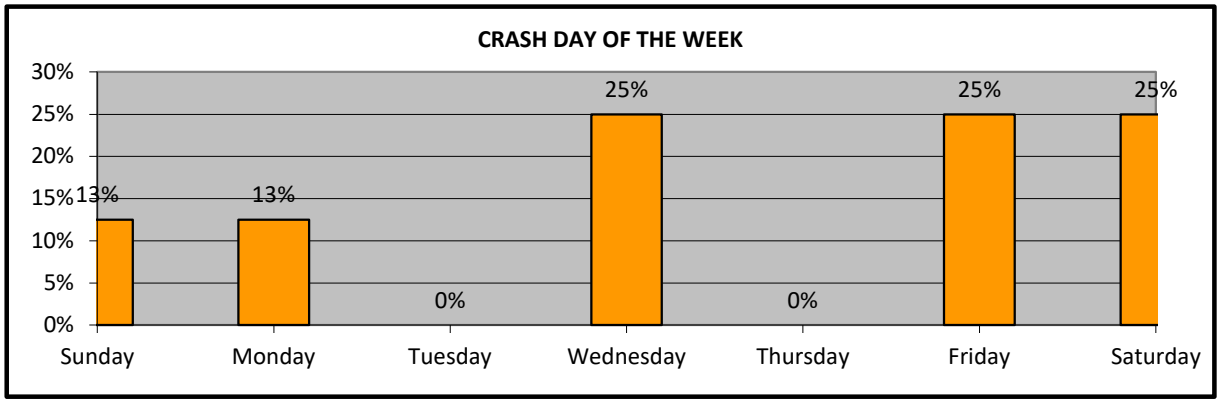
Hunting Rd at Kendrick St
2017 - 2019

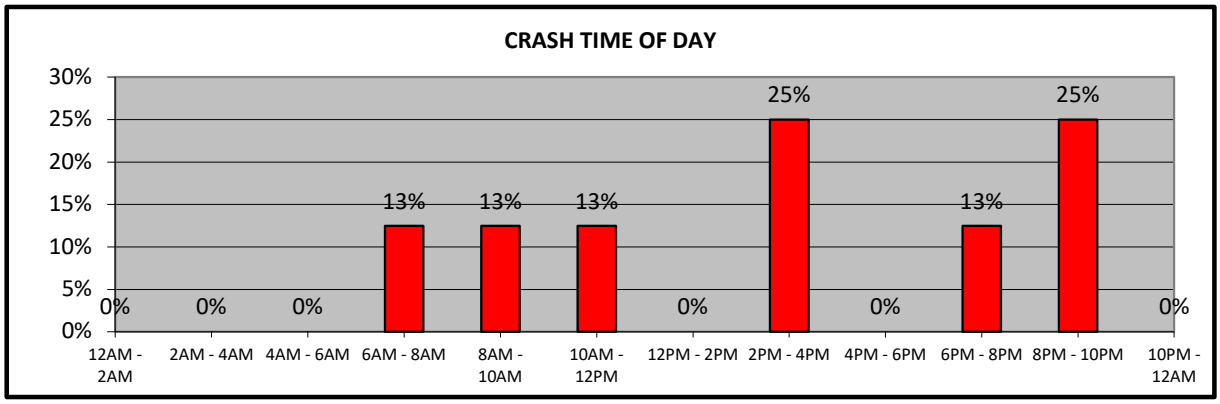
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	#	#	#	#	
1	02/08/17	Wednesday	6:30 AM	Single vehicle crash	Dark - lighted roadway	Clear	Ice	No improper driving	Unknown				Vehicle #1 was traveling northobund on Hunting Road when the extremely ice condition caused him to slide up onto a curb and struck the base of the a traffic light pole. Driver complained of dizziness and was evaluated. Flash freeze. Pole was not damaged.
2	11/10/17	Friday	10:57 AM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle #1 was traveling on Hunting Rd and crossing through a green light over Kendrick St to continue on Hunting Rd. Vehicle #2 stated he was stopped at red light on Kendrick St when he tried to take a right turn on red onto Hunting Rd. Vehilce #2 struck Vehicle #1 as it attempted to turn onto Hunting Rd. Vehicle #1 suffered minor damage ot the passenger side of front door. Vehicle #2 suffered minor damage to the driver's side front wheel well and front driver's side panel. No injuries were reported.
3	06/18/18	Monday	9:37 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #1 was traveling on Hunting Rd SB heading towards Cheney St. Vehicle #2 was on Kendrick St heading EB towards Newton. No injuries reported, Vehicle #1 had minor to moderate passenger side damage. Vehicle #2 had moderate front end damage.
4	11/03/18	Saturday	8:41 PM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #1 east on Hunting, Vehicle #2 north of Kendrick. No injury, minor to moderate damage.
5	11/21/18	Wednesday	2:44 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle #1 traveling EB on Kendrick St heading towards Newton. Vehicle #2 traveling WB on Kendrick St, making a left turn onto Hunting Rd. No inuries reported, moderate damages to vehicles
6	06/28/19	Friday	7:50 PM	Angle	Dark - lighted roadway	Clear	Dry	Inattention	Unknown	54			Vehicle #2 was traveling west on Kendrick Street with the right of way when vehicle #1 entered the intersection on a red light. No reported injuries and both vehicles had to be towed from the scene.
7	12/28/19	Saturday	3:48 PM	Angle	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle #1 traveling esouth on Hunting Rd when vehicle #2 crashed into the left side of his car. No injuries, both vehicles were towed.
8	12/01/19	Sunday	8:48 AM	Angle	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Vehicle #1 was travelling EB on Kendrick St. Vehicle #2 was travelling northbound on Hunting Road. Serious damage to both vehicles.

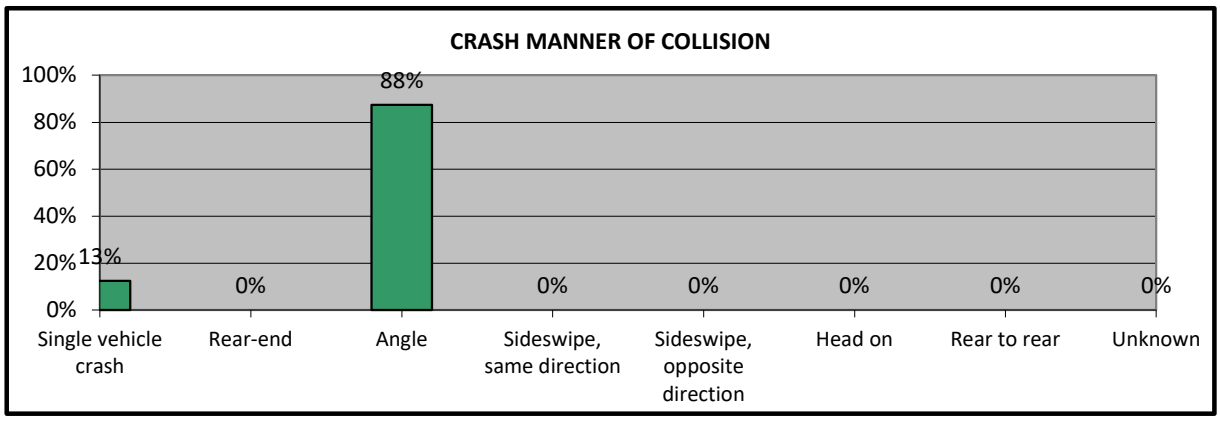
Crash Data Summary Charts

Hunting Rd at Kendrick St



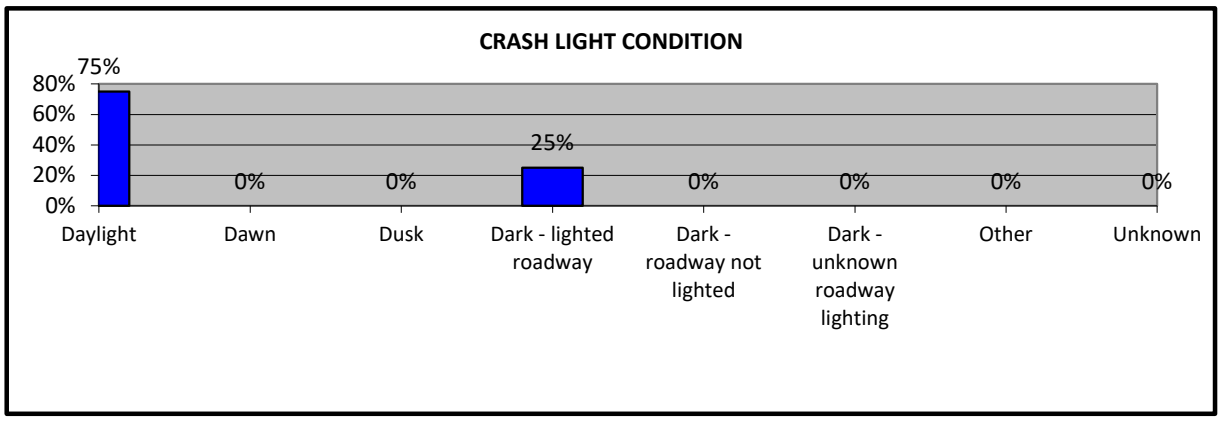


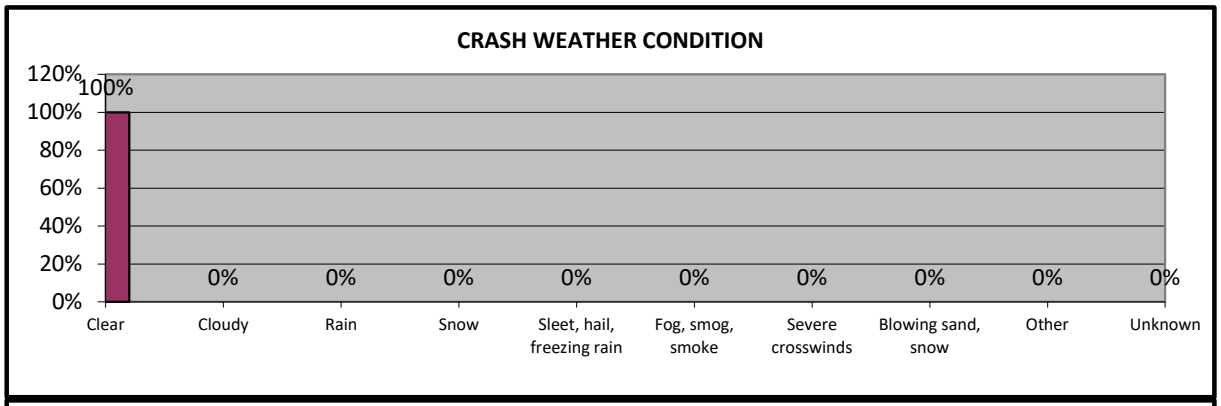


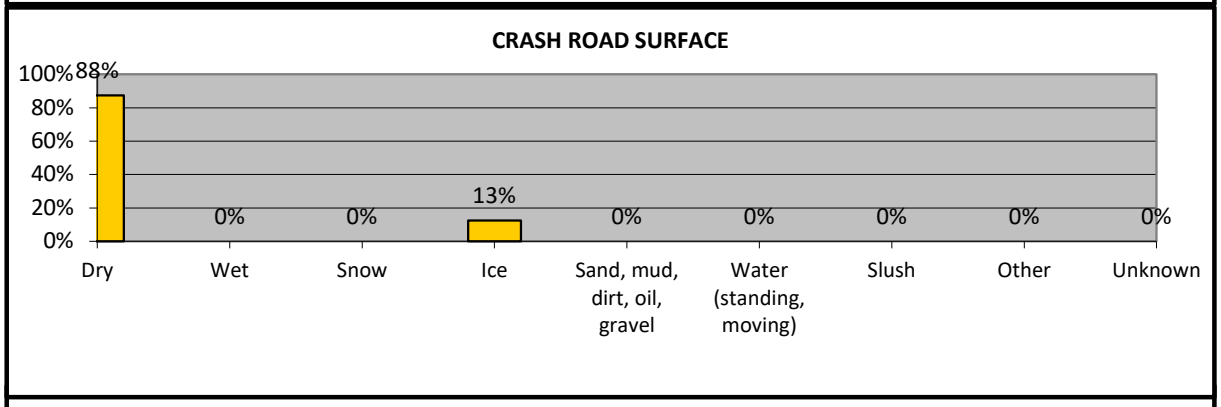


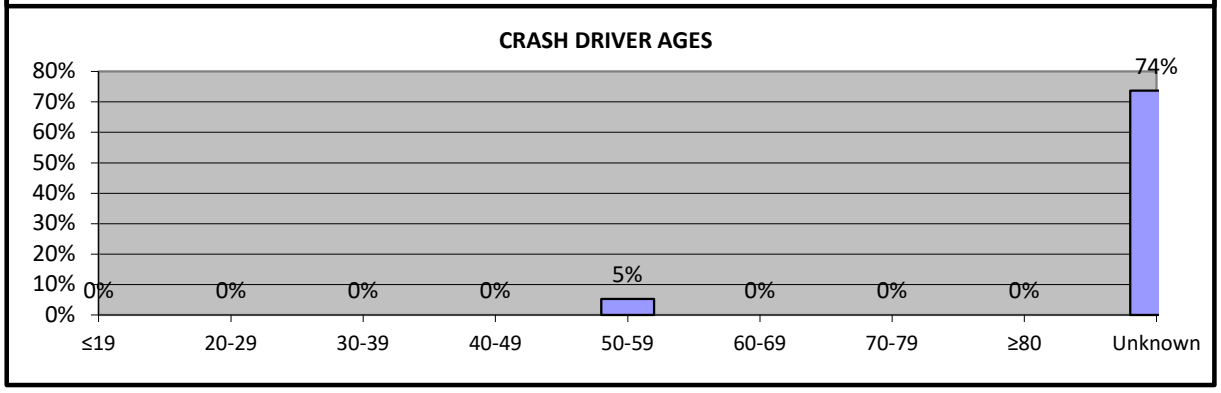
Crash Data Summary Charts

Hunting Rd at Kendrick St









\\vhb.com\gbl\proj\Boston\15306.00\tech\Crash Data\Crash Diagrams.dwg

SYMBOLS

- Moving Vehicle
- Backing Vehicle
- Non-Involved Vehicle

Involved	Non-Involved	
		Pedestrian
		Bicycle
		Animal
		Direction of Motion
		Parked Vehicle
		Fixed Object

TYPES OF CRASH

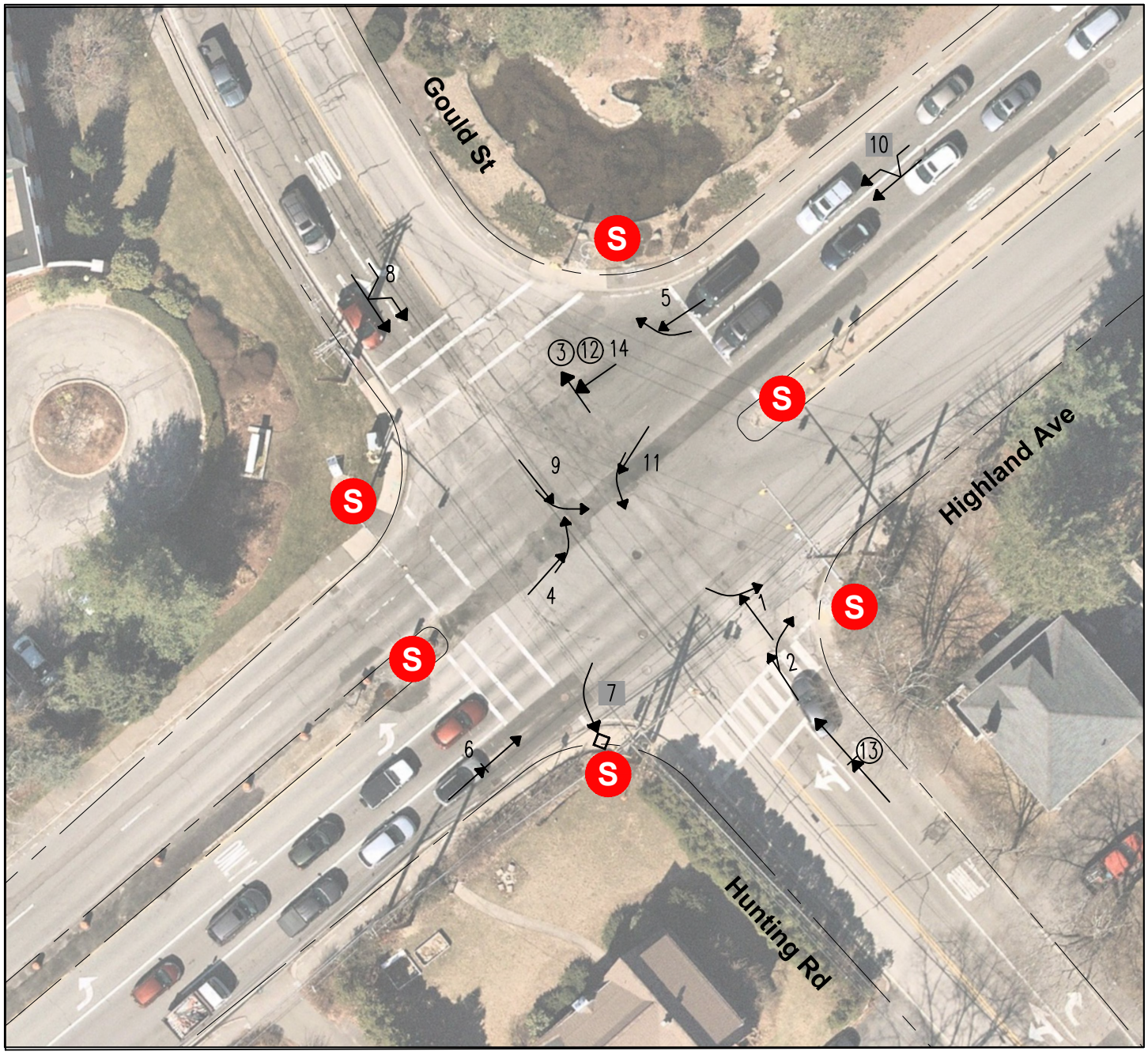
- Head on
- Rear End
- Angle
- Turning Movement
- Sideswipe
- Out of Control
- Night Time Crash

SEVERITY

- Injury
- Fatal

TRAFFIC CONTROL

- Traffic Signal Post
- Stop Sign
- Yield Sign
- One Way Sign



Not to Scale

TIME PERIOD ANALYZED: 2017-2019
SOURCE OF CRASH REPORTS: Needham Police Dept.

Collision Diagram
Highland Avenue at
Hunting Road/Gould Street
Needham, MA

Crash Data Summary Table

Highland Ave at Gould St / Hunting Rd
2017 - 2019

Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	mm/dd/yy	Day	hh:mm	Type	Type	Type	Type	Type	#	#	#	#	
1	08/03/19	Saturday	2:55 PM	Angle	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Vehcile #1 was turning onto Highland Ave at green. Vehicle #2 took a right on red and crashed into the passenger side of Vehicle #1.
2	03/01/17	Wednesday	1:31 PM	Sideswipe, same direction	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #2 was turning right onto Highland Ave from Hunting Road. Vehicle #1 was behind Vehicle #2 and attempted to pass it o nthe rigth and turn right onto Highland Ave as well. Vehicle #2 sustained moderate damage to the left rear and side Vehicle #1 sustained minor damage to the right front corner. There were no reported injuries and both vehicles were able to be driver from the scene.
3	06/27/18	Wednesday	7:23 AM	Angle	Daylight	Clear	Dry	Disregarded traffic signs, signals, road markings	Unknown	Unknown			Vehicle #2 stated he got a green arrow to turn right from his traffic signal, but accidentaly continued straight and vehicle #1 drove into him. Air bag deployment in both vehicles. Witness stated that Vehicle #1's lane of traffic had a green light, all of a sudden vehicle #2 came across the intersection at a high rate of speed and vehicle 1 drove into vehicle 2.
4	12/09/19	Monday	11:10 AM	Sideswipe, same direction	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	Unknown	Unknown			Vehicle #1 and Vehicle #2 were turning eastbound from Gould Street onto Highland Ave when Vehicle #1 did not stay in the proper lane, striking Vehicle #2 on the driver's side losest to the driver side door. Vehicle #1 had minor damage to the front right side bumper. Vehicle #2 had substantial damage to the left side mirror. No injuries were reported.
5	03/22/18	Thursday	4:40 PM	Rear-end	Daylight	Clear	Dry	Failed to yield right of way	Unknown	Unknown			Vehicle #2 was in the left lane on Gould St when she realized she needed to be on the right. Vehicle #2 was changing lanes and her vehicle struck Vehicle #1. Vehicle #2 sustained minor rear end damage, and Vehicle #1 sustained minor damage to the front fender and bumper.
6	05/04/18	Friday	6:00 PM	Rear-end	Daylight	Clear	Dry	Distracted	Unknown	Unknown			No injuries. Vehicle #1 was stopped at the lights on Highland Ave waiting to travel westbound on Highland Ave, when he was rear ended by vehicle #2.
7	07/17/18	Tuesday	2:03 AM	Single vehicle crash	Dark - lighted roadway	Clear	Dry	Inattention	Unknown	Unknown			Report of flashing lights possibly caused by a passing construction vehicle. Truck operator struck two signs along Highland Ave as well. The traffic signal was struck.
8	07/26/18	Thursday	8:20 AM	Sideswipe, same direction	Daylight	Clear	Dry	Failure to keep in proper lane or running off road	Unknown	Unknown			Vehicle #2 was stopped in traffic on Highland Ave facing eastbound. According to Vehicle #2, vehicle #1 drove by his stopped vehicle and sideswiped it, knocking his mirror off and damaging it. Vehicle #1 then turned onto Gould St and never stopped. No injuries were reported. Vehicle #2 had very minor damage.
9	12/12/18	Wednesday	12:11 PM	Angle	Daylight	Clear	Dry	No improper driving	Unknown	Unknown			Vehicle #2 was in the left lane, which is a left turn only lane. Vehicle #1 was in the right lane which has no turning restrictions. The light was red and when it turned green vehicle #1 turned left and vehicle #2 went straight ahead. Vehicle #2 struck vehicle #1 in the left rear and then fled the area on Highland Ave towards Netwon.
10	02/05/19	Tuesday	7:21 PM	Sideswipe, same direction	Dark - lighted roadway	Clear	Dry	No improper driving	Unknown	Unknown			Hit and run accident. Vehicle #2 stated that she was traveling west on Highland Ave, approaching the Gould St intersection, when Vehicle #1 sideswiped the right side of her vehicle as unkown vehicle #1 passed her on the right side. No one reported injury. Vehicle #2 sustained right side damage. Unknown vehicle #1 did not pull over after the accident and there is no information available for the vehicle make or operator.
11	03/23/19	Saturday	11:04 AM	Angle	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Vehicle #1 was facing southbound on Gould St attempting to make a left turn onto Highland Ave eastbound. Vehicle #1 started from inside travel lane of Gould Street. Vehicle #2 was facing on Gould St in the outside lane attempting to make a left turn onto Highland Ave eastbound. At some point during the turn the vehicles collided. The paint line delineating the traffic lanes at thsi intersection are faded. No injuries are reported. Vehicle #1 had minor right front bumper damage and vehicle #2 had minor left rear quarter panel damage (dents and scrape marks).

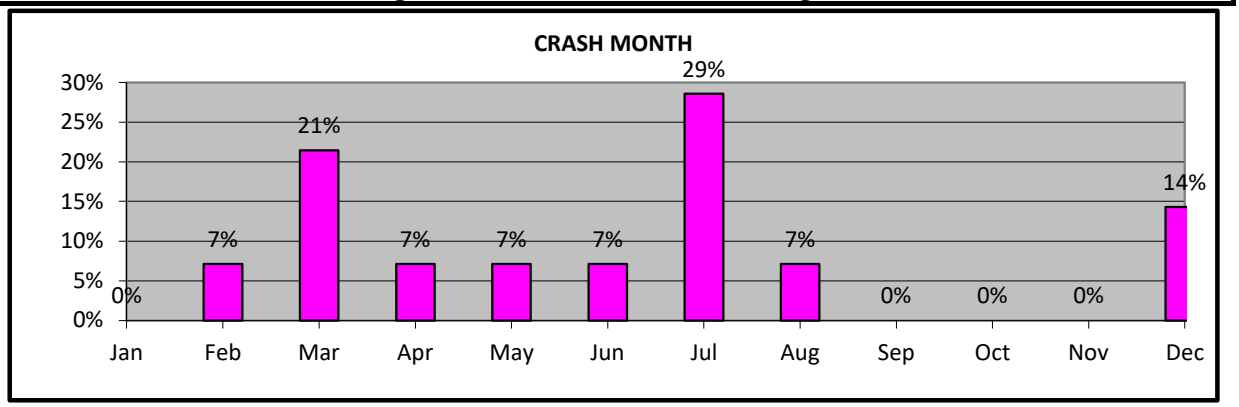
Crash Data Summary Table

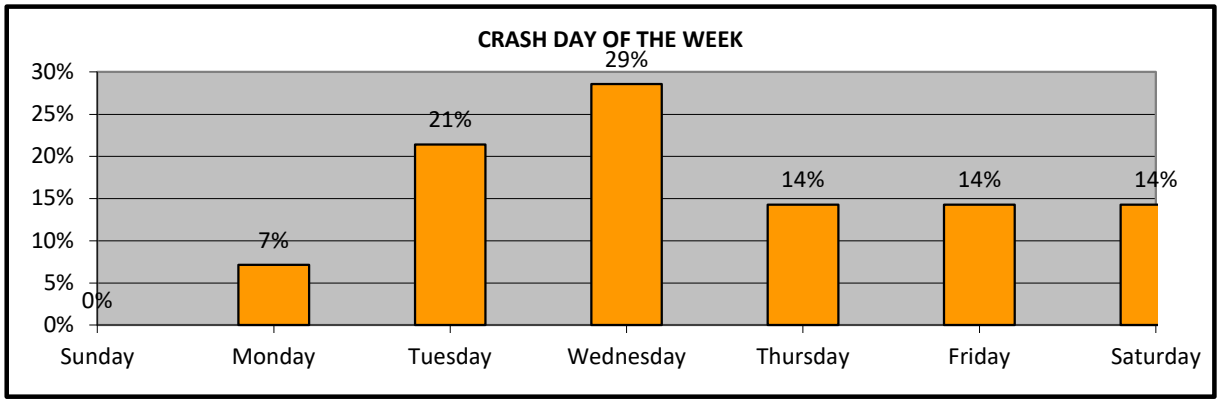
Highland Ave at Gould St / Hunting Rd
2017 - 2019

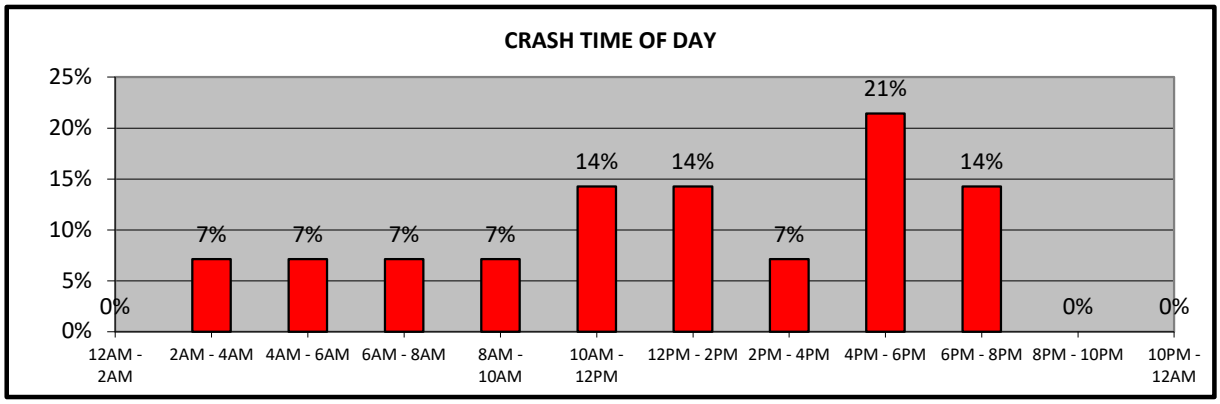
Crash Diagram Ref #	Crash Date	Crash Day	Time of Day	Manner of Collision	Light Condition	Weather Condition	Road Surface	Driver Contributing Code	D1 Age	D2 Age	D3 Age	D4 Age	Comments
#	*mm/dd/yy*	*Day*	*hh:mm*	*Type*	*Type*	*Type*	*Type*	*Type*	*#*	*#*	*#*	*#*	
12	04/30/19	Tuesday	4:49 AM	Angle	Daylight	Clear	Dry	Unknown	Unknown	Unknown			At 4:49 am, 2 car crash at intersection of Highland Ave and Gould St with no reported injuries. Vehicle #1 stated she was driving on Highland Ave (west) and turning right (north) onto Gould St when she struck vehicle #2. Some left shoulder pain of vehicle #2. Vehicle #2 was towed from the scene.
13	07/13/18	Friday	5:59 PM	Rear-end	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Vehicle #2 at the intersection of Highland Ave at Hunting Rd. Vehicle #1 rear ends Vehicle #2 while it is stopped. No injuries reported at the scene. Vehicles had significant damage but neither had to be towed from the scene. No injuries.
14	07/31/19	Wednesday	4:35 PM	Angle	Daylight	Clear	Dry	Unknown	Unknown	Unknown			Vehicle #1 was going southwest on Highland Ave. Vehicle #2 was driving towards her. Minimal damage on Vehicle #1. No injury.

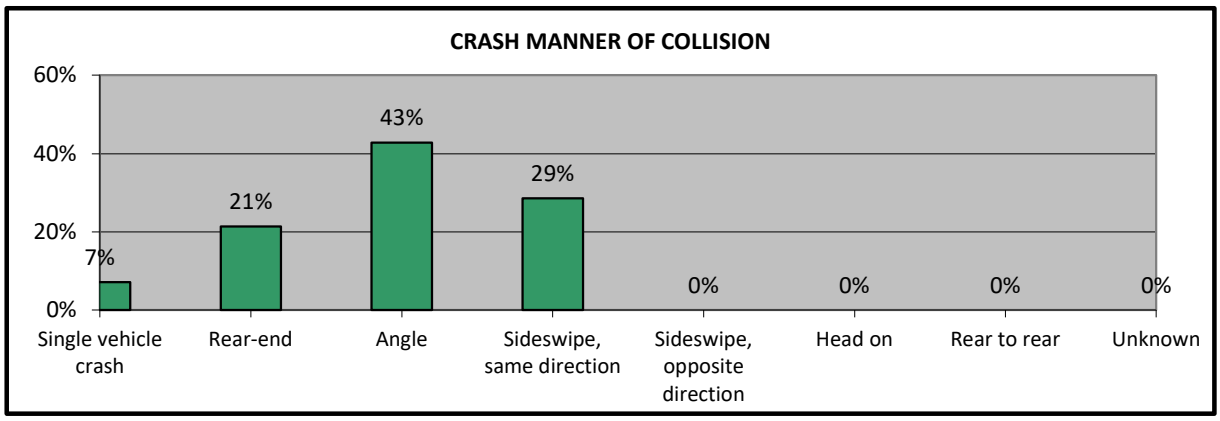
Crash Data Summary Charts

Highland Ave at Gould St / Hunting Rd



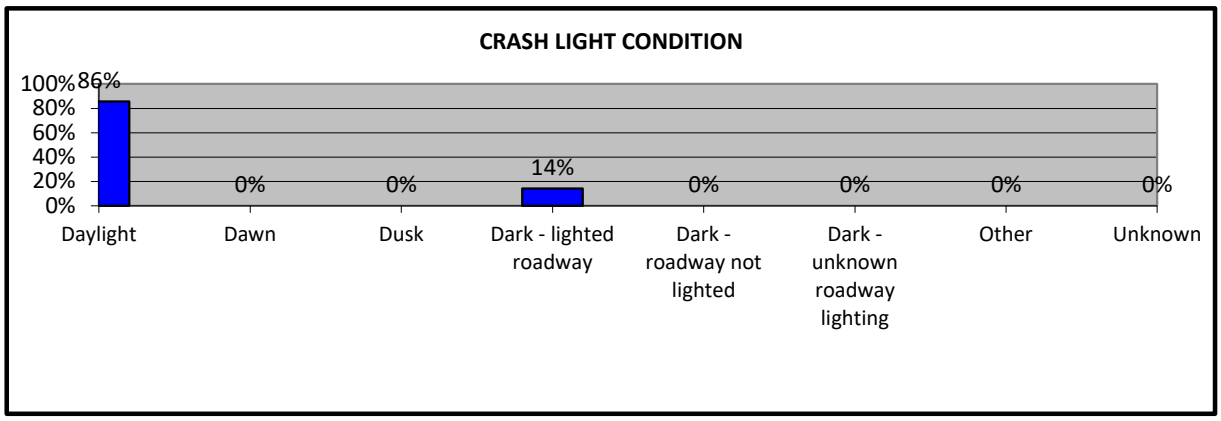


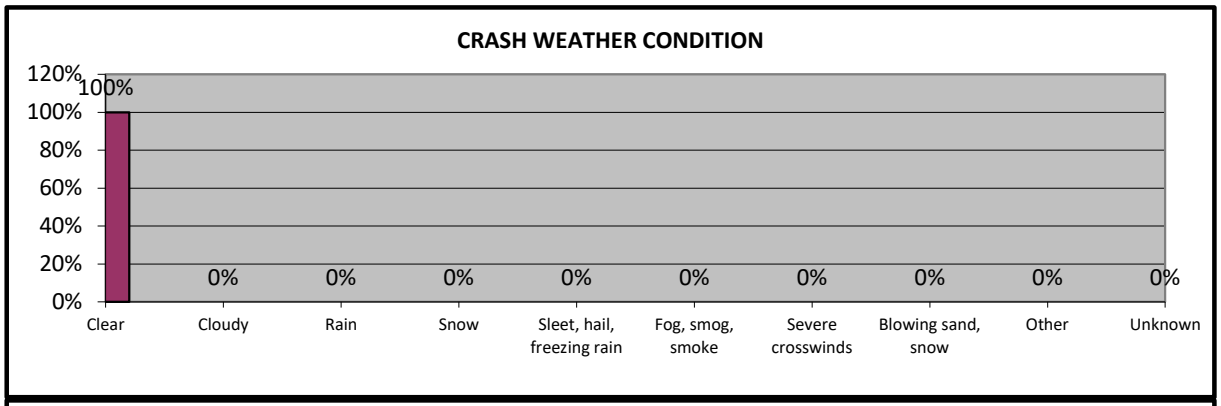


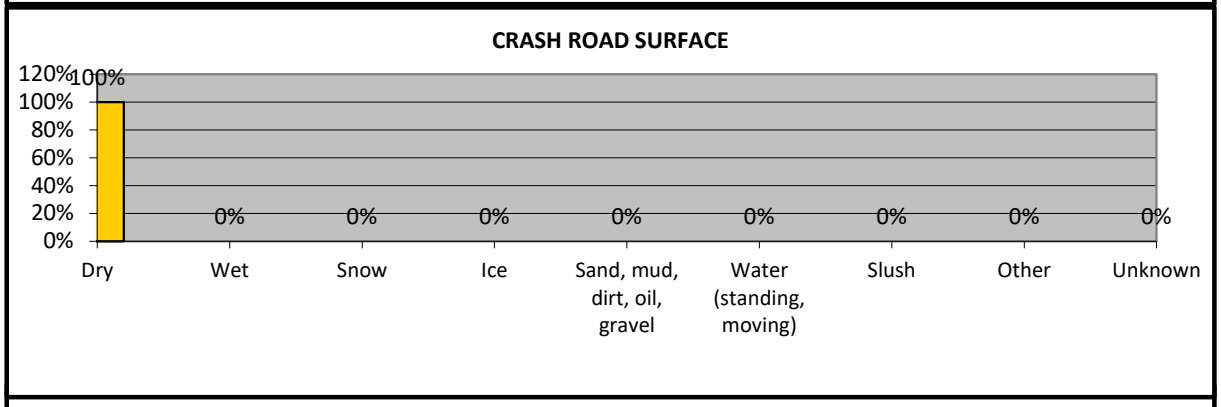


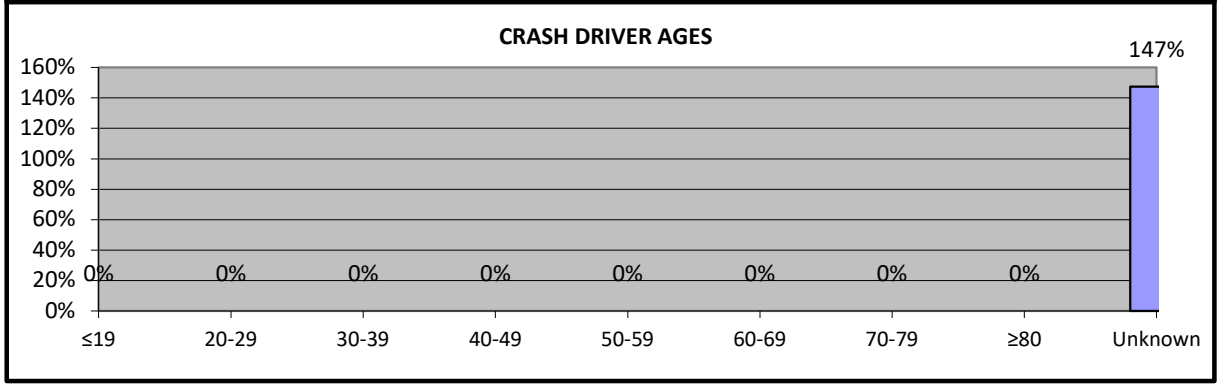
Crash Data Summary Charts

Highland Ave at Gould St / Hunting Rd









Existing Site Trip Generation Calculations

Comment 12

ITE TRIP GENERATION WORKSHEET
(11th Edition, Updated 2021)

LANDUSE: Automated Car Wash
LANDUSE CODE: 948
SETTING/LOCATION:
JOB NAME: **557 Highland Avenue**
JOB NUMBER:

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 4.60

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
AM PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--
PM PEAK OF GENERATOR	2	--	11.66	8.35	16.63	5.00	4.39	6.59	50%	50%

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	--	--	--	--	--	--
AM PEAK OF GENERATOR	--	--	--	--	--	--
PM PEAK OF GENERATOR	54	27	27	--	--	--

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	3	--	30.40	14.20	37.75	3.00	1.69	5.00	50%	50%

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	--	--	--	--	--	--
PEAK OF GENERATOR	140	70	70	--	--	--

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends: Average	Low	High	Independent Variable Range: Average	Low	High	Directional Distribution: Enter	Exit
DAILY	--	--	--	--	--	--	--	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--

TRIPS:

	BY AVERAGE: Total	Enter	Exit	BY REGRESSION: Total	Enter	Exit
DAILY	--	--	--	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--

ITE TRIP GENERATION WORKSHEET
(11th Edition, Updated 2021)

LANDUSE: Automobile Sales (New)
LANDUSE CODE: 840
SETTING/LOCATION: General Urban/Suburban
JOB NAME: **557 Highland Avenue**
JOB NUMBER:

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 35.15

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	18	0.80	27.84	14.98	41.78	36	15.00	77.00	50%	50%
AM PEAK OF GENERATOR	40	0.65	2.15	0.59	4.13	32	9.34	80.00	54%	46%
PM PEAK OF GENERATOR	39	0.61	2.65	0.89	5.64	33	9.34	80.00	46%	54%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	980	490	490	978	489	489
AM PEAK OF GENERATOR	76	41	35	75	40	34
PM PEAK OF GENERATOR	93	43	50	92	42	50

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	1	--	52.24	52.24	52.24	33	33	33	50%	50%
PEAK OF GENERATOR	4	0.92	4.02	1.41	5.64	21	16	33	50%	50%

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	1,838	919	919	--	--	--
PEAK OF GENERATOR	141	71	71	206	103	103

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Total Trip Ends Low	Total Trip Ends High	Independent Variable Range Average	Independent Variable Range Low	Independent Variable Range High	Directional Distribution Enter	Directional Distribution Exit
DAILY	1	--	21.73	21.73	21.73	33	33	33	50%	50%
PEAK OF GENERATOR	--	--	--	--	--	--	--	--	--	--

TRIPS:

	BY AVERAGE Total	BY AVERAGE Enter	BY AVERAGE Exit	BY REGRESSION Total	BY REGRESSION Enter	BY REGRESSION Exit
DAILY	764	382	382	--	--	--
PEAK OF GENERATOR	--	--	--	--	--	--

Existing Town of Needham Mode Share Data

Comment 14

2012-2016 American Community Survey - Work in Needham

Mode Share - Aggregate

Mode	Total	Percent
Car, Truck, or Van - Drove Alone	16,089	82.5%
Carpool - In 2-Person Carpool	1,072	5.5%
Carpooled - In 3-Person Carpool	181	0.9%
Carpooled - In 4-Person Carpool	65	0.3%
Carpooled - In a 5 or 6 Person Carpool	20	0.1%
Carpooled - In a 7 or More Person Carpool	140	0.7%
Public Transportation	302	1.5%
Walked	287	1.5%
Bicycle	99	0.5%
Taxicab / Motorcycle / Other	71	0.4%
Worked at Home	1,185	6.1%
Total	**19,511**	**100.0%**

Note: Based on Journey to Work data from the US Census Bureau (2012-2016 5-Year American Community Survey) for those who work in Needham.

Mode Share - Combined

Mode	Total	Percent
Vehicle	17,638	90.4%
Transit	302	1.5%
Bicycle	99	0.5%
Walked	287	1.5%
Worked at home	1,185	6.1%
Total	**19,511**	**100.0%**

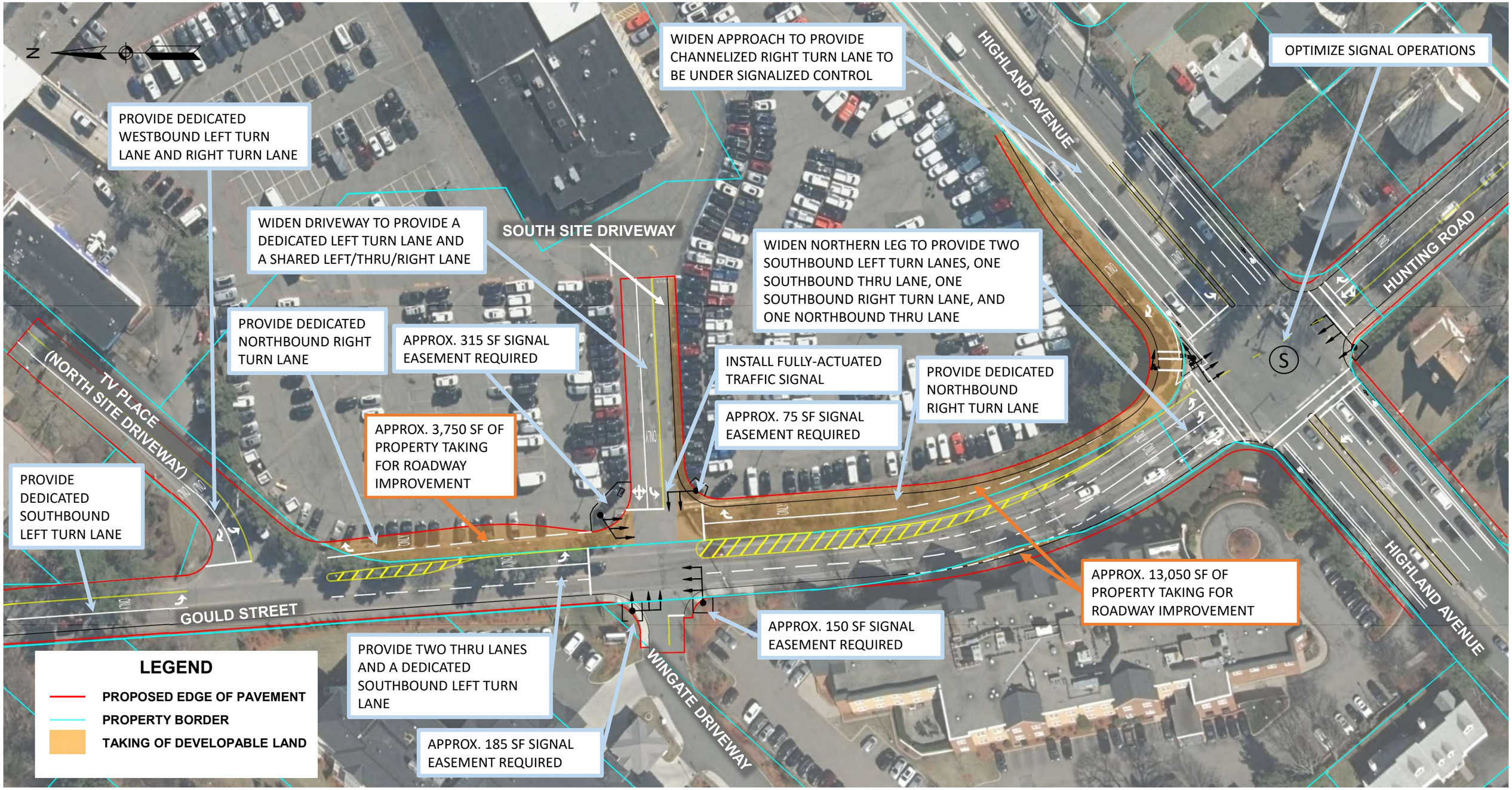
Mode Share - For Comparison

Mode	Total	Percent	% Rounded
Vehicle	17,638	96.2%	95%
Transit	302	1.6%	2%
Bike	99	0.5%	1%
Walk	287	1.6%	2%
Total	**18,326**	**100.0%**	**100.0%**

Note: Worked at home not incldued in dataset

Vehicle Occupancy Rate

Vehicule Occupancy	Total
1	16,160
2	1,072
3	181
4	65
5	10
6	10
7	140
VOR	**1.15**



GPI
Greenman-Pedersen, Inc. || 181 Ballardvale Street, Suite 202, Wilmington, MA 01887
MUZI FORD REDEVELOPMENT– NEEDHAM, MASSACHUSETTS

FIGURE 11

CONCEPT PLAN – ALTERNATIVE I

Intersection Capacity Analysis Worksheets

Comments 19 and 21-24

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	20	635	135	85	355
Future Vol, veh/h	25	20	635	135	85	355
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	95	95	91	91
Heavy Vehicles, %	0	0	2	2	0	3
Mvmt Flow	42	33	668	142	93	390

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1315	739	0	0	810	0
Stage 1	739	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	176	421	-	-	825	-
Stage 1	476	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	421	-	-	825	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	476	-	-	-	-	-
Stage 2	502	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.5	0	1.9
HCM LOS	D		

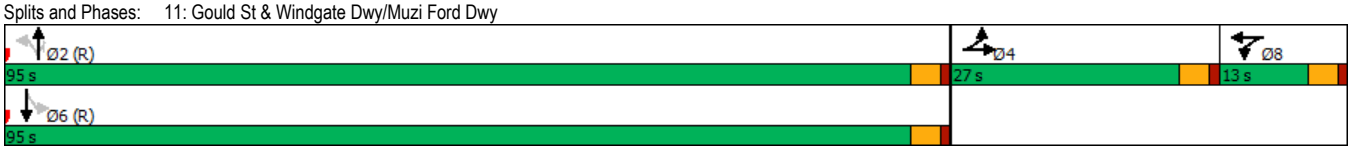
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	156	421	825	-
HCM Lane V/C Ratio	-	-	0.267	0.079	0.113	-
HCM Control Delay (s)	-	-	36.3	14.3	9.9	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	1	0.3	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		100	150		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Confl. Bikes (#/hr)									1			
Peak Hour Factor	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Shared Lane Traffic (%)				34%								
Lane Group Flow (vph)	0	10	0	51	50	0	0	850	428	36	424	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		13.0	13.0		95.0	95.0	95.0	95.0	95.0	
Total Split (%)	20.0%	20.0%		9.6%	9.6%		70.4%	70.4%	70.4%	70.4%	70.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.07		0.43	0.36			0.55	0.32	0.08	0.14	
Control Delay		0.8		70.6	44.5			7.1	3.2	5.8	4.0	
Queue Delay		0.0		0.0	0.0			4.5	1.2	0.0	0.0	
Total Delay		0.8		70.6	44.5			11.6	4.5	5.8	4.0	
Queue Length 50th (ft)		0		46	25			153	22	3	20	
Queue Length 95th (ft)		0		90	68			m273	m78	24	88	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)									100	150		
Base Capacity (vph)		313		128	147			1550	1339	447	2978	
Starvation Cap Reductn		0		0	0			611	669	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.03		0.40	0.34			0.91	0.64	0.08	0.14	

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 135	
Offset: 15 (11%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		0.89		1.00	0.93			1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	0.97			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1645		1681	1663			1861	1551	1770	3537	
Flt Permitted		0.99		0.95	0.97			0.99	1.00	0.29	1.00	
Satd. Flow (perm)		1645		1681	1663			1841	1551	531	3537	
Peak-hour factor, PHF	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Adj. Flow (vph)	2	0	8	78	1	22	17	833	428	36	422	2
RTOR Reduction (vph)	0	10	0	0	21	0	0	0	40	0	0	0
Lane Group Flow (vph)	0	0	0	51	29	0	0	850	388	36	424	0
Confl. Bikes (#/hr)									1			
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		5.8		8.3	8.3			108.9	108.9	108.9	108.9	
Effective Green, g (s)		5.8		8.3	8.3			108.9	108.9	108.9	108.9	
Actuated g/C Ratio		0.04		0.06	0.06			0.81	0.81	0.81	0.81	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		70		103	102			1485	1251	428	2853	
v/s Ratio Prot		c0.00		c0.03	0.02						0.12	
v/s Ratio Perm								c0.46	0.25	0.07		
v/c Ratio		0.01		0.50	0.29			0.57	0.31	0.08	0.15	
Uniform Delay, d1		61.8		61.3	60.5			4.7	3.4	2.7	2.9	
Progression Factor		1.00		1.00	1.00			0.98	1.14	1.00	1.00	
Incremental Delay, d2		0.0		3.7	1.6			0.4	0.2	0.4	0.1	
Delay (s)		61.9		65.0	62.1			5.0	4.0	3.1	3.0	
Level of Service		E		E	E			A	A	A	A	
Approach Delay (s)		61.9			63.6			4.7			3.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	225	220	30	40	190	60	30	555	60	25	305	105	
Future Volume (vph)	225	220	30	40	190	60	30	555	60	25	305	105	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	120		0	100		0	0		0	0		0	
Storage Lanes	1		0	1		0	0		0	0		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			No			No			No			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			371			476			549		
Travel Time (s)		7.2			8.4			10.8			12.5		
Confl. Peds. (#/hr)	14		4	4		14	4		22	22		4	
Peak Hour Factor	0.94	0.94	0.94	0.87	0.87	0.87	0.87	0.87	0.87	0.96	0.96	0.96	
Heavy Vehicles (%)	4%	2%	4%	0%	2%	0%	4%	4%	0%	0%	7%	5%	
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0	
Parking (#/hr)							0	0	0	0	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	239	266	0	46	287	0	0	741	0	0	453	0	
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases	1	1 2			2			3			3		9
Permitted Phases	2	2		2			3			3			
Detector Phase	1	1 2		2	2		3	3		3	3		
Switch Phase													
Minimum Initial (s)	6.0			10.0	10.0		10.0	10.0		10.0	10.0		7.0
Minimum Split (s)	11.0			15.0	15.0		15.0	15.0		15.0	15.0		20.0
Total Split (s)	15.0			35.0	35.0		60.0	60.0		60.0	60.0		20.0
Total Split (%)	11.5%			26.9%	26.9%		46.2%	46.2%		46.2%	46.2%		15%
Yellow Time (s)	4.0			4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	1.0			1.0	1.0		1.0	1.0		1.0	1.0		0.0
Lost Time Adjust (s)	0.0			0.0	0.0			0.0			0.0		
Total Lost Time (s)	5.0			5.0	5.0			5.0			5.0		
Lead/Lag	Lead			Lag	Lag								
Lead-Lag Optimize?													
Recall Mode	None			None	None		Min	Min		Min	Min		None
v/c Ratio	0.88	0.42		0.20	0.77			0.91			0.60		
Control Delay	60.4	29.2		38.0	55.1			42.6			24.5		
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0		
Total Delay	60.4	29.2		38.0	55.1			42.6			24.5		
Queue Length 50th (ft)	114	128		25	176			407			189		
Queue Length 95th (ft)	#258	252		65	313			#913			453		
Internal Link Dist (ft)		238			291			396			469		
Turn Bay Length (ft)	120			100									
Base Capacity (vph)	273	778		320	508			811			761		
Starvation Cap Reductn	0	0		0	0			0			0		
Spillback Cap Reductn	0	0		0	0			0			0		
Storage Cap Reductn	0	0		0	0			0			0		
Reduced v/c Ratio	0.88	0.34		0.14	0.56			0.91			0.60		

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 106.5
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Highland Ave & West St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	220	30	40	190	60	30	555	60	25	305	105
Future Volume (vph)	225	220	30	40	190	60	30	555	60	25	305	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00			0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	0.96			0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1730	1819		1793	1781			1606			1545	
Flt Permitted	0.29	1.00		0.60	1.00			0.97			0.94	
Satd. Flow (perm)	524	1819		1123	1781			1554			1456	
Peak-hour factor, PHF	0.94	0.94	0.94	0.87	0.87	0.87	0.87	0.87	0.87	0.96	0.96	0.96
Adj. Flow (vph)	239	234	32	46	218	69	34	638	69	26	318	109
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	239	266	0	46	287	0	0	741	0	0	453	0
Confl. Peds. (#/hr)	14		4	4		14	4		22	22		4
Heavy Vehicles (%)	4%	2%	4%	0%	2%	0%	4%	4%	0%	0%	7%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0
Parking (#/hr)							0	0	0	0	0	0
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2	2		2			3			3		
Actuated Green, G (s)	32.3	37.3		22.2	22.2			55.7			55.7	
Effective Green, g (s)	32.3	37.3		22.2	22.2			55.7			55.7	
Actuated g/C Ratio	0.30	0.35		0.21	0.21			0.52			0.52	
Clearance Time (s)	5.0			5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0			3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	269	628		231	366			802			751	
v/s Ratio Prot	c0.08	0.15			0.16							
v/s Ratio Perm	c0.18			0.04				c0.48			0.31	
v/c Ratio	0.89	0.42		0.20	0.78			0.92			0.60	
Uniform Delay, d1	33.3	27.1		35.5	40.6			24.1			18.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	27.7	0.5		0.4	10.5			16.2			1.4	
Delay (s)	61.0	27.5		35.9	51.1			40.3			19.7	
Level of Service	E	C		D	D			D			B	
Approach Delay (s)		43.4			49.0			40.3			19.7	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

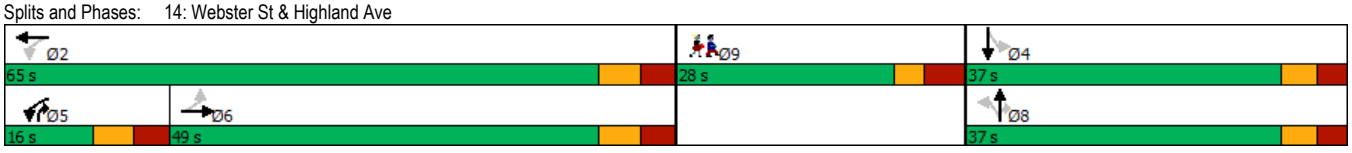
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30	
Future Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	150		0	150		0	0		150	0		200	
Storage Lanes	1		0	1		0	0		1	0		1	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			No			Yes			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1325			691			391			2983		
Travel Time (s)		30.1			15.7			8.9			67.8		
Confl. Peds. (#/hr)	7					7	1		7	7		1	
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.94	0.94	0.94	0.88	0.88	0.88	0.87	0.87	0.87	0.88	0.88	0.88	
Heavy Vehicles (%)	4%	3%	0%	0%	2%	4%	1%	1%	0%	0%	1%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	37	649	0	142	591	0	0	385	466	0	290	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA		
Protected Phases		6		5	2			8	5		4		9
Permitted Phases	6			2			8		8	4			
Detector Phase	6	6		5	2		8	8	5	4	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		7.0
Minimum Split (s)	17.5	17.5		13.5	17.5		12.5	12.5	13.5	12.5	12.5		28.0
Total Split (s)	49.0	49.0		16.0	65.0		37.0	37.0	16.0	37.0	37.0		28.0
Total Split (%)	37.7%	37.7%		12.3%	50.0%		28.5%	28.5%	12.3%	28.5%	28.5%		22%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	3.5	4.0	3.5	3.5		3.0
All-Red Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.5	3.0	3.0		4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Lost Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5		
Lead/Lag	Lag	Lag		Lead					Lead				
Lead-Lag Optimize?													
Recall Mode	Min	Min		None	Min		None	None	None	None	None		None
v/c Ratio	0.12	0.87		0.60	0.58			0.82	0.62		0.90dl		
Control Delay	25.4	44.6		26.6	20.6			52.2	11.5		40.4		
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay	25.4	44.6		26.6	20.6			52.2	11.5		40.4		
Queue Length 50th (ft)	14	366		39	223			223	51		82		
Queue Length 95th (ft)	52	#861		#152	531			#474	177		164		
Internal Link Dist (ft)		1245			611			311			2903		
Turn Bay Length (ft)	150			150					150				
Base Capacity (vph)	311	743		237	1019			537	747		566		
Starvation Cap Reductn	0	0		0	0			0	0		0		
Spillback Cap Reductn	0	0		0	0			0	0		0		
Storage Cap Reductn	0	0		0	0			0	0		0		
Reduced v/c Ratio	0.12	0.87		0.60	0.58			0.72	0.62		0.51		

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 104.2	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 14: Webster St & Highland Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30
Future Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.98	
Satd. Flow (prot)	1729	1839		1805	1821			1875	1578		3453	
Flt Permitted	0.42	1.00		0.10	1.00			0.96	1.00		0.54	
Satd. Flow (perm)	772	1839		184	1821			1811	1578		1907	
Peak-hour factor, PHF	0.94	0.94	0.94	0.88	0.88	0.88	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	37	633	16	142	523	68	23	362	466	97	159	34
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	224	0	0	0
Lane Group Flow (vph)	37	648	0	142	591	0	0	385	242	0	290	0
Confl. Peds. (#/hr)	7					7	1		7	7		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	3%	0%	0%	2%	4%	1%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	2			8	5		4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	42.2	42.2		58.3	58.3			27.2	35.8		27.2	
Effective Green, g (s)	42.2	42.2		58.3	58.3			27.2	35.8		27.2	
Actuated g/C Ratio	0.38	0.38		0.53	0.53			0.25	0.33		0.25	
Clearance Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	296	706		224	966			448	514		471	
v/s Ratio Prot		c0.35		0.05	c0.32				0.04			
v/s Ratio Perm	0.05			0.29				c0.21	0.12		0.15	
v/c Ratio	0.12	0.92		0.63	0.61			0.86	0.47		0.90dl	
Uniform Delay, d1	21.9	32.2		21.2	17.9			39.5	29.5		36.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	16.8		5.8	1.2			15.1	0.7		2.4	
Delay (s)	22.1	49.1		27.0	19.1			54.6	30.2		39.1	
Level of Service	C	D		C	B			D	C		D	
Approach Delay (s)		47.6			20.6			41.2			39.1	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	109.9	Sum of lost time (s)	28.5
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

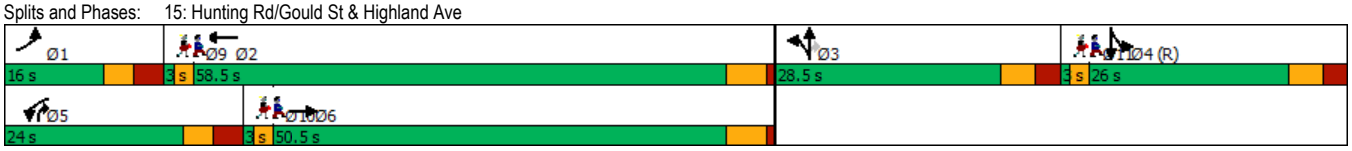
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			Yes			Yes			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Peds. (#/hr)	1		1	1		1									
Confl. Bikes (#/hr)									1						
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	172	1040	0	49	1484	0	0	301	273	309	144	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	5	4	4		9	10	11
Permitted Phases									3						
Detector Phase	1	6		5	2		3	3	5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0	12.0	29.5	29.5		3.0	3.0	3.0
Total Split (s)	16.0	50.5		24.0	58.5		28.5	28.5	24.0	26.0	26.0		3.0	3.0	3.0
Total Split (%)	11.9%	37.4%		17.8%	43.3%		21.1%	21.1%	17.8%	19.3%	19.3%		2%	2%	2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead	Lead				Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min	None	C-Min	C-Min		None	None	None
v/c Ratio	0.96	0.66		0.42	1.00			0.96	0.61	0.66	0.56				
Control Delay	117.3	33.3		70.2	56.2			98.4	22.8	68.6	63.4				
Queue Delay	15.8	0.0		0.0	2.4			0.0	0.0	0.0	0.0				
Total Delay	133.2	33.3		70.2	58.6			98.4	22.8	68.6	63.4				
Queue Length 50th (ft)	153	363		42	587			265	93	136	107				
Queue Length 95th (ft)	#330	503		83	#797			#433	136	180	166				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	179	1574		240	1479			312	548	509	280				
Starvation Cap Reductn	0	0		0	0			0	0	0	0				
Spillback Cap Reductn	11	0		0	13			0	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	1.02	0.66		0.20	1.01			0.96	0.50	0.61	0.51				

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.92			1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3530		1805	3178			1874	1600	3400	1781	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3530		1805	3178			1874	1600	3400	1781	
Peak-hour factor, PHF	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	172	1023	17	49	658	826	28	273	273	309	96	48
RTOR Reduction (vph)	0	1	0	0	159	0	0	0	74	0	14	0
Lane Group Flow (vph)	172	1039	0	49	1325	0	0	301	199	309	130	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	5	4	4	
Permitted Phases									3			
Actuated Green, G (s)	13.8	60.2		8.9	58.2			22.5	31.4	17.5	17.5	
Effective Green, g (s)	13.8	60.2		8.9	58.2			22.5	31.4	17.5	17.5	
Actuated g/C Ratio	0.10	0.45		0.07	0.43			0.17	0.23	0.13	0.13	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	179	1574		118	1370			312	372	440	230	
v/s Ratio Prot	c0.10	0.29		0.03	c0.42			c0.16	0.04	c0.09	0.07	
v/s Ratio Perm									0.09			
v/c Ratio	0.96	0.66		0.42	0.97			0.96	0.53	0.70	0.57	
Uniform Delay, d1	60.3	29.4		60.6	37.5			55.9	45.4	56.3	55.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.12	1.14	
Incremental Delay, d2	55.3	0.8		0.9	16.8			40.9	0.7	9.0	9.6	
Delay (s)	115.7	30.2		61.4	54.3			96.8	46.1	71.7	72.7	
Level of Service	F	C		E	D			F	D	E	E	
Approach Delay (s)		42.3			54.5			72.7			72.1	
Approach LOS		D			D			E			E	

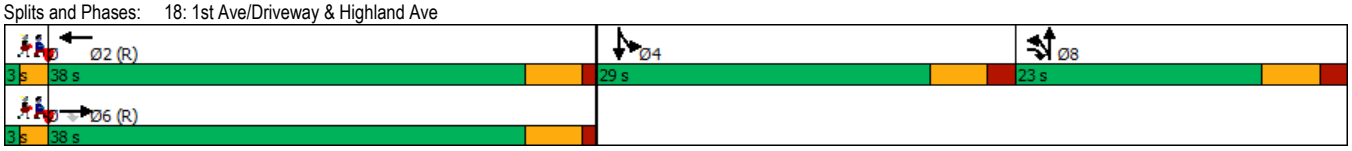
Intersection Summary			
HCM 2000 Control Delay	55.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø5
Lane Configurations														
Traffic Volume (vph)	5	1170	1005	0	965	15	175	0	70	5	5	10		
Future Volume (vph)	5	1170	1005	0	965	15	175	0	70	5	5	10		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)	0		0	0		0	75		0	0		0		
Storage Lanes	0		1	0		0	1		0	0		0		
Taper Length (ft)	25			25			25			25				
Right Turn on Red			Yes			Yes			Yes			Yes		
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		176			681			500			267			
Travel Time (s)		4.0			15.5			11.4			6.1			
Confl. Peds. (#/hr)			1	1					8	8				
Confl. Bikes (#/hr)			2											
Peak Hour Factor	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91	0.39	0.39	0.39		
Heavy Vehicles (%)	0%	4%	2%	0%	5%	0%	11%	0%	6%	33%	0%	0%		
Shared Lane Traffic (%)							28%							
Lane Group Flow (vph)	0	1336	1142	0	1032	0	138	131	0	0	52	0		
Turn Type		NA	pm+ov		NA		Split	NA		Split	NA			
Protected Phases		6	8		2		8	8		4	4		1	5
Permitted Phases			6											
Detector Phase		6	8		2		8	8		4	4			
Switch Phase														
Minimum Initial (s)		10.0	6.0		10.0		6.0	6.0		6.0	6.0		1.0	1.0
Minimum Split (s)		25.0	20.0		20.0		20.0	20.0		29.0	29.0		3.0	3.0
Total Split (s)		38.0	23.0		38.0		23.0	23.0		29.0	29.0		3.0	3.0
Total Split (%)		40.9%	24.7%		40.9%		24.7%	24.7%		31.2%	31.2%		3%	3%
Yellow Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0		2.0	2.0
All-Red Time (s)		1.0	2.0		1.0		2.0	2.0		2.0	2.0		0.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0			0.0			
Total Lost Time (s)		5.0	6.0		5.0		6.0	6.0			6.0			
Lead/Lag		Lag			Lag								Lead	Lead
Lead-Lag Optimize?														
Recall Mode		C-Min	None		C-Min		None	None		None	None		None	None
v/c Ratio		1.68	0.81		0.56		0.44	0.33			0.27			
Control Delay		334.2	7.4		19.2		36.1	9.9			24.3			
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0			
Total Delay		334.2	7.4		19.2		36.1	9.9			24.3			
Queue Length 50th (ft)		~611	11		203		73	7			15			
Queue Length 95th (ft)		#806	#103		354		140	58			10			
Internal Link Dist (ft)		96			601			420			187			
Turn Bay Length (ft)							75							
Base Capacity (vph)		794	1419		1840		347	421			419			
Starvation Cap Reductn		0	0		0		0	0			0			
Spillback Cap Reductn		0	0		0		0	0			0			
Storage Cap Reductn		0	0		0		0	0			0			
Reduced v/c Ratio		1.68	0.80		0.56		0.40	0.31			0.12			

Intersection Summary

Area Type: Other
Cycle Length: 93
Actuated Cycle Length: 93
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 18: 1st Ave/Driveway & Highland Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1170	1005	0	965	15	175	0	70	5	5	10
Future Volume (vph)	5	1170	1005	0	965	15	175	0	70	5	5	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	6.0		5.0		6.0	6.0			6.0	
Lane Util. Factor		0.95	1.00		0.95		0.95	0.95			1.00	
Frpb, ped/bikes		1.00	0.98		1.00		1.00	0.99			1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00			1.00	
Frt		1.00	0.85		1.00		1.00	0.91			0.93	
Flt Protected		1.00	1.00		1.00		0.95	0.98			0.99	
Satd. Flow (prot)		3471	1557		3433		1545	1472			1617	
Flt Permitted		0.95	1.00		1.00		0.95	0.98			0.99	
Satd. Flow (perm)		3300	1557		3433		1545	1472			1617	
Peak-hour factor, PHF	0.88	0.88	0.88	0.95	0.95	0.95	0.91	0.91	0.91	0.39	0.39	0.39
Adj. Flow (vph)	6	1330	1142	0	1016	16	192	0	77	13	13	26
RTOR Reduction (vph)	0	0	281	0	1	0	0	93	0	0	24	0
Lane Group Flow (vph)	0	1336	862	0	1031	0	138	38	0	0	28	0
Confl. Peds. (#/hr)			1	1					8	8		
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	0%	4%	2%	0%	5%	0%	11%	0%	6%	33%	0%	0%
Turn Type		NA	pm+ov		NA		Split	NA		Split	NA	
Protected Phases		6	8		2		8	8		4	4	
Permitted Phases			6									
Actuated Green, G (s)		48.6	67.5		48.6		18.9	18.9			8.5	
Effective Green, g (s)		48.6	67.5		48.6		18.9	18.9			8.5	
Actuated g/C Ratio		0.52	0.73		0.52		0.20	0.20			0.09	
Clearance Time (s)		5.0	6.0		5.0		6.0	6.0			6.0	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		1724	1230		1794		313	299			147	
v/s Ratio Prot			c0.14		0.30		0.09	0.03			c0.02	
v/s Ratio Perm		c0.40	0.41									
v/c Ratio		0.77	0.70		0.57		0.44	0.13			0.19	
Uniform Delay, d1		17.8	7.1		15.1		32.4	30.3			39.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		3.5	1.5		1.3		0.4	0.1			0.2	
Delay (s)		21.3	8.6		16.5		32.8	30.4			39.3	
Level of Service		C	A		B		C	C			D	
Approach Delay (s)		15.4			16.5			31.6			39.3	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	93.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10	
Future Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	190		0	0		400	125		0	
Storage Lanes	0		1	1		0	0		1	1		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			Yes			Yes			Yes	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		442			443			907			3028		
Travel Time (s)		10.0			10.1			20.6			68.8		
Confl. Peds. (#/hr)							2					2	
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.83	0.83	0.83	0.97	0.97	0.97	0.91	0.91	0.91	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	1%	0%	4%	4%	3%	0%	1%	0%	2%	2%	8%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	584	0	88	325	0	0	395	632	82	76	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA		
Protected Phases		2		1	6			8		7	4		9
Permitted Phases	2			6			8		Free	4			
Detector Phase	2	2		1	6		8	8		7	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		7.0	10.0		10.0	10.0		2.0	10.0		1.0
Minimum Split (s)	16.0	16.0		12.0	28.0		15.0	15.0		7.0	27.0		24.0
Total Split (s)	17.0	17.0		12.0	29.0		26.0	26.0		11.0	37.0		24.0
Total Split (%)	18.9%	18.9%		13.3%	32.2%		28.9%	28.9%		12.2%	41.1%		27%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		0.0
Lost Time Adjust (s)		0.0		0.0	0.0			0.0		0.0	0.0		
Total Lost Time (s)		5.0		5.0	5.0			5.0		5.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lead	Lead		Lag			
Lead-Lag Optimize?													
Recall Mode	C-Min	C-Min		None	C-Min		None	None		None	None		None
v/c Ratio		0.44		0.24	0.36			0.93	0.39	0.37	0.13		
Control Delay		26.4		17.7	17.3			65.0	0.7	30.5	17.8		
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay		26.4		17.7	17.3			65.0	0.7	30.5	17.8		
Queue Length 50th (ft)		124		23	93			219	0	31	24		
Queue Length 95th (ft)		#298		77	249			#386	0	63	54		
Internal Link Dist (ft)		362			363			827			2948		
Turn Bay Length (ft)				190					400	125			
Base Capacity (vph)		1327		373	912			437	1615	231	647		
Starvation Cap Reductn		0		0	0			0	0	0	0		
Spillback Cap Reductn		0		0	0			0	0	0	0		
Storage Cap Reductn		0		0	0			0	0	0	0		
Reduced v/c Ratio		0.44		0.24	0.36			0.90	0.39	0.35	0.12		

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 11 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 20: Hunting Rd & Kendrick St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10
Future Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	4.0	5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.96			1.00	0.85	1.00	0.98	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3565		1736	1757			1880	1615	1770	1801	
Flt Permitted		0.91		0.30	1.00			1.00	1.00	0.23	1.00	
Satd. Flow (perm)		3269		544	1757			1876	1615	420	1801	
Peak-hour factor, PHF	0.83	0.83	0.83	0.97	0.97	0.97	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	36	548	0	88	237	88	5	390	632	82	65	11
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	584	0	88	315	0	0	395	632	82	69	0
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	4%	4%	3%	0%	1%	0%	2%	2%	8%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		Free	4		
Actuated Green, G (s)		32.9		43.6	43.6			20.4	90.0	30.0	30.0	
Effective Green, g (s)		32.9		43.6	43.6			20.4	90.0	30.0	30.0	
Actuated g/C Ratio		0.37		0.48	0.48			0.23	1.00	0.33	0.33	
Clearance Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)		1195		339	851			425	1615	209	600	
v/s Ratio Prot				0.02	0.18					0.02	0.04	
v/s Ratio Perm		c0.18		0.11				c0.21	c0.39	0.11		
v/c Ratio		0.49		0.26	0.37			0.93	0.39	0.39	0.11	
Uniform Delay, d1		22.1		13.5	14.6			34.1	0.0	33.7	20.8	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.4		0.1	1.2			26.2	0.7	0.4	0.0	
Delay (s)		23.5		13.6	15.8			60.3	0.7	34.1	20.8	
Level of Service		C		B	B			E	A	C	C	
Approach Delay (s)		23.5			15.3			23.6			27.7	
Approach LOS		C			B			C			C	

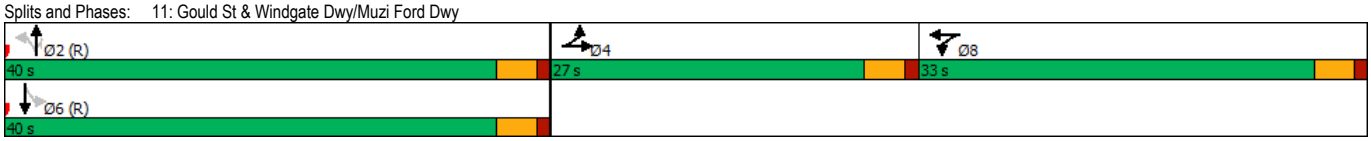
Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

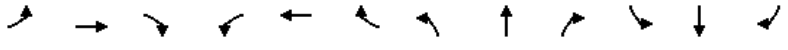
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		100	150		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Peak Hour Factor	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Shared Lane Traffic (%)				44%								
Lane Group Flow (vph)	0	41	0	280	277	0	0	337	93	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		33.0	33.0		40.0	40.0	40.0	40.0	40.0	
Total Split (%)	27.0%	27.0%		33.0%	33.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.20		0.75	0.71			0.30	0.09	0.03	0.36	
Control Delay		8.5		48.3	43.8			14.0	8.2	15.4	13.9	
Queue Delay		0.0		0.0	0.0			0.6	0.0	0.0	0.1	
Total Delay		8.5		48.3	43.8			14.6	8.2	15.4	14.0	
Queue Length 50th (ft)		0		174	163			56	1	4	124	
Queue Length 95th (ft)		12		187	176			m252	m30	21	270	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)									100	150		
Base Capacity (vph)		413		487	503			1112	986	568	2134	
Starvation Cap Reductn		0		0	0			437	0	0	0	
Spillback Cap Reductn		4		0	0			0	0	0	276	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.10		0.57	0.55			0.50	0.09	0.03	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	0.95	
Frt		0.87		1.00	0.97			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1615		1681	1705			1861	1583	1770	3536	
Flt Permitted		1.00		0.95	0.96			0.99	1.00	0.51	1.00	
Satd. Flow (perm)		1615		1681	1705			1842	1583	941	3536	
Peak-hour factor, PHF	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Adj. Flow (vph)	1	0	40	500	1	56	6	331	93	16	761	5
RTOR Reduction (vph)	0	38	0	0	10	0	0	0	32	0	0	0
Lane Group Flow (vph)	0	3	0	280	267	0	0	337	61	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		7.0		22.3	22.3			58.7	58.7	58.7	58.7	
Effective Green, g (s)		7.0		22.3	22.3			58.7	58.7	58.7	58.7	
Actuated g/C Ratio		0.07		0.22	0.22			0.59	0.59	0.59	0.59	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		113		374	380			1081	929	552	2075	
v/s Ratio Prot		c0.00		c0.17	0.16						c0.22	
v/s Ratio Perm								0.18	0.04	0.02		
v/c Ratio		0.03		0.75	0.70			0.31	0.07	0.03	0.37	
Uniform Delay, d1		43.3		36.2	35.8			10.4	8.9	8.7	10.9	
Progression Factor		1.00		1.00	1.00			0.99	1.48	1.00	1.00	
Incremental Delay, d2		0.1		8.0	5.8			0.4	0.1	0.1	0.5	
Delay (s)		43.4		44.2	41.6			10.7	13.2	8.8	11.4	
Level of Service		D		D	D			B	B	A	B	
Approach Delay (s)		43.4			42.9			11.2			11.3	
Approach LOS		D			D			B			B	

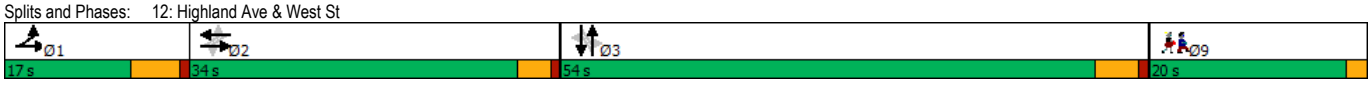
Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100	
Future Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	120		0	100		0	0		0	0		0	
Storage Lanes	1		0	1		0	0		0	0		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			No			No			No			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			371			476			549		
Travel Time (s)		7.2			8.4			10.8			12.5		
Confl. Peds. (#/hr)	7		8	8		7	4		36	36		4	
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.89	0.89	0.89	0.93	0.93	0.93	
Heavy Vehicles (%)	3%	0%	0%	0%	2%	2%	1%	8%	0%	0%	3%	6%	
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0	
Parking (#/hr)							0	0	0	0	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	207	327	0	81	250	0	0	562	0	0	753	0	
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases	1	1 2			2			3			3		9
Permitted Phases	2	2		2			3			3			
Detector Phase	1	1 2		2	2		3	3		3	3		
Switch Phase													
Minimum Initial (s)	6.0			10.0	10.0		10.0	10.0		10.0	10.0		7.0
Minimum Split (s)	11.5			15.0	15.0		15.0	15.0		15.0	15.0		20.0
Total Split (s)	17.0			34.0	34.0		54.0	54.0		54.0	54.0		20.0
Total Split (%)	13.6%			27.2%	27.2%		43.2%	43.2%		43.2%	43.2%		16%
Yellow Time (s)	4.5			3.0	3.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	1.0			1.0	1.0		1.0	1.0		1.0	1.0		0.0
Lost Time Adjust (s)	0.0			0.0	0.0			0.0			0.0		
Total Lost Time (s)	5.5			4.0	4.0			5.0			5.0		
Lead/Lag	Lead			Lag	Lag								
Lead-Lag Optimize?													
Recall Mode	None			None	None		Min	Min		Min	Min		None
v/c Ratio	0.65	0.49		0.38	0.70			0.76			0.97		
Control Delay	35.2	28.2		40.5	48.3			31.4			52.7		
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0		
Total Delay	35.2	28.2		40.5	48.3			31.4			52.7		
Queue Length 50th (ft)	87	148		42	140			254			408		
Queue Length 95th (ft)	178	281		98	256			#669			#994		
Internal Link Dist (ft)		238			291			396			469		
Turn Bay Length (ft)	120			100									
Base Capacity (vph)	320	854		323	540			735			777		
Starvation Cap Reductn	0	0		0	0			0			0		
Spillback Cap Reductn	0	0		0	0			0			0		
Storage Cap Reductn	0	0		0	0			0			0		
Reduced v/c Ratio	0.65	0.38		0.25	0.46			0.76			0.97		

Intersection Summary

Area Type: Other
Cycle Length: 125
Actuated Cycle Length: 99.6
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Highland Ave & West St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100
Future Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		4.0	4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.96			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1749	1840		1782	1766			1552			1613	
Flt Permitted	0.33	1.00		0.56	1.00			0.95			0.96	
Satd. Flow (perm)	614	1840		1056	1766			1473			1556	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.89	0.89	0.89	0.93	0.93	0.93
Adj. Flow (vph)	207	270	57	81	180	70	28	472	62	32	613	108
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	207	327	0	81	250	0	0	562	0	0	753	0
Confl. Peds. (#/hr)	7		8	8		7	4		36	36		4
Heavy Vehicles (%)	3%	0%	0%	0%	2%	2%	1%	8%	0%	0%	3%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0
Parking (#/hr)							0	0	0	0	0	0
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2	2		2			3			3		
Actuated Green, G (s)	31.9	37.4		20.2	20.2			49.8			49.8	
Effective Green, g (s)	31.9	37.4		20.2	20.2			49.8			49.8	
Actuated g/C Ratio	0.32	0.37		0.20	0.20			0.49			0.49	
Clearance Time (s)	5.5			4.0	4.0			5.0			5.0	
Vehicle Extension (s)	3.0			3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	325	680		210	352			725			766	
v/s Ratio Prot	c0.07	0.18			c0.14							
v/s Ratio Perm	0.13			0.08				0.38			c0.48	
v/c Ratio	0.64	0.48		0.39	0.71			0.78			0.98	
Uniform Delay, d1	27.4	24.4		35.1	37.7			21.1			25.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.1	0.5		1.2	6.6			5.2			28.1	
Delay (s)	31.4	24.9		36.2	44.3			26.2			53.4	
Level of Service	C	C		D	D			C			D	
Approach Delay (s)		27.5			42.4			26.2			53.4	
Approach LOS		C			D			C			D	

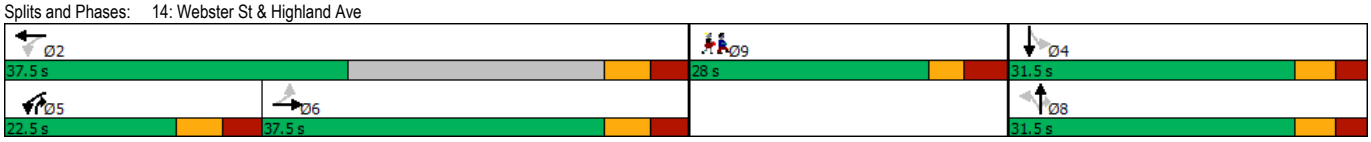
Intersection Summary			
HCM 2000 Control Delay	38.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	101.1	Sum of lost time (s)	16.5
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

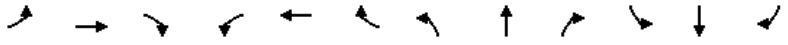
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	45	460	15	315	630	75	25	125	175	95	300	45	
Future Volume (vph)	45	460	15	315	630	75	25	125	175	95	300	45	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	150		0	150		0	0		150	0		200	
Storage Lanes	1		0	1		0	0		1	0		1	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			Yes			No			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1325			691			391			2983		
Travel Time (s)		30.1			15.7			8.9			67.8		
Confl. Peds. (#/hr)	2					2	2					2	
Peak Hour Factor	0.91	0.91	0.91	0.97	0.97	0.97	0.87	0.87	0.87	0.88	0.88	0.88	
Heavy Vehicles (%)	0%	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	49	521	0	325	726	0	0	173	201	0	500	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA		
Protected Phases		6		5	2			8	5		4		9
Permitted Phases	6			2			8		8	4			
Detector Phase	6	6		5	2		8	8	5	4	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		7.0
Minimum Split (s)	17.5	17.5		13.5	17.5		12.5	12.5	13.5	12.5	12.5		28.0
Total Split (s)	37.5	37.5		22.5	37.5		31.5	31.5	22.5	31.5	31.5		28.0
Total Split (%)	31.4%	31.4%		18.8%	31.4%		26.4%	26.4%	18.8%	26.4%	26.4%		23%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	3.5	4.0	3.5	3.5		3.0
All-Red Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.5	3.0	3.0		4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Lost Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5		
Lead/Lag	Lag	Lag		Lead					Lead				
Lead-Lag Optimize?													
Recall Mode	Min	Min		None	Min		None	None	None	None	None		None
v/c Ratio	0.21	0.85		0.85	0.70			0.53	0.27		0.75		
Control Delay	30.6	46.0		42.4	21.9			39.9	18.2		42.8		
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay	30.6	46.0		42.4	21.9			39.9	18.2		42.8		
Queue Length 50th (ft)	20	268		115	257			83	62		134		
Queue Length 95th (ft)	68	#673		#409	#750			191	162		#271		
Internal Link Dist (ft)		1245			611			311			2903		
Turn Bay Length (ft)	150			150					150				
Base Capacity (vph)	233	614		384	1042			378	752		768		
Starvation Cap Reductn	0	0		0	0			0	0		0		
Spillback Cap Reductn	0	0		0	0			0	0		0		
Storage Cap Reductn	0	0		0	0			0	0		0		
Reduced v/c Ratio	0.21	0.85		0.85	0.70			0.46	0.27		0.65		

Intersection Summary	
Area Type:	Other
Cycle Length: 119.5	
Actuated Cycle Length: 94	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 14: Webster St & Highland Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	460	15	315	630	75	25	125	175	95	300	45
Future Volume (vph)	45	460	15	315	630	75	25	125	175	95	300	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1803	1891		1787	1831			1884	1615		3508	
Flt Permitted	0.38	1.00		0.12	1.00			0.74	1.00		0.80	
Satd. Flow (perm)	716	1891		232	1831			1401	1615		2841	
Peak-hour factor, PHF	0.91	0.91	0.91	0.97	0.97	0.97	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	49	505	16	325	649	77	29	144	201	108	341	51
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	520	0	325	723	0	0	173	201	0	500	0
Confl. Peds. (#/hr)	2					2	2					2
Heavy Vehicles (%)	0%	0%	0%	1%	2%	1%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	2			8	5		4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	30.6	30.6		53.4	53.4			21.9	37.2		21.9	
Effective Green, g (s)	30.6	30.6		53.4	53.4			21.9	37.2		21.9	
Actuated g/C Ratio	0.31	0.31		0.54	0.54			0.22	0.37		0.22	
Clearance Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	219	580		363	981			308	603		624	
v/s Ratio Prot		0.28		0.14	c0.40				0.05			
v/s Ratio Perm	0.07			c0.34				0.12	0.07		c0.18	
v/c Ratio	0.22	0.90		0.90	0.74			0.56	0.33		0.80	
Uniform Delay, d1	25.7	33.0		25.3	17.7			34.6	22.3		36.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.5	16.4		23.4	2.9			2.3	0.3		7.3	
Delay (s)	26.2	49.4		48.7	20.6			36.9	22.7		44.1	
Level of Service	C	D		D	C			D	C		D	
Approach Delay (s)		47.4			29.3			29.3			44.1	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	99.6	Sum of lost time (s)	28.5
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		

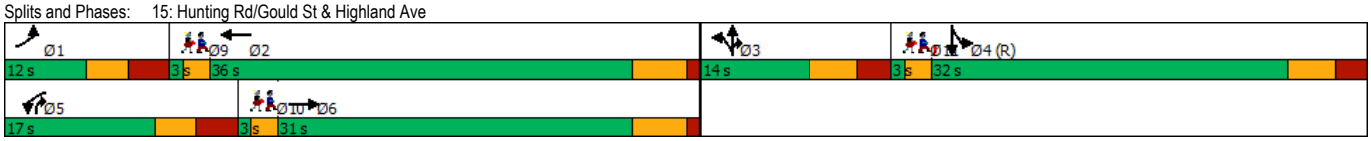
c Critical Lane Group

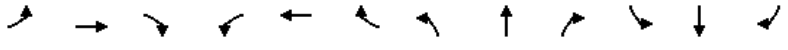
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			Yes			Yes			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Bikes (#/hr)						1									
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	38	819	0	142	1352	0	0	102	108	922	392	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	3 5	4	4		9	10	11
Permitted Phases															
Detector Phase	1	6		5	2		3	3	3 5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0		21.0	21.0		3.0	3.0	3.0
Total Split (s)	12.0	31.0		17.0	36.0		14.0	14.0		32.0	32.0		3.0	3.0	3.0
Total Split (%)	12.0%	31.0%		17.0%	36.0%		14.0%	14.0%		32.0%	32.0%		3%	3%	3%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead					Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min		C-Min	C-Min		None	None	None
v/c Ratio	0.36	0.80		0.78	1.02			0.73	0.26	0.93	0.74				
Control Delay	55.0	40.1		71.9	62.3			74.0	2.7	54.5	41.2				
Queue Delay	0.0	0.0		0.0	0.2			5.4	0.0	5.1	1.1				
Total Delay	55.0	40.1		71.9	62.5			79.4	2.7	59.6	42.3				
Queue Length 50th (ft)	24	252		89	~527			65	0	310	228				
Queue Length 95th (ft)	57	#373		#182	#702			#126	5	#376	#239				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	106	1027		194	1324			147	424	987	527				
Starvation Cap Reductn	0	0		0	0			0	0	43	32				
Spillback Cap Reductn	0	0		0	1			17	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	0.36	0.80		0.73	1.02			0.78	0.25	0.98	0.79				

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave





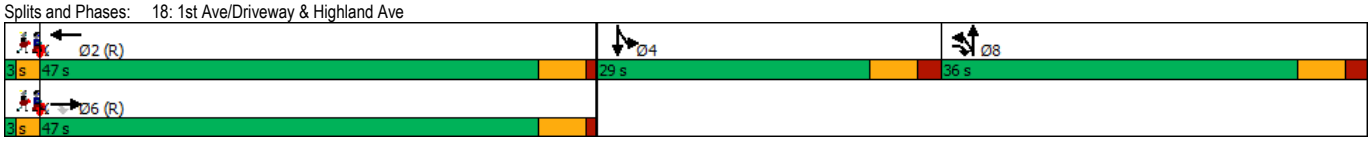
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.97			1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3413			1841	1583	3433	1747	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3525		1770	3413			1841	1583	3433	1747	
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	38	797	22	142	1068	284	24	78	108	922	229	163
RTOR Reduction (vph)	0	2	0	0	22	0	0	0	89	0	25	0
Lane Group Flow (vph)	38	817	0	142	1330	0	0	102	19	922	367	0
Confl. Bikes (#/hr)						1						
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Effective Green, g (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Actuated g/C Ratio	0.04	0.32		0.10	0.38			0.08	0.18	0.28	0.28	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	63	1110		182	1303			139	283	947	482	
v/s Ratio Prot	0.02	0.23		c0.08	c0.39			c0.06	0.01	c0.27	0.21	
v/s Ratio Perm												
v/c Ratio	0.60	0.74		0.78	1.02			0.73	0.07	0.97	0.76	
Uniform Delay, d1	47.5	30.5		43.7	30.9			45.2	34.1	35.8	33.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.09	1.07	
Incremental Delay, d2	10.7	2.2		17.8	30.4			15.8	0.0	22.4	10.0	
Delay (s)	58.2	32.8		61.6	61.3			61.0	34.2	61.6	45.5	
Level of Service	E	C		E	E			E	C	E	D	
Approach Delay (s)		33.9			61.3			47.2			56.8	
Approach LOS		C			E			D			E	

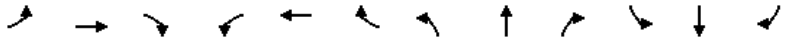
Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø5
Lane Configurations														
Traffic Volume (vph)	0	915	285	0	1675	5	630	0	110	1	1	10		
Future Volume (vph)	0	915	285	0	1675	5	630	0	110	1	1	10		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Storage Length (ft)	0		0	0		0	75		0	0		0		
Storage Lanes	0		1	0		0	1		0	0		0		
Taper Length (ft)	25			25			25			25				
Right Turn on Red			Yes			Yes			Yes			Yes		
Link Speed (mph)		30			30			30			30			
Link Distance (ft)		176			681			500			267			
Travel Time (s)		4.0			15.5			11.4			6.1			
Confl. Peds. (#/hr)									1	1				
Confl. Bikes (#/hr)						1								
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.63	0.63	0.63		
Heavy Vehicles (%)	0%	0%	2%	0%	2%	0%	2%	0%	1%	0%	0%	0%		
Shared Lane Traffic (%)							40%							
Lane Group Flow (vph)	0	1028	320	0	1888	0	425	407	0	0	20	0		
Turn Type		NA	pm+ov		NA		Split	NA		Split	NA			
Protected Phases		6	8		2		8	8		4	4		1	5
Permitted Phases			6											
Detector Phase		6	8		2		8	8		4	4			
Switch Phase														
Minimum Initial (s)		10.0	6.0		10.0		6.0	6.0		6.0	6.0		1.0	1.0
Minimum Split (s)		25.0	12.0		16.0		12.0	12.0		29.0	29.0		3.0	3.0
Total Split (s)		47.0	36.0		47.0		36.0	36.0		29.0	29.0		3.0	3.0
Total Split (%)		40.9%	31.3%		40.9%		31.3%	31.3%		25.2%	25.2%		3%	3%
Yellow Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0		2.0	2.0
All-Red Time (s)		1.0	2.0		1.0		2.0	2.0		2.0	2.0		0.0	0.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0			0.0			
Total Lost Time (s)		5.0	6.0		5.0		6.0	6.0			6.0			
Lead/Lag		Lag			Lag								Lead	Lead
Lead-Lag Optimize?														
Recall Mode		C-Min	None		C-Min		None	None		None	None		None	None
v/c Ratio		0.55	0.22		1.02		0.82	0.72			0.13			
Control Delay		22.5	0.9		53.9		51.1	34.9			23.6			
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0			
Total Delay		22.5	0.9		53.9		51.1	34.9			23.6			
Queue Length 50th (ft)		231	0		651		291	207			3			
Queue Length 95th (ft)		427	24		#1090		#532	#396			13			
Internal Link Dist (ft)		96			601			420			187			
Turn Bay Length (ft)							75							
Base Capacity (vph)		1874	1447		1856		518	568			350			
Starvation Cap Reductn		0	0		0		0	0			0			
Spillback Cap Reductn		0	0		0		0	0			0			
Storage Cap Reductn		0	0		0		0	0			0			
Reduced v/c Ratio		0.55	0.22		1.02		0.82	0.72			0.06			

Intersection Summary	
Area Type:	Other
Cycle Length: 115	
Actuated Cycle Length: 115	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 18: 1st Ave/Driveway & Highland Ave





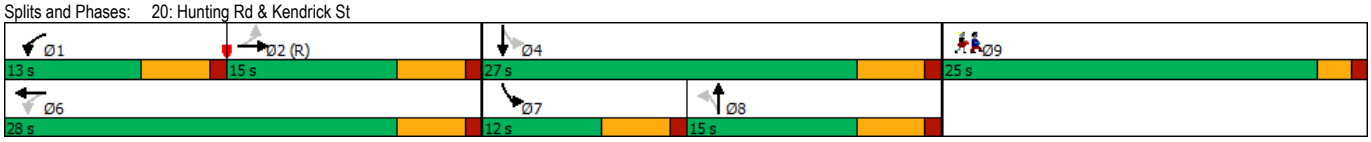
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	915	285	0	1675	5	630	0	110	1	1	10
Future Volume (vph)	0	915	285	0	1675	5	630	0	110	1	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	6.0		5.0		6.0	6.0			6.0	
Lane Util. Factor		0.95	1.00		0.95		0.95	0.95			1.00	
Frpb, ped/bikes		1.00	1.00		1.00		1.00	1.00			1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00			1.00	
Frt		1.00	0.85		1.00		1.00	0.95			0.89	
Flt Protected		1.00	1.00		1.00		0.95	0.97			1.00	
Satd. Flow (prot)		3610	1583		3538		1681	1630			1686	
Flt Permitted		1.00	1.00		1.00		0.95	0.97			1.00	
Satd. Flow (perm)		3610	1583		3538		1681	1630			1686	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.63	0.63	0.63
Adj. Flow (vph)	0	1028	320	0	1882	6	708	0	124	2	2	16
RTOR Reduction (vph)	0	0	63	0	0	0	0	66	0	0	15	0
Lane Group Flow (vph)	0	1028	257	0	1888	0	425	341	0	0	5	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	2%	0%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type		NA	pm+ov		NA		Split	NA		Split	NA	
Protected Phases		6	8		2		8	8		4	4	
Permitted Phases			6									
Actuated Green, G (s)		56.7	92.2		56.7		35.5	35.5			5.8	
Effective Green, g (s)		56.7	92.2		56.7		35.5	35.5			5.8	
Actuated g/C Ratio		0.49	0.80		0.49		0.31	0.31			0.05	
Clearance Time (s)		5.0	6.0		5.0		6.0	6.0			6.0	
Vehicle Extension (s)		2.0	2.0		2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)		1779	1351		1744		518	503			85	
v/s Ratio Prot		0.28	0.06		c0.53		c0.25	0.21			c0.00	
v/s Ratio Perm			0.10									
v/c Ratio		0.58	0.19		1.08		0.82	0.68			0.06	
Uniform Delay, d1		20.7	2.7		29.1		36.8	34.8			52.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.4	0.0		47.7		9.6	2.9			0.1	
Delay (s)		22.0	2.7		76.8		46.4	37.6			52.1	
Level of Service		C	A		E		D	D			D	
Approach Delay (s)		17.4			76.8			42.1			52.1	
Approach LOS		B			E			D			D	

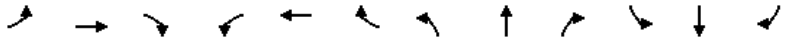
Intersection Summary			
HCM 2000 Control Delay	50.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15	
Future Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	190		0	0		400	125		0	
Storage Lanes	0		1	1		0	0		1	1		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			Yes			Yes			Yes	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		442			443			907			3028		
Travel Time (s)		10.0			10.1			20.6			68.8		
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.94	0.94	0.94	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	276	0	500	473	0	0	134	163	90	218	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA		
Protected Phases		2		1	6			8		7	4		9
Permitted Phases	2			6			8		Free	4			
Detector Phase	2	2		1	6		8	8		7	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		7.0	10.0		10.0	10.0		5.0	10.0		7.0
Minimum Split (s)	15.0	15.0		12.0	16.0		15.0	15.0		10.0	27.0		25.0
Total Split (s)	15.0	15.0		13.0	28.0		15.0	15.0		12.0	27.0		25.0
Total Split (%)	18.8%	18.8%		16.3%	35.0%		18.8%	18.8%		15.0%	33.8%		31%
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	0.0			0.0		0.0	0.0		
Total Lost Time (s)		5.0		5.0	5.0			5.0		5.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead			
Lead-Lag Optimize?													
Recall Mode	C-Min	C-Min		None	Min		None	None		None	None		None
v/c Ratio		0.53		0.57	0.41			0.58	0.10	0.33	0.48		
Control Delay		33.7		11.4	9.3			43.8	0.1	26.1	28.2		
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay		33.7		11.4	9.3			43.8	0.1	26.1	28.2		
Queue Length 50th (ft)		68		126	113			64	0	34	87		
Queue Length 95th (ft)		97		196	176			109	0	71	150		
Internal Link Dist (ft)		362			363			827			2948		
Turn Bay Length (ft)				190					400	125			
Base Capacity (vph)		523		875	1159			232	1583	277	510		
Starvation Cap Reductn		0		0	0			0	0	0	0		
Spillback Cap Reductn		0		0	0			0	0	0	0		
Storage Cap Reductn		0		0	0			0	0	0	0		
Reduced v/c Ratio		0.53		0.57	0.41			0.58	0.10	0.32	0.43		

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 5 (6%), Referenced to phase 2:EBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	

Splits and Phases: 20: Hunting Rd & Kendrick St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15
Future Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	4.0	5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.99			1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3525		1770	1835			1862	1583	1770	1842	
Flt Permitted		0.91		0.38	1.00			1.00	1.00	0.42	1.00	
Satd. Flow (perm)		3202		704	1835			1857	1583	781	1842	
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.94	0.94	0.94
Adj. Flow (vph)	16	258	2	500	426	47	1	133	163	90	202	16
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	275	0	500	470	0	0	134	163	90	214	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		Free	4		
Actuated Green, G (s)		12.0		49.4	49.4			10.0	80.0	20.6	20.6	
Effective Green, g (s)		12.0		49.4	49.4			10.0	80.0	20.6	20.6	
Actuated g/C Ratio		0.15		0.62	0.62			0.12	1.00	0.26	0.26	
Clearance Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)		480		866	1133			232	1583	270	474	
v/s Ratio Prot				c0.23	0.26					0.02	c0.12	
v/s Ratio Perm		0.09		c0.12				c0.07	0.10	0.06		
v/c Ratio		0.57		0.58	0.42			0.58	0.10	0.33	0.45	
Uniform Delay, d1		31.6		8.6	7.9			33.0	0.0	23.4	25.0	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.9		0.6	0.1			2.2	0.1	0.3	0.3	
Delay (s)		36.5		9.2	8.0			35.2	0.1	23.7	25.2	
Level of Service		D		A	A			D	A	C	C	
Approach Delay (s)		36.5			8.6			15.9			24.8	
Approach LOS		D			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	105	70	305	20	15	615
Future Vol, veh/h	105	70	305	20	15	615
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	75	75	73	73
Heavy Vehicles, %	0	0	0	0	0	6
Mvmt Flow	130	86	407	27	21	842

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1305	421	0	0	434	0
Stage 1	421	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	178	637	-	-	1136	-
Stage 1	667	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	175	637	-	-	1136	-
Mov Cap-2 Maneuver	175	-	-	-	-	-
Stage 1	667	-	-	-	-	-
Stage 2	400	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	45.7	0	0.2
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	175	637	1136	-
HCM Lane V/C Ratio	-	-	0.741	0.136	0.018	-
HCM Control Delay (s)	-	-	68.5	11.5	8.2	-
HCM Lane LOS	-	-	F	B	A	-
HCM 95th %tile Q(veh)	-	-	4.7	0.5	0.1	-

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Cedar Street

Major Street Direction: Eastbound-Westbound

Year: 2022 **Condition:** Existing Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

		Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	100	324	121	445	No	No	No	No	No
7:00 - 8:00 AM	203	656	226	882	Yes	Yes	Yes	Yes	No
8:00 - 9:00 AM	204	660	230	890	Yes	Yes	Yes	Yes	No
9:00 - 10:00 AM	156	505	215	720	Yes	No	Yes	No	No
10:00 - 11:00 AM	132	428	223	651	No	No	Yes	No	No
11:00 - 12:00 AM	140	451	243	694	No	No	Yes	No	No
12:00 - 1:00 PM	140	450	247	697	No	No	Yes	No	No
1:00 - 2:00 PM	150	314	401	715	No	No	Yes	No	No
2:00 - 3:00 PM	159	330	395	725	Yes	No	Yes	No	No
3:00 - 4:00 PM	184	384	367	751	Yes	Yes	Yes	Yes	No
4:00 - 5:00 PM	175	366	422	788	Yes	Yes	Yes	Yes	No
5:00 - 6:00 PM	141	295	540	835	No	Yes	Yes	Yes	No
6:00 - 7:00 PM	136	283	471	754	No	Yes	Yes	No	No
					No	**No**	**Yes**	**Yes**	**No**
			Warrants Met?		**1**			**2**	**3**
					Yes			**Yes**	**No**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Warrant 8, Roadway Network: No

See MUTCD for details.

Total Crashes 2015-2019: 4

based on MassDOT crash portal

Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Cedar Street

Major Street Direction: Eastbound-Westbound

Year: 2029 **Condition:** No Build Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

			Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	109	349	132	481	No	No	No	No	No
7:00 - 8:00 AM	219	705	245	950	Yes	Yes	Yes	Yes	**No**
8:00 - 9:00 AM	220	710	250	960	Yes	Yes	Yes	Yes	**No**
9:00 - 10:00 AM	169	543	234	777	Yes	Yes	Yes	**Yes**	No
10:00 - 11:00 AM	143	462	242	704	No	No	Yes	No	No
11:00 - 12:00 AM	150	485	264	749	Yes	No	Yes	**No**	No
12:00 - 1:00 PM	150	484	268	752	Yes	Yes	Yes	**No**	No
1:00 - 2:00 PM	162	335	431	766	Yes	Yes	Yes	**Yes**	No
2:00 - 3:00 PM	171	352	425	777	Yes	Yes	Yes	**Yes**	No
3:00 - 4:00 PM	198	410	394	804	Yes	Yes	Yes	Yes	No
4:00 - 5:00 PM	190	391	453	844	Yes	Yes	Yes	Yes	No
5:00 - 6:00 PM	153	315	580	895	Yes	Yes	Yes	Yes	No
6:00 - 7:00 PM	146	302	506	808	No	Yes	Yes	**No**	No
					Yes	**Yes**	**Yes**	**Yes**	**No**
			Warrants Met?		**1**			**2**	**3**
					Yes			**Yes**	**No**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Total Crashes 2015-2019 4

based on MassDOT crash portal

Warrant 8, Roadway Network: No

See MUTCD for details.

Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Cedar Street

Major Street Direction: Eastbound-Westbound

Year: 2029 **Condition:** Build Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

		Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	112	355	133	488	No	No	No	No	No
7:00 - 8:00 AM	230	723	248	971	Yes	Yes	Yes	Yes	**Yes**
8:00 - 9:00 AM	235	736	253	989	Yes	Yes	Yes	Yes	**Yes**
9:00 - 10:00 AM	173	551	240	791	Yes	Yes	Yes	**Yes**	No
10:00 - 11:00 AM	147	469	249	718	No	No	Yes	No	No
11:00 - 12:00 AM	155	492	277	769	Yes	Yes	Yes	**No**	No
12:00 - 1:00 PM	158	497	281	778	Yes	Yes	Yes	**Yes**	No
1:00 - 2:00 PM	169	346	439	785	Yes	Yes	Yes	**Yes**	No
2:00 - 3:00 PM	177	363	433	795	Yes	Yes	Yes	**Yes**	No
3:00 - 4:00 PM	204	419	404	824	Yes	Yes	Yes	Yes	No
4:00 - 5:00 PM	193	398	473	870	Yes	Yes	Yes	Yes	No
5:00 - 6:00 PM	155	320	604	923	Yes	Yes	Yes	Yes	No
6:00 - 7:00 PM	147	304	509	812	No	Yes	Yes	**No**	No
					Yes	**Yes**	**Yes**	**Yes**	**Yes**
			Warrants Met?		**1**			**2**	**3**
					Yes			**Yes**	**Yes**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Warrant 8, Roadway Network: No

See MUTCD for details.

Total Crashes 2015-2019: 4

based on MassDOT crash portal

Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Webster Street

Major Street Direction: Eastbound-Westbound

Year: 2022 **Condition:** Existing Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

		Required approach volumes	
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**	Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 **FOUR HOUR VEHICULAR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 **PEAK HOUR VOLUME**

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	64	347	198	545	No	No	No	No	No
7:00 - 8:00 AM	128	700	369	1069	No	Yes	Yes	Yes	No
8:00 - 9:00 AM	129	705	375	1080	No	Yes	Yes	Yes	No
9:00 - 10:00 AM	99	539	351	890	No	Yes	No	No	No
10:00 - 11:00 AM	84	458	364	822	No	Yes	No	No	No
11:00 - 12:00 AM	88	482	395	877	No	Yes	No	No	No
12:00 - 1:00 PM	88	481	402	883	No	Yes	No	No	No
1:00 - 2:00 PM	92	341	553	894	No	Yes	No	No	No
2:00 - 3:00 PM	97	358	545	903	No	Yes	No	No	No
3:00 - 4:00 PM	112	417	506	923	No	Yes	No	**No**	No
4:00 - 5:00 PM	107	397	583	980	No	Yes	No	**Yes**	No
5:00 - 6:00 PM	86	320	745	1065	No	Yes	No	**No**	No
6:00 - 7:00 PM	83	307	649	956	No	Yes	No	No	No
					No	**Yes**	**No**	**No**	**No**
			Warrants Met?		**1**			**2**	**3**
					Yes			**No**	**No**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Warrant 8, Roadway Network: No

See MUTCD for details.

Total Crashes 2015-2019: 1

based on MassDOT crash portal

Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Webster Street

Major Street Direction: Eastbound-Westbound

Year: 2029 **Condition:** No Build Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

			Required approach volumes Minimum*	Adjusted Minimum**
Warrant 1	**EIGHT-HOUR VEHICULAR VOLUME**			
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	500	500
	Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
	Major Street :	1 Lane(s) on each approach	750	750
	Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B			Warrant 1A	Warrant 1B
	Major Street :	1 Lane(s) on each approach	400	600
	Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2	**FOUR HOUR VEHICULAR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	**PEAK HOUR VOLUME**		
	Major Street :	1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street :	1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road Eastbound	Entering Vol. on Major Road Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	67	374	213	587	No	No	No	No	No
7:00 - 8:00 AM	135	755	398	1153	No	Yes	Yes	Yes	No
8:00 - 9:00 AM	136	760	405	1165	No	Yes	Yes	Yes	No
9:00 - 10:00 AM	104	581	379	960	No	Yes	No	**No**	No
10:00 - 11:00 AM	89	494	392	886	No	Yes	No	No	No
11:00 - 12:00 AM	93	519	427	946	No	Yes	No	**No**	No
12:00 - 1:00 PM	93	518	435	953	No	Yes	No	**No**	No
1:00 - 2:00 PM	100	367	602	969	No	Yes	No	**No**	No
2:00 - 3:00 PM	105	386	593	979	No	Yes	No	**No**	No
3:00 - 4:00 PM	123	449	551	1000	No	Yes	Yes	**Yes**	No
4:00 - 5:00 PM	117	428	634	1062	No	Yes	No	Yes	No
5:00 - 6:00 PM	94	345	810	1155	No	Yes	No	**Yes**	No
6:00 - 7:00 PM	90	331	706	1037	No	Yes	No	**No**	No
					No	**Yes**	**No**	**Yes**	**No**
			Warrants Met?		**1**			**2**	**3**
					Yes			**Yes**	**No**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Warrant 8, Roadway Network: No

See MUTCD for details.

Total Crashes 2015-2019: 1

based on MassDOT crash portal

Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Central Street at Webster Street

Major Street Direction: Eastbound-Westbound

Year: 2029 **Condition:** Build Conditions

Operating speed on major roadway: 35 mph

Number of approaches: 3

Warrant 1 EIGHT-HOUR VEHICULAR VOLUME		Required approach volumes: Minimum*	Adjusted Minimum**
Warrant 1A MINIMUM VEHICULAR VOLUME (8 hours of day)			
Major Street :	1 Lane(s) on each approach	500	500
Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
Major Street :	1 Lane(s) on each approach	750	750
Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B		Warrant 1A	Warrant 1B
Major Street :	1 Lane(s) on each approach	400	600
Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-1 or 4C-2.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME

Major Street : 1 Lane(s) on each approach — If "verify" indicated, see Figure 4C-3 or 4C-4.

Minor Street : 1 Lane(s) on each approach — 25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road: Eastbound	Entering Vol. on Major Road: Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	67	384	214	598	No	No	No	No	No
7:00 - 8:00 AM	135	784	402	1186	No	Yes	Yes	Yes	No
8:00 - 9:00 AM	136	801	411	1212	No	Yes	Yes	Yes	No
9:00 - 10:00 AM	104	594	388	982	No	Yes	No	No	No
10:00 - 11:00 AM	89	505	404	909	No	Yes	No	No	No
11:00 - 12:00 AM	93	531	448	979	No	Yes	No	No	No
12:00 - 1:00 PM	93	539	455	994	No	Yes	No	No	No
1:00 - 2:00 PM	100	385	615	1000	No	Yes	No	No	No
2:00 - 3:00 PM	105	403	605	1008	No	Yes	No	Yes	No
3:00 - 4:00 PM	123	464	568	1031	No	Yes	Yes	Yes	No
4:00 - 5:00 PM	117	438	665	1104	No	Yes	No	Yes	No
5:00 - 6:00 PM	94	352	848	1200	No	Yes	No	Yes	No
6:00 - 7:00 PM	90	334	710	1044	No	Yes	No	No	No
					No	**Yes**	**No**	**Yes**	**No**
			Warrants Met?		**1**			**2**	**3**
					Yes			**Yes**	**No**

Note: Major road volumes include through and left-turning vehicles.

Note: Minor Road volumes include 100% of left-turning volumes and 25% of right-turning volumes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

*107 pedestrians per hour is the minimum threshold

Peak Four Hour Pedestrian Volumes:

<100	7:00 AM
<100	8:00 AM
<100	4:00 PM
<100	5:00 PM

Warrant 5, School Crossing: No

See MUTCD for details.

Warrant 6, Coordinated Signal System: No

See MUTCD for details.

Warrant 7, Crash Experience: No

# of accidents "correctable by signalization" occuring in the last 12 months:

(threshold is 5 crashes in last year correctable by signalization)

Warrant 8, Roadway Network: No

See MUTCD for details.

Total Crashes 2015-2019: 1

based on MassDOT crash portal

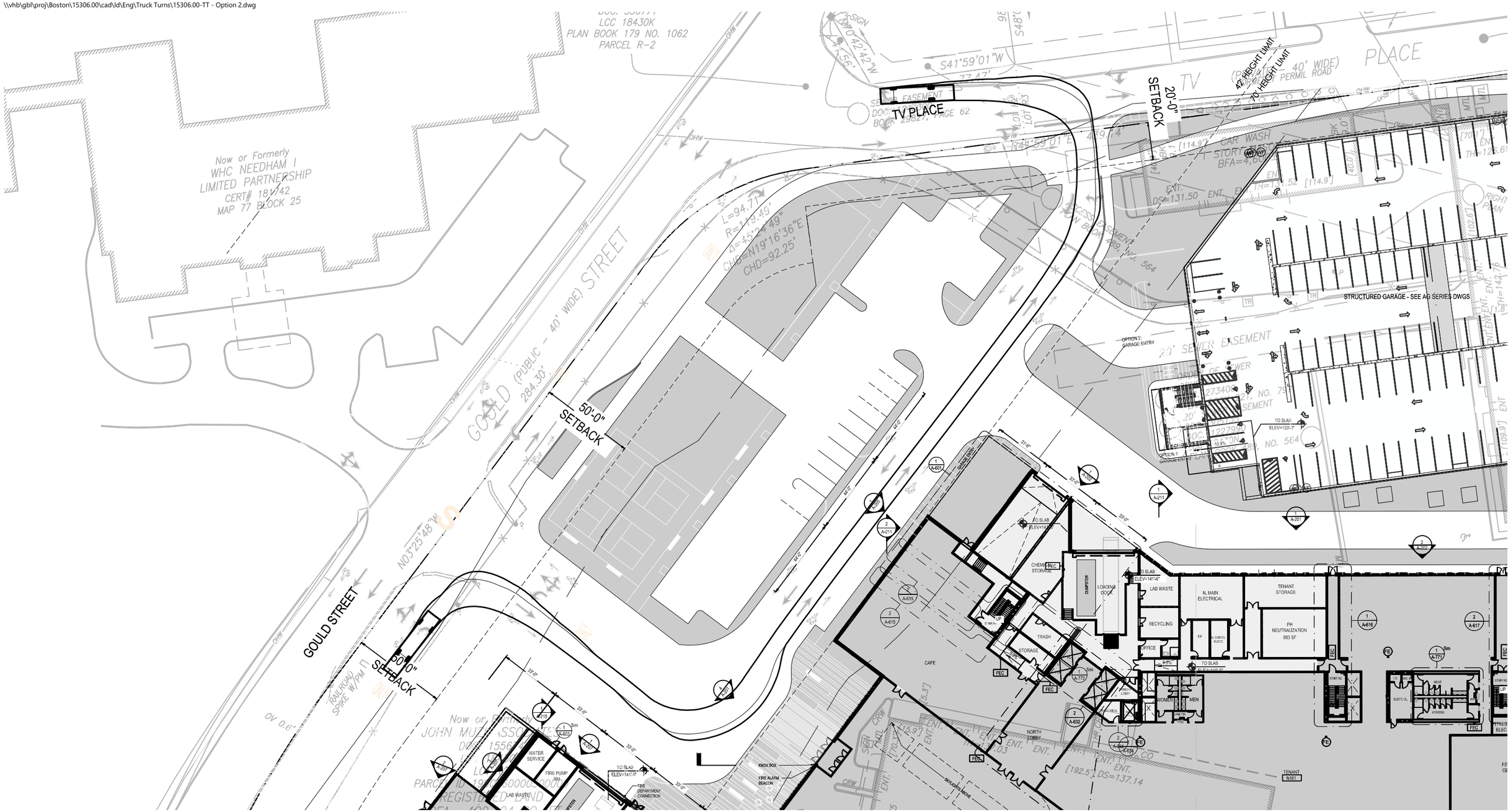
Warrant 9, Grade Crossing: No

last updated: 08/05/05 [version]

Turning Movement Diagrams

Comment 33

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



Firetruck Turn Figure 5A

557 Highland Ave

Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 25 50 Feet

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg

Firetruck Turn Figure 5B

557 Highland Ave

Needham, MA

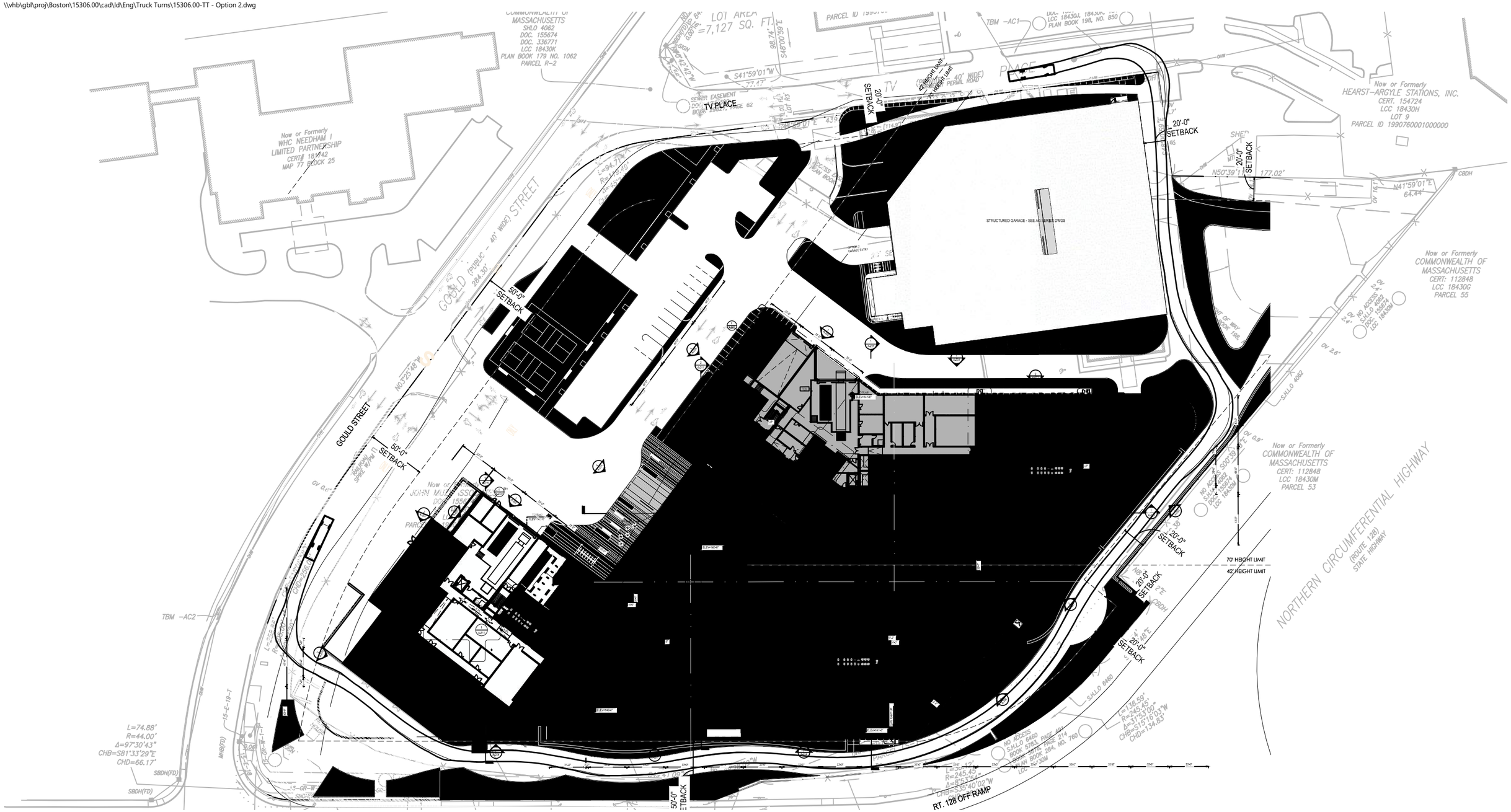
Source:

Prepared for:

Date: **2021-10-26**

0 25 50 Feet

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



Firetruck Turn Figure 5C

557 Highland Ave

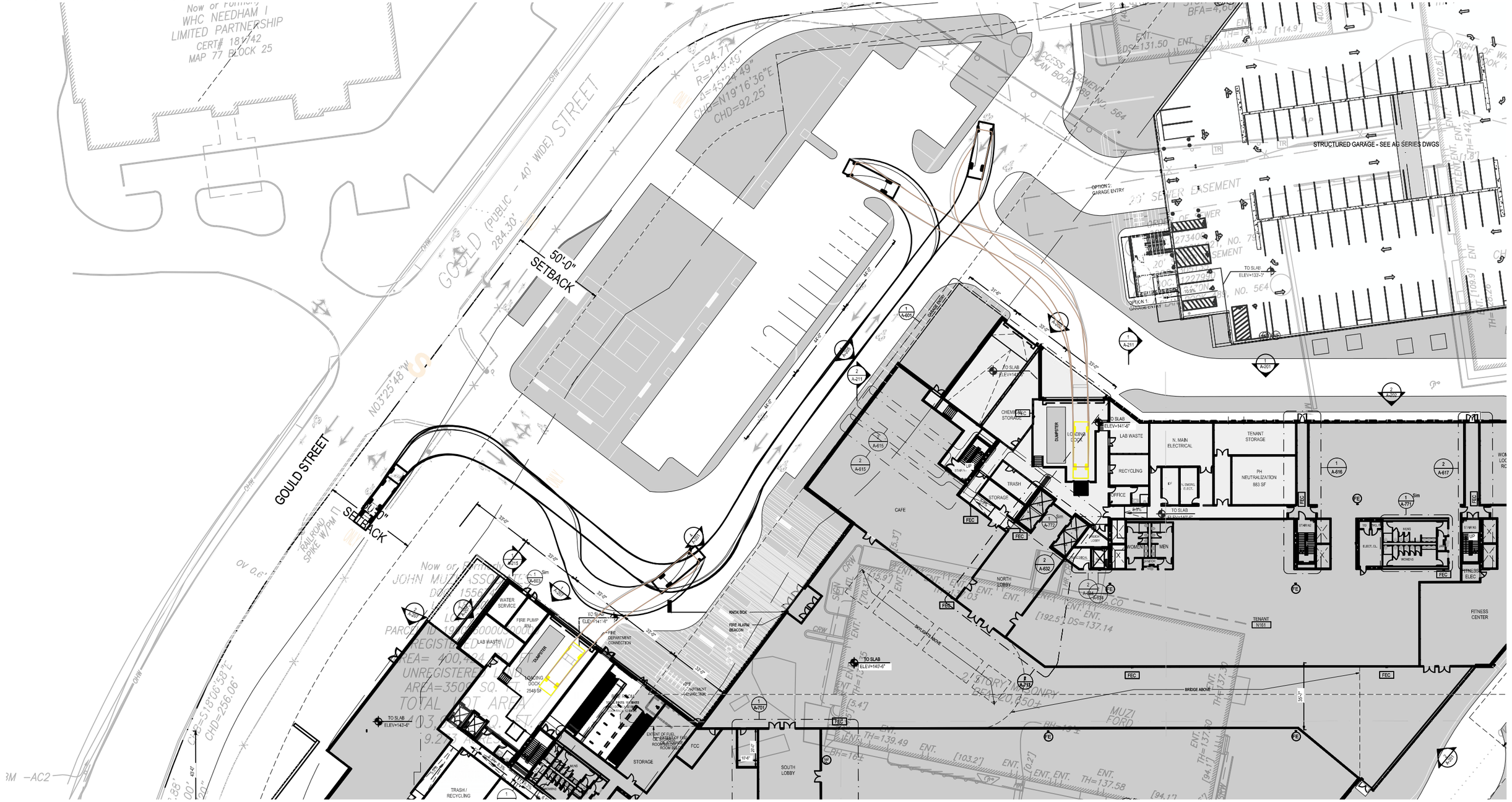
Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 40 80 Feet

vhb

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



SU-30 Truck Turn Figure 1A

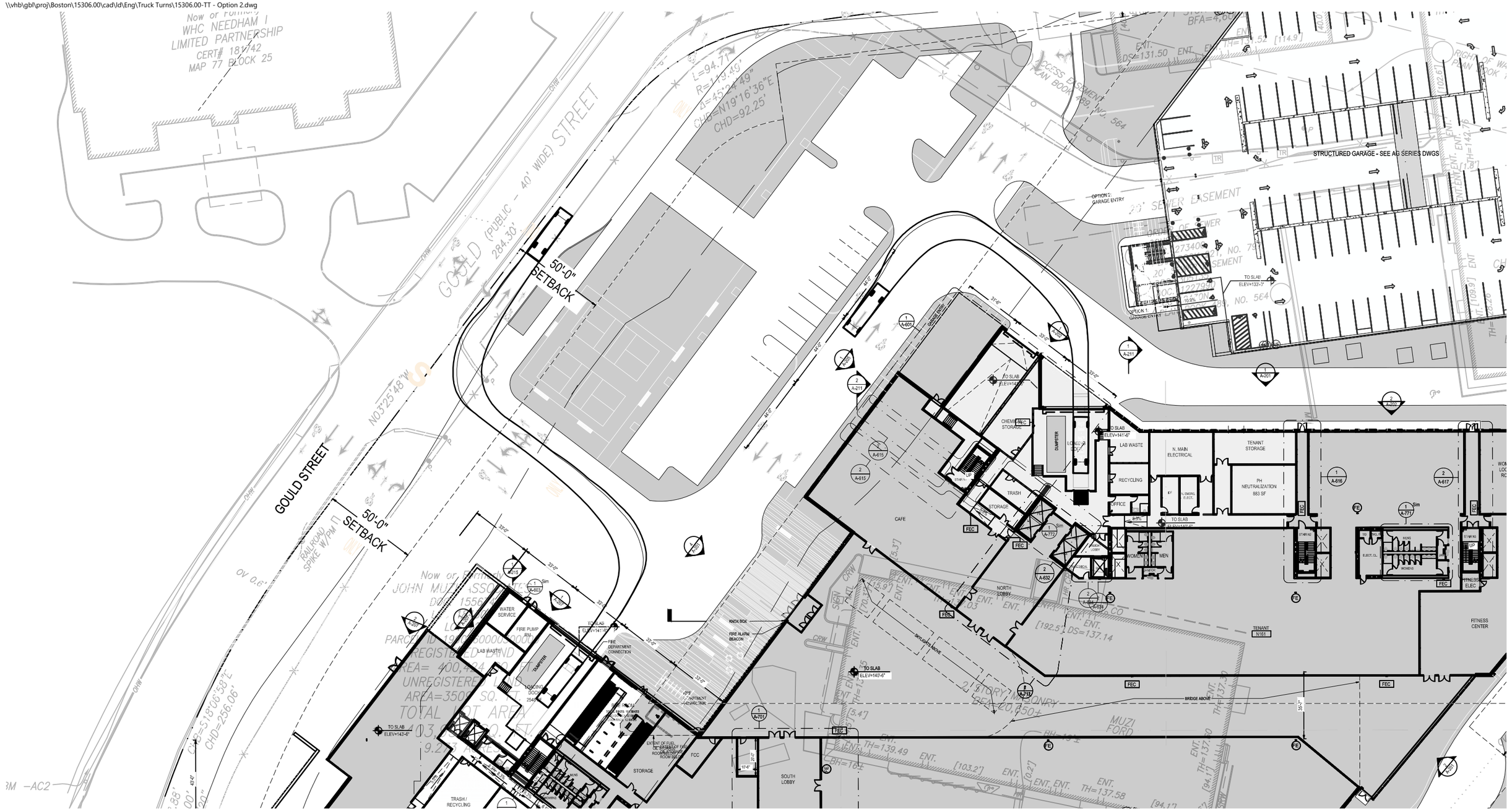
557 Highland Ave

Needham, MA

0 25 50 Feet

Source:
Prepared for:
Date: **2021-10-26**

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



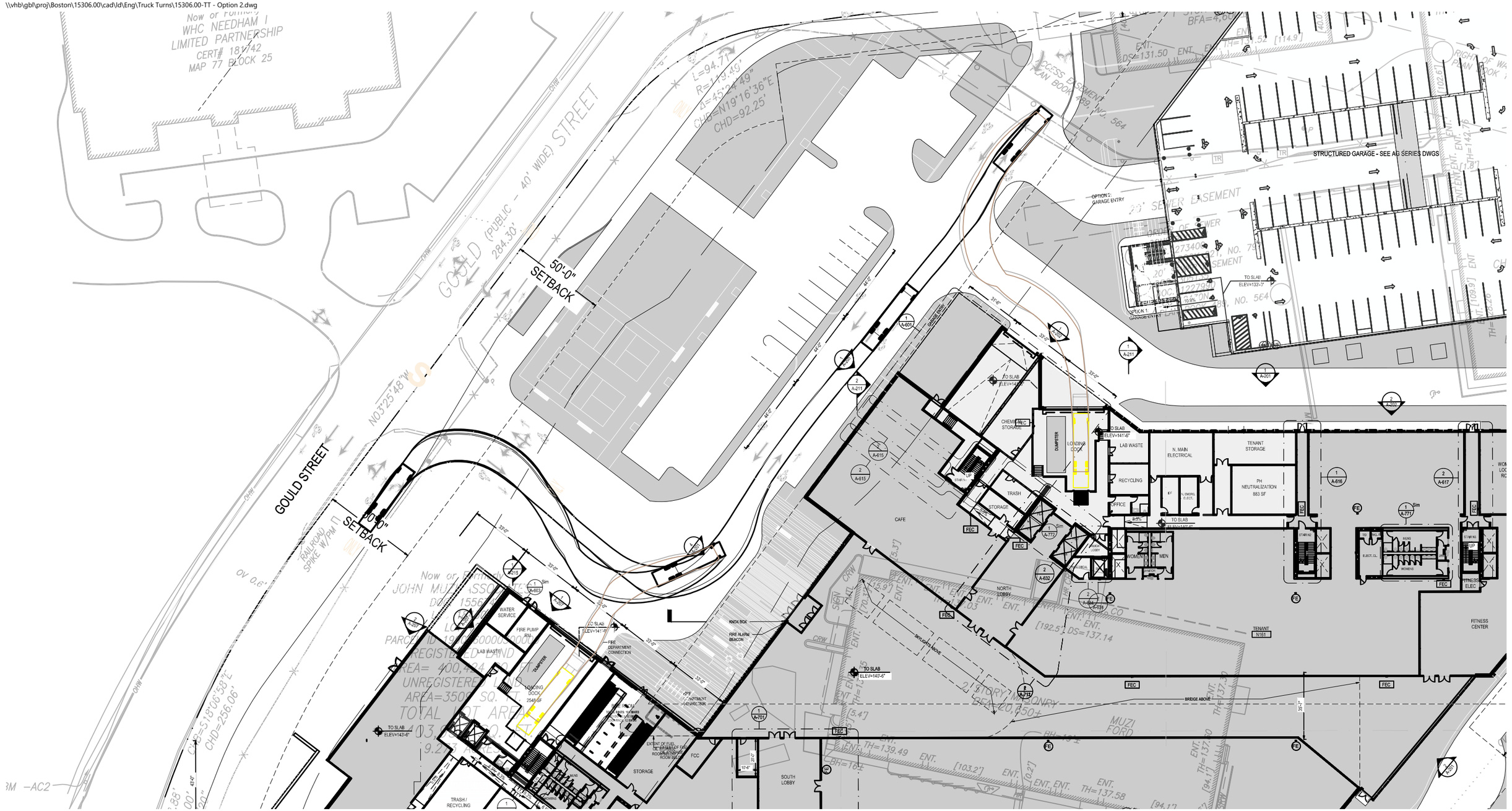
SU-30 Truck Turn Figure 1B

557 Highland Ave
Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

vhb

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



SU-40 Truck Turn Figure 2A

557 Highland Ave

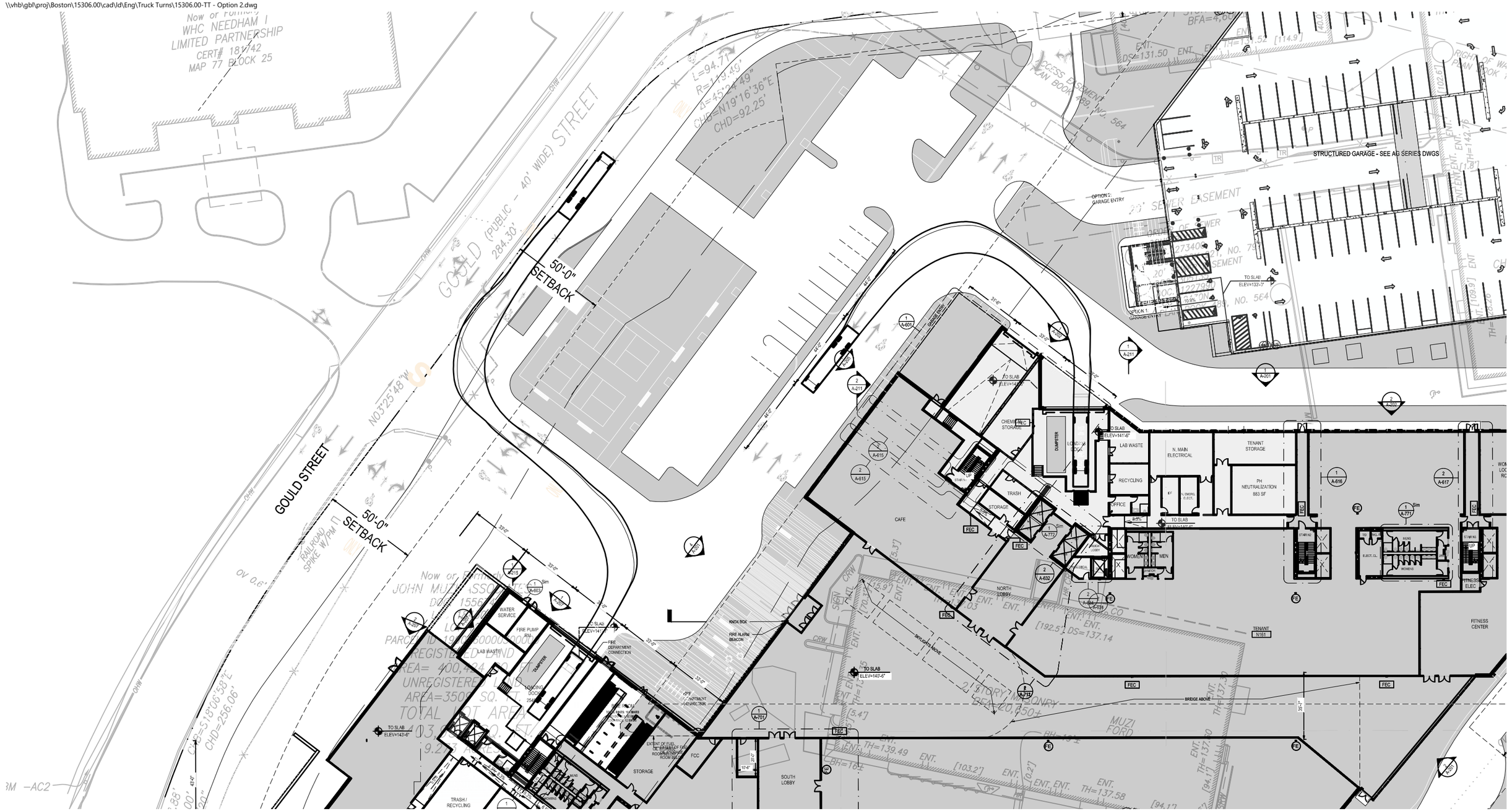
Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 25 50 Feet

vhb

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



SU-40 Truck Turn Figure 2A

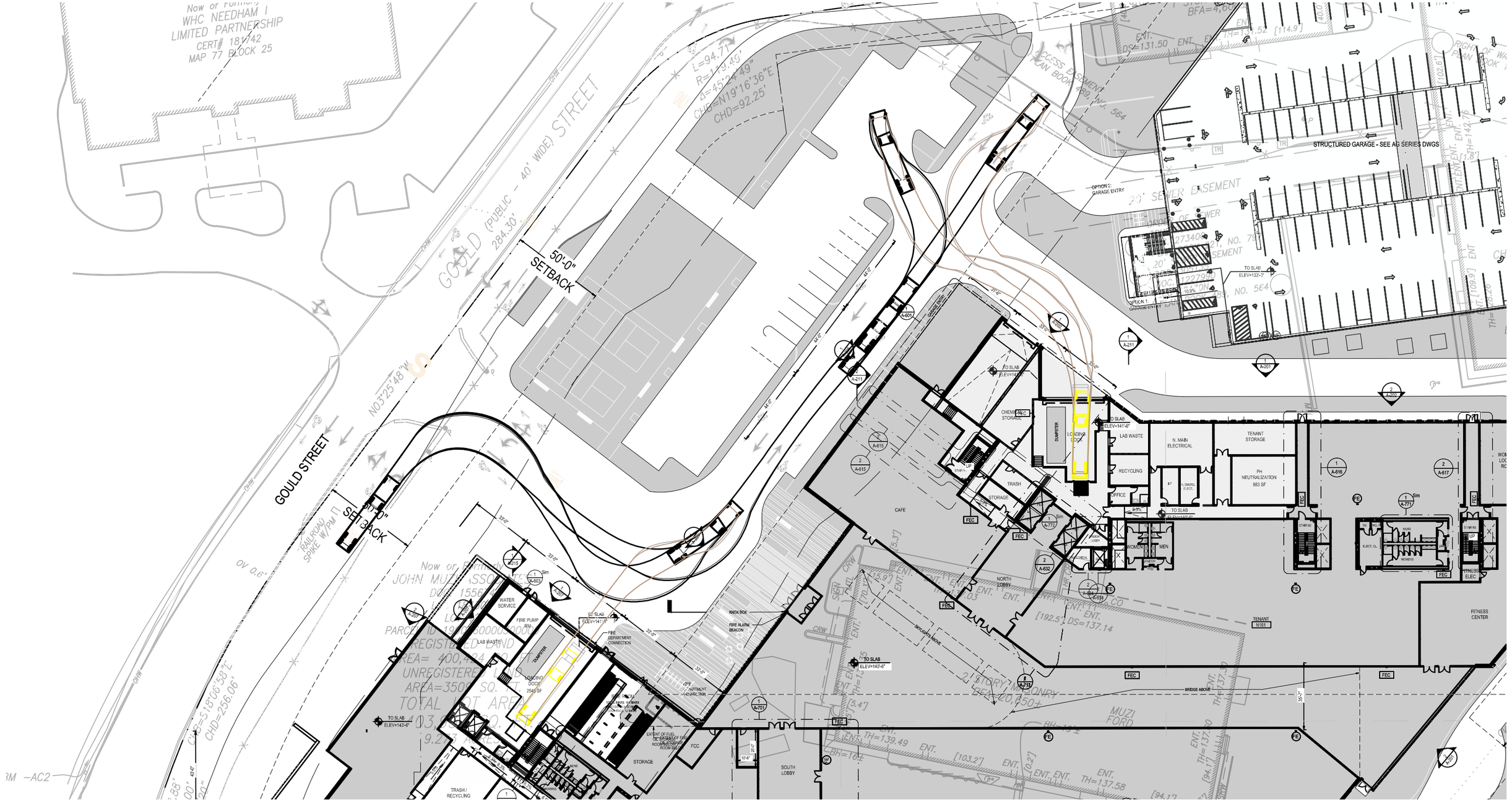
557 Highland Ave

Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 25 50 Feet

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



WB-40 Truck Turn Figure 3A

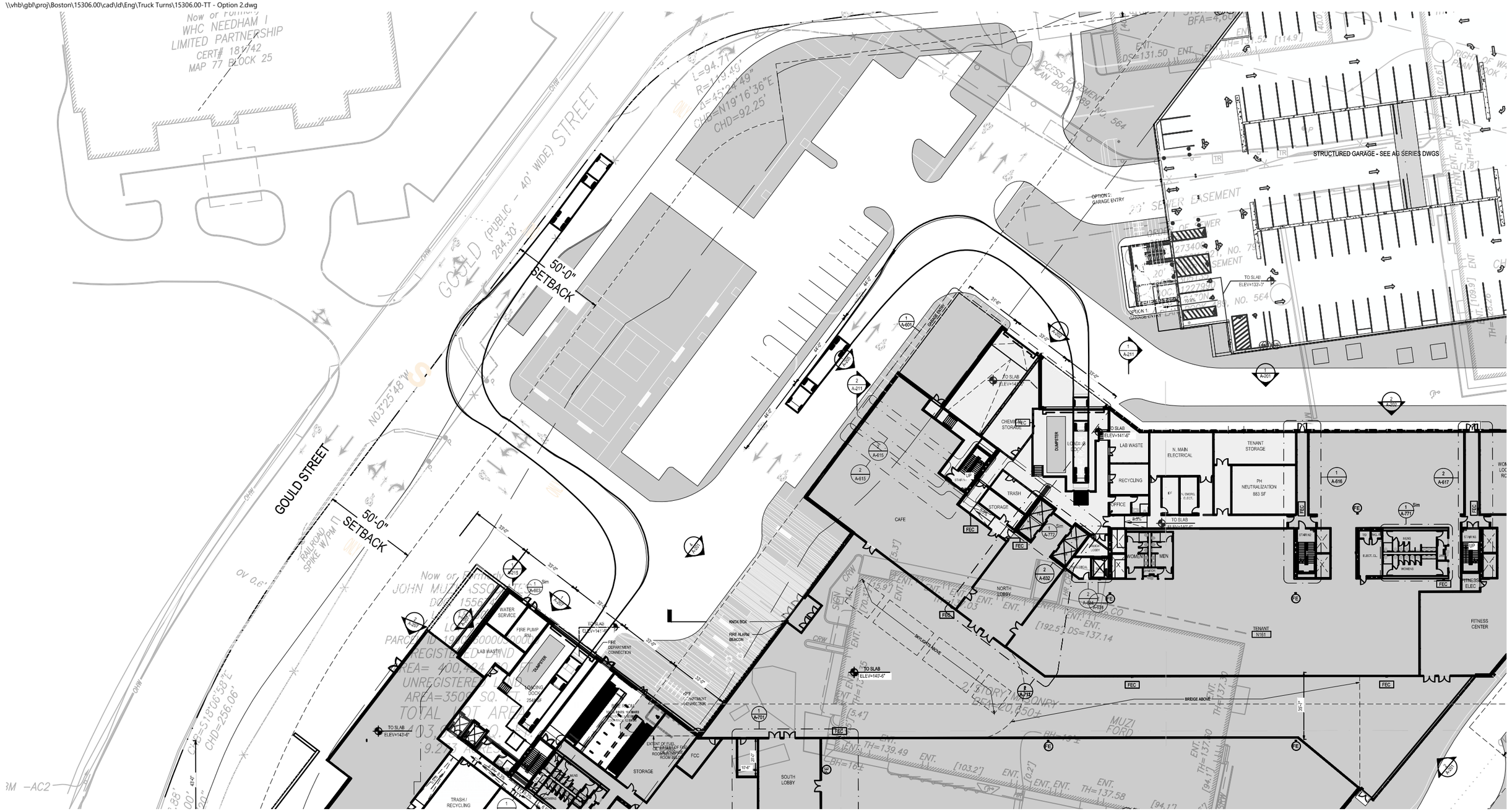
557 Highland Ave

Needham, MA

0 25 50 Feet

Source:
Prepared for:
Date: **2021-10-26**

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



WB-40 Truck Turn Figure 3B

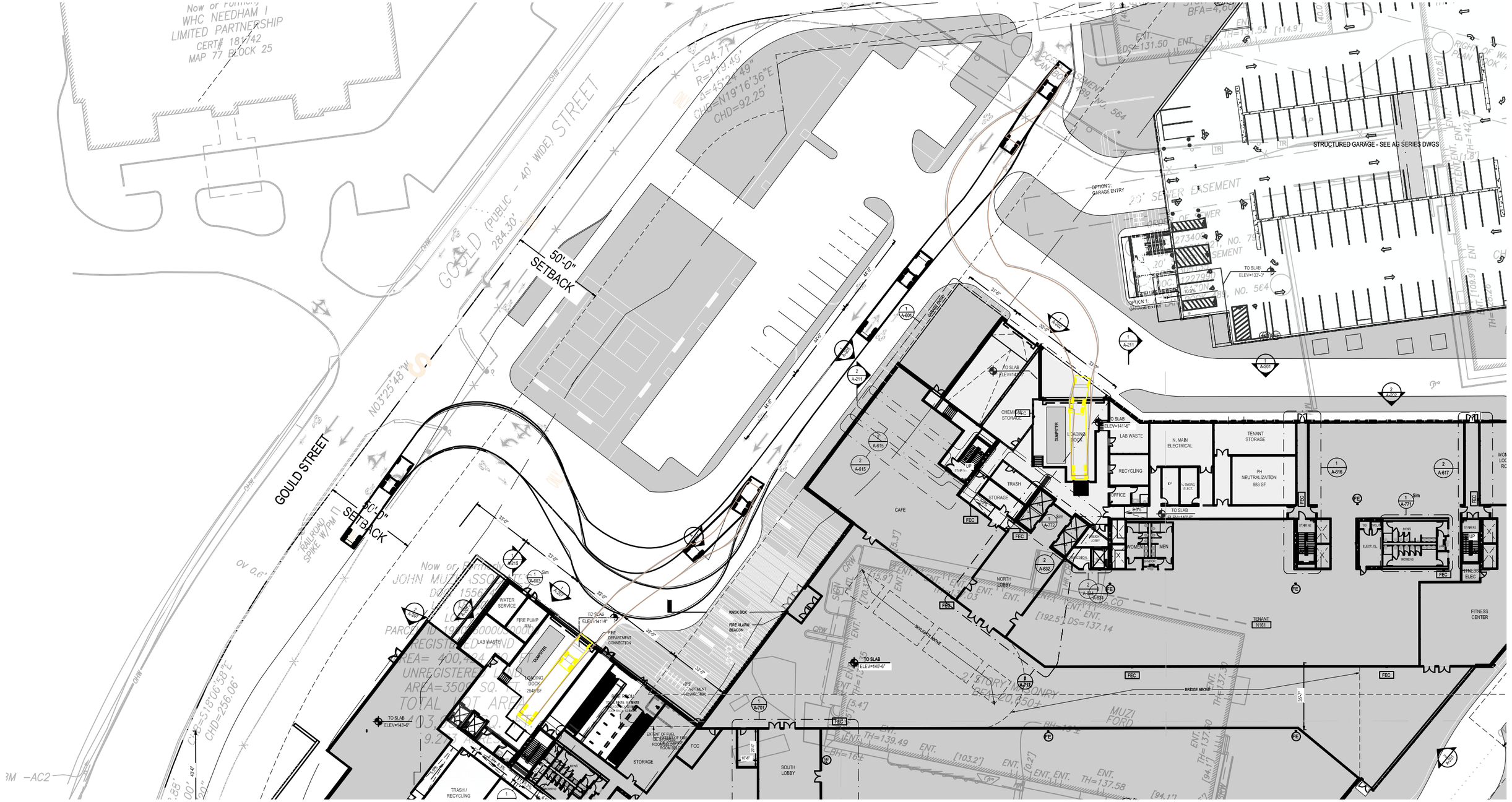
557 Highland Ave

Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 25 50 Feet

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg



WB-50 Truck Turn Figure 4A

557 Highland Ave

Needham, MA

0 25 50 Feet

Source:
Prepared for:
Date: **2021-10-26**

\\vhb\gbl\proj\Boston\15306.00\cad\ld\Eng\Truck Turns\15306.00-TT - Option 2.dwg

WB-50 Truck Turn Figure 4B

557 Highland Ave

Needham, MA

Source:
Prepared for:
Date: **2021-10-26**

0 25 50 Feet

Planning Board Members
June 30, 2022

EXHIBIT D

RESPONSE TO NITSCH COMMENTS ON TRANSPORTATION IMPACT AND ACCESS STUDY (557 HIGHLAND AVENUE)

[see attached]

Memorandum

To: Holly Charbonnier
Needham Heights Alliance

Date: June 29, 2022

Project #: 15306.00

From: Sean Manning, PE, PTOE
Matthew Duranleau, PE
Ariella Liebman, EIT

Re: Response to Transportation Impact and Access Study
Traffic Peer Review Comments dated June 9, 2022
By Nitsch Engineering
557 Highland Avenue
Needham, Massachusetts

Overview

VHB has received and reviewed the Transportation Impact and Access (TIA) study Transportation Engineering Peer Review submitted to the Needham Heights Alliance by Nitsch Engineering, dated June 9, 2022, for the proposed 557 Highland Avenue redevelopment in Needham, Massachusetts. This memorandum summarizes VHB's responses to the comments in that review. Each comment raised by the reviewer is listed below followed by the response by VHB. The comments follow the format and structure outlined in the Transportation Engineering Peer Review.

Since the submittal of the Transportation Engineering Peer Review, the Proponent has received feedback from the community and the Town of Needham on the proposed Gould Street off-site improvements, including the desire for more family-friendly bicycle accommodations and the wish to reduce the amount of new pavement added on Gould Street. Based on this feedback, new additional improvement concepts have been developed. Concept plans for the following three improvement alternatives along Gould Street are included in the Attachments to this memorandum:

- Option 1: Previously Proposed Concept
- Option 2: Two-Way Separated Bicycle Lanes on East Side with Reduced Gould Street Cross-Section
- Option 3: Two-Way Separated Bicycle Lanes on West Side with Reduced Gould Street Cross-Section

The two additional improvement concept plans include dedicated sidewalk-level bicycle facilities in each direction along Gould Street between Highland Avenue and just north of TV Place. In addition, the two additional concepts eliminate the Gould Street dedicated northbound right-turn lane into TV Place and the dedicated southbound right-turn lane onto Highland Avenue based on feedback from the Town of Needham to reduce the amount of pavement. While these turn lanes were included in the initial concept design, the lanes are not required to provide an adequate level of operations for vehicles. Intersection traffic analyses for the new concepts are included in the Attachments to this memorandum.

Peer Review Comments

Existing Conditions

Study Area

1. The Applicant studied/examined 20 intersections including:

- Central Avenue at Cedar Street
- Central Avenue at Webster Street
- Central Avenue at Gould Street
- Central Avenue at Hampton Avenue
- Central Avenue at River Park Street
- Gould Street at Ellis Street
- Gould Street at Kearney Road
- Gould Street at Station Road
- Gould Street at Noanett Road
- Gould Street at TV Place
- Gould Street at Muzi Ford/Wingate Residences driveways
- Highland Avenue at West Street
- Highland Avenue at Hunnewell Street
- Highland Avenue at Webster Street
- Highland Avenue at Gould Street / Hunting Road
- Highland Avenue at I-95 SB Ramps
- Highland Avenue at I-95 NB Ramps
- Highland Avenue at 1st Avenue
- Highland Avenue at 2nd Avenue
- Kendrick Street at Hunting Road

Nitsch agrees with the selected Study Area.

Applicant Response: No response needed

Existing Traffic Data

2. Traffic volumes were collected during the weekday morning and weekday evening peak periods at each of the study area intersections. Applicant indicates that since traffic volumes may not have represented normal travel conditions due to the coronavirus (COVID-19) pandemic, they used MassDOT guidelines, and 2019 data were considered as existing traffic volumes. At locations where pre-pandemic counts were not available, new traffic counts were conducted in July 2021 and adjusted to represent "pre-pandemic" conditions based on traffic volumes at nearby intersections. ***Nitsch agrees with the Applicant's data collection methodology.***

   Applicant Response: No response needed

Memorandum

Seasonal Adjustment

3. The Applicant utilized MassDOT's 2019 Weekday Seasonal Adjustment Factor data sheet to quantify the seasonal variation of traffic volumes in the area. ***Nitsch finds the Applicant's methodology to be conservative and thereby acceptable.***

   Applicant Response: No response needed

Public Transportation

4. ***Nitsch finds the Applicant's discussion on public transportation in the area to be adequate.***

   Applicant Response: No response needed

Pedestrian and Bike Facilities

5. ***Nitsch finds the Applicant's discussion on existing pedestrian and bicycle facilities to be adequate.***

   Applicant Response: No response needed

Safety Analysis

6. The Applicant examined crash data from the MassDOT Crash Database for the years of 2015 to 2019 at all study area intersections. ***Nitsch finds the crash data analysis appropriate.***

   Applicant Response: No response needed

Future Conditions

7. Traffic volumes in the study area were projected to the year 2029, reflecting a typical seven-year traffic-planning horizon as required by MassDOT. ***Nitsch finds the Applicant's methodology to be acceptable.***

   Applicant Response: No response needed

Background Growth

8. Background traffic growth was examined the historic traffic data, project-specific growth and roadway improvement projects. The Applicant determined that a growth rate of 1.0 percent to be appropriate for the study. ***Nitsch finds the Applicant's methodology to be conservative and thereby acceptable.***

   Applicant Response: No response needed

Build Conditions

Trip Generation

9. Projected trip generation for the proposed development was estimated using the following Land Use Codes (LUC) from the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th Edition:

   - LUC 710 – General Office Building
   - LUC 760 – Research and Development Center
   - LUC 822 – Retail Plaza (<40,000 SF)

   Nitsch finds the Applicant's trip generation estimation acceptable.

   Applicant Response: No response needed

Internal Capture Trips and Mode Share

10. ***Nitsch finds the Applicant's discussion and methodology for these sections to be acceptable.***

    Applicant Response: No response needed

Pass-By-Trips

11. For this evaluation, the Applicant used ITE pass-by rates for LUC 821 (Shopping Plaza) for the retail trip generation and applied to existing trips on Gould Street. ITE identifies LUC 821 as a Shopping Plaza (40-150KSF). For project related trip generation, the Applicant used LUC 822-Retail Plaza (<40K SF) since the retail portion of the project consists of approximately 10,000 SF. However, for pass-by-trips they used LUC 821. ***Nitsch requests the Applicant provide additional information detailing the estimated pass-by-trips for a LUC 822.***

    Applicant Response: The most recent edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th edition, 2021) was reviewed to determine trip generation characteristics and applicable pass-by rates for the retail portion of the Site. Pass-by rates are provided for different land uses in the Appendix to the Trip Generation Manual. As the retail portion of the Site is proposed to consist of 10,000 square feet (SF) of space, the most applicable land use code (LUC) was determined to be LUC 822 (Strip Retail Plaza (<40 ksf)). However, no pass-by rates are included in the Appendix to the Trip Generation Manual for LUC 822, as data have not been provided. Instead, the pass-by rates for LUC 821 (Shopping Plaza (40-150 ksf)) were applied to the Site-generated retail trips. While the two land use codes are not identical, it is expected that the pass-by rates for LUC 822 and LUC 821 would be similar, as the two uses consist of the same types of retail establishments; the only difference between the two land use codes is the total SF of retail included in a Site. Therefore, due to a lack of specific pass-by rate data for LUC 822, the pass-by rates for LUC 821 are expected to provide an accurate estimate of the pass-by trips for the proposed retail uses on Site.

    It is also important to note that pass-by trips are only applicable to the retail portion of the Project. Retail constitutes only a very small portion of the total Project (approximately 10,000 SF, or roughly 2 percent of the Project). The retail pass-by trips total only 4 trips during the weekday morning peak hour and 30 trips during

the evening peak hour. Exclusion of these trips from the project trip generation would have no measurable impact on the findings of the TIA or the level of transportation improvements and mitigation that is being proposed.

Project-generated Trips

12. As stated by the Applicant in the report, the pass-by-trips include trips for the retail uses already traveling on the roadway network under Existing Conditions. However, these trips still enter and exit the project site. They should only be adjusted for adjacent roadways, but not for entering and exiting the project site. **Nitsch requests the Applicant provide update Table 5, as well as Figures 11 through 14. Also, the capacity analysis for Build Condition may need to be revised.**

    Applicant Response: VHB agrees that pass-by trips still enter and exit the Project Site and should only be adjusted for adjacent roadways. Table 5 in the TIA provides a summary of the total Project-generated trips and includes both the total number of vehicles expected to enter and exit the Project Site as well as the total net new trips added to the roadway network. The "Adjusted Vehicle Trips – Total" column in Table 5 presents the number of total trips to enter and exit the Project Site and the "Total Net New Vehicle Trips" column in Table 5 presents the new trips added to the roadway, which does not include the pass-by trips or the existing trips already on the roadway that were generated by the previous uses on-Site.

    Figures 11 and 12 presented in the TIA only showed the total net new vehicle trips and did not include the pass-by trips that will enter and exit the Project Site. These figures have been updated to also illustrate the pass-by trips and are included in the Attachments to this memorandum.

    Figures 13 and 14 presented in the TIA illustrate the 2029 Build Conditions peak hour traffic volumes. The traffic volumes include all Project-generated trips entering and exiting the Project Site, including existing trips generated by the previous uses and the pass-by trips. The intersection capacity analyses for the Build Condition are based on the traffic volumes presented in Figure 13 and 14 and include the pass-by trips. Therefore, the intersection capacity analyses for the Build Condition do not need to be revised, as they already include the pass-by trips entering and exiting the Project Site.

Comparison to Previous Zoning Traffic Study

13. The Applicant provides a comparison of the trip generation presented in the GPI's 2020 traffic study with the trip generation for the proposed development. **Nitsch requests the Applicant provide clarification for providing this comparison and how it impacts the analysis.**

    Applicant Response: The comparison of the proposed Project-generated trips to the site-generated trips in the 2020 GPI traffic study was included for comparison purposes only. No analyses were conducted based on the comparison to the site-generated trips in the 2020 GPI traffic study.

    The 2020 traffic study was conducted to support the rezoning of the Site and the trip generation presented in the study was based on the maximum build-out of the Site and the adjacent Channel 5 property based on the new zoning guidelines. The purpose of including the comparison in the TIA was to simply illustrate that the proposed Project will generate significantly fewer trips than what was estimated in the 2020 traffic study to

support the rezoning of the Site. However, the proposed mitigation for the Project along Gould Street mirrors what was proposed by GPI in the 2020 traffic study. The Proponent is committed to providing the full set of proposed improvements along Gould Street plus additional significant bicycle accommodations, even though the Site will generate fewer trips than anticipated when the concept was presented in the 2020 traffic study.

Project Trip Distribution

14. Projected vehicle trips generated to the site were distributed to the study area network based on Journey-to-Work data for the Town of Needham with the 2010 U.S. Census data. **Nitsch finds the Applicant's trip distribution estimation acceptable.**

    Applicant Response: No response needed

Transportation Operations Analysis

15. The Applicant examined Existing and projected No-Build and Build traffic conditions for both weekday morning and weekday evening peak hours at the 20 study area intersections. The Applicant also analyzed the interchange of Highland Avenue at I-95 (Ramp) using methodology for merge, diverge, and weaving conflicts. **Nitsch finds the Applicant's methodology to be acceptable.**

    Applicant Response: No response needed

Signal Warrant Analysis

16. To determine the feasibility of potential mitigation measures, signal warrant analyses were conducted at two intersections: Central Avenue at Gould Street and Gould Street at the Project Site driveway / Wingate Driveway. Based on the analysis, both intersections meet the three-traffic volume-based warrants (Warrant 1-8-Hour, Warrant 2 4-Hour and Warrant 3 Peak Hour). **Nitsch finds the Applicant's analysis to be acceptable.**

    Applicant Response: No response needed

Transportation Mitigation

17. As mitigation measures the Applicant proposes to add on-road bicycle accommodations along Gould Street to create a new north-south bicycle network within this area of Needham and connect Mills Field and the commercial and residential uses on Gould Street with the under-construction bicycle accommodations along Highland Avenue and the existing bicycle lanes in each direction on Hunting Road that include the following:

- Bicycle accommodations consisting of on-road bicycle lanes in each direction for approximately 900 feet between Highland Avenue and the former MBTA railroad ROW just north of TV Place.
- Between the former MBTA railroad ROW and Central Avenue, a distance of approximately ½ mile, the Proponent will fund the installation of shared lane pavement markings and signage in each direction.
- Coordinate with the Town of Needham to fund a study evaluating the feasibility of converting the former railroad ROW into a shared-use path between the Charles River and the commuter rail at Needham Heights.
- A crosswalk at the location of the future shared-use path.

On-road and shared bicycle lanes are intended for commuter, intermediate and experienced cyclists and primarily assist in promoting alternative means of travel for the development. They are not recommended for leisure use and do not provide sufficient accommodations for residents, including children, to access the new rail-trail and Mills Field Playground. **Nitsch feels it's pertinent for the Applicant to provide wider sidewalks and separated (buffered) bike lanes for leisure bicyclists from Highland Avenue to Ellis Street (Mills Field Playground) for a safe means of community connectivity for all users, especially for children.**

Applicant Response: As presented in the TIA, the Proponent is proposing significant pedestrian and bicycle improvements along Gould Street. Based on feedback received in neighborhood community meetings and from the Town of Needham since the submittal of the TIA, the Proponent is now in the process of revising those preliminary pedestrian and bicycle improvements to provide a higher level of accommodations, including separated bicycle facilities. The currently proposed Gould Street pedestrian and bicycle accommodation improvements are as follows:

- Sidewalk-level separated bicycle facilities in both directions on Gould Street between Highland Avenue and just north of TV Place
- Shared lane pavement markings and signage in each direction for bicyclists along Gould Street for approximately ½ mile between just north of TV Place and Central Avenue
- Sidewalk improvements along the west side of Gould Street between Highland Avenue and Noanett Road.
- A new pedestrian facility on the east side of Gould Street along the Site frontage between Highland Avenue and just north of TV Place
- A new crosswalk across Gould Street at the location of the abandoned railroad right-of-way with either an LED Warning sign or a rapid rectangular flashing beacon (RRFB) to alert drivers.

The Gould Street pedestrian and bicycle accommodations will tie into the Highland Avenue accommodations that are currently under construction by MassDOT as well as a potential future shared-use path along the former MBTA railroad right-of-way north of the Site. The Proponent will work with the Town of Needham to support additional funding for a study of the feasibility of converting the former MBTA railroad right-of-way north of the Project Site and the Channel 5 property into a shared use path that would connect with Needham Heights to the south.

As noted above, the Proponent will fund the design and construction of approximately 800 feet of sidewalk-level separated bicycle facilities in both directions on Gould Street between Highland Avenue and just north of TV Place. The Proponent reviewed the feasibility of providing separated bicycle facilities on Gould Street between TV Place and Central Avenue, extending past Mills Field. However, dedicated bicycle facilities cannot

be added within the existing width of the Gould Street cross-section, as the right-of-way is too narrow. Any expansion of the right-of-way north of TV Place would require significant impact to adjacent properties along Gould Street, which the Proponent does not control. Based on coordination with the Town of Needham, the Proponent is proposing the installation of shared lane pavement markings and signage for the segments of Gould Street that are beyond the control of the Proponent.

Memorandum

Attachments

› Revised Off-Site Roadway Mitigation
- Concept Plans
- Intersection Capacity Analyses

› Revised Site-Generated Peak Hour Traffic Volume Networks

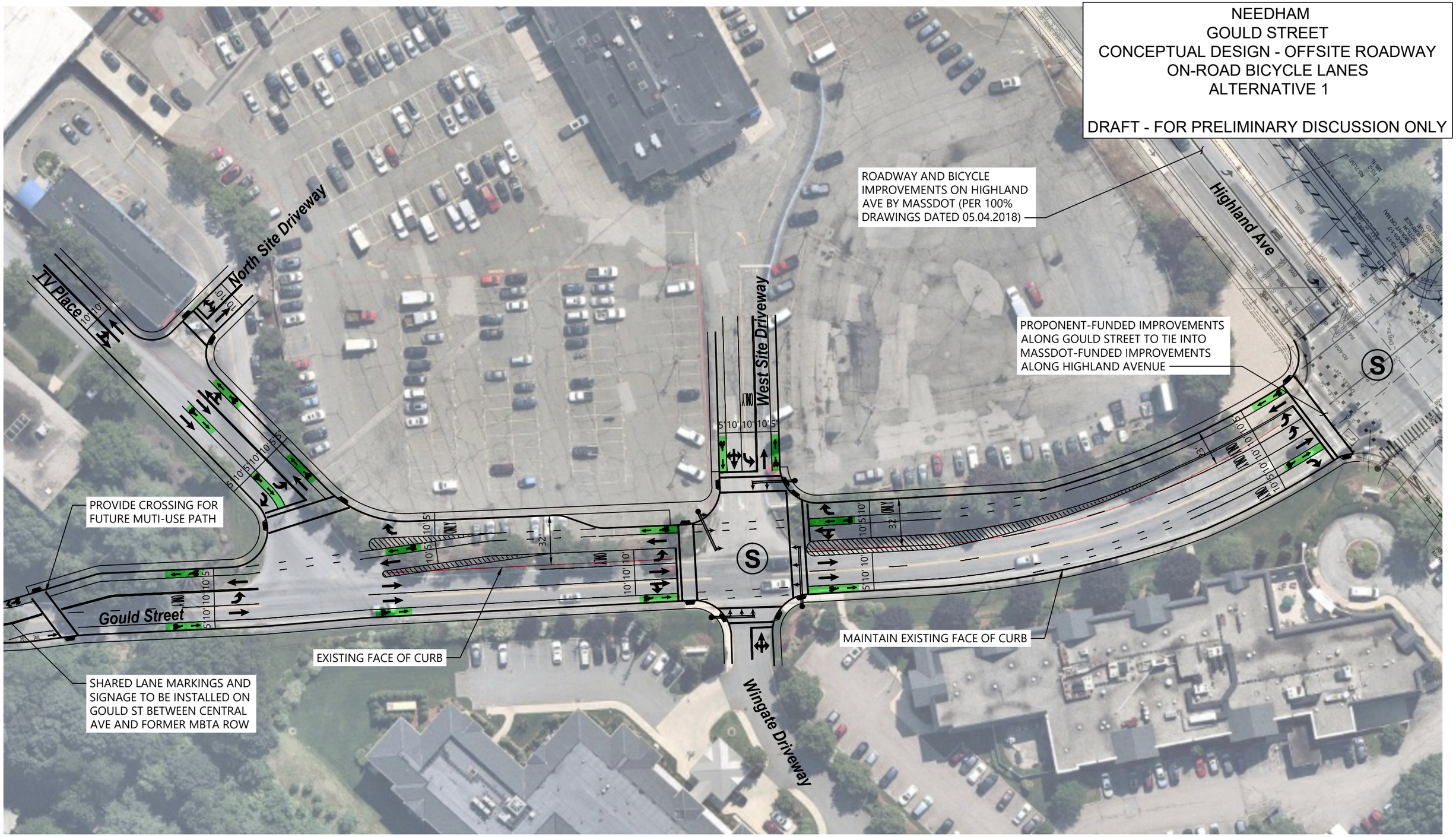
Revised Off-Site Roadway Mitigation

Concept Plans

\\vhb.com\gbl\proj\Boston\15306.00\Graphics\FIGURES\Intersection Improvements_May2022.dwg

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
ON-ROAD BICYCLE LANES
ALTERNATIVE 1

DRAFT - FOR PRELIMINARY DISCUSSION ONLY



NOT FOR CONSTRUCTION

0 30 60 120 Feet

vhb

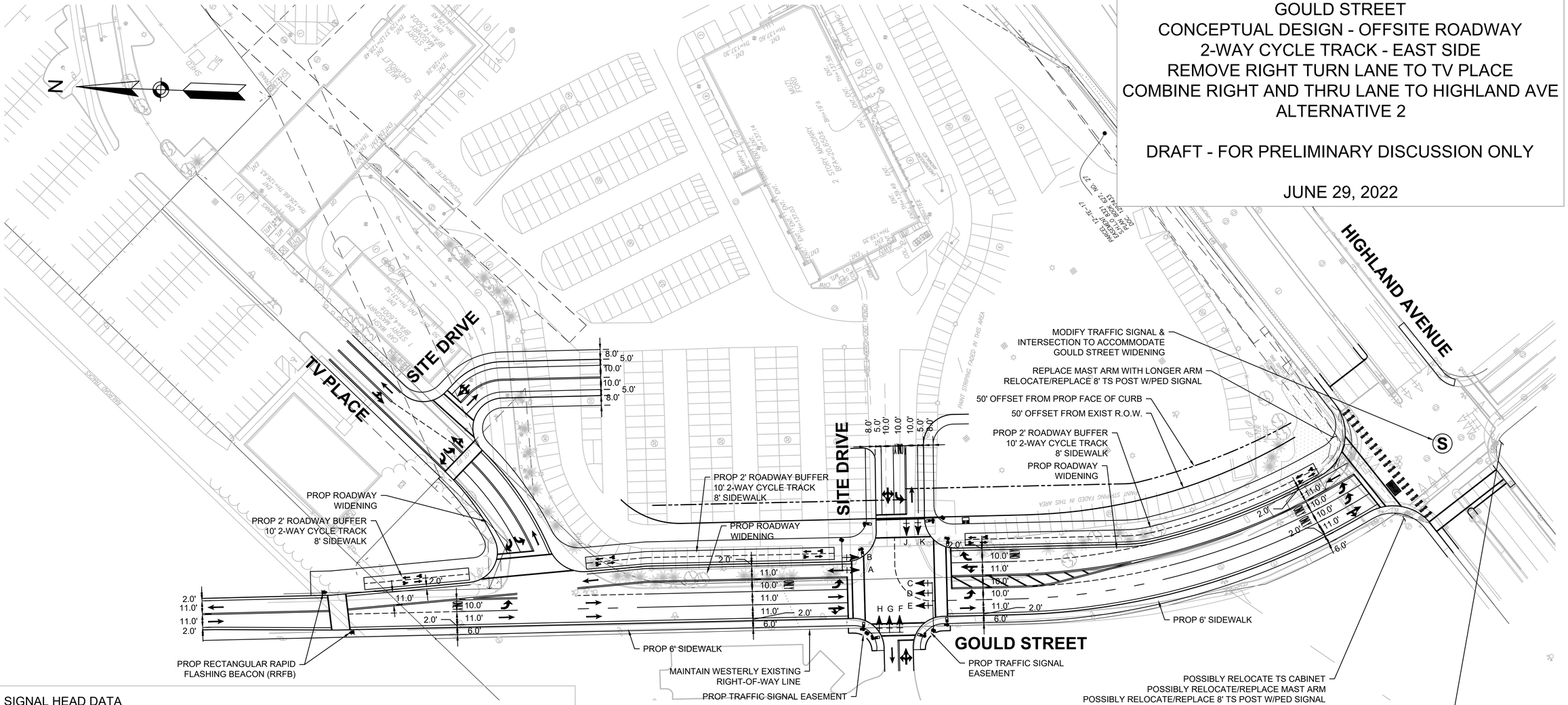
Highland Innovation Center
Needham, Massachusetts

04.19.22

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
2-WAY CYCLE TRACK - EAST SIDE
REMOVE RIGHT TURN LANE TO TV PLACE
COMBINE RIGHT AND THRU LANE TO HIGHLAND AVE
ALTERNATIVE 2

DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 29, 2022

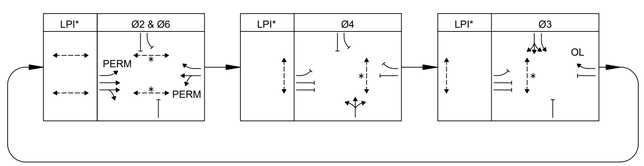


SIGNAL HEAD DATA

A,D,E,H,K	B	C	F	G,J	ALL
R Y G	R Y Y G G	R Y FY	R Y G	R Y G G	W/COUNTDOWN TIMER
ALL 12" LENS					

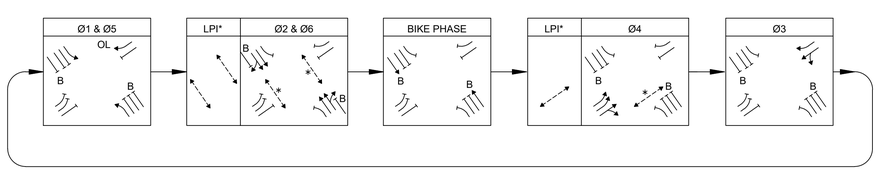
NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

SITE DRIVEWAY
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
LPI = LEADING PEDESTRIAN INTERVAL

HIGHLAND AVENUE
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
OL = OVERLAP
LPI = LEADING PEDESTRIAN INTERVAL
B = HIGHLAND AVENUE SEPARATED BIKE LANE

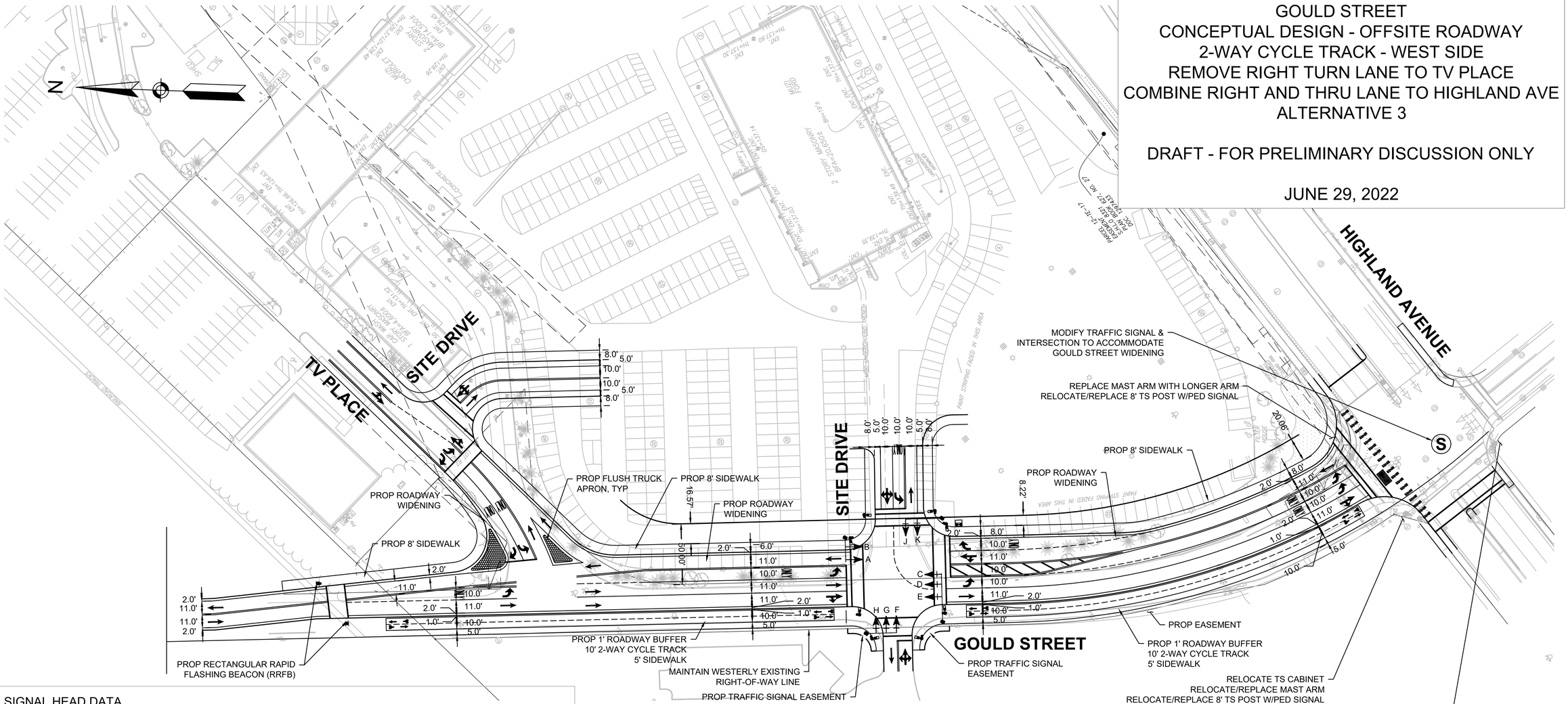
0 40 100 160
SCALE: 1" = 40'

15306.00 - CONCEPT - ALT5 - 2WAY CT & WALK EAST - V2.DWG Plotted on 29-Jun-2022 1:56 PM

NEEDHAM
GOULD STREET
CONCEPTUAL DESIGN - OFFSITE ROADWAY
2-WAY CYCLE TRACK - WEST SIDE
REMOVE RIGHT TURN LANE TO TV PLACE
COMBINE RIGHT AND THRU LANE TO HIGHLAND AVE
ALTERNATIVE 3

DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 29, 2022

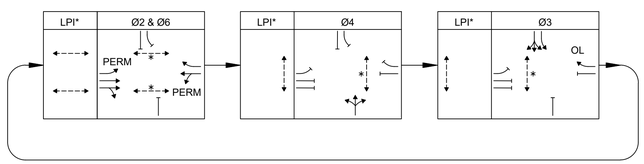


SIGNAL HEAD DATA

A,D,E,H,K	B	C	F	G,J	ALL
R Y G	R Y Y G G	R Y FY	R Y G	R Y G G	W/COUNTDOWN TIMER
ALL 12" LENS					

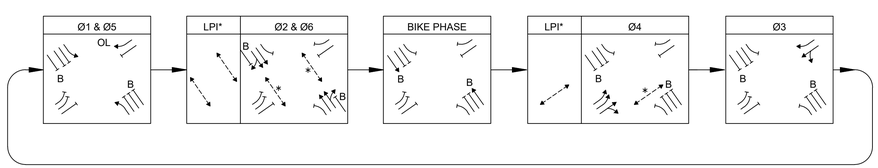
NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

SITE DRIVEWAY
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
LPI = LEADING PEDESTRIAN INTERVAL

HIGHLAND AVENUE
PREFERENTIAL PHASE SEQUENCE



* NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
OL = OVERLAP
LPI = LEADING PEDESTRIAN INTERVAL
B = HIGHLAND AVENUE SEPARATED BIKE LANE

0 40 100 160

SCALE: 1" = 40'

15306.00 - CONCEPT - ALT2C - 2WAY CT & WALK WEST - V1.DWG Plotted on 29-Jun-2022 1:53 PM

NEEDHAM
GOULD STREET @ CENTRAL AVENUE
CONCEPTUAL LAYOUT

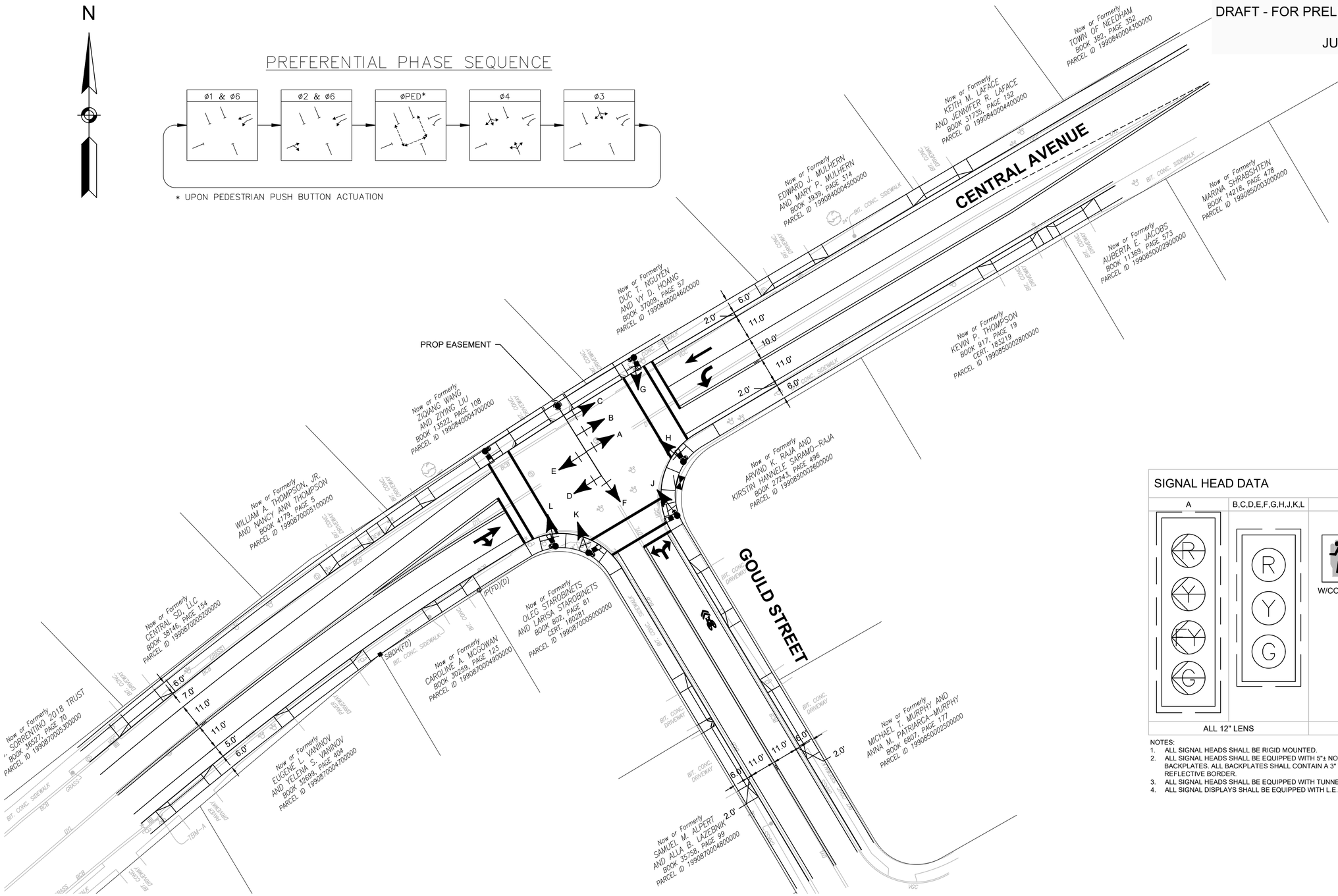
DRAFT - FOR PRELIMINARY DISCUSSION ONLY

JUNE 27, 2022

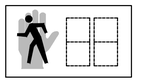
N

PREFERENTIAL PHASE SEQUENCE

* UPON PEDESTRIAN PUSH BUTTON ACTUATION



SIGNAL HEAD DATA

A	B,C,D,E,F,G,H,J,K,L	ALL
		 W/COUNTDOWN TIMER
ALL 12" LENS		

NOTES:
1. ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
2. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± NON- LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 3" WIDE YELLOW REFLECTIVE BORDER.
3. ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
4. ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.

0 20 50 100

SCALE: 1" = 20'

Table A Signalized Intersection Capacity Analysis Summary – Revised Gould Street Concepts

Location / Movement	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Mitigation				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at Gould Street and Hunting Road															
Weekday Morning															
Highland Ave EB L	1.04	>120	F	~93	#234	>1.20	>120	F	~190	#353	0.96	115.7	F	153	#330
Highland Ave EB T/R	0.86	40.2	D	364	#512	0.79	36.6	D	364	#512	0.66	30.2	C	363	503
Highland Ave WB L	0.58	58.6	E	36	83	0.61	65.3	E	38	83	0.42	61.4	E	42	83
Highland Ave WB T/R	0.94	52.1	D	362	#545	1.15	117.8	F	~616	#841	0.97	54.3	D	587	#797
Hunting Rd NB L/T	0.96	89.0	F	206	#434	1.13	>120	F	~263	#480	0.96	96.8	F	265	#433
Hunting Rd NB R	0.48	39.8	D	48	102	0.51	44.0	D	52	102	0.53	46.1	D	93	136
Gould St SB L	0.82	64.8	E	145	#281	0.91	84.5	F	182	#347	0.70	71.7	E	136	180
Gould St SB L/T/R	0.78	59.4	E	137	#264	0.88	77.3	E	175	#335	0.57	72.7	E	107	166
Overall	**0.98**	**55.1**	**E**	-	-	**1.20**	**100.2**	**F**	-	-	**0.95**	**55.5**	**E**	-	-
Weekday Evening															
Highland Ave EB L	>1.20	>120	F	19	57	>1.20	>120	F	27	72	0.60	58.2	E	24	57
Highland Ave EB T/R	0.81	42.3	D	287	440	0.81	42.4	D	290	442	0.74	32.8	C	252	#373
Highland Ave WB L	0.86	83.3	F	100	194	0.87	84.5	F	101	196	0.78	61.6	E	89	#182
Highland Ave WB T/R	1.00	61.7	E	~535	#774	1.07	84.0	F	~599	#861	1.02	61.3	E	~527	#702
Hunting Rd NB L/T	0.56	51.4	D	66	127	0.58	52.2	D	70	134	0.73	61.0	E	65	#126
Hunting Rd NB R	0.10	35.7	D	4	24	0.10	35.7	D	4	24	0.07	34.2	C	0	5
Gould St SB L	0.91	61.1	E	295	#574	>1.20	>120	F	~681	#1051	0.97	61.6	E	310	#376
Gould St SB L/T/R	0.88	56.9	E	284	#554	>1.20	>120	F	~653	#1022	0.76	45.5	D	228	#239
Overall	**1.03**	**59.5**	**E**	-	-	**>1.20**	**>120**	**F**	-	-	**1.05**	**52.9**	**D**	-	-
Gould Street at Wingate Driveway / Project Site Driveway															
Weekday Morning															
Wingate Dwy EB L/T/R											0.01	61.9	E	0	0
Site Dwy WB L											0.50	65.0	E	46	90
Site Dwy WB L/T/R											0.29	62.1	E	25	68
Gould St NB L/T	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.57	5.0	A	153	m273
Gould St NB R											0.31	4.0	A	22	m78
Gould St SB L											0.08	3.1	A	3	24
Gould St SB T/R											0.15	3.0	A	20	88
Overall											**0.54**	**7.8**	**A**		
Weekday Evening															
Wingate Dwy EB L/T/R											0.03	43.4	D	0	12
Site Dwy WB L											0.75	44.2	D	174	187
Site Dwy WB L/T/R											0.70	41.6	D	163	176
Gould St NB L/T	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.31	10.7	B	56	m252
Gould St NB R											0.07	13.2	B	1	m30
Gould St SB L											0.03	8.8	A	4	21
Gould St SB T/R											0.37	11.4	B	124	270
Overall											**0.44**	**21.8**	**C**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

Note: Elimination of Gould Street northbound right-turn lane onto TV Place does not impact operations as northbound approach is under free-flow conditions.

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	25	20	635	135	85	355
Future Vol, veh/h	25	20	635	135	85	355
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	95	95	91	91
Heavy Vehicles, %	0	0	2	2	0	3
Mvmt Flow	42	33	668	142	93	390

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1315	739	0	0	810	0
Stage 1	739	-	-	-	-	-
Stage 2	576	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	176	421	-	-	825	-
Stage 1	476	-	-	-	-	-
Stage 2	566	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	421	-	-	825	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	476	-	-	-	-	-
Stage 2	502	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.5	0	1.9
HCM LOS	D		

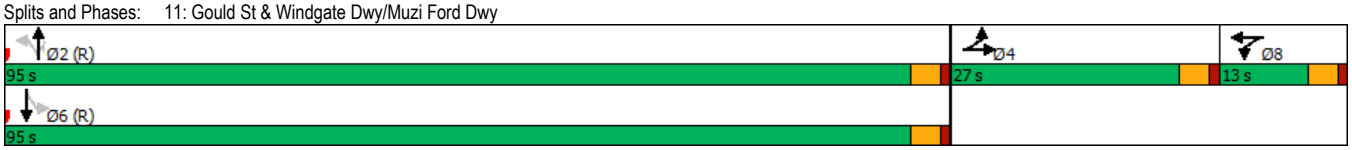
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	156	421	825	-
HCM Lane V/C Ratio	-	-	0.267	0.079	0.113	-
HCM Control Delay (s)	-	-	36.3	14.3	9.9	-
HCM Lane LOS	-	-	E	B	A	-
HCM 95th %tile Q(veh)	-	-	1	0.3	0.4	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		100	150		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Confl. Bikes (#/hr)									1			
Peak Hour Factor	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Shared Lane Traffic (%)				34%								
Lane Group Flow (vph)	0	10	0	51	50	0	0	850	428	36	424	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		13.0	13.0		95.0	95.0	95.0	95.0	95.0	
Total Split (%)	20.0%	20.0%		9.6%	9.6%		70.4%	70.4%	70.4%	70.4%	70.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.07		0.43	0.36			0.55	0.32	0.08	0.14	
Control Delay		0.8		70.6	44.5			7.1	3.2	5.8	4.0	
Queue Delay		0.0		0.0	0.0			4.5	1.2	0.0	0.0	
Total Delay		0.8		70.6	44.5			11.6	4.5	5.8	4.0	
Queue Length 50th (ft)		0		46	25			153	22	3	20	
Queue Length 95th (ft)		0		90	68			m273	m78	24	88	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)									100	150		
Base Capacity (vph)		313		128	147			1550	1339	447	2978	
Starvation Cap Reductn		0		0	0			611	669	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.03		0.40	0.34			0.91	0.64	0.08	0.14	

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 135	
Offset: 15 (11%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		0.89		1.00	0.93			1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	0.97			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1645		1681	1663			1861	1551	1770	3537	
Flt Permitted		0.99		0.95	0.97			0.99	1.00	0.29	1.00	
Satd. Flow (perm)		1645		1681	1663			1841	1551	531	3537	
Peak-hour factor, PHF	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Adj. Flow (vph)	2	0	8	78	1	22	17	833	428	36	422	2
RTOR Reduction (vph)	0	10	0	0	21	0	0	0	40	0	0	0
Lane Group Flow (vph)	0	0	0	51	29	0	0	850	388	36	424	0
Confl. Bikes (#/hr)									1			
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		5.8		8.3	8.3			108.9	108.9	108.9	108.9	
Effective Green, g (s)		5.8		8.3	8.3			108.9	108.9	108.9	108.9	
Actuated g/C Ratio		0.04		0.06	0.06			0.81	0.81	0.81	0.81	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		70		103	102			1485	1251	428	2853	
v/s Ratio Prot		c0.00		c0.03	0.02						0.12	
v/s Ratio Perm								c0.46	0.25	0.07		
v/c Ratio		0.01		0.50	0.29			0.57	0.31	0.08	0.15	
Uniform Delay, d1		61.8		61.3	60.5			4.7	3.4	2.7	2.9	
Progression Factor		1.00		1.00	1.00			0.98	1.14	1.00	1.00	
Incremental Delay, d2		0.0		3.7	1.6			0.4	0.2	0.4	0.1	
Delay (s)		61.9		65.0	62.1			5.0	4.0	3.1	3.0	
Level of Service		E		E	E			A	A	A	A	
Approach Delay (s)		61.9			63.6			4.7			3.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

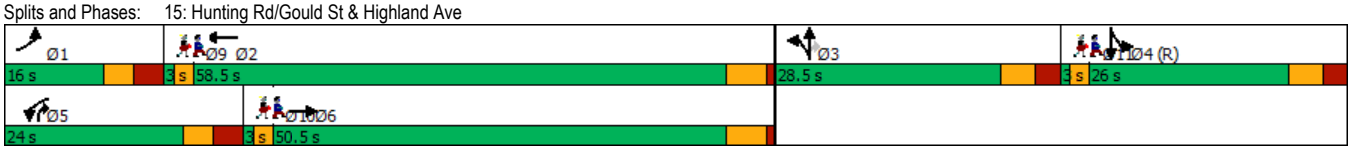
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			Yes			Yes			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Peds. (#/hr)	1		1	1		1									
Confl. Bikes (#/hr)									1						
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	172	1040	0	49	1484	0	0	301	273	309	144	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	5	4	4		9	10	11
Permitted Phases									3						
Detector Phase	1	6		5	2		3	3	5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0	12.0	29.5	29.5		3.0	3.0	3.0
Total Split (s)	16.0	50.5		24.0	58.5		28.5	28.5	24.0	26.0	26.0		3.0	3.0	3.0
Total Split (%)	11.9%	37.4%		17.8%	43.3%		21.1%	21.1%	17.8%	19.3%	19.3%		2%	2%	2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead	Lead				Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min	None	C-Min	C-Min		None	None	None
v/c Ratio	0.96	0.66		0.42	1.00			0.96	0.61	0.66	0.56				
Control Delay	117.3	33.3		70.2	56.2			98.4	22.8	68.6	63.4				
Queue Delay	15.8	0.0		0.0	2.4			0.0	0.0	0.0	0.0				
Total Delay	133.2	33.3		70.2	58.6			98.4	22.8	68.6	63.4				
Queue Length 50th (ft)	153	363		42	587			265	93	136	107				
Queue Length 95th (ft)	#330	503		83	#797			#433	136	180	166				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	179	1574		240	1479			312	548	509	280				
Starvation Cap Reductn	0	0		0	0			0	0	0	0				
Spillback Cap Reductn	11	0		0	13			0	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	1.02	0.66		0.20	1.01			0.96	0.50	0.61	0.51				

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green
Natural Cycle: 145
Control Type: Actuated-Coordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.92			1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3530		1805	3178			1874	1600	3400	1781	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3530		1805	3178			1874	1600	3400	1781	
Peak-hour factor, PHF	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	172	1023	17	49	658	826	28	273	273	309	96	48
RTOR Reduction (vph)	0	1	0	0	159	0	0	0	74	0	14	0
Lane Group Flow (vph)	172	1039	0	49	1325	0	0	301	199	309	130	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	5	4	4	
Permitted Phases									3			
Actuated Green, G (s)	13.8	60.2		8.9	58.2			22.5	31.4	17.5	17.5	
Effective Green, g (s)	13.8	60.2		8.9	58.2			22.5	31.4	17.5	17.5	
Actuated g/C Ratio	0.10	0.45		0.07	0.43			0.17	0.23	0.13	0.13	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	179	1574		118	1370			312	372	440	230	
v/s Ratio Prot	c0.10	0.29		0.03	c0.42			c0.16	0.04	c0.09	0.07	
v/s Ratio Perm									0.09			
v/c Ratio	0.96	0.66		0.42	0.97			0.96	0.53	0.70	0.57	
Uniform Delay, d1	60.3	29.4		60.6	37.5			55.9	45.4	56.3	55.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.12	1.14	
Incremental Delay, d2	55.3	0.8		0.9	16.8			40.9	0.7	9.0	9.6	
Delay (s)	115.7	30.2		61.4	54.3			96.8	46.1	71.7	72.7	
Level of Service	F	C		E	D			F	D	E	E	
Approach Delay (s)		42.3			54.5			72.7			72.1	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	55.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	105	70	305	20	15	615
Future Vol, veh/h	105	70	305	20	15	615
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	150	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	81	81	75	75	73	73
Heavy Vehicles, %	0	0	0	0	0	6
Mvmt Flow	130	86	407	27	21	842

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1305	421	0	0	434	0
Stage 1	421	-	-	-	-	-
Stage 2	884	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	178	637	-	-	1136	-
Stage 1	667	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	175	637	-	-	1136	-
Mov Cap-2 Maneuver	175	-	-	-	-	-
Stage 1	667	-	-	-	-	-
Stage 2	400	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	45.7	0	0.2
HCM LOS	E		

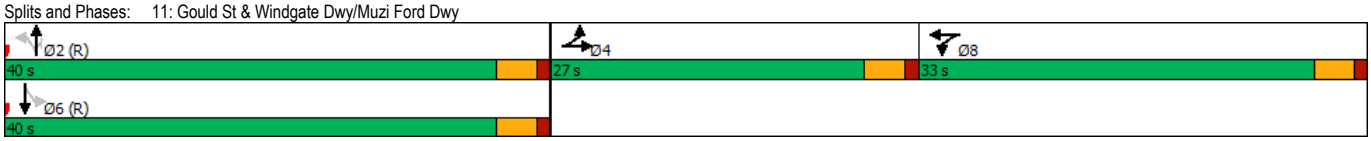
Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	175	637	1136	-
HCM Lane V/C Ratio	-	-	0.741	0.136	0.018	-
HCM Control Delay (s)	-	-	68.5	11.5	8.2	-
HCM Lane LOS	-	-	F	B	A	-
HCM 95th %tile Q(veh)	-	-	4.7	0.5	0.1	-

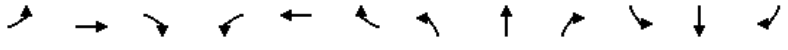
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		100	150		0
Storage Lanes	0		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Peak Hour Factor	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Shared Lane Traffic (%)				44%								
Lane Group Flow (vph)	0	41	0	280	277	0	0	337	93	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		33.0	33.0		40.0	40.0	40.0	40.0	40.0	
Total Split (%)	27.0%	27.0%		33.0%	33.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.20		0.75	0.71			0.30	0.09	0.03	0.36	
Control Delay		8.5		48.3	43.8			14.0	8.2	15.4	13.9	
Queue Delay		0.0		0.0	0.0			0.6	0.0	0.0	0.1	
Total Delay		8.5		48.3	43.8			14.6	8.2	15.4	14.0	
Queue Length 50th (ft)		0		174	163			56	1	4	124	
Queue Length 95th (ft)		12		187	176			m252	m30	21	270	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)									100	150		
Base Capacity (vph)		413		487	503			1112	986	568	2134	
Starvation Cap Reductn		0		0	0			437	0	0	0	
Spillback Cap Reductn		4		0	0			0	0	0	276	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.10		0.57	0.55			0.50	0.09	0.03	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95			1.00	1.00	1.00	0.95	
Frt		0.87		1.00	0.97			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1615		1681	1705			1861	1583	1770	3536	
Flt Permitted		1.00		0.95	0.96			0.99	1.00	0.51	1.00	
Satd. Flow (perm)		1615		1681	1705			1842	1583	941	3536	
Peak-hour factor, PHF	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Adj. Flow (vph)	1	0	40	500	1	56	6	331	93	16	761	5
RTOR Reduction (vph)	0	38	0	0	10	0	0	0	32	0	0	0
Lane Group Flow (vph)	0	3	0	280	267	0	0	337	61	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		7.0		22.3	22.3			58.7	58.7	58.7	58.7	
Effective Green, g (s)		7.0		22.3	22.3			58.7	58.7	58.7	58.7	
Actuated g/C Ratio		0.07		0.22	0.22			0.59	0.59	0.59	0.59	
Clearance Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		113		374	380			1081	929	552	2075	
v/s Ratio Prot		c0.00		c0.17	0.16						c0.22	
v/s Ratio Perm								0.18	0.04	0.02		
v/c Ratio		0.03		0.75	0.70			0.31	0.07	0.03	0.37	
Uniform Delay, d1		43.3		36.2	35.8			10.4	8.9	8.7	10.9	
Progression Factor		1.00		1.00	1.00			0.99	1.48	1.00	1.00	
Incremental Delay, d2		0.1		8.0	5.8			0.4	0.1	0.1	0.5	
Delay (s)		43.4		44.2	41.6			10.7	13.2	8.8	11.4	
Level of Service		D		D	D			B	B	A	B	
Approach Delay (s)		43.4			42.9			11.2			11.3	
Approach LOS		D			D			B			B	

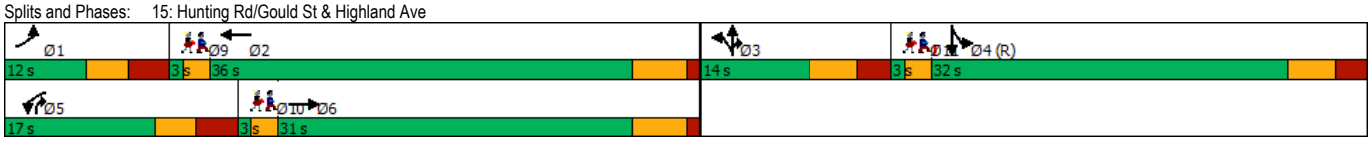
Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

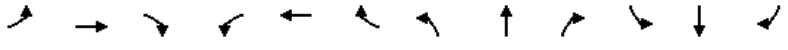
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			Yes			Yes			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Bikes (#/hr)						1									
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	38	819	0	142	1352	0	0	102	108	922	392	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	3 5	4	4		9	10	11
Permitted Phases															
Detector Phase	1	6		5	2		3	3	3 5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0		21.0	21.0		3.0	3.0	3.0
Total Split (s)	12.0	31.0		17.0	36.0		14.0	14.0		32.0	32.0		3.0	3.0	3.0
Total Split (%)	12.0%	31.0%		17.0%	36.0%		14.0%	14.0%		32.0%	32.0%		3%	3%	3%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead					Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min		C-Min	C-Min		None	None	None
v/c Ratio	0.36	0.80		0.78	1.02			0.73	0.26	0.93	0.74				
Control Delay	55.0	40.1		71.9	62.3			74.0	2.7	54.5	41.2				
Queue Delay	0.0	0.0		0.0	0.2			5.4	0.0	5.1	1.1				
Total Delay	55.0	40.1		71.9	62.5			79.4	2.7	59.6	42.3				
Queue Length 50th (ft)	24	252		89	~527			65	0	310	228				
Queue Length 95th (ft)	57	#373		#182	#702			#126	5	#376	#239				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	106	1027		194	1324			147	424	987	527				
Starvation Cap Reductn	0	0		0	0			0	0	43	32				
Spillback Cap Reductn	0	0		0	1			17	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	0.36	0.80		0.73	1.02			0.78	0.25	0.98	0.79				

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave

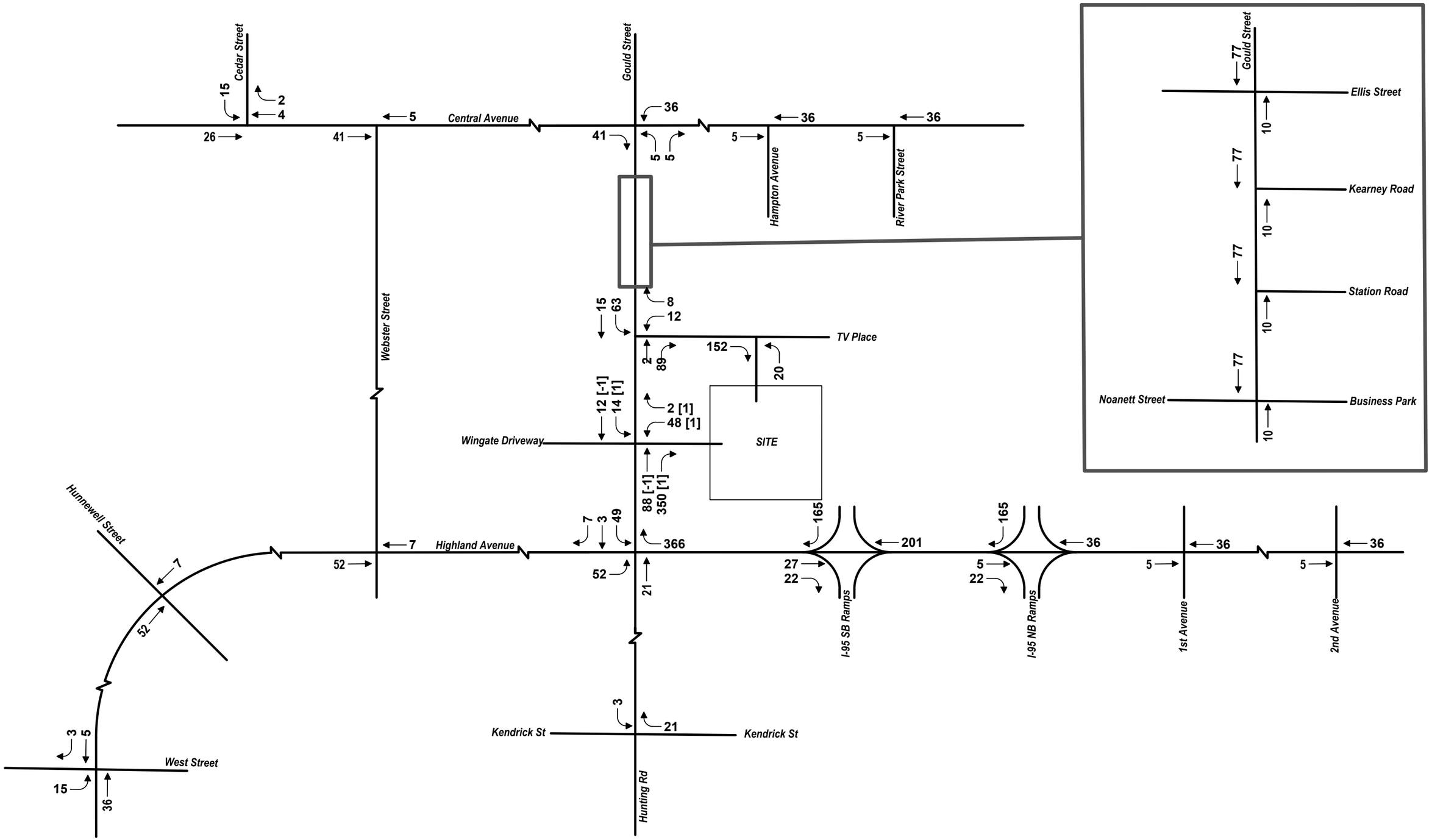




Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.97			1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3413			1841	1583	3433	1747	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3525		1770	3413			1841	1583	3433	1747	
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	38	797	22	142	1068	284	24	78	108	922	229	163
RTOR Reduction (vph)	0	2	0	0	22	0	0	0	89	0	25	0
Lane Group Flow (vph)	38	817	0	142	1330	0	0	102	19	922	367	0
Confl. Bikes (#/hr)						1						
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Effective Green, g (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Actuated g/C Ratio	0.04	0.32		0.10	0.38			0.08	0.18	0.28	0.28	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	63	1110		182	1303			139	283	947	482	
v/s Ratio Prot	0.02	0.23		c0.08	c0.39			c0.06	0.01	c0.27	0.21	
v/s Ratio Perm												
v/c Ratio	0.60	0.74		0.78	1.02			0.73	0.07	0.97	0.76	
Uniform Delay, d1	47.5	30.5		43.7	30.9			45.2	34.1	35.8	33.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.09	1.07	
Incremental Delay, d2	10.7	2.2		17.8	30.4			15.8	0.0	22.4	10.0	
Delay (s)	58.2	32.8		61.6	61.3			61.0	34.2	61.6	45.5	
Level of Service	E	C		E	E			E	C	E	D	
Approach Delay (s)		33.9			61.3			47.2			56.8	
Approach LOS		C			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Revised Site-Generated Peak Hour Traffic Volume Networks



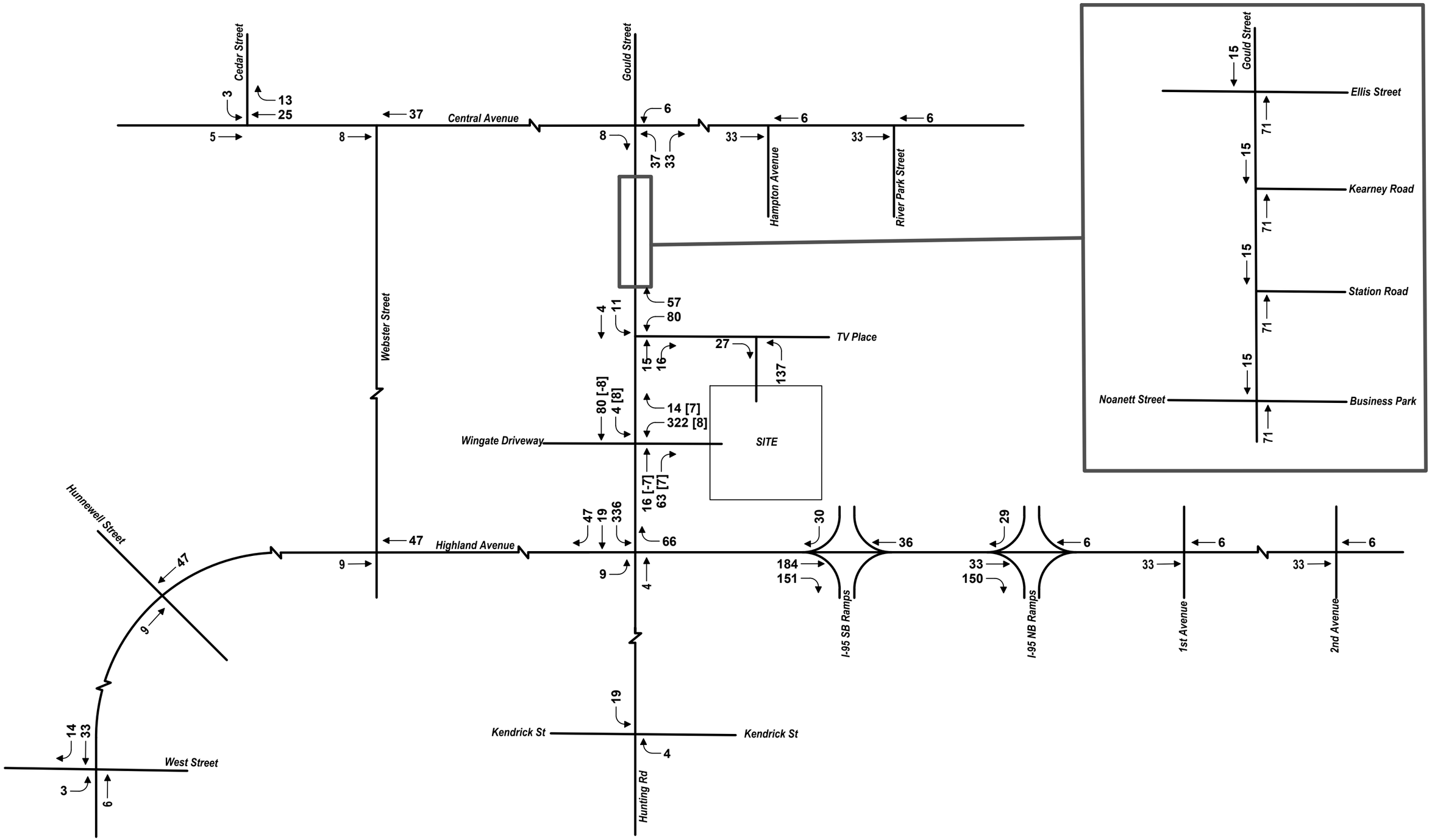
XX = New Project Generated Vehicles

[XX] = Pass-By Vehicles

Not to Scale

Project Generated Vehicle Volumes
Weekday Morning Peak Hour
Highland Science Center
Needham, Massachusetts

Figure 11



XX = New Project Generated Vehicles

[XX] = Pass-By Vehicles

Not to Scale

Project Generated Vehicle Volumes
Weekday Evening Peak Hour
Highland Science Center
Needham, Massachusetts

Figure 12

REF.: NEX-2200133.00

August 18, 2022

Ms. Lee Newman
Director of Planning and Community Development
Needham Department of Public Works
500 Dedham Avenue
Needham, MA 02492

SUBJECT: Highland Science Center, Gould Street, Needham, MA
MEPA DEIR – Traffic Peer Review

Dear Ms. Newman:

On behalf of the Town of Needham, ***Greenman-Pedersen Inc.*** (GPI) performed a review of the *Draft Environmental Impact Report*[1] (DEIR) prepared by Vanasse Hangen Brustlin, Inc. (VHB) for review by the Massachusetts Environmental Policy Act (MEPA) office for the proposed Highland Science Center in Needham, Massachusetts. The site is located on the northeast corner of the intersection of Highland Avenue and Gould Street, and currently contains a Muzi Ford car dealership, Charles River Media Group and WCVB Channel 5. The site was recently part of a rezoning effort by the Town to allow for the development of up to ±880,000 square feet (SF) of office, research and development (R&D), and ancillary retail and service space. GPI has reviewed the DEIR and supporting traffic analysis for consistency with the goals and studies prepared as part of the Town's rezoning, as well as for compliance with the MEPA Certificate issued on the *Environmental Notification Form* (ENF)[2], Massachusetts Department of Transportation (MassDOT) guidelines for traffic impact analysis and general engineering practice. The following summarizes GPI's comments related to the DEIR.

Changes Since ENF

1. At the time of the ENF filing, the Project was proposed to include extensive widening along Gould Street to provide five travel lanes approaching the intersection with Highland Avenue (a dedicated right-turn lane, a through lane, two left-turn lanes, and a receiving lane), as well as bicycle lanes along each side of the roadway. This plan was consistent with the concept plans prepared as part of the Town's rezoning effort for a development of the site with ±880,000 SF of office, R&D, and retail space. The currently proposed project consists of only ±530,000 SF of development, with only 10,000 SF being retail space. The reduction is square footage has reduced the volume of traffic anticipated to be generated by the proposed development. The capacity and queue analysis prepared by the Applicant as part of the ENF and DEIR indicates that a five-lane cross-section along Gould Street is not warranted for a project of this scale. As such, the concept plans have been modified to reduce Gould Street to a four-lane section with a shared through/right-turn lane, two left-turn lanes and one receiving lane. This modification will allow for improved pedestrian and bicycle accommodations along the corridor with the construction of a separated bicycle facility along the east side of Gould Street, a bicycle-accommodating shoulder along the west side, and upgraded sidewalks along both sides of the street. GPI supports this design change in favor of providing a multi-modal, Complete Streets design of Gould Street.

2. The project also previously included a dedicated right-turn lane on Gould Street northbound at TV Place, which has been eliminated as part of the currently proposed concept plans. The analysis provided by the Applicant indicates that this intersection can operate well without the dedicated right-turn lane based on the

[1] *Draft Environmental Impact Report, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); July 2022.
[2] *Environmental Notification Form, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); March 2022.

trip generation and distribution projections contained in the ENF and DEIR. However, the location of the parking garage and entrance close to TV Place may encourage office employees to utilize TV Place for access into the garage to avoid activity near the front door and Atrium. Therefore, GPI recommends that the site be designed to accommodate the potential future widening to provide a right-turn lane if needed, and that the post-occupancy traffic monitoring program include a review of the Gould Street / TV Place intersection to assess whether a right-turn lane is warranted at this location based on traffic operations. The design should include locating the proposed new Town right-of-way lines for Gould Avenue in a manner that will allow for future widening to provide a right-turn lane if and when needed. This will also ensure that adequate right-of-way is available should the Channel 5 site ever be redeveloped as contemplated in the Town's recent rezoning effort.

3. With the provision of the separated bicycle facility on the east side of Gould Street, the Applicant has proposed a new crosswalk with either LED warning signs or rectangular rapid flashing beacons (RRFBs) on Gould Street at the abandoned railroad right-of-way. GPI concurs with the location of this crosswalk as the railroad may be converted to a shared-use path in the future. The DEIR does not describe how the warning signs or RRFBs would be activated. Consideration should be given to implementing a passive detection system such as video or thermal detection to assist bicyclists in crossing without the need to dismount their bicycles to activate a push-button. Passive detection would be particularly beneficial if the railroad is converted to a shared-use path.

4. Section 1.3.2.3 of the DEIR describes that 25 percent of the proposed parking spaces will be equipped with EV charging stations and the Applicant will consider means to increase capacity for EV stations in the future as demand increases. GPI recommends that the EV stations within the surface parking lot be high-speed charging stations as these spaces will be primarily utilized by visitors and retail patrons who will make shorter trips to the site. For the purposes of efficient fire suppression, EV charging stations within the parking garage should be located along the outside walls of the garage.

Collision History

5. The collision diagram contained in the DEIR for the Hunting Road / Kendrick Street intersection indicates a high occurrence of crashes between vehicles traveling eastbound on Kendrick Street and through vehicles in both directions on Hunting Road. This may be an indication of red-light-running and insufficient clearance intervals at the intersection. The Applicant has proposed signal timing modifications at this intersection to optimize the operations. As part of this retiming, GPI recommends that the Applicant review the existing clearance intervals on all signal phases to verify that they are appropriate for the geometry of the intersection and adjust the timings accordingly.

Transportation Operations Analysis

6. The concept plans for the Highland Avenue / Gould Street / Hunting Road intersection contained in the DEIR indicate that bicycle boxes are proposed along Highland Avenue to allow two-stage left-turn movements for bicyclists using the bike lanes on either side of the roadway. With these bike boxes, the bike box is located on the far side of the intersection in front of the opposing through lane. For example, a bicyclist traveling westbound on Highland Avenue that wanted to turn left onto Hunting Road would travel straight through the intersection and wait in the bike box in front of the Gould Street southbound vehicles for the Gould Street southbound phase to be activated and then complete the turn by traveling south to Hunting Road. Because the bike box will be located in front of the through lane, right-turn-on-red movements must be prohibited when a two-stage bike box is provided. The analysis of the 2029 Build with Improvements condition prepared by the Applicant as part of the DEIR does not include a restriction of right-turn-on-red movements on the Gould Street southbound and Hunting Road northbound approaches. Therefore, the analysis results incorrectly represent improved operations at the intersection. The Applicant should update the analysis to reflect the required turn restrictions and re-evaluate whether a right-turn lane will be required on Gould Street southbound or whether additional improvements will be needed with these turn restrictions in place.

7. As the geometric modifications at the Highland Avenue / Gould Street / Hunting Road intersection will require substantial upgrades to existing signal equipment, the Applicant should consider installation of adaptive signal controls at this location as a means of further improving operations and ensuring that timings are optimized for all time periods as further growth and development occurs in the surrounding area. The Applicant should also consider installation of GridSmart or other high definition cameras, equipped with communication to the Needham Police Department for incident management and traffic monitoring.

8. As part of our review of the ENF, GPI noted that the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project and requested that the Applicant review options to improve the operations of the intersection. The Applicant has proposed increasing the cycle length at the intersection and modifying the split times to reduce the delay on the southbound approach by approximately 19 seconds to bring the movement below capacity and back to a nearly No-Build condition. While this signal timing modification will reduce the delay on the southbound approach, the increase in cycle length will actually increase the queues on the southbound approach, which has the potential to create additional collisions at a location that already experiences a crash rate higher than the statewide average. It appears that the Applicant has designed the signal timing modifications to maintain the 2029 No-Build delays and queues on all other intersection approaches to the maximum extent feasible, rather than reoptimizing the intersection operations as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations. This may mean that other movements will experience longer delays and queues than estimated under 2029 No-Build conditions in order to improve the operations of the southbound approach.

9. Similarly, the analysis contained in the ENF indicated the Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has proposed increasing the cycle length and modifying split times to reduce the delay on the eastbound through/right-turn movement. While the delay will be reduced to less than No-Build conditions as a result of these signal timing changes, the queues on this movement will increase by five vehicles and the Webster Street southbound approach will continue operating over capacity. Several of the movements at the intersection are anticipated to operate at LOS B or C under 2029 Build conditions with excess capacity. Therefore, it appears that the modified timings have been designed solely to reduce delay on the eastbound through/right-turn movement and do not consider the overall operations of the intersection as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations of the entire intersection. This may require delay or queues to increase on some movements as compared to 2029 No-Build conditions in order to improve the delays and queues on other movements.

10. The analysis contained in the ENF also indicated that, although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. The Applicant has proposed signal timing modifications at this intersection to reduce delay on the westbound left/through movement. While Table 5-7 indicates that the movement will still continue to operate over capacity, the timing changes will significantly reduce the delay on the westbound approach well below the 2029 No-Build condition and mitigate the Project's impacts on operations at this location.

11. The Applicant is proposing significant geometric modifications and signal improvements at the Highland Avenue / Gould Street / Hunting Road intersection as mitigation for the Project. The capacity and queue analysis contained in the ENF showed that some movements would still be operating at level-of-service (LOS) F and over capacity under 2029 Build conditions with the proposed improvements. The Applicant has since modified the improvement plan, as well as the signal timings at the intersection, to optimize the intersection operations. In most cases, the modifications result in 2029 Build conditions that are either improved from or similar to No-Build conditions. However, GPI notes that during the weekday PM peak hour, the Highland Avenue westbound through / right-turn movement is still anticipated to operate over capacity under 2029 Build

with improvements conditions. The opposing eastbound left-turn will operate at approximately 60 percent of capacity at LOS E during the same time period. The Applicant should consider a slight modification to the proposed signal timings to remove some green time from the eastbound left-turn and provide additional green time for the westbound through movement to better optimize operations. This may be done through post-occupancy monitoring of the intersection and adjusting the timings in the field based on observed delays and queues.

Parking

12. The Project includes the construction of a below-grade parking garage to be under the building, as well as a stand-along parking garage. The provision of multiple parking areas on-site with no connections between these parking areas other than via the single internal project roadway has the potential to create excessive recirculation of vehicles on-site looking for empty spaces and to cause congestion along the site roadway. The internal roadway is only approximately 500 feet long in its entirety and will include a drop-off area at the Atrium, and three separate intersections with driveways into the surface lot and two parking garages, as well as at least one pedestrian crossing over that short distance. Less than 100 feet of stacking distance is proposed between the drop-off zone and Gould Street when the capacity analysis results show queues on the driveway extending nearly 200 feet. Additional turns into and out of the parking areas to look for empty parking spaces will create additional congestion that has the potential to back onto TV Place and Gould Street. To avoid this scenario, GPI recommends that the Applicant implement a parking management program that could include either potential assignment of employees to designated parking areas or spaces, or installation of a driver alert system to let drivers know when parking areas are full before entering them. This driver alert system may also include means of directing drivers to open EV charging stations on-site.

13. There is a small stub parking area provided in the northwest corner of the below-ground parking garage that contains eight compact-car parking spaces. The size of the compact spaces will already make maneuvering in and out of the spaces difficult. In addition, the spaces are provided immediately adjacent to the wall without an area provided for a car to back out of the parking space to exit. As a result, drivers may need to back down the parking aisle and into the main drive aisle to exit the last two spaces in the garage. GPI recommends the Applicant consider elimination of the last two parking spaces to provide improved maneuverability for the spaces in this area.

14. The Applicant is committed to providing EV charging stations in 25 percent of the parking spaces within each of the surface, underground, and stand-alone garage parking areas. While GPI commends the Applicant on providing a high percentage of EV stations for sustainability, GPI also has concerns over the adequacy of the proposed parking supply to accommodate the anticipated parking demand by gasoline powered vehicles if such vehicles are not allowed to park in the EV spaces. The DEIR notes that while all of the analysis has been prepared assuming that 1,770 parking spaces will be provided on the site, the Applicant is seeking a Special Permit from the Town of Needham to request a reduced parking supply of only 1,408 spaces. With 25 percent of these being for EV charging only, only 1,056 parking spaces will remain for use by gasoline powered vehicles. Currently, fewer than 1.0 percent of vehicles on the roadway in the U.S. are electric vehicles and only just over 5.0 percent of vehicles sold in 2022 have been electric vehicles according to a report from Car and Driver Magazine on August 8, 2022. Therefore, the Applicant should ensure that the number of parking spaces provided for gasoline powered vehicles will be adequate to accommodate gasoline powered vehicle parking demand for opening year condition. If needed, spaces can be made EV ready and converted to EV spaces when demand within the provided EV spaces begins to reach capacity.

15. To encourage the use of electric vehicles, EV charging stations should be free for employee use within the parking garages. GPI also recommends that at least one accessible parking space be equipped with EV charging with additional spaces being EV ready.

16. A total of 30 parking spaces are proposed to be provided within the surface parking lot for use by visitors and the retail use. Approximately 10,000 SF of retail space is proposed on-site. Typically, at least one parking

space per 250 SF of retail space is provided, which would result in a parking demand of 40 spaces for the retail use alone. It is recognized that the proposed retail space will be ancillary to the on-site office and R&D space so many of the retail patrons may be office/R&D employees who are already parked in the garages. However, this small surface lot may not be sufficient to accommodate both retail and visitor parking, particularly under opening condition if 25 percent of the spaces are designated for EV charging only. GPI recommends that retail employees be required to park in the parking garages to leave the surface lot parking available for patrons. The Applicant should also monitor the use of the surface parking lot post-occupancy and consider signing additional visitor parking with the parking garage, if necessary. This may also include a driver alert system to direct visitors to open visitor parking spaces.

Transportation Demand Management

17. The Applicant is proposing to implement a shuttle between the site and nearby public transportation services, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. The DEIR notes that the MBTA recently developed a Bus Network Redesign Plan, a draft of which was released in May 2022, that eliminates some of the variations of Route 59 to simplify routes. As a result, the MBTA is not likely to be interested in modifying Route 59 to provide service closer to the site. GPI recommends that the Applicant reach out to the MBTA to assess whether a partnership makes sense for allowing area residents and employees an opportunity to use the Applicant's shuttle service for access to nearby transit services to supplement Route 59.

18. The DEIR notes that based on U.S. Census information, approximately five percent of Needham employees commuter to work via public transportation, walking, and bicycling. While the DEIR states that the TDM measures proposed by the Applicant are likely to result in a greater percentage of alternative means of travel, the Applicant has not identified any targeted mode share goals.

Mitigation Measures

19. Figure 5.1 provides a conceptual plan of the improvements proposed along Gould Street as mitigation for the proposed redevelopment. The plan is prepared on an aerial image with limited existing conditions linework that is scaled back in gray. It appears that the linework along Highland Avenue at the intersection of Gould Street / Kendrick Street is consistent with the MassDOT improvement plans along Highland Avenue, but there is not enough detail provided on the plans to determine this. The Applicant should provide a plan that clearly shows how the proposed improvements to be constructed by the Applicant will tie into MassDOT's improvements along Highland Avenue. This should include the layout of all signal equipment that will be necessary to accommodate the Applicant's proposed improvements. The Figure provides a note that states "Geometric and Signal Improvements at Intersection", but there are no signal improvements shown on the plan and the DEIR does not commit to installing new or relocating signal equipment.

20. In addition, Figure 5.1 does not show the proposed site plan or the existing and proposed municipal right-of-way and State Highway Layout (SHLO) lines along Gould Street and Highland Avenue. The Applicant should provide a plan that clearly shows how the site relates to the street and future right-of-way to verify that adequate setbacks will be provided from the street layout to the on-site structures. There are additional concept plans provided in Appendix D that are prepared on survey with some additional detail. However, these plans also do not depict the site layout or the proposed right-of-way boundaries. The plan of Gould Street along the site frontage depicts a 50-foot offset from the curb line and a 50-foot offset from the existing right-of-way line. However, the lack of site layout information on this plan does not allow for assessment of setbacks. In addition, the plan does not depict proposed right-of-way layout or a 50-foot offset from the proposed layout.

21. The Applicant has proposed a striped median with a shared left/through lane on Gould Street northbound approaching the site driveway based on Figure 5.1. GPI questions the Applicant's reasoning for providing this

median and shared lane in lieu of a dedicated left-turn pocket into the Wingate driveway. A dedicated left-turn pocket may provide reduced delays and queues and improve safety on Gould Street northbound.

22. Based on the concept plan for the Central Avenue / Gould Street intersection in Appendix D, the Applicant is proposing to signalize the two residential driveways on the northerly side of Gould Street as part of the improvements. The western-most of the residential driveways is proposed to operate concurrently with the Gould Street northbound approach. Due to the offset of the driveway from Gould Street and the low volume of traffic exiting the driveway, GPI does not recommend these movements operate concurrently. Gould Street is heavily used by commuters who will regularly traverse this intersection without encountering any opposing traffic from the residential driveway due to its low volume. This will reduce driver expectation of traffic exiting the driveway and cause traffic on Gould Street to assume right-of-way, generating the potential for a collision when a vehicle is present on the driveway. Therefore, GPI recommends that both residential driveways operate on their own signal phases. The additional signal phase is not expected to have a measurable impact on the operations of the intersection given the low volume on the driveway.

23. The Applicant is proposing to install signage along Noanett Road to restrict the roadway to local traffic only during the weekday morning and afternoon time periods. Cut-through traffic should be discouraged during all times of the day, not just during commuter time periods. Therefore, if such signage is to be installed, it should restrict the roadway to local traffic during all times.

24. The Applicant has proposed installing BLIND DRIVEWAY and SLOW CHILDREN PLAYING signage along Noanett Road at the request of residents along this roadway as mitigation for the project. It is important to note that SLOW CHILDREN PLAYING signs are not compliant with Manual on Uniform Traffic Control Devices (MUTCD) signage as they provide a false sense of security to residents, they do not indicate a particular location of a potential hazard, they do not indicate what speed is actually safe for travel, and they generally do not reduce vehicle travel speed. These signs also pose liability issues for the municipality as they imply that it is safe for children to play in the roadway. The Applicant has proposed installing NO CUT-THROUGH traffic signage on Noanett Road and will be installing a traffic signal at the intersection of Central Avenue / Gould Street as mitigation for the project. The presence of the new traffic signal at Central Avenue / Gould Street will facilitate left-turns from Gould Street onto Central Avenue and reduce the appeal for and likelihood of cut-through traffic along Noanett Road. Therefore, the majority of traffic along Noanett Road should be local residential traffic who will be familiar with the area and the potential for children in or close to the roadway. As a result, GPI does not recommend installation of SLOW CHILDREN PLAYING signage along Noanett Road.

25. The BLIND DRIVEWAY signs are proposed along Noanett Road at the residents' request because some of the driveways are located in close proximity to curves where sight lines are an issue. The sight line restrictions for these driveways are the residents' own landscaping, which could be removed to eliminate the sight line restriction without the installation of these signs. These signs are not included in the MUTCD as they provide a false sense of security to the resident exiting the driveway, they do not provide any legal message, they do not tell the driver what speed is safe to travel, and they are not enforceable. When a sight line restriction exists at a driveway, the responsibility belongs to the property owner to ensure adequate sight lines are provided. Therefore, GPI does not recommend installation of these signs along Noanett Road. If the curves along Noanett Road require vehicles to travel slower than the enforced speed of the roadway, installation of curve warning signage with supplemental curve advisory speed placards in advance of the curve would be a better option.

Traffic Monitoring Program

26. Section 5.7.1 of the DEIR describes an on-site parking facility study that will be conducted as part of the monitoring program to count vehicles as they enter and exit each of the parking areas. While these counts may be effective in determining the volume of vehicle trips generated by the development during the peak hours, this data will not provide an assessment of the actual use of the parking areas. GPI recommends that

the monitoring program include a parking utilization study to be conducted during the heaviest demand periods for the site as a whole and for each parking area to assess whether the parking provided in each area is meeting current parking demands. This should include a review of the utilization of EV charging stations, designated visitor or retail parking spaces, designated rideshare / carpool spaces if provided, and compact vehicle parking spaces to assess the need for modifications to the parking provisions.

Should you have any questions regarding these comments, please contact me directly at 603-766-5223.

Sincerely,

GREENMAN–PEDERSEN, INC.

Rebecca L. Brown, P.E.
Senior Project Manager

Memorandum

To: Lee Newman
Director of Community Planning and Development
Town of Needham, MA

Date: August 29, 2022

Project #: 15306.00

From: Sean Manning, PE, PTOE
Matthew Duranleau, PE

Re: Response to MEPA DEIR – Traffic Peer Review
By Greenman-Pedersen Inc. (GPI) dated 08/18/2022
557 Highland Avenue
Needham, Massachusetts

Overview

VHB has received and reviewed the MEPA DEIR Traffic Peer Review submitted to the Town of Needham by the Town's traffic review firm, Greenman-Pederson, Inc (GPI), dated August 18, 2022, for the proposed 557 Highland Avenue redevelopment in Needham, Massachusetts. This memorandum summarizes VHB's responses to those delineated comments. Each comment raised by the reviewer is listed below followed by the response by VHB. The comments follow the format and structure outlined in the Traffic Peer Review.

Peer Review Comments

Changes Since ENF

1. At the time of the ENF filing, the Project was proposed to include extensive widening along Gould Street to provide five travel lanes approaching the intersection with Highland Avenue (a dedicated right-turn lane, a through lane, two left-turn lanes, and a receiving lane), as well as bicycle lanes along each side of the roadway. This plan was consistent with the concept plans prepared as part of the Town's rezoning effort for a development of the site with ±880,000 SF of office, R&D, and retail space. The currently proposed project consists of only ±530,000 SF of development, with only 10,000 SF being retail space. The reduction in square footage has reduced the volume of traffic anticipated to be generated by the proposed development. The capacity and queue analysis prepared by the Applicant as part of the ENF and DEIR indicates that a five-lane cross-section along Gould Street is not warranted for a project of this scale. As such, the concept plans have been modified to reduce Gould Street to a four-lane section with a shared through/right-turn lane, two left-turn lanes, and one receiving lane. This modification will allow for improved pedestrian and bicycle accommodations along the corridor with the construction of a separated bicycle facility along the east side of Gould Street, a bicycle-accommodating shoulder along the west side, and upgraded sidewalks along both sides of the street. GPI supports this design change in favor of providing a multi-modal, Complete Streets design of Gould Street.

   Applicant Response: Thank you for your comment. We of course agree that this is a much more complete mobility-oriented solution that takes into account important input from you, Town officials, and the community. No response is required.

2. The project also previously included a dedicated right-turn lane on Gould Street northbound at TV Place, which has been eliminated as part of the currently proposed concept plans. The analysis provided by the

Applicant indicates that this intersection can operate well without the dedicated right-turn lane based on the trip generation and distribution projections contained in the ENF and DEIR. However, the location of the parking garage and entrance close to TV Place may encourage office employees to utilize TV Place for access into the garage to avoid activity near the front door and Atrium. Therefore, GPI recommends that the site be designed to accommodate the potential future widening to provide a right-turn lane if needed, and that the post-occupancy traffic monitoring program include a review of the Gould Street / TV Place intersection to assess whether a right-turn lane is warranted at this location based on traffic operations. The design should include locating the proposed new Town right-of-way lines for Gould Street in a manner that will allow for future widening to provide a right-turn lane if and when needed. This will also ensure that adequate right-of-way is available should the Channel 5 site ever be redeveloped as contemplated in the Town's recent rezoning effort.

Applicant Response: While the parking garage will be located on the northern portion of the Site near TV Place, the installation of a traffic signal at the intersection of Gould Street at the Site driveway / Wingate driveway and the installation of a dedicated right-turn lane into the Site at this location will encourage most northbound vehicles entering the Site to do so at the signalized location regardless of the destination within the Site.

If additional traffic were to make a right turn from Gould Street northbound onto TV Place due to the redistribution of internal Site traffic or due to the redevelopment of the Channel 5 Site, the intersection of Gould Street at TV Place will be able to accommodate the additional right-turning traffic without the need of a dedicated northbound right-turn lane. Since the intersection is unsignalized, any additional right-turning traffic will not conflict with any other vehicular movements and therefore would not result in a notable increase in delay. In addition, since Gould Street is a neighborhood roadway, a dedicated right-turn lane approaching an unsignalized intersection is not necessary to provide deceleration room, as through vehicles should not be traveling at speeds high enough that would put them in a major conflict with vehicles slowing down to make a right turn.

The site has been designed in a manner that would allow for the future implementation of the right-turn lane. In the event such additional right turn lane is needed after approval and construction of the Project, and the conveyance of such area reduces any of the project's buildings setbacks, the buildings would be entitled to the protections of By-Law Section 4.1.3 as pre-existing nonconforming structures. Therefore, such right-turn lane could be incorporated into the current design in the future if (1) the WCVB site were ever to be redeveloped and (2) a traffic study assessing future conditions indicates a need to include this design improvement, without affecting zoning compliance of the Project's structures.

Further, the proponent is amenable to carefully assessing future traffic conditions at this location via their post-occupancy traffic monitoring program, which will include a review of the Gould Street / TV Place intersection to assess whether a right-turn lane is warranted at this location based on traffic operations. The specifics of that monitoring program will clearly define criteria by which the peak period traffic operations of this location are evaluated in the future.

3. With the provision of the separated bicycle facility on the east side of Gould Street, the Applicant has proposed a new crosswalk with either LED warning signs or rectangular rapid flashing beacons (RRFBs) on Gould Street at the abandoned railroad right-of-way. GPI concurs with the location of this crosswalk as the

railroad may be converted to a shared-use path in the future. The DEIR does not describe how the warning signs or RRFBs would be activated. Consideration should be given to implementing a passive detection system such as video or thermal detection to assist bicyclists in crossing without the need to dismount their bicycles to activate a push-button. Passive detection would be particularly beneficial if the railroad is converted to a shared-use path.

Applicant Response: VHB agrees that passive detection would be more beneficial than push-button detection as it would not require any action on the part of the crossing pedestrian or bicyclist. The Applicant will continue to coordinate with the Town of Needham on the final design of all off-site improvements, including the RRFB prior to construction and will implement a passive detection system if that is the direction preferred by the Town.

4. Section 1.3.2.3 of the DEIR describes that 25 percent of the proposed parking spaces will be equipped with EV charging stations and the Applicant will consider means to increase capacity for EV stations in the future as demand increases. GPI recommends that the EV stations within the surface parking lot be high-speed charging stations as these spaces will be primarily utilized by visitors and retail patrons who will make shorter trips to the site. For the purposes of efficient fire suppression, EV charging stations within the parking garage should be located along the outside walls of the garage.

   Applicant Response: The Applicant is committed to sustainable design, including implementation of significant EV charging capability to be responsive to a significant shift in automobile use from traditional fossil fuel vehicles. The actual allocation of those EV charges will be a combination of Level 1, Level 2 and Level 3 chargers that match the needs of the tenants and visitors of the Site. It is also important to note that technology advancements are occurring in this space continuously – and the Applicant will be looking to take advantage of those advancements that reach the market prior to the occupancy of the Project, which is still several years away.

Collision History

5. The collision diagram contained in the DEIR for the Hunting Road / Kendrick Street intersection indicates a high occurrence of crashes between vehicles traveling eastbound on Kendrick Street and through vehicles in both directions on Hunting Road. This may be an indication of red-light-running and insufficient clearance intervals at the intersection. The Applicant has proposed signal timing modifications at this intersection to optimize the operations. As part of this retiming, GPI recommends that the Applicant review the existing clearance intervals on all signal phases to verify that they are appropriate for the geometry of the intersection and adjust the timings accordingly.

   Applicant Response: Currently, all phases at this intersection have a yellow time of 4.0 seconds and an all-red time of 1.0 seconds. VHB has evaluated the clearance intervals at the intersection of Hunting Road at Kendrick Street and determined that some of the yellow and all-red times should be updated given the geometry of the intersection. Specifically, the all-red times for the northbound and southbound through movements (Phases 4 and 8) should be increased to 1.5 seconds and the all-red times for the westbound left and southbound left protected movements (Phases 1 and 7) should be increased to 3.0 seconds. In addition, some

of the yellow times should be shortened from 4.0 seconds to 3.0 or 3.5 seconds based on the intersection geometry. The clearance interval worksheet is included in the Attachments to this memorandum.

Updated capacity analyses have been conducted that included the revised clearance intervals, as presented in Table 1 (included in the Attachments to this memorandum). The capacity analysis worksheets are also included in the Attachments to this memorandum. As shown in Table 1, the adjusted clearance intervals are expected to have a negligible impact on operations at the intersection with the overall intersection delay increasing by less than one second during both peak hours. Any decrease in intersection efficiency is expected to be offset by the improvements in intersection safety by having appropriately timed clearance intervals for all phases. The Applicant is committed to working with the Town to formalize these timing modifications and working with a contractor to implement those changes as part of our transportation improvement and mitigation plan.

Transportation Operations Analysis

6. The concept plans for the Highland Avenue / Gould Street / Hunting Road intersection contained in the DEIR indicate that bicycle boxes are proposed along Highland Avenue to allow two-stage left-turn movements for bicyclists using the bike lanes on either side of the roadway. With these bike boxes, the bike box is located on the far side of the intersection in front of the opposing through lane. For example, a bicyclist traveling westbound on Highland Avenue that wanted to turn left onto Hunting Road would travel straight through the intersection and wait in the bike box in front of the Gould Street southbound vehicles for the Gould Street southbound phase to be activated and then complete the turn by traveling south to Hunting Road. Because the bike box will be located in front of the through lane, right-turn-on-red movements must be prohibited when a two-stage bike box is provided. The analysis of the 2029 Build with Improvements condition prepared by the Applicant as part of the DEIR does not include a restriction of right-turn-on-red movements on the Gould Street southbound and Hunting Road northbound approaches. Therefore, the analysis results incorrectly represent improved operations at the intersection. The Applicant should update the analysis to reflect the required turn restrictions and re-evaluate whether a right-turn lane will be required on Gould Street southbound or whether additional improvements will be needed with these turn restrictions in place.

   Applicant Response: VHB agrees that right-turns-on-red should not be permitted when two-stage left-turn boxes are provided. Updated capacity analyses have been conducted with right-turns-on-red prohibited on the Gould Street southbound and Hunting Road northbound approaches, as presented in Table 2 (included in the Attachments to this memorandum). The capacity analysis worksheets are also included in the Attachments to this memorandum.

   Note that this update to the traffic operations analysis results in only minimal changes to the resultant delay at the intersection. The Gould Street southbound and Hunting Road northbound approaches are expected to have an increase in delay of less than four seconds during the weekday morning and weekday evening peak hours due to implementing a no-turn-on-red restriction and both approaches are expected to operate under capacity. Therefore, we would not recommend design modifications to the Gould Street southbound or Hunting Road northbound approaches based on inclusion of no turn on red for this intersection. The Applicant is committed to working with the Town and MassDOT as the design of the intersection improvements progress.

Memorandum

7. As the geometric modifications at the Highland Avenue / Gould Street / Hunting Road intersection will require substantial upgrades to existing signal equipment, the Applicant should consider installation of adaptive signal controls at this location as a means of further improving operations and ensuring that timings are optimized for all time periods as further growth and development occurs in the surrounding area. The Applicant should also consider installation of GridSmart or other high-definition cameras, equipped with communication to the Needham Police Department for incident management and traffic monitoring.

   Applicant Response: The Applicant agrees to work with MassDOT to fund the design and installation of adaptive signal control at the intersection of Highland Avenue at Gould Street / Hunting Road as a means of further improving operations and ensuring that timings are optimized for all time periods as further growth and development occurs in the surrounding area. It should be noted that this intersection is currently being reconstructed by MassDOT as part of a larger project to reconstruct Highland Avenue in Needham and Needham Street and Winchester Street in Newton. While the MassDOT project will include adaptive signal control at the signalized intersections along the corridor east of Route 128/I-95, MassDOT is not planning to install adaptive signal control at the intersection of Highland Avenue at Gould Street / Hunting Road.

   The inclusion of adaptive signal control will provide a means of further improving operations beyond what was presented in the TIA (and in Table 2 in this memorandum), as the intersection capacity analysis does not consider adaptive traffic signal control. It should be noted that this intersection is under the jurisdiction of MassDOT and therefore the Applicant will be required to coordinate with MassDOT on the proposed traffic signal mitigation at this location, including the potential installation of GridSmart or other high-definition cameras.

8. As part of our review of the ENF, GPI noted that the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project and requested that the Applicant review options to improve the operations of the intersection. The Applicant has proposed increasing the cycle length at the intersection and modifying the split times to reduce the delay on the southbound approach by approximately 19 seconds to bring the movement below capacity and back to a nearly No-Build condition. While this signal timing modification will reduce the delay on the southbound approach, the increase in cycle length will actually increase the queues on the southbound approach, which has the potential to create additional collisions at a location that already experiences a crash rate higher than the statewide average. It appears that the Applicant has designed the signal timing modifications to maintain the 2029 No-Build delays and queues on all other intersection approaches to the maximum extent feasible, rather than reoptimizing the intersection operations as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations. This may mean that other movements will experience longer delays and queues than estimated under 2029 No-Build conditions in order to improve the operations of the southbound approach.

   Applicant Response: VHB has revised the proposed traffic signal timing modification at the intersection of Highland Avenue at West Street to reoptimize intersection operations as a whole, as presented in Table 3 (included in the Attachments to this memorandum). The capacity analysis worksheets are also included in the Attachments to this memorandum.

The revised proposed traffic signal timing modification during the weekday evening peak hour would result in an overall cycle length of 115 seconds and reallocates green time from the eastbound/westbound phases to the northbound/southbound phases to optimize overall operations. With these modifications, the southbound queue is expected to be reduced by approximately one vehicle length from the 2029 No Build Conditions and all movements are expected to operate under capacity at LOS D or better.

As suggested by GPI, these incremental modifications do change the outcomes for some identified approaches, however overall intersection operations would be improved with this suggested timing update. The Applicant is committed to working with the Town to formalize these timing modifications and working with a contractor to implement those changes as part of our transportation improvement and mitigation plan,

9. Similarly, the analysis contained in the ENF indicated the Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has proposed increasing the cycle length and modifying split times to reduce the delay on the eastbound through/right-turn movement. While the delay will be reduced to less than No-Build conditions as a result of these signal timing changes, the queues on this movement will increase by five vehicles and the Webster Street southbound approach will continue operating over capacity. Several of the movements at the intersection are anticipated to operate at LOS B or C under 2029 Build conditions with excess capacity. Therefore, it appears that the modified timings have been designed solely to reduce delay on the eastbound through/right-turn movement and do not consider the overall operations of the intersection as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations of the entire intersection. This may require delay or queues to increase on some movements as compared to 2029 No-Build conditions in order to improve the delays and queues on other movements.

   Applicant Response: VHB has revised the proposed traffic signal timing modification at the intersection of Highland Avenue at Webster Street to reoptimize intersection operations as a whole, as presented in Table 4 (included in the Attachments to this memorandum). The capacity analysis worksheets are also included in the Attachments to this memorandum.

   The revised proposed traffic signal timing modification during the weekday evening peak hour reallocates green time from the northbound/southbound and westbound left-turn phases to the eastbound/westbound through phases to optimize overall operations. With these modifications, all movements are expected to operate under capacity at LOS D or better. No movement is expected to experience an increase in queue of move than two vehicles over the 2029 No Build Conditions, except for the Webster Street northbound right-turn movement which is expected to see an increase in queue of up to four vehicles. However, even with the increase in queue, the Webster Street northbound right-turn movement should only experience a maximum queue of nine vehicles or less.

   As suggested by GPI, these incremental modifications do change the outcomes for some identified approaches, however overall intersection operations would be improved with this suggested timing update. The Applicant is committed to working with the Town to formalize these timing modifications and working with a contractor to implement those changes as part of our transportation improvement and mitigation plan.

Memorandum

10. The analysis contained in the ENF also indicated that, although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. The Applicant has proposed signal timing modifications at this intersection to reduce delay on the westbound left/through movement. While Table 5-7 indicates that the movement will still continue to operate over capacity, the timing changes will significantly reduce the delay on the westbound approach well below the 2029 No-Build condition and mitigate the Project's impacts on operations at this location.

    Applicant Response: No technical response is required. The Applicant is committed to working with the Town to formalize these timing modifications and working with a contractor to implement those changes as part of our transportation improvement and mitigation plan.

11. The Applicant is proposing significant geometric modifications and signal improvements at the Highland Avenue / Gould Street / Hunting Road intersection as mitigation for the Project. The capacity and queue analysis contained in the ENF showed that some movements would still be operating at level-of-service (LOS) F and over capacity under 2029 Build conditions with the proposed improvements. The Applicant has since modified the improvement plan, as well as the signal timings at the intersection, to optimize the intersection operations. In most cases, the modifications result in 2029 Build conditions that are either improved from or similar to No-Build conditions. However, GPI notes that during the weekday PM peak hour, the Highland Avenue westbound through / right-turn movement is still anticipated to operate over capacity under 2029 Build with improvements conditions. The opposing eastbound left-turn will operate at approximately 60 percent of capacity at LOS E during the same time period. The Applicant should consider a slight modification to the proposed signal timings to remove some green time from the eastbound left-turn and provide additional green time for the westbound through movement to better optimize operations. This may be done through post-occupancy monitoring of the intersection and adjusting the timings in the field based on observed delays and queues.

    Applicant Response: VHB has reviewed the proposed signal timings to determine if any green time can be reallocated from the eastbound left-turn movement to the opposing westbound through / right-turn movement during the weekday evening peak hour. As proposed, the eastbound left-turn movement has a 12 second phase, which is the minimum split that can be provided to accommodate a six second minimum green time, three second yellow time, and three second all-red time. To provide a sufficient clearance interval while maintaining the minimum six second green time, it is not recommended to shorten the eastbound left-turn phase beyond the 12 seconds provided. While the westbound through / right-turn movement is expected to operate over capacity, the movement is just barely over capacity with an anticipated volume-to-capacity ratio of 1.02.

    As part of the post-occupancy monitoring of the Project, the Applicant will review traffic volumes and operations at this intersection during the peak hours and will adjust the timings in the field at that time based on observed delays and queues.

Parking

12. The Project includes the construction of a below-grade parking garage to be under the building, as well as a stand-along parking garage. The provision of multiple parking areas on-site with no connections between these parking areas other than via the single internal project roadway has the potential to create excessive recirculation of vehicles on-site looking for empty spaces and to cause congestion along the site roadway. The internal roadway is only approximately 500 feet long in its entirety and will include a drop-off area at the Atrium, and three separate intersections with driveways into the surface lot and two parking garages, as well as at least one pedestrian crossing over that short distance. Less than 100 feet of stacking distance is proposed between the drop-off zone and Gould Street when the capacity analysis results show queues on the driveway extending nearly 200 feet. Additional turns into and out of the parking areas to look for empty parking spaces will create additional congestion that has the potential to back onto TV Place and Gould Street. To avoid this scenario, GPI recommends that the Applicant implement a parking management program that could include either potential assignment of employees to designated parking areas or spaces, or installation of a driver alert system to let drivers know when parking areas are full before entering them. This driver alert system may also include means of directing drivers to open EV charging stations on-site.

    Applicant Response: As the underground parking and the stand-alone parking garage will be designated for use by employees of the Site, the vast majority of the motorists using the parking garages will park there on a regular basis and will be familiar with the layout and design. Due to human behavior of routine and habit, it is likely that most employees will park in the same general location each day and will not need to circle around the Site between different parking locations. The expected impact on the Site roadway of drivers being unfamiliar with the parking layout and traveling between parking areas is expected to be very small and not require a change in the Site configuration.

    However, the Applicant will include parking management provisions into the design of the structured parking to help motorists clearly understand availability (by level). In addition, daily parking levels will be monitored in the underground parking garage and motorists will be informed prior to entering the underground parking garage when the parking area is full. Post-occupancy monitoring will be used to assess future conditions and offer other incremental actions if incremental needs are warranted based on those observations.

13. There is a small stub parking area provided in the northwest corner of the below-ground parking garage that contains eight compact-car parking spaces. The size of the compact spaces will already make maneuvering in and out of the spaces difficult. In addition, the spaces are provided immediately adjacent to the wall without an area provided for a car to back out of the parking space to exit. As a result, drivers may need to back down the parking aisle and into the main drive aisle to exit the last two spaces in the garage. GPI recommends the Applicant consider elimination of the last two parking spaces to provide improved maneuverability for the spaces in this area.

    Applicant Response: Since the filing of the DEIR, the configuration of the underground parking garage has been revised resulting in the removal of the small stub parking area. The updated underground parking garage configuration is included in the revised Special Permit application submitted to the Town of Needham on August 16, 2022, ahead of the forthcoming Planning Board meeting on September 7, 2022. The updated parking site plan is included in the Attachments to this memorandum as well. Based on the site plan included in the revised Special Permit application, the Site will include approximately 1,390 off-street parking spaces.

14. The Applicant is committed to providing EV charging stations in 25 percent of the parking spaces within each of the surface, underground, and stand-alone garage parking areas. While GPI commends the Applicant on providing a high percentage of EV stations for sustainability, GPI also has concerns over the adequacy of the proposed parking supply to accommodate the anticipated parking demand by gasoline powered vehicles if such vehicles are not allowed to park in the EV spaces. The DEIR notes that while all of the analysis has been prepared assuming that 1,770 parking spaces will be provided on the site, the Applicant is seeking a Special Permit from the Town of Needham to request a reduced parking supply of only 1,408 spaces. With 25 percent of these being for EV charging only, only 1,056 parking spaces will remain for use by gasoline powered vehicles. Currently, fewer than 1.0 percent of vehicles on the roadway in the U.S. are electric vehicles and only just over 5.0 percent of vehicles sold in 2022 have been electric vehicles according to a report from Car and Driver Magazine on August 8, 2022. Therefore, the Applicant should ensure that the number of parking spaces provided for gasoline powered vehicles will be adequate to accommodate gasoline powered vehicle parking demand for opening year condition. If needed, spaces can be made EV ready and converted to EV spaces when demand within the provided EV spaces begins to reach capacity.

    Applicant Response: The Applicant understands that the percentage of fossil-fuel vehicles and EV vehicles is changing continually and therefore the parking restrictions and regulations will be monitored and adjusted to reflect those changes, parking needs, and market demands. It is not expected that the parking spaces with EV charging station will be restricted to electric vehicles only when the Project first opens. As electric vehicles continue to become more prevalent, the Applicant will evaluate if/when the EV charging spaces should be restricted to electric vehicles only.

    The Project is including EV charging stations at 25 percent of all parking spaces in anticipation of a future when electric vehicles are much more prevalent than they currently are. While fewer than one percent of vehicles on the roadway in the US as of 2022 are electric vehicles, the Commonwealth of Massachusetts has a goal to phase out the sale of new gasoline-powered vehicles by the year 2035[1]. With that in mind, the Applicant is planning to construct a sustainable development that is compatible with the future transportation, sustainability, and mobility goals of the Commonwealth.

15. To encourage the use of electric vehicles, EV charging stations should be free for employee use within the parking garages. GPI also recommends that at least one accessible parking space be equipped with EV charging with additional spaces being EV ready.

    Applicant Response: EV charging stations will be free for employee use within the parking garages for at least the first five years upon completion of the Project. After five years, the Applicant will review EV policies throughout the region to determine the best way to accommodate EV charging on-site. By providing free EV charging upon the opening of the Project, the Applicant will be promoting the use of electric vehicles among employees of the Site at a time when Massachusetts is going through a wholesale shift in the composition of vehicles on the roadway.

[1] Massachusetts 2050 Decarbonization Roadmap; Commissioned by the Massachusetts Executive Office of Energy and Environmental Affairs; December 2020.

It is proposed that 25 percent of all accessible parking spaces will also include EV charging stations, matching the same proportion of EV charging stations to parking spaces throughout the Project Site.

16. A total of 30 parking spaces are proposed to be provided within the surface parking lot for use by visitors and the retail use. Approximately 10,000 SF of retail space is proposed on-site. Typically, at least one parking space per 250 SF of retail space is provided, which would result in a parking demand of 40 spaces for the retail use alone. It is recognized that the proposed retail space will be ancillary to the on-site office and R&D space so many of the retail patrons may be office/R&D employees who are already parked in the garages. However, this small surface lot may not be sufficient to accommodate both retail and visitor parking, particularly under opening condition if 25 percent of the spaces are designated for EV charging only. GPI recommends that retail employees be required to park in the parking garages to leave the surface lot parking available for patrons. The Applicant should also monitor the use of the surface parking lot post-occupancy and consider signing additional visitor parking with the parking garage, if necessary. This may also include a driver alert system to direct visitors to open visitor parking spaces.

    Applicant Response: Retail employees will be required to park in the parking garages, leaving the surface parking lot available to patrons and guests. The Applicant will also monitor the use of the surface parking lot post-occupancy and will assign additional visitor parking with the parking garage, if necessary.

Transportation Demand Management

17. The Applicant is proposing to implement a shuttle between the site and nearby public transportation services, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. The DEIR notes that the MBTA recently developed a Bus Network Redesign Plan, a draft of which was released in May 2022, that eliminates some of the variations of Route 59 to simplify routes. As a result, the MBTA is not likely to be interested in modifying Route 59 to provide service closer to the site. GPI recommends that the Applicant reach out to the MBTA to assess whether a partnership makes sense for allowing area residents and employees an opportunity to use the Applicant's shuttle service for access to nearby transit services to supplement Route 59.

    Applicant Response: The Applicant will allow area residents and employees to use the shuttles to access nearby transit services and to supplement Route 59. The use of the shuttles by area residents and employees will be a benefit of the Project by providing a new transit connection that does not currently exist.

18. The DEIR notes that based on U.S. Census information, approximately five percent of Needham employee commuter to work via public transportation, walking, and bicycling. While the DEIR states that the TDM measures proposed by the Applicant are likely to result in a greater percentage of alternative means of travel, the Applicant has not identified any targeted mode share goals.

    Applicant Response: The Applicant is looking to target mobility to the site to be up to 10 percent, which is approximately double the rate noted in the US Census. The Applicant is committed to this goal and will report on future effectiveness as part of its post-occupancy transportation monitoring program.

Mitigation Measures

19. Figure 5.1 provides a conceptual plan of the improvements proposed along Gould Street as mitigation for the proposed redevelopment. The plan is prepared on an aerial image with limited existing conditions linework that is scaled back in gray. It appears that the linework along Highland Avenue at the intersection of Gould Street / Kendrick Street is consistent with the MassDOT improvement plans along Highland Avenue, but there is not enough detail provided on the plans to determine this. The Applicant should provide a plan that clearly shows how the proposed improvements to be constructed by the Applicant will tie into MassDOT's improvements along Highland Avenue. This should include the layout of all signal equipment that will be necessary to accommodate the Applicant's proposed improvements. The Figure provides a note that states "Geometric and Signal Improvements at Intersection", but there are no signal improvements shown on the plan and the DEIR does not commit to installing new or relocating signal equipment.

    Applicant Response: The linework along Highland Avenue at the intersection of Gould Street / Hunting Road is consistent with the MassDOT improvements plans. The Applicant will coordinate closely with the Town of Needham and MassDOT as to how the proposed Project mitigation will tie into the Highland Avenue layout. As noted on the offsite roadway improvement plan included in Appendix D to the DEIR, the proposed improvements are expected to require, at a minimum, replacing the mast arms on the northeast and southwest corners of the intersection with longer mast arms to accommodate the Gould Street widening and relocating or replacing the traffic signal posts with pedestrian signals.

20. In addition, Figure 5.1 does not show the proposed site plan or the existing and proposed municipal right-of-way and State Highway Layout (SHLO) lines along Gould Street and Highland Avenue. The Applicant should provide a plan that clearly shows how the site relates to the street and future right-of-way to verify that adequate setbacks will be provided from the street layout to the on-site structures. There are additional concept plans provided in Appendix D that are prepared on survey with some additional detail. However, these plans also do not depict the site layout or the proposed right-of-way boundaries. The plan of Gould Street along the site frontage depicts a 50-foot offset from the curb line and a 50-foot offset from the existing right-of-way line. However, the lack of site layout information on this plan does not allow for assessment of setbacks. In addition, the plan does not depict proposed right-of-way layout or a 50-foot offset from the proposed layout.

    Applicant Response: Updated plans have been developed that show the site layout information, the existing and proposed roadway right-of-way boundaries, and the proposed setbacks between the curb line and the building faces. The update plans were submitted to the Town of Needham on August 16, 2022, ahead of the forthcoming Planning Board meeting on September 7, 2022. The updated site plan is included in the Attachments to this memorandum as well.

21. The Applicant has proposed a striped median with a shared left/through lane on Gould Street northbound approaching the site driveway based on Figure 5.1. GPI questions the Applicant's reasoning for providing this median and shared lane in lieu of a dedicated left-turn pocket into the Wingate driveway. A dedicated left-turn pocket may provide reduced delays and queues and improve safety on Gould Street northbound.

Applicant Response: The Applicant is open to modifying the proposed geometry on Gould Street to include a northbound left-turn lane for vehicles turning into the Wingate driveway in the area that is currently proposed as a striped median. Due to the proposed roadway layout, the left-turn lane would likely serve as a short pocket lane of approximately 50 feet that would provide storage for one-to-two vehicles waiting to turn left into the Wingate driveway. The Applicant is committed to working with the Town as the design of the intersection improvements progress.

Updated capacity analyses have been conducted with a dedicated northbound left-turn lane at the intersection of Gould Street at the Site driveway / Wingate driveway, as presented in Table 5 (included in the Attachments to this memorandum). The capacity analysis worksheets are also included in the Attachments to this memorandum. If included, it is proposed that the northbound left-turn movement would continue to be permitted and a dedicated protected phase would not need to be provided due to the small number of vehicles turning into the Wingate driveway. As shown in Table 5, the operations will be similar with and without the northbound left-turn pocket.

22. Based on the concept plan for the Central Avenue / Gould Street intersection in Appendix D, the Applicant is proposing to signalize the two residential driveways on the northerly side of Gould Street as part of the improvements. The western-most of the residential driveways is proposed to operate concurrently with the Gould Street northbound approach. Due to the offset of the driveway from Gould Street and the low volume of traffic exiting the driveway, GPI does not recommend these movements operate concurrently. Gould Street is heavily used by commuters who will regularly traverse this intersection without encountering any opposing traffic from the residential driveway due to its low volume. This will reduce driver expectation of traffic exiting the driveway and cause traffic on Gould Street to assume right-of-way, generating the potential for a collision when a vehicle is present on the driveway. Therefore, GPI recommends that both residential driveways operate on their own signal phases. The additional signal phase is not expected to have a measurable impact on the operations of the intersection given the low volume on the driveway.

    Applicant Response: The Applicant agrees due to the offset of the driveway from Gould Street and the low volume of traffic exiting the driveway, these movements should not operate concurrently. The traffic signal timings and phasing will be developed so that the two residential driveways will operate on their own signal phases. As the two residential driveways have low volumes, the inclusion of separate phases for each driveway is not expected to have a measurable impact on the operations of the intersection. The two driveway phases will only be activated when a vehicle is on the approach and during most cycles these phases will not be triggered. Therefore, the intersection is expected to operate with minimal changes from the results reported in the TIA and the DEIR.

23. The Applicant is proposing to install signage along Noanett Road to restrict the roadway to local traffic only during the weekday morning and afternoon time periods. Cut-through traffic should be discouraged during all times of the day, not just during commuter time periods. Therefore, if such signage is to be installed, it should restrict the roadway to local traffic during all times.

Applicant Response: The Applicant agrees that cut-through traffic should be discouraged along Noanett Road at all times of the day, not just during commuter time periods. The Applicant will coordinate with the Town of Needham the final wording of the signs that will be installed at Noanett Road.

24. The Applicant has proposed installing BLIND DRIVEWAY and SLOW CHILDREN PLAYING signage along Noanett Road at the request of residents along this roadway as mitigation for the project. It is important to note that SLOW CHILDREN PLAYING signs are not compliant with Manual on Uniform Traffic Control Devices (MUTCD) signage as they provide a false sense of security to residents, they do not indicate a particular location of a potential hazard, they do not indicate what speed is actually safe for travel, and they generally do not reduce vehicle travel speed. These signs also pose liability issues for the municipality as they imply that it is safe for children to play in the roadway. The Applicant has proposed installing NO CUT-THROUGH traffic signage on Noanett Road and will be installing a traffic signal at the intersection of Central Avenue / Gould Street as mitigation for the project. The presence of the new traffic signal at Central Avenue / Gould Street will facilitate left-turns from Gould Street onto Central Avenue and reduce the appeal for and likelihood of cut-through traffic along Noanett Road. Therefore, the majority of traffic along Noanett Road should be local residential traffic who will be familiar with the area and the potential for children in or close to the roadway. As a result, GPI does not recommend installation of SLOW CHILDREN PLAYING signage along Noanett Road.

    Applicant Response: The Applicant agrees it may not be appropriate to install "Slow Children Playing" signage along Noanett Road. The Applicant will coordinate with the Town of Needham which signs will be installed along Noanett Road and at what locations. Those signs will be MUTCD compliant.

25. The BLIND DRIVEWAY signs are proposed along Noanett Road at the residents' request because some of the driveways are located in close proximity to curves where sight lines are an issue. The sight line restrictions for these driveways are the residents' own landscaping, which could be removed to eliminate the sight line restriction without the installation of these signs. These signs are not included in the MUTCD as they provide a false sense of security to the resident exiting the driveway, they do not provide any legal message, they do not tell the driver what speed is safe to travel, and they are not enforceable. When a sight line restriction exists at a driveway, the responsibility belongs to the property owner to ensure adequate sight lines are provided. Therefore, GPI does not recommend installation of these signs along Noanett Road. If the curves along Noanett Road require vehicles to travel slower than the enforced speed of the roadway, installation of curve warning signage with supplemental curve advisory speed placards in advance of the curve would be a better option.

    Applicant Response: The Applicant agrees it may not be appropriate to install "Blind Driveway" signage along Noanett Road and that it may be more appropriate to installed "Curve Warning" signage. The Applicant will coordinate with the Town of Needham which signs will be installed along Noanett Road and at what locations. Those signs will be MUTCD compliant.

Memorandum

Traffic Monitoring Program

26. Section 5.7.1 of the DEIR describes an on-site parking facility study that will be conducted as part of the monitoring program to count vehicles as they enter and exit each of the parking areas. While these counts may be effective in determining the volume of vehicle trips generated by the development during the peak hours, this data will not provide an assessment of the actual use of the parking areas. GPI recommends that the monitoring program include a parking utilization study to be conducted during the heaviest demand periods for the site as a whole and for each parking area to assess whether the parking provided in each area is meeting current parking demands. This should include a review of the utilization of EV charging stations, designated visitor or retail parking spaces, designated rideshare / carpool spaces if provided, and compact vehicle parking spaces to assess the need for modifications to the parking provisions.

    Applicant Response: The Applicant agrees to include an annual parking utilization study during a peak weekday condition at full occupancy for each parking area to assess whether the parking provided in each area is meeting current parking demands. As suggested, this assessment will include a review of the utilization of EV charging stations, designated visitor or retail parking spaces, designated rideshare / carpool spaces if provided, and compact vehicle parking spaces to assess the need for modifications to the parking provisions.

Attachments

- Intersection Capacity Analysis Summary Tables
- Revised Site Plans
- Signal Timing Clearance Interval Calculations
- Intersection Capacity Analysis Worksheets

Intersection Capacity Analysis Summary Tables

Table 1 Intersection Capacity Analysis Summary – Hunting Road at Kendrick Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Previous Mitigation [f]					2029 Build with Revised Mitigation [g]				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Hunting Road at Kendrick Street																				
Weekday Morning																				
Kendrick St EB L/T/R	0.43	19.5	B	109	#252	0.43	19.6	B	110	#253	0.49	23.5	C	124	#298	0.50	23.9	C	123	#304
Kendrick St WB L	0.23	11.0	B	20	71	0.23	11.0	B	20	71	0.26	13.6	B	23	77	0.27	13.8	B	23	77
Kendrick St WB T/R	0.31	12.4	B	72	213	0.33	12.7	B	78	227	0.37	15.8	B	93	249	0.37	15.7	B	90	244
Hunting Rd NB T/R	>1.20	>120	F	~285	#461	>1.20	>120	F	~285	#461	0.93	60.3	E	219	#386	0.94	64.3	E	221	#392
Hunting Rd NB R	0.39	0.7	A	0	0	0.39	0.7	A	0	0	0.39	0.7	A	0	0	0.39	0.7	A	0	0
Hunting Rd SB L	0.42	38.0	D	32	65	0.45	38.2	D	34	69	0.39	34.1	C	31	63	0.57	26.5	C	32	65
Hunting Rd SB T/R	0.14	24.3	C	28	60	0.14	24.3	C	27	60	0.11	20.8	C	24	54	0.12	21.0	C	25	56
Overall	**0.68**	**41.7**	**D**	-	-	**0.68**	**42.1**	**D**	-	-	**0.67**	**22.3**	**C**	-	-	**0.69**	**22.9**	**C**	-	-
Weekday Evening																				
Kendrick St EB L/T/R	0.57	36.3	D	68	97	0.57	36.5	D	68	97						0.57	36.5	D	70	102
Kendrick St WB L	0.58	9.0	A	126	196	0.58	9.2	A	126	196						0.58	8.8	A	129	214
Kendrick St WB T/R	0.41	7.8	A	112	174	0.42	8.0	A	113	176						0.41	8.4	A	111	176
Hunting Rd NB T/R	0.58	35.2	D	64	109	0.58	35.2	D	64	109	*Mitigation previously not proposed*					0.65	39.6	D	64	108
Hunting Rd NB R	0.10	0.10	A	0	0	0.10	0.1	A	0	0	*during weekday evening peak hour*					0.10	0.1	A	0	0
Hunting Rd SB L	0.26	23.5	C	26	57	0.33	23.7	C	34	71						0.38	24.7	C	35	72
Hunting Rd SB T/R	0.46	25.4	C	87	150	0.45	25.2	C	87	150						0.48	26.2	C	88	150
Overall	**0.65**	**16.5**	**B**	-	-	**0.65**	**16.6**	**B**	-	-						**0.68**	**17.1**	**B**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Previous mitigation includes that proposed in the DEIR.
g Revised mitigation includes adjustment of clearance intervals.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 2 Intersection Capacity Analysis Summary – Highland Avenue at Gould Street/Hunting Road

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Previous Mitigation [f]					2029 Build with Revised Mitigation [g]				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at Gould Street and Hunting Road																				
Weekday Morning																				
Highland Ave EB L	1.04	>120	F	~93	#234	>1.20	>120	F	~190	#353	0.96	115.7	F	153	#330	0.96	115.7	F	153	#330
Highland Ave EB T/R	0.86	40.2	D	364	#512	0.79	36.6	D	364	#512	0.66	30.2	C	363	503	0.68	32.1	C	374	515
Highland Ave WB L	0.58	58.6	E	36	83	0.61	65.3	E	38	83	0.42	61.4	E	42	83	0.33	58.9	E	41	81
Highland Ave WB T/R	0.94	52.1	D	362	#545	1.15	117.8	F	~616	#841	0.97	54.3	D	587	#797	0.96	53.8	D	587	#797
Hunting Rd NB L/T	0.96	89.0	F	206	#434	1.13	>120	F	~263	#480	0.96	96.8	F	265	#433	0.96	96.8	F	265	#433
Hunting Rd NB R	0.48	39.8	D	48	102	0.51	44.0	D	52	102	0.53	46.1	D	93	136	0.69	49.8	D	147	183
Gould St SB L	0.82	64.8	E	145	#281	0.91	84.5	F	182	#347	0.70	71.7	E	136	180	0.70	72.0	E	136	194
Gould St SB L/T/R	0.78	59.4	E	137	#264	0.88	77.3	E	175	#335	0.57	72.7	E	107	166	0.62	75.0	E	121	203
Overall	**0.98**	**55.1**	**E**	-	-	**1.20**	**100.2**	**F**	-	-	**0.95**	**55.5**	**E**	-	-	**0.96**	**56.1**	**E**	-	-
Weekday Evening																				
Highland Ave EB L	>1.20	>120	F	19	57	>1.20	>120	F	27	72	0.60	58.2	E	24	57	0.60	58.2	E	24	57
Highland Ave EB T/R	0.81	42.3	D	287	440	0.81	42.4	D	290	442	0.74	32.8	C	252	#373	0.74	32.8	C	252	#373
Highland Ave WB L	0.86	83.3	F	100	194	0.87	84.5	F	101	196	0.78	61.6	E	89	#182	0.78	61.6	E	89	#182
Highland Ave WB T/R	1.00	61.7	E	~535	#774	1.07	84.0	F	~599	#861	1.02	61.3	E	~527	#702	1.02	61.3	E	~527	#702
Hunting Rd NB L/T	0.56	51.4	D	66	127	0.58	52.2	D	70	134	0.73	61.0	E	65	#126	0.73	61.0	E	65	#126
Hunting Rd NB R	0.10	35.7	D	4	24	0.10	35.7	D	4	24	0.07	34.2	C	0	5	0.38	36.5	D	28	48
Gould St SB L	0.91	61.1	E	295	#574	>1.20	>120	F	~681	#1051	0.97	61.6	E	310	#376	0.97	61.6	E	310	#376
Gould St SB L/T/R	0.88	56.9	E	284	#554	>1.20	>120	F	~653	#1022	0.76	45.5	D	228	#239	0.81	49.1	D	248	#335
Overall	**1.03**	**59.5**	**E**	-	-	**>1.20**	**>120**	**F**	-	-	**1.05**	**52.9**	**D**	-	-	**1.05**	**53.4**	**D**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Previous mitigation includes that proposed in the DEIR.
g Revised mitigation includes No-Turn-on-Red restrictions for northbound and southbound approaches.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 3 Intersection Capacity Analysis Summary – Highland Avenue at West Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Previous Mitigation [f]					2029 Build with Revised Mitigation [g]				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at West Street																				
Weekday Evening																				
West St EB L	0.60	26.2	C	70	154	0.61	26.7	C	73	159	0.64	31.4	C	87	178	0.73	38.3	D	91	#203
West St EB T/R	0.46	20.9	C	123	251	0.46	20.9	C	123	251	0.48	24.9	C	148	281	0.52	27.0	C	153	193
West St WB L	0.36	30.7	C	35	88	0.36	30.7	C	35	88	0.39	36.2	D	42	98	0.43	37.8	D	43	102
West St WB T/R	0.66	36.3	D	117	229	0.66	36.3	D	117	229	0.71	44.3	D	140	256	0.79	51.2	D	142	#301
Highland Ave NB L/T/R	0.82	28.1	C	225	#664	0.83	29.0	C	229	#675	0.78	26.2	C	254	#669	0.74	22.7	C	240	#567
Highland Ave SB L/T/R	0.97	50.7	D	320	#889	1.05	72.0	E	369	#978	0.98	53.4	D	408	#994	0.94	40.7	D	385	#863
Overall	**0.81**	**35.3**	**D**	-	-	**0.85**	**43.3**	**D**	-	-	**0.84**	**38.4**	**D**	-	-	**0.84**	**34.9**	**C**	-	-

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Previous mitigation includes that proposed in the DEIR.
g Revised mitigation includes reallocating green time from the eastbound-westbound phases to the northbound-southbound phases.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 4 Intersection Capacity Analysis Summary – Highland Avenue at Webster Street

	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Previous Mitigation [f]					2029 Build with Revised Mitigation [g]				
Location / Movement	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Highland Avenue at Webster Street																				
Weekday Morning																				
Highland Ave EB L	0.14	22.7	C	13	50	0.14	22.7	C	13	50	0.12	22.1	C	14	52	0.13	20.8	C	13	49
Highland Ave EB T/R	1.00	67.6	E	290	#745	1.08	93.4	F	330	#830	0.92	49.1	D	366	#861	0.88	41.7	D	337	#785
Highland Ave WB L	0.55	20.9	C	32	109	0.55	21.5	C	32	109	0.63	27.0	C	39	#152	0.69	30.1	C	38	#143
Highland Ave WB T/R	0.64	18.5	B	180	473	0.64	18.6	B	182	480	0.61	19.1	B	223	531	0.62	19.3	B	213	503
Webster St NB L/T	0.90	56.0	E	189	#471	0.90	56.0	E	189	#471	0.86	54.6	D	223	#474	0.85	52.6	D	228	#516
Webster St NB R	0.40	24.4	C	25	122	0.40	24.4	C	25	122	0.47	30.2	C	51	177	0.52	32.1	C	65	213
Webster St SB L/T/R	>1.20	35.0	D	69	#160	>1.20	35.0	D	69	#160	>1.20	39.1	D	82	164	0.86	38.2	D	83	170
Overall	**0.91**	**39.2**	**D**	-	-	**0.95**	**46.3**	**D**	-	-	**0.87**	**36.8**	**D**	-	-	**0.85**	**35.1**	**D**	-	-

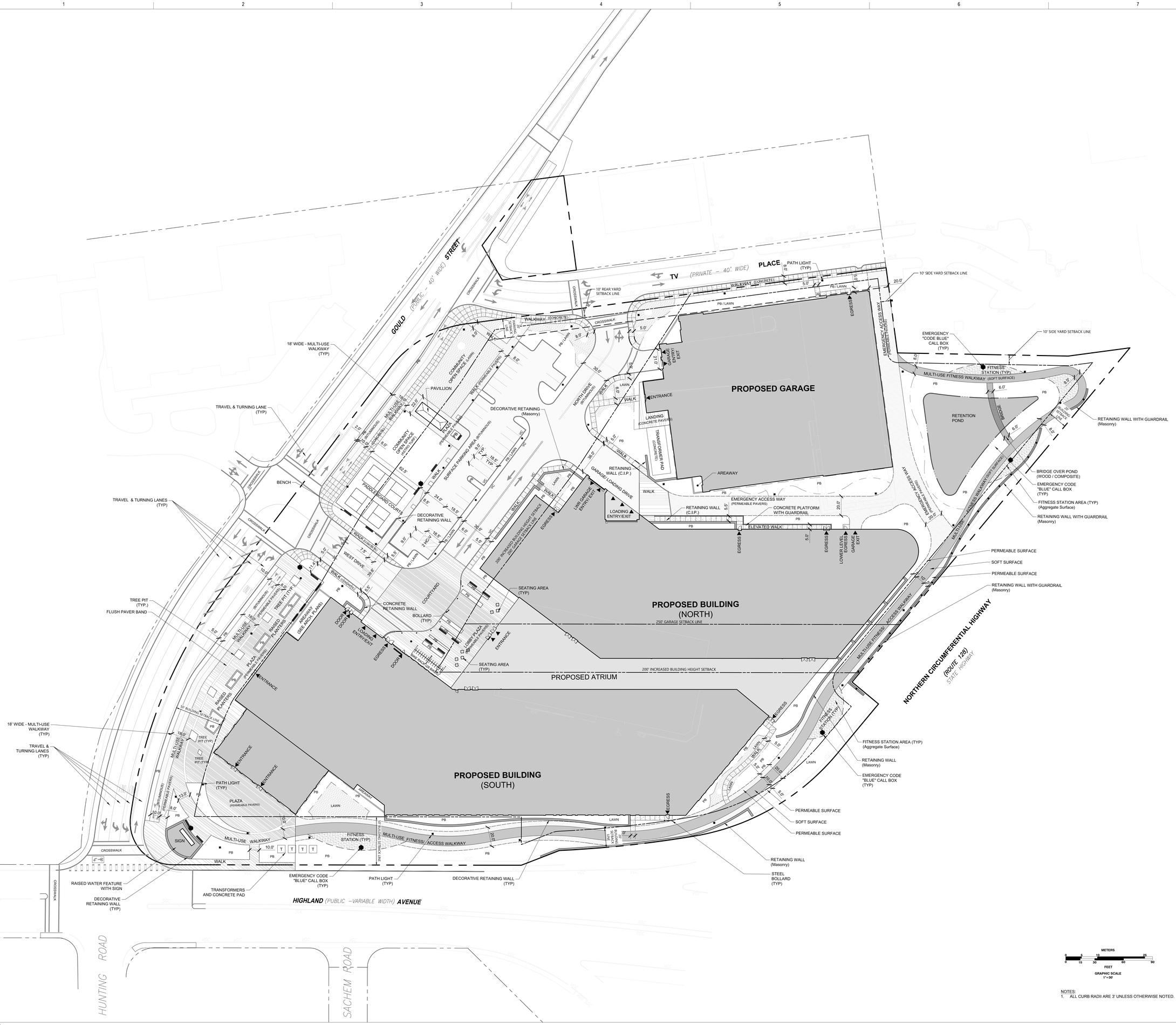
a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Previous mitigation includes that proposed in the DEIR.
g Revised mitigation includes reallocating green time from other phases to the eastbound-westbound through phases.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 5 Intersection Capacity Analysis Summary – Gould Street at Site Driveway / Wingate Driveway

Location / Movement	2029 No-Build Condition					2029 Build without Mitigation					2029 Build with Previous Mitigation [f]					2029 Build with Revised Mitigation [g]				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Gould Street at Wingate Driveway / Project Site Driveway																				
Weekday Morning																				
Wingate Dwy EB L/T/R	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.01	61.9	E	0	0	0.01	61.9	E	0	0
Site Dwy WB L											0.50	65.0	E	46	90	0.50	65.0	E	46	90
Site Dwy WB L/T/R											0.29	62.1	E	25	68	0.29	62.1	E	25	68
Gould St NB L/T											0.57	5.0	A	153	m273	n/a	n/a	n/a	n/a	n/a
Gould St NB L											n/a	n/a	n/a	n/a	n/a	0.02	3.1	A	1	m6
Gould St NB T											n/a	n/a	n/a	n/a	n/a	0.55	5.1	A	122	m295
Gould St NB R											0.31	4.0	A	22	m78	0.31	4.3	A	18	m87
Gould St SB L											0.08	3.1	A	3	24	0.08	3.1	A	3	24
Gould St SB T/R											0.15	3.0	A	20	88	0.15	3.0	A	20	88
Overall											**0.54**	**7.8**	**A**			**0.52**	**7.9**	**A**		
Weekday Evening																				
Wingate Dwy EB L/T/R	*Intersection unsignalized under 2029 No Build Conditions without Mitigation*					*Intersection unsignalized under 2029 Build Conditions without Mitigation*					0.03	43.4	D	0	12	0.03	43.3	D	0	12
Site Dwy WB L											0.75	44.2	D	174	187	0.75	44.2	D	174	187
Site Dwy WB L/T/R											0.70	41.6	D	163	176	0.70	41.6	D	163	176
Gould St NB L/T											0.31	10.7	B	56	m252	n/a	n/a	n/a	n/a	n/a
Gould St NB L											n/a	n/a	n/a	n/a	n/a	0.02	9.9	A	1	m6
Gould St NB T											n/a	n/a	n/a	n/a	n/a	0.30	10.6	B	54	m248
Gould St NB R											0.07	13.2	B	1	m30	0.06	13.4	B	1	m30
Gould St SB L											0.03	8.8	A	4	21	0.03	8.8	A	4	21
Gould St SB T/R											0.37	11.4	B	124	270	0.37	11.4	B	124	270
Overall											**0.44**	**21.8**	**C**			**0.44**	**21.7**	**C**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
f Previous mitigation includes that proposed in the DEIR.
g Revised mitigation includes dedicated northbound left-turn lane.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Revised Site Plans



Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street, 3rd Floor
Boston, MA 02135
Tel: (617) 234-3100 • www.stantec.com

Consultant

pfa
Landscape Architects + Planners
Urban Designers + Preservationists
PAUL FINGER ASSOCIATES
14 Story Street
Boston, Massachusetts 02241-4429
617 227 4911
www.paulfinger.com

By	Appd	YYYY.MM.DD	Issued/Revision
DEM	SWM	2022.06.15	SPECIAL PERMIT PACKAGE R1
DEM	SWM	2022.07.15	SPECIAL PERMIT PACKAGE R2
DEM	SWM	2022.08.12	SPECIAL PERMIT PACKAGE R3
DEM	SWM	2022.03.30	SPECIAL PERMIT PACKAGE

Permit/Seal

KEY PLAN

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.: 218421343
File Name:
Scale: 1" = 30'-0"

Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

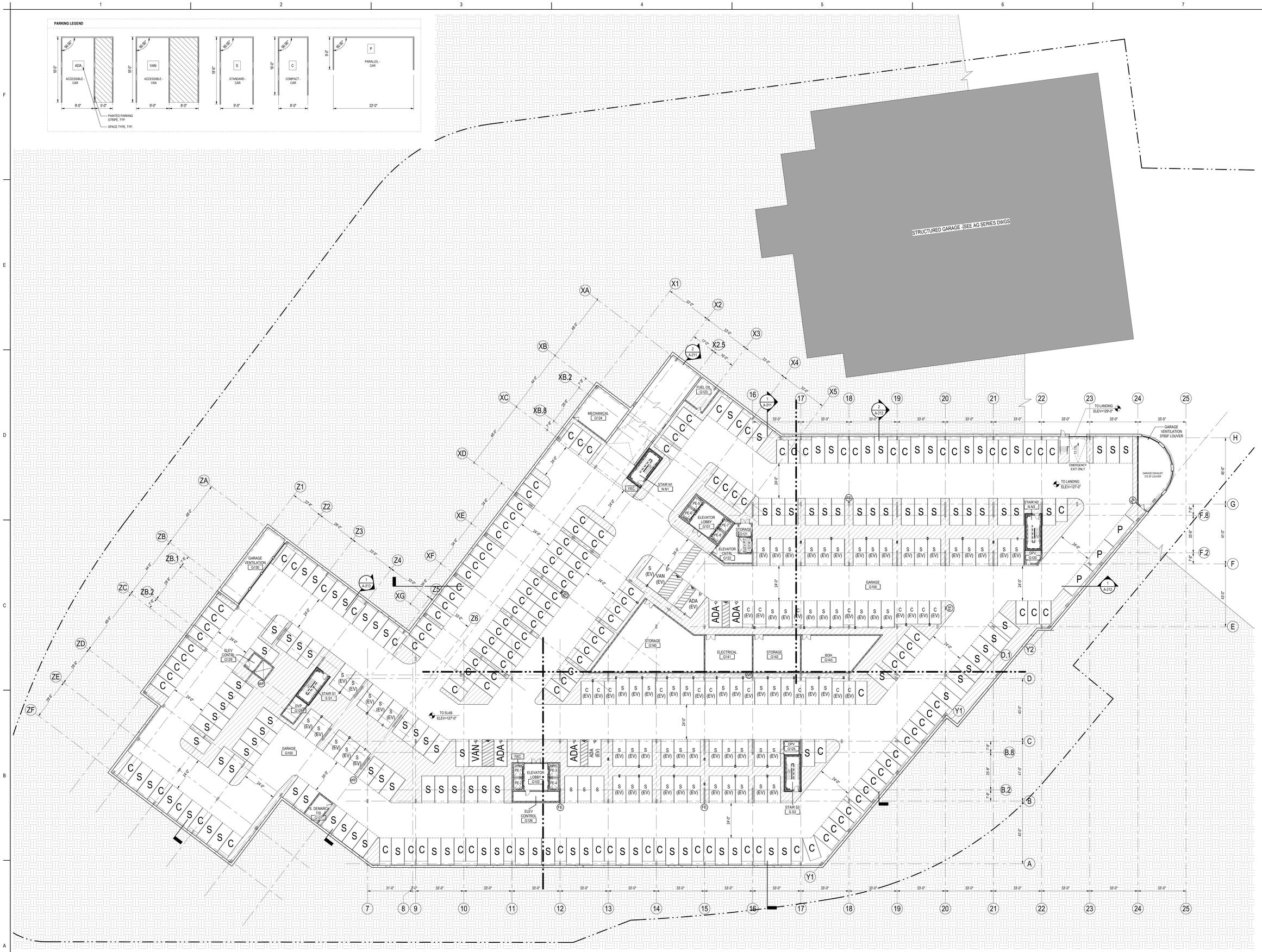
Title
SITE PLAN

Revision:
Drawing No.
L-1.0

METERS
0 5 10 25
0 15 30 60 90
FEET
GRAPHIC SCALE
1" = 30'

NOTES:
1. ALL CURB RADII ARE 3' UNLESS OTHERWISE NOTED.

ORIGINAL SHEET - ARCH E



1 GARAGE LEVEL G1 PLAN
A-100G1 — 1" = 20'-0"

Stantec
Stantec Architecture and Engineering P.C.
40 Wantor Street - 3rd Floor
Boston MA 02109
Tel: (617) 234-3100 • www.stantec.com

Consultant

Issued/Revision	By	Appd	YYYY.MM.DD
3RD PLANNING BOARD SUBMISSION			2022.08.15
DEP SUBMISSION			2022.07.15
30% DESIGN SUBMISSION			2022.03.30
30% CDs PLAN SUBMISSION			2022.03.30

Permit/Seal

KEY PLAN

PARKING COUNT	
Type Comments	Count

LEVEL G1	
ACCESSIBLE	4
ACCESSIBLE - EV SPACE	2
ACCESSIBLE VAN	1
ACCESSIBLE VAN - EV SPACE	1
COMPACT	151
COMPACT - EV SPACE	18
PARALLEL	3
STANDARD	112
STANTARD - EV SPACE	70
LEVEL G1: 362	362
GRAND TOTAL: 362	362

PARKING SYMBOLS

ADA =	ACCESSIBLE
ADA-EV =	ACCESSIBLE ELECTRIC VEHICLE
VAN =	ACCESSIBLE VAN
B =	BOLLARD - EMBEDDED IN SLAB
EV =	ELECTRIC VEHICLE
P=	PARALLEL
S =	STANDARD
WF =	WHEELED FIRE EXTINGUISHER

STALL STRIPING

SPECIAL PERMIT PACKAGE R1
08/15/2022
(FOR 09/07/2022 PLANNING BOARD SPECIAL PERMIT PUBLIC HEARING)

Client/Project
Bulfinch
HIGHLAND INNOVATION CENTER
557 Highland Ave.
Needham, MA 02494

Project No.:218421343
File Name: N/A
Scale: As indicated

Author	Designer	Checker	2022.04.24
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GARAGE LEVEL G1 - OVERALL PLAN & PARKING LEGEND

Revision:

Drawing No.
A-100G1

ORIGINAL SHEET - ARCH E

Signal Timing Clearance Interval Calculations

Traffic Signal Clearance Intervals

Yellow Times $Y = t + v/(2a + 2Gg)$

Where
- Y = Length of Yellow Time (sec), 3 second minimum
- t = Driver Perception Reaction Time (1.0sec)
- v = Speed of Vehicle (fps)
  - Thru Movement: 85th percentile speed OR posted plus 7mph
  - Left Turn: Posted minus 5 mph
- a = Driver Acceleration(10 ft/sec)
- G = Acceleration due to Gravity (32.2 f/sec^2)
- g = Grade of Approach (percent/ 100), measured about 5.0 seconds upstream

All Red Times $R = [(L + w)/v] - 1$

Where
- R = Length of Red Clearance Interval (sec), 1 second minimum
- L = Length of Vehicle (20 ft)
- w = Width of Intersection (ft)
  - Thru Movement: Stop Line to Outside Edge of Furthest Travel Lane or Nearest Farside Crosswalk lLne
  - Exclusive Left Turn: Along Vehicle Path from Stop Line to No-conflict Point
- v = Speed of Vehicle
  - Thru Movement: 85th percentile speed OR posted plus 7mph
  - Left Turn: 20mph

** See MASSDOT Guidance dated 1/8/2013for info on reducing EXCESSIVELY LONG clearances for PERMISSIVE or PROT/PERM LEFT turns

Location: Hunting Road at Kendrick Street

										Calculated		Rounded		Plan Value	
Phase	Movement	Posted or 85th Speed (mph)	Speed Adj. (if required) (mph)	Speed Used for Yellow Calc	Speed Used for Red Calc	Yellow v (ft/sec)	Red v (ft/sec)	g	W	YELLOW TIME (sec)	RED TIME (sec)	YELLOW TIME (sec)	RED TIME (sec)	YELLOW TIME (sec)	RED TIME (sec)
1	Kendrick St WB Left	20 mph	0 mph	20 mph	20 mph	29.4	29.4	-0.020	90	3.0	2.7	3.0	3.0	4.0	1.0
2	Kendrick St EB Through	37 mph	0 mph	37 mph	37 mph	54.4	54.4	0.020	95	3.6	1.1	3.5	1.0	4.0	1.0
4	Hunting Road SB Through	37 mph	0 mph	37 mph	37 mph	54.4	54.4	0.020	110	3.6	1.4	3.5	1.5	4.0	1.0
6	Kendrick St WB Through	37 mph	0 mph	37 mph	37 mph	54.4	54.4	-0.020	90	3.9	1.0	4.0	1.0	4.0	1.0
7	Hunting Road SB Left	20 mph	0 mph	20 mph	20 mph	29.4	29.4	0.020	100	3.0	3.1	3.0	3.0	4.0	1.0
8	Hunting Road NB Through	37 mph	0 mph	37 mph	37 mph	54.4	54.4	0.000	115	3.7	1.5	4.0	1.5	4.0	1.0

Rounding: n.0 to n.1 equals n.0, n.2 to n.6 equals n.5, n.7 to n.9 equals next whole number

Under:
Meets:
Over:

Intersection Capacity Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	0		100	150		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Confl. Bikes (#/hr)									1			
Peak Hour Factor	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Shared Lane Traffic (%)				34%								
Lane Group Flow (vph)	0	10	0	51	50	0	17	833	428	36	424	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		13.0	13.0		95.0	95.0	95.0	95.0	95.0	
Total Split (%)	20.0%	20.0%		9.6%	9.6%		70.4%	70.4%	70.4%	70.4%	70.4%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.07		0.43	0.36		0.02	0.53	0.32	0.08	0.14	
Control Delay		0.8		70.6	44.5		6.5	7.2	3.4	5.8	4.0	
Queue Delay		0.0		0.0	0.0		0.0	4.1	1.2	0.0	0.0	
Total Delay		0.8		70.6	44.5		6.5	11.4	4.6	5.8	4.0	
Queue Length 50th (ft)		0		46	25		1	122	18	3	20	
Queue Length 95th (ft)		0		90	68		m6	m295	m87	24	88	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)									100	150		
Base Capacity (vph)		313		128	147		792	1569	1339	460	2978	
Starvation Cap Reductn		0		0	0		0	638	667	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		0.03		0.40	0.34		0.02	0.89	0.64	0.08	0.14	

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 135	
Offset: 15 (11%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Future Volume (vph)	1	0	5	70	1	20	15	750	385	30	350	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes		1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.89		1.00	0.93		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	0.97		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1645		1681	1663		1770	1863	1551	1770	3537	
Flt Permitted		0.99		0.95	0.97		0.50	1.00	1.00	0.29	1.00	
Satd. Flow (perm)		1645		1681	1663		940	1863	1551	545	3537	
Peak-hour factor, PHF	0.63	0.63	0.63	0.90	0.90	0.90	0.90	0.90	0.90	0.83	0.83	0.83
Adj. Flow (vph)	2	0	8	78	1	22	17	833	428	36	422	2
RTOR Reduction (vph)	0	10	0	0	21	0	0	0	41	0	0	0
Lane Group Flow (vph)	0	0	0	51	29	0	17	833	387	36	424	0
Confl. Bikes (#/hr)									1			
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		5.8		8.3	8.3		108.9	108.9	108.9	108.9	108.9	
Effective Green, g (s)		5.8		8.3	8.3		108.9	108.9	108.9	108.9	108.9	
Actuated g/C Ratio		0.04		0.06	0.06		0.81	0.81	0.81	0.81	0.81	
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		70		103	102		758	1502	1251	439	2853	
v/s Ratio Prot		c0.00		c0.03	0.02			c0.45			0.12	
v/s Ratio Perm							0.02		0.25	0.07		
v/c Ratio		0.01		0.50	0.29		0.02	0.55	0.31	0.08	0.15	
Uniform Delay, d1		61.8		61.3	60.5		2.6	4.6	3.4	2.7	2.9	
Progression Factor		1.00		1.00	1.00		1.20	1.03	1.23	1.00	1.00	
Incremental Delay, d2		0.0		3.7	1.6		0.0	0.4	0.2	0.4	0.1	
Delay (s)		61.9		65.0	62.1		3.1	5.1	4.3	3.1	3.0	
Level of Service		E		E	E		A	A	A	A	A	
Approach Delay (s)		61.9			63.6			4.8			3.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

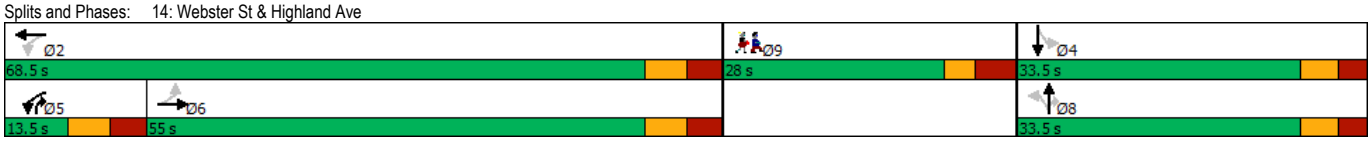
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30	
Future Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	150		0	150		0	0		150	0		200	
Storage Lanes	1		0	1		0	0		1	0		1	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			No			Yes			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1325			691			391			2983		
Travel Time (s)		30.1			15.7			8.9			67.8		
Confl. Peds. (#/hr)	7					7	1		7	7		1	
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.94	0.94	0.94	0.88	0.88	0.88	0.87	0.87	0.87	0.88	0.88	0.88	
Heavy Vehicles (%)	4%	3%	0%	0%	2%	4%	1%	1%	0%	0%	1%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	37	649	0	142	591	0	0	385	466	0	290	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA		
Protected Phases		6		5	2			8	5		4		9
Permitted Phases	6			2			8		8	4			
Detector Phase	6	6		5	2		8	8	5	4	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		7.0
Minimum Split (s)	17.5	17.5		13.5	17.5		12.5	12.5	13.5	12.5	12.5		28.0
Total Split (s)	55.0	55.0		13.5	68.5		33.5	33.5	13.5	33.5	33.5		28.0
Total Split (%)	42.3%	42.3%		10.4%	52.7%		25.8%	25.8%	10.4%	25.8%	25.8%		22%
Yellow Time (s)	4.0	4.0		4.0	4.0		3.5	3.5	4.0	3.5	3.5		3.0
All-Red Time (s)	3.5	3.5		3.5	3.5		3.0	3.0	3.5	3.0	3.0		4.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Lost Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5		
Lead/Lag	Lag	Lag		Lead					Lead				
Lead-Lag Optimize?													
Recall Mode	Min	Min		None	Min		None	None	None	None	None		None
v/c Ratio	0.12	0.84		0.65	0.59			0.80	0.66		0.86dl		
Control Delay	22.2	38.9		30.4	19.8			51.5	14.7		40.9		
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay	22.2	38.9		30.4	19.8			51.5	14.7		40.9		
Queue Length 50th (ft)	13	337		38	213			228	65		83		
Queue Length 95th (ft)	49	#785		#143	503			#516	213		170		
Internal Link Dist (ft)		1245			611			311			2903		
Turn Bay Length (ft)	150			150					150				
Base Capacity (vph)	338	857		217	1090			480	707		509		
Starvation Cap Reductn	0	0		0	0			0	0		0		
Spillback Cap Reductn	0	0		0	0			0	0		0		
Storage Cap Reductn	0	0		0	0			0	0		0		
Reduced v/c Ratio	0.11	0.76		0.65	0.54			0.80	0.66		0.57		

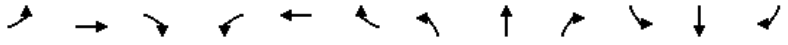
Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 103.5	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 14: Webster St & Highland Ave





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30
Future Volume (vph)	35	595	15	125	460	60	20	315	405	85	140	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.98			1.00	0.85		0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.98	
Satd. Flow (prot)	1729	1839		1805	1821			1875	1574		3453	
Flt Permitted	0.40	1.00		0.12	1.00			0.96	1.00		0.55	
Satd. Flow (perm)	727	1839		224	1821			1811	1574		1920	
Peak-hour factor, PHF	0.94	0.94	0.94	0.88	0.88	0.88	0.87	0.87	0.87	0.88	0.88	0.88
Adj. Flow (vph)	37	633	16	142	523	68	23	362	466	97	159	34
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	216	0	0	0
Lane Group Flow (vph)	37	648	0	142	591	0	0	385	250	0	290	0
Confl. Peds. (#/hr)	7					7	1		7	7		1
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	4%	3%	0%	0%	2%	4%	1%	1%	0%	0%	1%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	Perm	NA	
Protected Phases		6		5	2			8	5		4	
Permitted Phases	6			2			8		8	4		
Actuated Green, G (s)	43.8	43.8		57.4	57.4			27.4	33.5		27.4	
Effective Green, g (s)	43.8	43.8		57.4	57.4			27.4	33.5		27.4	
Actuated g/C Ratio	0.40	0.40		0.53	0.53			0.25	0.31		0.25	
Clearance Time (s)	7.5	7.5		7.5	7.5			6.5	7.5		6.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	291	738		206	958			454	483		482	
v/s Ratio Prot		c0.35		0.04	c0.32				0.03			
v/s Ratio Perm	0.05			0.32				c0.21	0.13		0.15	
v/c Ratio	0.13	0.88		0.69	0.62			0.85	0.52		0.86dl	
Uniform Delay, d1	20.6	30.2		20.9	18.1			38.9	31.2		36.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.2	11.5		9.2	1.2			13.7	0.9		2.1	
Delay (s)	20.8	41.7		30.1	19.3			52.6	32.1		38.2	
Level of Service	C	D		C	B			D	C		D	
Approach Delay (s)		40.6			21.4			41.4			38.2	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	109.1	Sum of lost time (s)	28.5
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

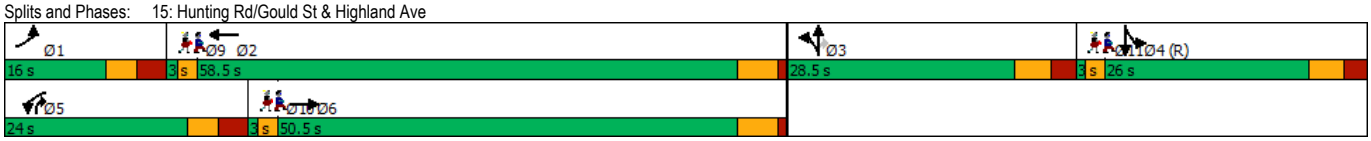
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

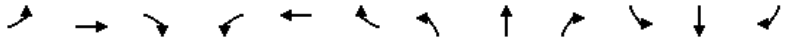
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			No			No			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Peds. (#/hr)	1		1	1		1									
Confl. Bikes (#/hr)									1						
Peak Hour Factor	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	172	1040	0	49	1484	0	0	301	273	309	144	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	5	4	4		9	10	11
Permitted Phases									3						
Detector Phase	1	6		5	2		3	3	5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0	6.0	6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0	12.0	29.5	29.5		3.0	3.0	3.0
Total Split (s)	16.0	50.5		24.0	58.5		28.5	28.5	24.0	26.0	26.0		3.0	3.0	3.0
Total Split (%)	11.9%	37.4%		17.8%	43.3%		21.1%	21.1%	17.8%	19.3%	19.3%		2%	2%	2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5	3.0	3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5	3.0	2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead	Lead				Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min	None	C-Min	C-Min		None	None	None
v/c Ratio	0.96	0.68		0.33	1.00			0.96	0.69	0.66	0.59				
Control Delay	117.3	35.2		63.4	56.2			98.4	35.4	69.3	72.2				
Queue Delay	0.0	0.0		0.0	2.2			4.6	0.0	0.0	0.0				
Total Delay	117.3	35.2		63.4	58.4			103.0	35.4	69.3	72.2				
Queue Length 50th (ft)	153	374		41	587			265	147	136	121				
Queue Length 95th (ft)	#330	515		81	#797			#433	183	194	203				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	179	1520		240	1479			312	481	509	266				
Starvation Cap Reductn	0	0		0	0			0	0	0	0				
Spillback Cap Reductn	0	0		0	12			7	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	0.96	0.68		0.20	1.01			0.99	0.57	0.61	0.54				

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 135	
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green	
Natural Cycle: 145	
Control Type: Actuated-Coordinated	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave





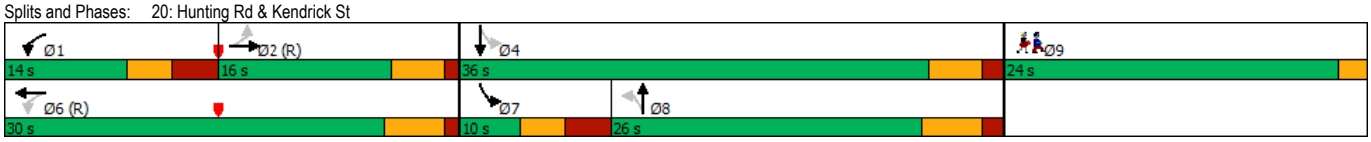
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Future Volume (vph)	150	890	15	45	605	760	25	240	240	290	90	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.92			1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3530		1805	3194			1874	1601	3400	1781	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3530		1805	3194			1874	1601	3400	1781	
Peak-hour factor, PHF	0.87	0.87	0.87	0.92	0.92	0.92	0.88	0.88	0.88	0.94	0.94	0.94
Adj. Flow (vph)	172	1023	17	49	658	826	28	273	273	309	96	48
RTOR Reduction (vph)	0	1	0	0	159	0	0	0	0	0	0	0
Lane Group Flow (vph)	172	1039	0	49	1325	0	0	301	273	309	144	0
Confl. Peds. (#/hr)	1		1	1		1						
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	3%	2%	0%	0%	5%	1%	0%	1%	0%	3%	2%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	pm+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	5	4	4	
Permitted Phases									3			
Actuated Green, G (s)	13.8	58.1		11.1	58.1			22.5	33.6	17.6	17.6	
Effective Green, g (s)	13.8	58.1		11.1	58.1			22.5	33.6	17.6	17.6	
Actuated g/C Ratio	0.10	0.43		0.08	0.43			0.17	0.25	0.13	0.13	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	179	1519		148	1374			312	398	443	232	
v/s Ratio Prot	c0.10	0.29		0.03	c0.41			c0.16	0.06	c0.09	0.08	
v/s Ratio Perm									0.11			
v/c Ratio	0.96	0.68		0.33	0.96			0.96	0.69	0.70	0.62	
Uniform Delay, d1	60.3	31.0		58.4	37.4			55.9	45.9	56.2	55.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.13	1.14	
Incremental Delay, d2	55.3	1.0		0.5	16.3			40.9	3.9	8.7	11.8	
Delay (s)	115.7	32.1		58.9	53.8			96.8	49.8	72.0	75.0	
Level of Service	F	C		E	D			F	D	E	E	
Approach Delay (s)		43.9			53.9			74.4			73.0	
Approach LOS		D			D			E			E	

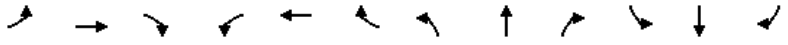
Intersection Summary			
HCM 2000 Control Delay	56.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10	
Future Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	190		0	0		400	125		0	
Storage Lanes	0		1	1		0	0		1	1		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			Yes			Yes			Yes	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		442			443			907			3028		
Travel Time (s)		10.0			10.1			20.6			68.8		
Confl. Peds. (#/hr)							2					2	
Confl. Bikes (#/hr)			1										
Peak Hour Factor	0.83	0.83	0.83	0.97	0.97	0.97	0.91	0.91	0.91	0.92	0.92	0.92	
Heavy Vehicles (%)	0%	1%	0%	4%	4%	3%	0%	1%	0%	2%	2%	8%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	584	0	88	325	0	0	395	632	82	76	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA		
Protected Phases		2		1	6			8		7	4		9
Permitted Phases	2			6			8		Free	4			
Detector Phase	2	2		1	6		8	8		7	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		7.0	10.0		10.0	10.0		2.0	10.0		1.0
Minimum Split (s)	16.0	16.0		14.0	28.0		15.5	15.5		9.0	27.0		24.0
Total Split (s)	16.0	16.0		14.0	30.0		26.0	26.0		10.0	36.0		24.0
Total Split (%)	17.8%	17.8%		15.6%	33.3%		28.9%	28.9%		11.1%	40.0%		27%
Yellow Time (s)	3.5	3.5		3.0	4.0		4.0	4.0		3.0	3.5		2.0
All-Red Time (s)	1.0	1.0		3.0	1.0		1.5	1.5		3.0	1.5		0.0
Lost Time Adjust (s)		0.0		0.0	0.0			0.0		0.0	0.0		
Total Lost Time (s)		4.5		6.0	5.0			5.5		6.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead			
Lead-Lag Optimize?													
Recall Mode	C-Min	C-Min		None	C-Min		None	None		None	None		None
v/c Ratio		0.44		0.25	0.35			0.94	0.39	0.54	0.13		
Control Delay		26.5		17.9	16.7			67.7	0.7	35.5	18.5		
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay		26.5		17.9	16.7			67.7	0.7	35.5	18.5		
Queue Length 50th (ft)		123		23	90			221	0	32	25		
Queue Length 95th (ft)		#304		77	244			#392	0	65	56		
Internal Link Dist (ft)		362			363			827			2948		
Turn Bay Length (ft)				190					400	125			
Base Capacity (vph)		1322		367	919			427	1615	152	626		
Starvation Cap Reductn		0		0	0			0	0	0	0		
Spillback Cap Reductn		0		0	0			0	0	0	0		
Storage Cap Reductn		0		0	0			0	0	0	0		
Reduced v/c Ratio		0.44		0.24	0.35			0.93	0.39	0.54	0.12		

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 20: Hunting Rd & Kendrick St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10
Future Volume (vph)	30	455	0	85	230	85	5	355	575	75	60	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		6.0	5.0			5.5	4.0	6.0	5.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.96			1.00	0.85	1.00	0.98	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3565		1736	1757			1880	1615	1770	1801	
Flt Permitted		0.92		0.28	1.00			1.00	1.00	0.15	1.00	
Satd. Flow (perm)		3273		511	1757			1876	1615	280	1801	
Peak-hour factor, PHF	0.83	0.83	0.83	0.97	0.97	0.97	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	36	548	0	88	237	88	5	390	632	82	65	11
RTOR Reduction (vph)	0	0	0	0	11	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	584	0	88	314	0	0	395	632	82	69	0
Confl. Peds. (#/hr)							2					2
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	1%	0%	4%	4%	3%	0%	1%	0%	2%	2%	8%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		Free	4		
Actuated Green, G (s)		32.4		43.8	43.8			20.1	90.0	29.8	29.8	
Effective Green, g (s)		32.4		43.8	43.8			20.1	90.0	29.8	29.8	
Actuated g/C Ratio		0.36		0.49	0.49			0.22	1.00	0.33	0.33	
Clearance Time (s)		4.5		6.0	5.0			5.5		6.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)		1178		328	855			418	1615	145	596	
v/s Ratio Prot				0.02	0.18					0.02	0.04	
v/s Ratio Perm		c0.18		0.11				c0.21	c0.39	0.17		
v/c Ratio		0.50		0.27	0.37			0.94	0.39	0.57	0.12	
Uniform Delay, d1		22.4		13.6	14.4			34.4	0.0	23.5	20.9	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.5		0.2	1.2			29.9	0.7	3.0	0.0	
Delay (s)		23.9		13.8	15.7			64.3	0.7	26.5	21.0	
Level of Service		C		B	B			E	A	C	C	
Approach Delay (s)		23.9			15.3			25.2			23.9	
Approach LOS		C			B			C			C	

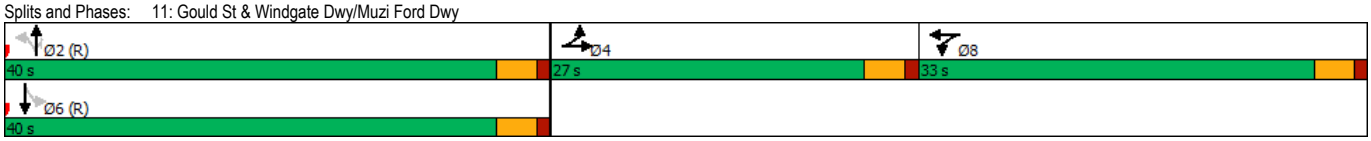
Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

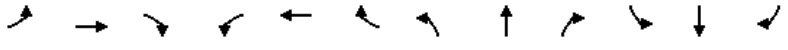
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	13	13	12	12	12	12	12	12
Storage Length (ft)	0		0	0		0	50		100	150		0
Storage Lanes	0		0	1		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		151			225			398			315	
Travel Time (s)		3.4			5.1			9.0			7.2	
Peak Hour Factor	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Shared Lane Traffic (%)				44%								
Lane Group Flow (vph)	0	41	0	280	277	0	6	331	93	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		11.0	11.0		15.0	15.0	15.0	23.0	23.0	
Total Split (s)	27.0	27.0		33.0	33.0		40.0	40.0	40.0	40.0	40.0	
Total Split (%)	27.0%	27.0%		33.0%	33.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Min	C-Min	C-Min	C-Min	C-Min	
v/c Ratio		0.20		0.75	0.71		0.02	0.29	0.09	0.03	0.36	
Control Delay		8.5		48.3	43.8		18.6	13.9	8.1	15.4	13.9	
Queue Delay		0.0		0.0	0.0		0.0	0.6	0.0	0.0	0.1	
Total Delay		8.5		48.3	43.8		18.6	14.5	8.1	15.4	14.0	
Queue Length 50th (ft)		0		174	163		1	54	1	4	124	
Queue Length 95th (ft)		12		187	176		m6	m248	m30	21	270	
Internal Link Dist (ft)		71			145			318			235	
Turn Bay Length (ft)							50		100	150		
Base Capacity (vph)		413		487	503		351	1124	986	573	2134	
Starvation Cap Reductn		0		0	0		0	449	0	0	0	
Spillback Cap Reductn		4		0	0		0	0	0	0	276	
Storage Cap Reductn		0		0	0		0	0	0	0	0	
Reduced v/c Ratio		0.10		0.57	0.55		0.02	0.49	0.09	0.03	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Gould St & Windgate Dwy/Muzi Ford Dwy





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Future Volume (vph)	1	0	30	360	1	40	5	285	80	15	700	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00		0.95	0.95		1.00	1.00	1.00	1.00	0.95	
Frt		0.87		1.00	0.97		1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	0.96		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1615		1681	1705		1770	1863	1583	1770	3536	
Flt Permitted		1.00		0.95	0.96		0.31	1.00	1.00	0.51	1.00	
Satd. Flow (perm)		1615		1681	1705		582	1863	1583	950	3536	
Peak-hour factor, PHF	0.75	0.75	0.75	0.72	0.72	0.72	0.86	0.86	0.86	0.92	0.92	0.92
Adj. Flow (vph)	1	0	40	500	1	56	6	331	93	16	761	5
RTOR Reduction (vph)	0	38	0	0	10	0	0	0	33	0	0	0
Lane Group Flow (vph)	0	3	0	280	267	0	6	331	60	16	766	0
Turn Type	Split	NA		Split	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2		2	6		
Actuated Green, G (s)		7.0		22.3	22.3		58.7	58.7	58.7	58.7	58.7	
Effective Green, g (s)		7.0		22.3	22.3		58.7	58.7	58.7	58.7	58.7	
Actuated g/C Ratio		0.07		0.22	0.22		0.59	0.59	0.59	0.59	0.59	
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		113		374	380		341	1093	929	557	2075	
v/s Ratio Prot		c0.00		c0.17	0.16			0.18			c0.22	
v/s Ratio Perm							0.01		0.04	0.02		
v/c Ratio		0.03		0.75	0.70		0.02	0.30	0.06	0.03	0.37	
Uniform Delay, d1		43.3		36.2	35.8		8.6	10.4	8.9	8.7	10.9	
Progression Factor		1.00		1.00	1.00		1.14	0.99	1.50	1.00	1.00	
Incremental Delay, d2		0.1		8.0	5.8		0.0	0.4	0.1	0.1	0.5	
Delay (s)		43.4		44.2	41.6		9.9	10.6	13.4	8.8	11.4	
Level of Service		D		D	D		A	B	B	A	B	
Approach Delay (s)		43.4			42.9			11.2			11.3	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100	
Future Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	120		0	100		0	0		0	0		0	
Storage Lanes	1		0	1		0	0		0	0		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			No			No			No			No	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		318			371			476			549		
Travel Time (s)		7.2			8.4			10.8			12.5		
Confl. Peds. (#/hr)	7		8	8		7	4		36	36		4	
Peak Hour Factor	0.87	0.87	0.87	0.86	0.86	0.86	0.89	0.89	0.89	0.93	0.93	0.93	
Heavy Vehicles (%)	3%	0%	0%	0%	2%	2%	1%	8%	0%	0%	3%	6%	
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0	
Parking (#/hr)							0	0	0	0	0	0	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	207	327	0	81	250	0	0	562	0	0	753	0	
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases	1	1 2			2			3			3		9
Permitted Phases	2	2		2			3			3			
Detector Phase	1	1 2		2	2		3	3		3	3		
Switch Phase													
Minimum Initial (s)	6.0			10.0	10.0		10.0	10.0		10.0	10.0		7.0
Minimum Split (s)	11.5			15.0	15.0		15.0	15.0		15.0	15.0		20.0
Total Split (s)	16.0			23.0	23.0		56.0	56.0		56.0	56.0		20.0
Total Split (%)	13.9%			20.0%	20.0%		48.7%	48.7%		48.7%	48.7%		17%
Yellow Time (s)	4.5			3.0	3.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	1.0			1.0	1.0		1.0	1.0		1.0	1.0		0.0
Lost Time Adjust (s)	0.0			0.0	0.0			0.0			0.0		
Total Lost Time (s)	5.5			4.0	4.0			5.0			5.0		
Lead/Lag	Lead			Lag	Lag								
Lead-Lag Optimize?													
Recall Mode	None			None	None		Min	Min		Min	Min		None
v/c Ratio	0.74	0.54		0.42	0.77			0.73			0.92		
Control Delay	44.5	31.5		44.7	56.4			26.7			41.4		
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0		
Total Delay	44.5	31.5		44.7	56.4			26.7			41.4		
Queue Length 50th (ft)	91	153		43	142			240			385		
Queue Length 95th (ft)	#203	293		102	#301			#567			#863		
Internal Link Dist (ft)		238			291			396			469		
Turn Bay Length (ft)	120			100									
Base Capacity (vph)	280	634		205	344			771			816		
Starvation Cap Reductn	0	0		0	0			0			0		
Spillback Cap Reductn	0	0		0	0			0			0		
Storage Cap Reductn	0	0		0	0			0			0		
Reduced v/c Ratio	0.74	0.52		0.40	0.73			0.73			0.92		

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 97.9
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Highland Ave & West St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100
Future Volume (vph)	180	235	50	70	155	60	25	420	55	30	570	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		4.0	4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.96			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1749	1840		1780	1765			1552			1613	
Flt Permitted	0.29	1.00		0.56	1.00			0.95			0.96	
Satd. Flow (perm)	543	1840		1055	1765			1471			1556	
Peak-hour factor, PHF	0.87	0.87	0.87	0.86	0.86	0.86	0.89	0.89	0.89	0.93	0.93	0.93
Adj. Flow (vph)	207	270	57	81	180	70	28	472	62	32	613	108
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	207	327	0	81	250	0	0	562	0	0	753	0
Confl. Peds. (#/hr)	7		8	8		7	4		36	36		4
Heavy Vehicles (%)	3%	0%	0%	0%	2%	2%	1%	8%	0%	0%	3%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	2	2	2	0	0	0
Parking (#/hr)							0	0	0	0	0	0
Turn Type	D.P+P	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	1 2			2			3			3	
Permitted Phases	2	2		2			3			3		
Actuated Green, G (s)	28.5	34.0		17.9	17.9			51.4			51.4	
Effective Green, g (s)	28.5	34.0		17.9	17.9			51.4			51.4	
Actuated g/C Ratio	0.29	0.34		0.18	0.18			0.52			0.52	
Clearance Time (s)	5.5			4.0	4.0			5.0			5.0	
Vehicle Extension (s)	3.0			3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	284	628		189	317			759			803	
v/s Ratio Prot	c0.08	0.18			c0.14							
v/s Ratio Perm	0.13			0.08				0.38			c0.48	
v/c Ratio	0.73	0.52		0.43	0.79			0.74			0.94	
Uniform Delay, d1	29.3	26.2		36.3	39.0			18.8			22.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	9.0	0.8		1.6	12.2			3.9			18.2	
Delay (s)	38.3	27.0		37.8	51.2			22.7			40.7	
Level of Service	D	C		D	D			C			D	
Approach Delay (s)		31.4			47.9			22.7			40.7	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	99.5	Sum of lost time (s)	16.5
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

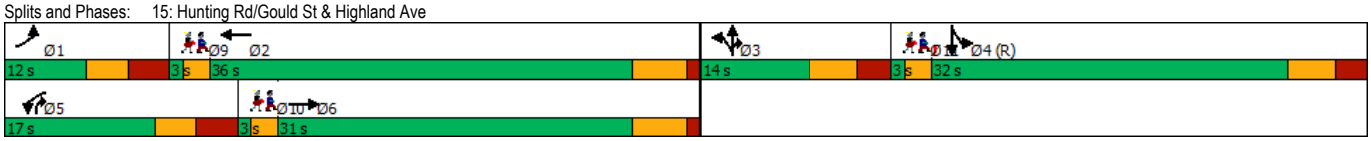
c Critical Lane Group

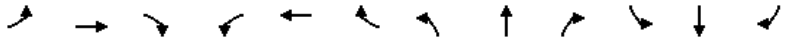
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	Ø10	Ø11
Lane Configurations															
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900			
Storage Length (ft)	175		0	165		400	0		150	200		200			
Storage Lanes	1		0	1		0	0		1	1		0			
Taper Length (ft)	25			25			25			25					
Right Turn on Red			Yes			Yes			No			No			
Link Speed (mph)		30			30			30			30				
Link Distance (ft)		345			745			3028			398				
Travel Time (s)		7.8			16.9			68.8			9.0				
Confl. Bikes (#/hr)						1									
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83			
Shared Lane Traffic (%)															
Lane Group Flow (vph)	38	819	0	142	1352	0	0	102	108	922	392	0			
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA				
Protected Phases	1	6		5	2		3	3	3 5	4	4		9	10	11
Permitted Phases															
Detector Phase	1	6		5	2		3	3	3 5	4	4				
Switch Phase															
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0		1.0	1.0	1.0
Minimum Split (s)	12.0	20.0		12.0	25.0		12.0	12.0		21.0	21.0		3.0	3.0	3.0
Total Split (s)	12.0	31.0		17.0	36.0		14.0	14.0		32.0	32.0		3.0	3.0	3.0
Total Split (%)	12.0%	31.0%		17.0%	36.0%		14.0%	14.0%		32.0%	32.0%		3%	3%	3%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.5	3.5		3.5	3.5		2.0	2.0	2.0
All-Red Time (s)	3.0	1.0		3.0	1.0		2.5	2.5		2.5	2.5		0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0		0.0	0.0				
Total Lost Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0				
Lead/Lag	Lead			Lead			Lead	Lead					Lag	Lag	Lag
Lead-Lag Optimize?															
Recall Mode	None	Min		None	Min		Min	Min		C-Min	C-Min		None	None	None
v/c Ratio	0.36	0.80		0.78	1.02			0.73	0.38	0.93	0.78				
Control Delay	55.0	40.1		71.9	62.3			74.0	21.9	54.5	47.1				
Queue Delay	0.0	0.0		0.0	0.2			3.7	0.0	5.1	1.6				
Total Delay	55.0	40.1		71.9	62.5			77.7	21.9	59.6	48.7				
Queue Length 50th (ft)	24	252		89	~527			65	28	310	248				
Queue Length 95th (ft)	57	#373		#182	#702			#126	48	#376	#335				
Internal Link Dist (ft)		265			665			2948			318				
Turn Bay Length (ft)	175			165					150	200					
Base Capacity (vph)	106	1027		194	1324			147	300	987	502				
Starvation Cap Reductn	0	0		0	0			0	0	43	30				
Spillback Cap Reductn	0	0		0	1			13	0	0	0				
Storage Cap Reductn	0	0		0	0			0	0	0	0				
Reduced v/c Ratio	0.36	0.80		0.73	1.02			0.76	0.36	0.98	0.83				

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 4:SBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
~ 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.

Splits and Phases: 15: Hunting Rd/Gould St & Highland Ave





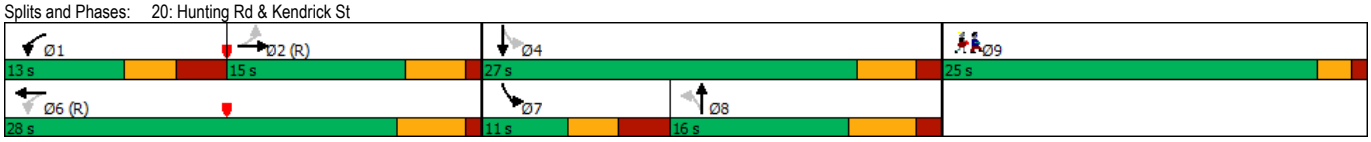
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Future Volume (vph)	35	725	20	135	1015	270	20	65	90	765	190	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0		6.0	5.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.97			1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3525		1770	3413			1841	1583	3433	1747	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3525		1770	3413			1841	1583	3433	1747	
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	38	797	22	142	1068	284	24	78	108	922	229	163
RTOR Reduction (vph)	0	2	0	0	22	0	0	0	0	0	0	0
Lane Group Flow (vph)	38	817	0	142	1330	0	0	102	108	922	392	0
Confl. Bikes (#/hr)						1						
Turn Type	Prot	NA		Prot	NA		Split	NA	pt+ov	Split	NA	
Protected Phases	1	6		5	2		3	3	3 5	4	4	
Permitted Phases												
Actuated Green, G (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Effective Green, g (s)	3.6	31.5		10.3	38.2			7.6	17.9	27.6	27.6	
Actuated g/C Ratio	0.04	0.32		0.10	0.38			0.08	0.18	0.28	0.28	
Clearance Time (s)	6.0	5.0		6.0	5.0			6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	63	1110		182	1303			139	283	947	482	
v/s Ratio Prot	0.02	0.23		c0.08	c0.39			c0.06	0.07	c0.27	0.22	
v/s Ratio Perm												
v/c Ratio	0.60	0.74		0.78	1.02			0.73	0.38	0.97	0.81	
Uniform Delay, d1	47.5	30.5		43.7	30.9			45.2	36.2	35.8	33.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.09	1.07	
Incremental Delay, d2	10.7	2.2		17.8	30.4			15.8	0.3	22.4	13.0	
Delay (s)	58.2	32.8		61.6	61.3			61.0	36.5	61.6	49.1	
Level of Service	E	C		E	E			E	D	E	D	
Approach Delay (s)		33.9			61.3			48.4			57.9	
Approach LOS		C			E			D			E	

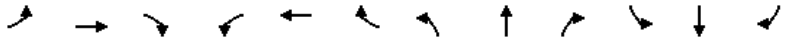
Intersection Summary			
HCM 2000 Control Delay	53.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	27.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15	
Future Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		100	190		0	0		400	125		0	
Storage Lanes	0		1	1		0	0		1	1		0	
Taper Length (ft)	25			25			25			25			
Right Turn on Red			Yes			Yes			Yes			Yes	
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		442			443			907			3028		
Travel Time (s)		10.0			10.1			20.6			68.8		
Peak Hour Factor	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.94	0.94	0.94	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	276	0	500	473	0	0	134	163	90	218	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA		
Protected Phases		2		1	6			8		7	4		9
Permitted Phases	2			6			8		Free	4			
Detector Phase	2	2		1	6		8	8		7	4		
Switch Phase													
Minimum Initial (s)	10.0	10.0		7.0	10.0		10.0	10.0		5.0	10.0		7.0
Minimum Split (s)	15.0	15.0		13.0	15.0		15.5	15.5		11.0	15.5		25.0
Total Split (s)	15.0	15.0		13.0	28.0		16.0	16.0		11.0	27.0		25.0
Total Split (%)	18.8%	18.8%		16.3%	35.0%		20.0%	20.0%		13.8%	33.8%		31%
Yellow Time (s)	3.5	3.5		3.0	4.0		4.0	4.0		3.0	3.5		2.0
All-Red Time (s)	1.0	1.0		3.0	1.0		1.5	1.5		3.0	1.5		1.0
Lost Time Adjust (s)		0.0		0.0	0.0			0.0		0.0	0.0		
Total Lost Time (s)		4.5		6.0	5.0			5.5		6.0	5.0		
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead			
Lead-Lag Optimize?													
Recall Mode	C-Min	C-Min		None	C-Min		None	None		None	None		None
v/c Ratio		0.57		0.58	0.41			0.57	0.10	0.38	0.48		
Control Delay		36.1		12.5	9.2			42.9	0.1	28.3	28.3		
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0		
Total Delay		36.1		12.5	9.2			42.9	0.1	28.3	28.3		
Queue Length 50th (ft)		70		129	111			64	0	35	88		
Queue Length 95th (ft)		102		214	176			108	0	72	150		
Internal Link Dist (ft)		362			363			827			2948		
Turn Bay Length (ft)				190					400	125			
Base Capacity (vph)		490		857	1160			243	1583	237	510		
Starvation Cap Reductn		0		0	0			0	0	0	0		
Spillback Cap Reductn		0		0	0			0	0	0	0		
Storage Cap Reductn		0		0	0			0	0	0	0		
Reduced v/c Ratio		0.56		0.58	0.41			0.55	0.10	0.38	0.43		

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 80	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	

Splits and Phases: 20: Hunting Rd & Kendrick St





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15
Future Volume (vph)	15	235	2	475	405	45	1	110	135	85	190	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		6.0	5.0			5.5	4.0	6.0	5.0	
Lane Util. Factor		0.95		1.00	1.00			1.00	1.00	1.00	1.00	
Frt		1.00		1.00	0.99			1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)		3525		1770	1835			1862	1583	1770	1842	
Flt Permitted		0.91		0.33	1.00			1.00	1.00	0.40	1.00	
Satd. Flow (perm)		3214		621	1835			1856	1583	746	1842	
Peak-hour factor, PHF	0.91	0.91	0.91	0.95	0.95	0.95	0.83	0.83	0.83	0.94	0.94	0.94
Adj. Flow (vph)	16	258	2	500	426	47	1	133	163	90	202	16
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	275	0	500	470	0	0	134	163	90	214	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Free	pm+pt	NA	
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		Free	4		
Actuated Green, G (s)		12.0		50.5	50.5			8.9	80.0	19.5	19.5	
Effective Green, g (s)		12.0		50.5	50.5			8.9	80.0	19.5	19.5	
Actuated g/C Ratio		0.15		0.63	0.63			0.11	1.00	0.24	0.24	
Clearance Time (s)		4.5		6.0	5.0			5.5		6.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)		482		865	1158			206	1583	234	448	
v/s Ratio Prot				c0.24	0.26					0.02	c0.12	
v/s Ratio Perm		0.09		c0.13				c0.07	0.10	0.07		
v/c Ratio		0.57		0.58	0.41			0.65	0.10	0.38	0.48	
Uniform Delay, d1		31.6		8.2	7.3			34.1	0.0	24.4	25.9	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.8		0.6	1.1			5.5	0.1	0.4	0.3	
Delay (s)		36.5		8.8	8.4			39.6	0.1	24.7	26.2	
Level of Service		D		A	A			D	A	C	C	
Approach Delay (s)		36.5			8.6			17.9			25.8	
Approach LOS		D			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

REF.: NEX-2200133.00

August 30, 2022

Ms. Lee Newman
Director of Planning and Community Development
Needham Department of Public Works
500 Dedham Avenue
Needham, MA 02492

SUBJECT: Highland Science Center, Gould Street, Needham, MA
Traffic Peer Review – Response to Comments Review

Dear Ms. Newman:

On behalf of the Town of Needham, ***Greenman-Pedersen Inc.*** (GPI) previously performed a review of the of the *Transportation Impact and Access Study*[1] (TIAS) prepared by Vanasse Hangen Brustlin, Inc. (VHB) for review by the Town of Needham for the proposed Highland Science Center in Needham, Massachusetts. The comments associated with this review were provided to the Town in a letter dated May 27, 2022. Subsequent to the issuance of the May 2022 review letter, the Applicant's consultant team has provided the following additional materials for review in response to GPI's initial comments on the TIAS:

- *Conceptual Design – Offsite Roadway Improvements*; prepared by Vanasse Hangen Brustlin, Inc. (VHB); June 27, 2022;
- *Response to Transportation Impact and Access Study Traffic Peer Review Comments dated May 27, 2022 by Greenman-Pedersen Inc. (GPI), 557 Highland Avenue, Needham, Massachusetts*; prepared by VHB; June 29, 2022.
- *Revised Site Plan, Highland Science Center, Needham Heights, Massachusetts*; prepared by VHB; July 14, 2022.
- *Draft Environmental Impact Report, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); July 2022;
- *Needham Special Permit Package R1, 557 Highland Avenue, Needham, MA;* prepared by Stantec and VHB; August 15, 2022;
- *Highland Innovation Center – 557 Highland Avenue, Needham Heights, Massachusetts – Application for Major Project Site Plan Review and Special Permits – Revisions dated as of September 7, 2022 Planning Board Public Hearing Letter #3;* prepared by Goulston & Storrs; August 15, 2022.

Following receipt and review of the above documents from the Applicant's team, GPI provided an additional comment letter dated August 18, 2022 to the Town for submission to the Massachusetts Environmental Policy Act (MEPA) office, summarizing our comments related to the MEPA *Draft Environmental Impact Report* (DEIR) for the proposed development. A copy of GPI's comments on the DEIR is attached for reference. To address GPI's comments in the August 18, 2022 letter, the Applicant's team prepared the following additional documents:

- *Response to MEPA DEIR – Traffic Peer Review by Greenman-Pedersen Inc. (GPI) dated 8/18/2022, 557 Highland Avenue, Needham, Massachusetts;* prepared by VHB; August 29, 2022.

GPI has reviewed the Applicant's responses and additional traffic analysis and generally found that the responses adequately address GPI's comments on the DEIR. The following summarizes the comments that

[1] *Transportation Impact and Access Study, Highland Science Center, Needham, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); March 2022.

remain outstanding and GPI's recommendations for mitigation and conditions of approval of the proposed Highland Science Center. The original comment numbers from the DEIR review letter have been retained for ease of reference.

Changes Since TIAS

1. As initially submitted to the Town, the Project was proposed to include extensive widening along Gould Street to provide five travel lanes approaching the intersection with Highland Avenue (a dedicated right-turn lane, a through lane, two left-turn lanes, and a receiving lane), as well as bicycle lanes along each side of the roadway. This plan was consistent with the concept plans prepared as part of the Town's rezoning effort for a development of the site with ±880,000 SF of office, R&D, and retail space. The currently proposed project consists of only ±530,000 SF of development, with only 10,000 SF being retail space. The reduction in square footage has reduced the volume of traffic anticipated to be generated by the proposed development. The capacity and queue analysis prepared by the Applicant as part of the ENF and DEIR indicates that a five-lane cross-section along Gould Street is not warranted for a project of this scale. As such, the concept plans have been modified to reduce Gould Street to a four-lane section with a shared through/right-turn lane, two left-turn lanes and one receiving lane. This modification will allow for improved pedestrian and bicycle accommodations along the corridor with the construction of a separated bicycle facility along the east side of Gould Street, a bicycle-accommodating shoulder along the west side, and upgraded sidewalks along both sides of the street. GPI supports this design change in favor of providing a multi-modal, Complete Streets design of Gould Street.

2. The project also previously included a dedicated right-turn lane on Gould Street northbound at TV Place, which has been eliminated as part of the currently proposed concept plans. The analysis provided by the Applicant indicates that this intersection can operate well without the dedicated right-turn lane based on the trip generation and distribution projections contained in the ENF and DEIR. However, the location of the parking garage and entrance close to TV Place may encourage office employees to utilize TV Place for access into the garage to avoid activity near the front door and Atrium. In addition, the right-turn lane may be warranted in the future if the Channel 5 site is ever redeveloped. Therefore, the Applicant has committed to monitoring traffic operations at the Gould Street / TV Place intersection to assess the need for a right-turn lane as part of the post-occupancy monitoring program and designing the site to accommodate the future widening of Gould Street to provide this right-turn lane if and when it is determined to be needed.

3. With the provision of the separated bicycle facility on the east side of Gould Street, the Applicant has proposed a new crosswalk with either LED warning signs or rectangular rapid flashing beacons (RRFBs) on Gould Street at the abandoned railroad right-of-way. GPI concurs with the location of this crosswalk as the railroad may be converted to a shared-use path in the future. GPI recommended consideration be given to implementing a passive detection system such as video or thermal detection to assist bicyclists in crossing without the need to dismount their bicycles to activate a push-button. Passive detection would be particularly beneficial if the railroad is converted to a shared-use path. The Applicant has committed to implementing a passive detection system if desired by the Town.

Collision History

5. The collision diagram contained in the DEIR for the Hunting Road / Kendrick Street intersection indicates a high occurrence of crashes between vehicles traveling eastbound on Kendrick Street and through vehicles in both directions on Hunting Road. This may be an indication of red-light-running and insufficient clearance intervals at the intersection. The Applicant has proposed signal timing modifications at this intersection to optimize the operations. As part of this retiming, GPI recommended that the Applicant review the clearance intervals to ensure they are adequate for the geometry of the intersection. The Applicant has performed an appropriate review of the clearance intervals and recommended updated the yellow and red clearance intervals accordingly. The capacity analysis provided by the Applicant indicates that the longer clearance intervals will have minimal impact on the operations of the intersection and will provide a significant safety

benefit. Therefore, GPI recommends these updated clearance intervals be incorporated into the revised signal timings at this location.

Transportation Operations Analysis

7. The results of the Applicant's updated capacity and queue analysis summarized in Table 1 of VHB's August 29th Response to Comments letter indicates that the proposed improvements at the Highland Avenue / Gould Street / Hunting Road intersection will mitigate the project's impacts at this location. The Applicant has also committed to installing adaptive signal controls at this intersection, which will further improve the operations by ensuring that the timings are optimized for all time periods as further growth and development occurs in the area. The Applicant should also consider installation of GridSmart or other high definition cameras, equipped with communication to the Needham Police Department for incident management and traffic monitoring.

8. The Applicant has revised the capacity and queue analysis at the Highland Avenue / West Street intersection to better optimize the operations of the overall intersection. GPI concurs with these revised signal timings.

9. The Applicant has revised the capacity and queue analysis at the Highland Avenue / Webster Street intersection to better optimize the operations of the overall intersection. GPI concurs with these revised signal timings.

Parking

12. The Project includes the construction of a below-grade parking garage to be under the building, as well as a stand-along parking garage. The provision of multiple parking areas on-site with no connections between these parking areas other than via the single internal project roadway has the potential to create excessive recirculation of vehicles on-site looking for empty spaces and to cause congestion along the site roadway. The internal roadway is only approximately 500 feet long in its entirety and will include a drop-off area at the Atrium, and two separate intersections with driveways into the surface lot and two parking garages, as well as at least one pedestrian crossing over that short distance. Less than 100 feet of stacking distance is proposed between the drop-off zone and Gould Street when the capacity analysis results show queues on the driveway extending nearly 200 feet. Additional turns into and out of the parking areas to look for empty parking spaces will create additional congestion that has the potential to back onto TV Place and Gould Street. To alleviate this issue, the Applicant has committed to providing a parking monitoring and driver alert system to let drivers know when the underground parking is full and direct them to park in the stand-alone garage instead. The system will also monitor the parking and alert drivers to the availability of parking in the stand-alone garage on a floor-by-floor basis.

15. To encourage the use of electric vehicles, the Applicant has committed to providing free use of the EV charging stations by employees within the parking garages for at least the first five years following opening and will re-evaluate EV parking policies at that time.

Transportation Demand Management

17. The Applicant is proposing to implement a shuttle between the site and nearby public transportation services, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. The Applicant has also committed to allowing area residents and employees to utilize the shuttle, which will provide an additional benefit to the surrounding community.

18. The DEIR notes that based on U.S. Census information, approximately five percent of Needham employees commute to work via public transportation, walking, and bicycling. The Applicant has committed to a target mobility goal of 10 percent, which is a substantial improvement over current mode share trends.

Mitigation Measures

19. An updated Site Plan has been included in the August 29th Response letter that demonstrates the proposed geometric modifications along Gould Street. It appears that the linework along Highland Avenue at the intersection of Gould Street / Kendrick Street is consistent with the MassDOT improvement plans along Highland Avenue, but there is not enough detail provided on the plans to determine this. The Applicant should provide a plan that clearly shows how the proposed improvements to be constructed by the Applicant will tie into MassDOT's improvements along Highland Avenue. This should include the layout of all signal equipment that will be necessary to accommodate the Applicant's proposed improvements.

20. An updated Site Plan has been included in the August 29th Response letter, which shows how the site plan will tie into the roadway layout. While this plan does reflect the required setbacks from the existing roadway layout, the plan does not indicate the proposed right-of-way boundaries following the proposed roadway widening. A portion of the site frontage will need to be conveyed to the Town either through a permanent conveyance of the land or through an access easement. A plan should be provide to indicate any proposed adjustments to the public right-of-way, as well as any easements over the Applicant's property required to serve the roadway, bicycle facility, and sidewalks along Gould Street.

21. The Applicant is willing to install a dedicated 50-foot left-turn pocket on Gould Street northbound at the Wingate Driveway if desired by the Town. Although the volume of left-turns entering Wingate is low, the occasional left-turn has the potential to back up traffic on Gould Street into the intersection of Highland Avenue. This left-turn pocket would allow a left-turn vehicle to wait for a gap in southbound traffic in a dedicate lane while allowing through traffic to continue flowing on Gould Street northbound.

23. The Applicant is proposing to install signage along Noanett Road to restrict the roadway to local traffic only during the weekday morning and afternoon time periods. Cut-through traffic should be discouraged during all times of the day, not just during commuter time periods. Therefore, if such signage is to be installed, it should restrict the roadway to local traffic during all times.

24. The Applicant previously proposed installing BLIND DRIVEWAY and SLOW CHILDREN PLAYING signage along Noanett Road at the request of residents along this roadway as mitigation for the project. It is important to note that SLOW CHILDREN PLAYING signs are not compliant with Manual on Uniform Traffic Control Devices (MUTCD) signage as they provide a false sense of security to residents, they do not indicate a particular location of a potential hazard, they do not indicate what speed is actually safe for travel, and they generally do not reduce vehicle travel speed. These signs also pose liability issues for the municipality as they imply that it is safe for children to play in the roadway. The Applicant has proposed installing NO CUT-THROUGH traffic signage on Noanett Road and will be installing a traffic signal at the intersection of Central Avenue / Gould Street as mitigation for the project. The presence of the new traffic signal at Central Avenue / Gould Street will facilitate left-turns from Gould Street onto Central Avenue and reduce the appeal for and likelihood of cut-through traffic along Noanett Road. Therefore, the majority of traffic along Noanett Road should be local residential traffic who will be familiar with the area and the potential for children in or close to the roadway. As a result, GPI does not recommend installation of SLOW CHILDREN PLAYING signage along Noanett Road.

25. The BLIND DRIVEWAY signs are proposed along Noanett Road at the residents' request because some of the driveways are located in close proximity to curves where sight lines are an issue. The sight line restrictions for these driveways are the residents' own landscaping, which could be removed to eliminate the sight line restriction without the installation of these signs. These signs are not included in the MUTCD as they provide a false sense of security to the resident exiting the driveway, they do not provide any legal message, they do not tell the driver what speed is safe to travel, and they are not enforceable. When a sight line restriction exists at a driveway, the responsibility belongs to the property owner to ensure adequate sight lines are provided. Therefore, GPI does not recommend installation of these signs along Noanett Road. If the curves along Noanett Road require vehicles to travel slower than the enforced speed of the roadway, installation of

curve warning signage with supplemental curve advisory speed placards in advance of the curve would be a better option.

Traffic Monitoring Program

26. The Applicant has committed to including a parking utilization study as part of the post-occupancy monitoring program to be conducted during the heaviest demand periods for the site as a whole and for each parking area to assess whether the parking provided in each area is meeting current parking demands. This study will include a review of the utilization of EV charging stations, designated visitor or retail parking spaces, designated rideshare / carpool spaces if provided, and compact vehicle parking spaces to assess the need for modifications to the parking provisions.

Site Access and Circulation

The following additional comments are in regards to the Applicant's June 29, 2022 Response to Comments letter for comments related to the site access and circulation. The original comment numbers from the June 29th letter have been retained for ease of reference.

31. The Applicant has revised the site plan to indicate a pedestrian walkway will be provided from the surface parking lot along the northerly side of the site driveway connecting to the front door of the building. No crosswalk is proposed on the plan to get pedestrians to the opposite side of the site roadway. In addition, this sidewalk location pushes pedestrians to the most heavily-congested vehicle space on the site where pedestrians will need to cross at an uncontrolled crossing where vehicles will not be required to stop while making turning movements. In addition, pedestrian will either need to cross the roadway twice or make a long diagonal crossing to access the building. GPI recommends the Applicant consider an alternative location for a pedestrian crossing, such as at the internal 4-way intersection near the surface parking and below-ground parking garage driveways, or at a mid-block location between the atrium and the surface parking entrance.

32. The alignment of the TV Place entrance has been modified to reduce the offset as a driver passes through the intersection of TV Place and the proposed site roadway. However, the entrance lane continues to provide a skewed alignment that has the potential for drivers to drive over the curb when passing through the intersection. GPI recommends additional sliver widening of TV Place to the east of the site roadway to provide a more gradual shift of the entrance lane.

Should you have any questions regarding these comments, please contact me directly at 603-766-5223.

Sincerely,

GREENMAN–PEDERSEN, INC.

Rebecca L. Brown, P.E.
Senior Project Manager

ATTACHMENTS:
- GPI's August 18, 2022 DEIR Comment Letter

REF.: NEX-2200133.00

August 18, 2022

Ms. Lee Newman
Director of Planning and Community Development
Needham Department of Public Works
500 Dedham Avenue
Needham, MA 02492

SUBJECT: Highland Science Center, Gould Street, Needham, MA
MEPA DEIR – Traffic Peer Review

Dear Ms. Newman:

On behalf of the Town of Needham, ***Greenman-Pedersen Inc.*** (GPI) performed a review of the *Draft Environmental Impact Report*[1] (DEIR) prepared by Vanasse Hangen Brustlin, Inc. (VHB) for review by the Massachusetts Environmental Policy Act (MEPA) office for the proposed Highland Science Center in Needham, Massachusetts. The site is located on the northeast corner of the intersection of Highland Avenue and Gould Street, and currently contains a Muzi Ford car dealership, Charles River Media Group and WCVB Channel 5. The site was recently part of a rezoning effort by the Town to allow for the development of up to ±880,000 square feet (SF) of office, research and development (R&D), and ancillary retail and service space. GPI has reviewed the DEIR and supporting traffic analysis for consistency with the goals and studies prepared as part of the Town's rezoning, as well as for compliance with the MEPA Certificate issued on the *Environmental Notification Form* (ENF)[2], Massachusetts Department of Transportation (MassDOT) guidelines for traffic impact analysis and general engineering practice. The following summarizes GPI's comments related to the DEIR.

Changes Since ENF

1. At the time of the ENF filing, the Project was proposed to include extensive widening along Gould Street to provide five travel lanes approaching the intersection with Highland Avenue (a dedicated right-turn lane, a through lane, two left-turn lanes, and a receiving lane), as well as bicycle lanes along each side of the roadway. This plan was consistent with the concept plans prepared as part of the Town's rezoning effort for a development of the site with ±880,000 SF of office, R&D, and retail space. The currently proposed project consists of only ±530,000 SF of development, with only 10,000 SF being retail space. The reduction is square footage has reduced the volume of traffic anticipated to be generated by the proposed development. The capacity and queue analysis prepared by the Applicant as part of the ENF and DEIR indicates that a five-lane cross-section along Gould Street is not warranted for a project of this scale. As such, the concept plans have been modified to reduce Gould Street to a four-lane section with a shared through/right-turn lane, two left-turn lanes and one receiving lane. This modification will allow for improved pedestrian and bicycle accommodations along the corridor with the construction of a separated bicycle facility along the east side of Gould Street, a bicycle-accommodating shoulder along the west side, and upgraded sidewalks along both sides of the street. GPI supports this design change in favor of providing a multi-modal, Complete Streets design of Gould Street.

2. The project also previously included a dedicated right-turn lane on Gould Street northbound at TV Place, which has been eliminated as part of the currently proposed concept plans. The analysis provided by the Applicant indicates that this intersection can operate well without the dedicated right-turn lane based on the

[1] *Draft Environmental Impact Report, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); July 2022.
[2] *Environmental Notification Form, Highland Science Center, Needham Heights, Massachusetts;* prepared by Vanasse Hangen Brustlin, Inc. (VHB); March 2022.

trip generation and distribution projections contained in the ENF and DEIR. However, the location of the parking garage and entrance close to TV Place may encourage office employees to utilize TV Place for access into the garage to avoid activity near the front door and Atrium. Therefore, GPI recommends that the site be designed to accommodate the potential future widening to provide a right-turn lane if needed, and that the post-occupancy traffic monitoring program include a review of the Gould Street / TV Place intersection to assess whether a right-turn lane is warranted at this location based on traffic operations. The design should include locating the proposed new Town right-of-way lines for Gould Avenue in a manner that will allow for future widening to provide a right-turn lane if and when needed. This will also ensure that adequate right-of-way is available should the Channel 5 site ever be redeveloped as contemplated in the Town's recent rezoning effort.

3. With the provision of the separated bicycle facility on the east side of Gould Street, the Applicant has proposed a new crosswalk with either LED warning signs or rectangular rapid flashing beacons (RRFBs) on Gould Street at the abandoned railroad right-of-way. GPI concurs with the location of this crosswalk as the railroad may be converted to a shared-use path in the future. The DEIR does not describe how the warning signs or RRFBs would be activated. Consideration should be given to implementing a passive detection system such as video or thermal detection to assist bicyclists in crossing without the need to dismount their bicycles to activate a push-button. Passive detection would be particularly beneficial if the railroad is converted to a shared-use path.

4. Section 1.3.2.3 of the DEIR describes that 25 percent of the proposed parking spaces will be equipped with EV charging stations and the Applicant will consider means to increase capacity for EV stations in the future as demand increases. GPI recommends that the EV stations within the surface parking lot be high-speed charging stations as these spaces will be primarily utilized by visitors and retail patrons who will make shorter trips to the site. For the purposes of efficient fire suppression, EV charging stations within the parking garage should be located along the outside walls of the garage.

Collision History

5. The collision diagram contained in the DEIR for the Hunting Road / Kendrick Street intersection indicates a high occurrence of crashes between vehicles traveling eastbound on Kendrick Street and through vehicles in both directions on Hunting Road. This may be an indication of red-light-running and insufficient clearance intervals at the intersection. The Applicant has proposed signal timing modifications at this intersection to optimize the operations. As part of this retiming, GPI recommends that the Applicant review the existing clearance intervals on all signal phases to verify that they are appropriate for the geometry of the intersection and adjust the timings accordingly.

Transportation Operations Analysis

6. The concept plans for the Highland Avenue / Gould Street / Hunting Road intersection contained in the DEIR indicate that bicycle boxes are proposed along Highland Avenue to allow two-stage left-turn movements for bicyclists using the bike lanes on either side of the roadway. With these bike boxes, the bike box is located on the far side of the intersection in front of the opposing through lane. For example, a bicyclist traveling westbound on Highland Avenue that wanted to turn left onto Hunting Road would travel straight through the intersection and wait in the bike box in front of the Gould Street southbound vehicles for the Gould Street southbound phase to be activated and then complete the turn by traveling south to Hunting Road. Because the bike box will be located in front of the through lane, right-turn-on-red movements must be prohibited when a two-stage bike box is provided. The analysis of the 2029 Build with Improvements condition prepared by the Applicant as part of the DEIR does not include a restriction of right-turn-on-red movements on the Gould Street southbound and Hunting Road northbound approaches. Therefore, the analysis results incorrectly represent improved operations at the intersection. The Applicant should update the analysis to reflect the required turn restrictions and re-evaluate whether a right-turn lane will be required on Gould Street southbound or whether additional improvements will be needed with these turn restrictions in place.

7. As the geometric modifications at the Highland Avenue / Gould Street / Hunting Road intersection will require substantial upgrades to existing signal equipment, the Applicant should consider installation of adaptive signal controls at this location as a means of further improving operations and ensuring that timings are optimized for all time periods as further growth and development occurs in the surrounding area. The Applicant should also consider installation of GridSmart or other high definition cameras, equipped with communication to the Needham Police Department for incident management and traffic monitoring.

8. As part of our review of the ENF, GPI noted that the Highland Avenue southbound approach to West Street will operate over capacity with long delays during the weekday PM peak hour under 2029 Build conditions, with an increase in delay of 22 seconds per vehicle generated by the project and requested that the Applicant review options to improve the operations of the intersection. The Applicant has proposed increasing the cycle length at the intersection and modifying the split times to reduce the delay on the southbound approach by approximately 19 seconds to bring the movement below capacity and back to a nearly No-Build condition. While this signal timing modification will reduce the delay on the southbound approach, the increase in cycle length will actually increase the queues on the southbound approach, which has the potential to create additional collisions at a location that already experiences a crash rate higher than the statewide average. It appears that the Applicant has designed the signal timing modifications to maintain the 2029 No-Build delays and queues on all other intersection approaches to the maximum extent feasible, rather than reoptimizing the intersection operations as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations. This may mean that other movements will experience longer delays and queues than estimated under 2029 No-Build conditions in order to improve the operations of the southbound approach.

9. Similarly, the analysis contained in the ENF indicated the Highland Avenue eastbound through/right-turn movement at the intersection with Webster Street will operate over capacity during the weekday AM peak hour under 2029 Build conditions, with an increase in delay of 26 seconds per vehicle generated by the project. The Applicant has proposed increasing the cycle length and modifying split times to reduce the delay on the eastbound through/right-turn movement. While the delay will be reduced to less than No-Build conditions as a result of these signal timing changes, the queues on this movement will increase by five vehicles and the Webster Street southbound approach will continue operating over capacity. Several of the movements at the intersection are anticipated to operate at LOS B or C under 2029 Build conditions with excess capacity. Therefore, it appears that the modified timings have been designed solely to reduce delay on the eastbound through/right-turn movement and do not consider the overall operations of the intersection as a whole. GPI recommends that the Applicant reconsider the proposed timing changes at this location to optimize the operations of the entire intersection. This may require delay or queues to increase on some movements as compared to 2029 No-Build conditions in order to improve the delays and queues on other movements.

10. The analysis contained in the ENF also indicated that, although not heavily impacted by project-generated traffic, the Highland Avenue westbound left/through movement at the intersection with 1st Avenue will be well over capacity during the weekday PM peak hour under both 2029 No-Build and Build conditions. The Applicant has proposed signal timing modifications at this intersection to reduce delay on the westbound left/through movement. While Table 5-7 indicates that the movement will still continue to operate over capacity, the timing changes will significantly reduce the delay on the westbound approach well below the 2029 No-Build condition and mitigate the Project's impacts on operations at this location.

11. The Applicant is proposing significant geometric modifications and signal improvements at the Highland Avenue / Gould Street / Hunting Road intersection as mitigation for the Project. The capacity and queue analysis contained in the ENF showed that some movements would still be operating at level-of-service (LOS) F and over capacity under 2029 Build conditions with the proposed improvements. The Applicant has since modified the improvement plan, as well as the signal timings at the intersection, to optimize the intersection operations. In most cases, the modifications result in 2029 Build conditions that are either improved from or similar to No-Build conditions. However, GPI notes that during the weekday PM peak hour, the Highland Avenue westbound through / right-turn movement is still anticipated to operate over capacity under 2029 Build

with improvements conditions. The opposing eastbound left-turn will operate at approximately 60 percent of capacity at LOS E during the same time period. The Applicant should consider a slight modification to the proposed signal timings to remove some green time from the eastbound left-turn and provide additional green time for the westbound through movement to better optimize operations. This may be done through post-occupancy monitoring of the intersection and adjusting the timings in the field based on observed delays and queues.

Parking

12. The Project includes the construction of a below-grade parking garage to be under the building, as well as a stand-along parking garage. The provision of multiple parking areas on-site with no connections between these parking areas other than via the single internal project roadway has the potential to create excessive recirculation of vehicles on-site looking for empty spaces and to cause congestion along the site roadway. The internal roadway is only approximately 500 feet long in its entirety and will include a drop-off area at the Atrium, and three separate intersections with driveways into the surface lot and two parking garages, as well as at least one pedestrian crossing over that short distance. Less than 100 feet of stacking distance is proposed between the drop-off zone and Gould Street when the capacity analysis results show queues on the driveway extending nearly 200 feet. Additional turns into and out of the parking areas to look for empty parking spaces will create additional congestion that has the potential to back onto TV Place and Gould Street. To avoid this scenario, GPI recommends that the Applicant implement a parking management program that could include either potential assignment of employees to designated parking areas or spaces, or installation of a driver alert system to let drivers know when parking areas are full before entering them. This driver alert system may also include means of directing drivers to open EV charging stations on-site.

13. There is a small stub parking area provided in the northwest corner of the below-ground parking garage that contains eight compact-car parking spaces. The size of the compact spaces will already make maneuvering in and out of the spaces difficult. In addition, the spaces are provided immediately adjacent to the wall without an area provided for a car to back out of the parking space to exit. As a result, drivers may need to back down the parking aisle and into the main drive aisle to exit the last two spaces in the garage. GPI recommends the Applicant consider elimination of the last two parking spaces to provide improved maneuverability for the spaces in this area.

14. The Applicant is committed to providing EV charging stations in 25 percent of the parking spaces within each of the surface, underground, and stand-alone garage parking areas. While GPI commends the Applicant on providing a high percentage of EV stations for sustainability, GPI also has concerns over the adequacy of the proposed parking supply to accommodate the anticipated parking demand by gasoline powered vehicles if such vehicles are not allowed to park in the EV spaces. The DEIR notes that while all of the analysis has been prepared assuming that 1,770 parking spaces will be provided on the site, the Applicant is seeking a Special Permit from the Town of Needham to request a reduced parking supply of only 1,408 spaces. With 25 percent of these being for EV charging only, only 1,056 parking spaces will remain for use by gasoline powered vehicles. Currently, fewer than 1.0 percent of vehicles on the roadway in the U.S. are electric vehicles and only just over 5.0 percent of vehicles sold in 2022 have been electric vehicles according to a report from Car and Driver Magazine on August 8, 2022. Therefore, the Applicant should ensure that the number of parking spaces provided for gasoline powered vehicles will be adequate to accommodate gasoline powered vehicle parking demand for opening year condition. If needed, spaces can be made EV ready and converted to EV spaces when demand within the provided EV spaces begins to reach capacity.

15. To encourage the use of electric vehicles, EV charging stations should be free for employee use within the parking garages. GPI also recommends that at least one accessible parking space be equipped with EV charging with additional spaces being EV ready.

16. A total of 30 parking spaces are proposed to be provided within the surface parking lot for use by visitors and the retail use. Approximately 10,000 SF of retail space is proposed on-site. Typically, at least one parking

space per 250 SF of retail space is provided, which would result in a parking demand of 40 spaces for the retail use alone. It is recognized that the proposed retail space will be ancillary to the on-site office and R&D space so many of the retail patrons may be office/R&D employees who are already parked in the garages. However, this small surface lot may not be sufficient to accommodate both retail and visitor parking, particularly under opening condition if 25 percent of the spaces are designated for EV charging only. GPI recommends that retail employees be required to park in the parking garages to leave the surface lot parking available for patrons. The Applicant should also monitor the use of the surface parking lot post-occupancy and consider signing additional visitor parking with the parking garage, if necessary. This may also include a driver alert system to direct visitors to open visitor parking spaces.

Transportation Demand Management

17. The Applicant is proposing to implement a shuttle between the site and nearby public transportation services, such as the commuter rail at Needham Heights and the Green Line D Branch at Newton Highlands. The DEIR notes that the MBTA recently developed a Bus Network Redesign Plan, a draft of which was released in May 2022, that eliminates some of the variations of Route 59 to simplify routes. As a result, the MBTA is not likely to be interested in modifying Route 59 to provide service closer to the site. GPI recommends that the Applicant reach out to the MBTA to assess whether a partnership makes sense for allowing area residents and employees an opportunity to use the Applicant's shuttle service for access to nearby transit services to supplement Route 59.

18. The DEIR notes that based on U.S. Census information, approximately five percent of Needham employees commuter to work via public transportation, walking, and bicycling. While the DEIR states that the TDM measures proposed by the Applicant are likely to result in a greater percentage of alternative means of travel, the Applicant has not identified any targeted mode share goals.

Mitigation Measures

19. Figure 5.1 provides a conceptual plan of the improvements proposed along Gould Street as mitigation for the proposed redevelopment. The plan is prepared on an aerial image with limited existing conditions linework that is scaled back in gray. It appears that the linework along Highland Avenue at the intersection of Gould Street / Kendrick Street is consistent with the MassDOT improvement plans along Highland Avenue, but there is not enough detail provided on the plans to determine this. The Applicant should provide a plan that clearly shows how the proposed improvements to be constructed by the Applicant will tie into MassDOT's improvements along Highland Avenue. This should include the layout of all signal equipment that will be necessary to accommodate the Applicant's proposed improvements. The Figure provides a note that states "Geometric and Signal Improvements at Intersection", but there are no signal improvements shown on the plan and the DEIR does not commit to installing new or relocating signal equipment.

20. In addition, Figure 5.1 does not show the proposed site plan or the existing and proposed municipal right-of-way and State Highway Layout (SHLO) lines along Gould Street and Highland Avenue. The Applicant should provide a plan that clearly shows how the site relates to the street and future right-of-way to verify that adequate setbacks will be provided from the street layout to the on-site structures. There are additional concept plans provided in Appendix D that are prepared on survey with some additional detail. However, these plans also do not depict the site layout or the proposed right-of-way boundaries. The plan of Gould Street along the site frontage depicts a 50-foot offset from the curb line and a 50-foot offset from the existing right-of-way line. However, the lack of site layout information on this plan does not allow for assessment of setbacks. In addition, the plan does not depict proposed right-of-way layout or a 50-foot offset from the proposed layout.

21. The Applicant has proposed a striped median with a shared left/through lane on Gould Street northbound approaching the site driveway based on Figure 5.1. GPI questions the Applicant's reasoning for providing this

median and shared lane in lieu of a dedicated left-turn pocket into the Wingate driveway. A dedicated left-turn pocket may provide reduced delays and queues and improve safety on Gould Street northbound.

22. Based on the concept plan for the Central Avenue / Gould Street intersection in Appendix D, the Applicant is proposing to signalize the two residential driveways on the northerly side of Gould Street as part of the improvements. The western-most of the residential driveways is proposed to operate concurrently with the Gould Street northbound approach. Due to the offset of the driveway from Gould Street and the low volume of traffic exiting the driveway, GPI does not recommend these movements operate concurrently. Gould Street is heavily used by commuters who will regularly traverse this intersection without encountering any opposing traffic from the residential driveway due to its low volume. This will reduce driver expectation of traffic exiting the driveway and cause traffic on Gould Street to assume right-of-way, generating the potential for a collision when a vehicle is present on the driveway. Therefore, GPI recommends that both residential driveways operate on their own signal phases. The additional signal phase is not expected to have a measurable impact on the operations of the intersection given the low volume on the driveway.

23. The Applicant is proposing to install signage along Noanett Road to restrict the roadway to local traffic only during the weekday morning and afternoon time periods. Cut-through traffic should be discouraged during all times of the day, not just during commuter time periods. Therefore, if such signage is to be installed, it should restrict the roadway to local traffic during all times.

24. The Applicant has proposed installing BLIND DRIVEWAY and SLOW CHILDREN PLAYING signage along Noanett Road at the request of residents along this roadway as mitigation for the project. It is important to note that SLOW CHILDREN PLAYING signs are not compliant with Manual on Uniform Traffic Control Devices (MUTCD) signage as they provide a false sense of security to residents, they do not indicate a particular location of a potential hazard, they do not indicate what speed is actually safe for travel, and they generally do not reduce vehicle travel speed. These signs also pose liability issues for the municipality as they imply that it is safe for children to play in the roadway. The Applicant has proposed installing NO CUT-THROUGH traffic signage on Noanett Road and will be installing a traffic signal at the intersection of Central Avenue / Gould Street as mitigation for the project. The presence of the new traffic signal at Central Avenue / Gould Street will facilitate left-turns from Gould Street onto Central Avenue and reduce the appeal for and likelihood of cut-through traffic along Noanett Road. Therefore, the majority of traffic along Noanett Road should be local residential traffic who will be familiar with the area and the potential for children in or close to the roadway. As a result, GPI does not recommend installation of SLOW CHILDREN PLAYING signage along Noanett Road.

25. The BLIND DRIVEWAY signs are proposed along Noanett Road at the residents' request because some of the driveways are located in close proximity to curves where sight lines are an issue. The sight line restrictions for these driveways are the residents' own landscaping, which could be removed to eliminate the sight line restriction without the installation of these signs. These signs are not included in the MUTCD as they provide a false sense of security to the resident exiting the driveway, they do not provide any legal message, they do not tell the driver what speed is safe to travel, and they are not enforceable. When a sight line restriction exists at a driveway, the responsibility belongs to the property owner to ensure adequate sight lines are provided. Therefore, GPI does not recommend installation of these signs along Noanett Road. If the curves along Noanett Road require vehicles to travel slower than the enforced speed of the roadway, installation of curve warning signage with supplemental curve advisory speed placards in advance of the curve would be a better option.

Traffic Monitoring Program

26. Section 5.7.1 of the DEIR describes an on-site parking facility study that will be conducted as part of the monitoring program to count vehicles as they enter and exit each of the parking areas. While these counts may be effective in determining the volume of vehicle trips generated by the development during the peak hours, this data will not provide an assessment of the actual use of the parking areas. GPI recommends that

the monitoring program include a parking utilization study to be conducted during the heaviest demand periods for the site as a whole and for each parking area to assess whether the parking provided in each area is meeting current parking demands. This should include a review of the utilization of EV charging stations, designated visitor or retail parking spaces, designated rideshare / carpool spaces if provided, and compact vehicle parking spaces to assess the need for modifications to the parking provisions.

Should you have any questions regarding these comments, please contact me directly at 603-766-5223.

Sincerely,

GREENMAN–PEDERSEN, INC.

Rebecca L. Brown, P.E.
Senior Project Manager

Town of Needham
Building Department
500 Dedham Ave.
Needham, MA 02492

Tel.781-455-7550 x 308

August 23, 2022

Town of Needham Planning Board
Lee Newman / Town Planner
500 Dedham Ave.
Needham, MA. 024902

Re: 557 Highland Ave. / Highland Innovation Center

Dear Planning Board Members,

Please be advised that I have reviewed the proposed plan for the former Muzi site the new Highland Innovation Center and I have the following comments.

Fire Department access: The plan shows a Fitness path / Fire access driveway around the buildings, it does not show the curb cuts or access to this roadway from Gould St. or TV. Place. This roadway / walk should probably be gated at the entry of the roadway to prevent vehicles from driving around the building. This should include some sort of barrier preventing vehicle access between the parking garage and Lab building beyond the loading area. These gates should be approved by the Fire Department and have additional signage installed stating “Fire Department Emergency access only.”

Cross walks: The plan shows cross walks in four locations but there is no direct access from the surface parking to the entrance of the lab building. It appears the pedestrian traffic would have to exit the parking lot walk toward Gould Street then cross at the entry of the complex and walk back to the lab building. I believe that a cross walk should be installed between the open parking area and the entrance to the lab building. There should also be a defined crossing between the parking garage and the lab building, the plan shows a large walk next to the loading dock area with no curb cuts for this area. The plan does show two curb cuts at the entry of the loading area between the buildings, I would suggest this location for the crosswalk.

Pond Bridge: The plan shows a pedestrian walkway over the pond, this pond is proposed to be approximately six feet deep, the bridge does not show any guards or railings crossing over the pond.

Retaining walls: The plan indicates retaining walls in many locations on the plans, no details were provided on the type of walls to be used. Some of the walls are along emergency roadways

and walkways no details are provided for vehicle guard rails, or pedestrian guards, railings or fencing along these areas that need fall protection.

Accessible Entries: The plan indicates a stairway in front of the Lab building it is assumed that there is an accessible ramp along the front of the building providing accessible entry into the building.

Public Community open space: The proposal is to provide public spaces for paddle board courts, pavilion plaza, possible seasonal skating rink. The developer has not identified rest room facilities within 300’ of this area.

Front Setback TV Place: The plan on page L-1.0 indicates a rear setback along TV Place this is a way and would be considered frontage therefore it needs to reflect front setback, the plan on page A-101 shows the setback at 20’

Any Questions please contact my office.

David A Roche
Building Commissioner
Town of Needham

Town of Needham
Building Department
500 Dedham Ave.
Needham, MA 02492

Tel.781-455-7550 x 308

August 31, 2022

Town of Needham Planning Board
Lee Newman / Town Planner
500 Dedham Ave.
Needham, MA. 024902

Re: 557 Highland Ave. / Highland Innovation Center / **Revised Letter**

Dear Planning Board Members,

Please be advised that I have reviewed the proposed plan for the former Muzi site the new Highland Innovation Center and I have the following comments. **The applicant has responded to our comments and town staff concerns, I have added my new comments to my previous letter.**

Fire Department access: The plan shows a Fitness path / Fire access driveway around the buildings, it does not show the curb cuts or access to this roadway from Gould St. or TV. Place. This roadway / walk should probably be gated at the entry of the roadway to prevent vehicles from driving around the building. This should include some sort of barrier preventing vehicle access between the parking garage and Lab building beyond the loading area. These gates should be approved by the Fire Department and have additional signage installed stating "Fire Department Emergency access only." **After an additional meeting with Planning staff, Fire Chief, Town Engineer and Building Commissioner, the applicant has provided three plan modifications. The last modification which we have approved answers the gate, curb cut and access pathway questions. The applicant will provide a cross section detail showing a 10' wide permeable pavement with 5' permeable pavers on both sides meeting the Chiefs request for H 20 Loading for the 20' width. Final detail of this walk will be approved on-site before construction by the Town Engineer and Fire Chief.**

Cross walks: The plan shows cross walks in four locations but there is no direct access from the surface parking to the entrance of the lab building. It appears the pedestrian traffic would have to exit the parking lot walk toward Gould Street then cross at the entry of the complex and walk back to the lab building. I believe that a cross walk should be installed between the open parking area and the entrance to the lab building. There should also be a defined crossing between the parking garage and the lab building, the plan shows a large walk next to the loading dock area with no curb cuts for this area. The plan does show two curb cuts at the entry of the loading area

between the buildings, I would suggest this location for the crosswalk. **These corrections have been answered and corrected.**

Pond Bridge: The plan shows a pedestrian walkway over the pond, this pond is proposed to be approximately six feet deep, the bridge does not show any guards or railings crossing over the pond. **These questions have been answered and will be addressed upon issuance of the Building Permit.**

Retaining walls: The plan indicates retaining walls in many locations on the plans, no details were provided on the type of walls to be used. Some of the walls are along emergency roadways and walkways no details are provided for vehicle guard rails, or pedestrian guards, railings or fencing along these areas that need fall protection. **These questions have been answered and will be addressed upon issuance of the building permits and actual site visit.**

Accessible Entries: The plan indicates a stairway in front of the Lab building it is assumed that there is an accessible ramp along the front of the building providing accessible entry into the building. **These questions have been answered.**

Public Community open space: The proposal is to provide public spaces for paddle board courts, pavilion plaza, possible seasonal skating rink. The developer has not identified rest room facilities within 300' of this area. **This question has been answered and will comply with the State Building and Plumbing Code requirements.**

The plan was also corrected to illustrate the front Set-back from TV Place where the previous plan showed it as side set-back.

Many small technical details will need to need to be clarified throughout the permitting process with multiple departments. The applicant has been very responsive to our concerns, and after working with this developer I am confident that the design team for the project and town staff will work out the fine details on this complex development.

Any Questions please contact my office.
781-455-7550 x 308

David A Roche
Building Commissioner
Town of Needham

Town of Needham
Fire Department Headquarters
88 Chestnut Street
Needham, MA 02492

(781) 455-7580
(781) 444-2174

Chief of Department
Thomas M. Conroy

Deputy Fire Chief of Operations
Donald E. Anastasi

Deputy Fire Chiefs
Matthew P. Dooher
Matthew B. Bagnell
Peter J. Vigliano

TO: Lee Newman

FROM: Thomas Conroy
Chief of Department

DATE: August 31, 2022

RE: August 30, 2022, 557 Highland Ave Project Meeting (Muzi)

Dave Roche has been working with the landscape architect to address the Fire Departments concerns for the project at 557 Highland Ave. Listed below are our concerns:

- Access and egress points for the fitness/access walkway
- What is the finish material for the path
- What is the finish material on either side of the walkway
- Is this material safe for the stability of a fire truck
- Moving the lighting out of the walkway path for accessibility
- Where are the curb cuts going to be and will there be a driveway or a sloped berm

Chief Thomas M. Conroy
Needham Fire Department
88 Chestnut Street
Needham, MA 02492
(781) 455-7580 tconroy@needhamma.gov

From:	Stacey Mulroy
To:	Alexandra Clee
Cc:	Lee Newman; Thomas Ryder; Carys Lustig
Subject:	RE: Request for comment - 577 Highland Ave
Date:	Wednesday, August 31, 2022 2:39:54 PM
Attachments:	image001.png

HI All,

Sorry for my delayed response.

On a quick overview it looks fine, though I would make suggestions to the contractors about the walking path and the orientation of the pickleball courts. There wasn't a lot of detail on the "recreational" parts, but if you get more details in the next wave, I'd be happy to take a closer look.

Thank you!
Stacey

Stacey Mulroy, CPRP
She/Her/Hers (What's this?)

Director, Needham Park & Recreation
O: 781.455.7930
C: 781.589.0960
E: smulroy@needhamma.gov

Rosemary Recreation Complex
178 Rosemary Street
Needham, MA 02494
www.needhamma.gov/495/Park-Recreation

From: Alexandra Clee <aclee@needhamma.gov>
Sent: Thursday, August 18, 2022 12:05 PM
To: Stacey Mulroy <smulroy@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Carys

Lustig <clustig@needhamma.gov>
Subject: Request for comment - 577 Highland Ave

Hi Stacey,

The Planning Board does not typically ask you or the Commission for comments; however, in this case your input would be helpful.

If you wouldn't mind reviewing the plans, specifically regarding the amenities provided, such as the walking trail and the pickle ball court.

Links to materials:

- Revised Plans, dated August 15, 2022.

- Cover letter from Attorney Tim Sullivan, dated August 15, 2022 as well as the following documents: a) Boundary Description; b) Revision Letter from Civil; c) Revision Letter re: Transportation; d) Revision Letter re: Landscape; e) Revision Letter re: Architecture; f) Preliminary Exterior/Community Noise Evaluation/Narrative.

Any comments you have would be welcomes by August 30.

Thanks!

Alexandra Clee
Assistant Town Planner
Needham, MA
www.needhamma.gov

From: Alexandra Clee
Sent: Wednesday, August 17, 2022 3:27 PM
To: Carys Lustig <clustig@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Tom Conroy <TConroy@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>; Deb Anderson <andersond@needhamma.gov>; David Roche <droche@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>
Subject: ADDITIONAL request for comment - 577 Highland Ave

Dear all,

We received revised plans on the project at 557 Highland. They can be found at the following links:

- Revised Plans, dated August 15, 2022.

- Cover letter from Attorney Tim Sullivan, dated August 15, 2022 as well as the following

documents: a) Boundary Description; b) Revision Letter from Civil; c) Revision Letter re: Transportation; d) Revision Letter re: Landscape; e) Revision Letter re: Architecture; f) Preliminary Exterior/Community Noise Evaluation/Narrative.

Please provide comments by August 30, 2022.

Thanks, alex.

Alexandra Clee
Assistant Town Planner
Needham, MA
781-455-7550 ext. 271
www.needhamma.gov

From: Alexandra Clee
Sent: Tuesday, April 19, 2022 4:17 PM
To: Carys Lustig <clustig@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>; Deb Anderson <andersond@needhamma.gov>; 'David Roche (droche@needhamma.gov)' <droche@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>
Subject: RE: request for comment - 577 Highland Ave

Apologies, one additional application item:

6. Fiscal Impact Analysis, prepared for rezoning, prepared by Barrett Planning Group, Inc., dated March 20, 2021.

Thanks, alex.

Alexandra Clee
Assistant Town Planner
Needham, MA
www.needhamma.gov

From: Alexandra Clee
Sent: Tuesday, April 19, 2022 4:08 PM
To: Carys Lustig <clustig@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>; Deb Anderson <andersond@needhamma.gov>; David Roche (droche@needhamma.gov) <droche@needhamma.gov>

Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>
Subject: request for comment - 577 Highland Ave

Dear all,

We have received the application materials for the proposal to redevelop 557 Highland Avenue. the information can be found on the website: https://www.needhamma.gov/Archive.aspx?ADID=9611

Although we operate electronically much of the time lately, I am sending hard copies for this project.

The Planning Board has scheduled this matter for June 7, 2022. Please send your comments by Wednesday May 25, 2022 at the latest.

Please note: These are the same materials that we distributed (electronically) for the Development Review Team meeting to be held April 26. We are also seeking staff comment, which can arrive after the DRT meeting.

The documents attached for your review are as follows:

1. Application for the Major Project Special Permit No. 2022-02, Applicant 557 Highland, LLC, dated April 7, 2022.

2. Letter directed to Planning Board Members, from Timothy Sullivan, dated April 5, 2022.

3. Plan set consisting of 44 pages, dated March 30, 2022.

4. Transportation Impact and Access Study, prepared by VHB, 101 Walnut Street, PO Box 9151, Watertown, MA, dated March 2022. (Appendices only sent to Engineering)

5. Stormwater Report, prepared by VHB, 101 Walnut Street, PO Box 9151, Watertown, MA, dated March 2022.

Thank you, alex.

Alexandra Clee
Assistant Town Planner
Needham, MA
781-455-7550 ext. 271
www.needhamma.gov

TOWN OF NEEDHAM, MASSACHUSETTS
PUBLIC WORKS DEPARTMENT
500 Dedham Avenue, Needham, MA 02492
Telephone (781) 455-7550 FAX (781) 449-9023

September 1, 2022

Needham Planning Board
Needham Public Service Administration Building
Needham, MA 02492

RE: Major Project Special Permit No. 2022-02
557 Highland Avenue- Bullfinch Companies

Dear Members of the Board,

The Department of Public Works has completed its review of the above referenced request for a Special Permit. The applicant requests to redevelop the former Muzi Ford and Chevrolet automotive dealerships and service centers and Muzi car wash.

The proposed project will const 2-buildings of a 497,694 sf office, laboratory, research and development, as well as 10,000 sf for retail uses. A proposed one level parking garage for each building as well as a separate stand alone garage to accommodate the parking needs.

The most recent review of the documents submitted for review are as follows:

- Letter from Goulston & Storrs Counsellors at Law to Planning Board Members dated August 15, 2022 including attachments from VHB, Paul Finger Associates, Stantec, and Acentech.

- Memorandum from Sean Manning, VHB to Lee Newman dated August 29, 2022 in response to DEIR comments.

- Two Letters from GPI to Lee Newman, Traffic Peer Review dated August 18, 2022, and August 30, 2022.

- Plan set consisting of 51 Sheets, dated August 15, 2022.

- Updated Plan sheets L-1.0 and L-5.1 revised dated 8/31/22

Our comments and recommendations are as follows:

We no objections to updates be provided as a subsequent plan modification in the decision.

Water Supply:

- At the proposed South Building, the domestic water service connection should be revised as a separate connection off the site's 10-inch water main. The current plan shows this connection off the fire protection 8-inch service to the building.

- At the proposed Garage, add a water gate valve for the fire protection line.

- We suggest the use of 45 degree bends of the onsite water main rather than the 90 degree angles shown.

Wastewater:

- For the new facility, four times the 54,554 GPD expected generated increase in wastewater flow equates to a total of 126,004 GPD I/I removal anticipated from the development. This may be satisfied by either undertaking a construction project or paying a fee to the Town's I&I program at a rate of $8.00 per gallon required to be removed. The applicant has been in contact with Town of Needham representatives and understands the requirements. We are in the process of analyzing the target areas for the inflow/infiltration to be removed and expect to work with the developer through the site plan approval process.

- Prior to reconnecting the building sewers to the existing sewer services at Highland Avenue and at the service that directed towards the Mass. Highway Layout (RTE 128), the applicant will need to CCTV and provide the documentation condition to Needham Sewer Division. The Sewer Division should be contacted on the date that this camera work will be performed, the applicant will need to make any necessary upgrades to the service that the proposed facility intends to use.

Traffic and Site Layout

- We concur with traffic comments/recommendations prepared by GPI in their Two Letters dated August 18, 2022, and the updated August 30, 2022.

- As per a previous comment, we expect the Developer to work with the town in providing an alteration/taking plan and recordings for a new Road Right of Way layout on Gould Street and to optimize of the traffic signals at Highland at Gould. The alteration should also include installation of granite monuments designating the Right of Way survey control at Gould Street. We expect to work with the applicant to have them install the appropriate number and location of such monuments.

- The proposed sidewalks and bike paths are shown outside Gould Street Road Right of Way from Highland Avenue to the Railroad Tracks at the Mass Bay Transportation Authority's Property. The DPW does not currently operate sidewalk snowplowing in this area. We expect that the applicant will be provide the regular

maintenance and snow clearing of the sidewalk and bike paths in this area as part of the Planning Board's Decision.

- As part of the traffic mitigation plan, the applicant is proposing to geometrically improve and signalize the intersection of Gould at Central Avenue. We concur with GPI and VHB assessment of the intersection. In addition, there may be a need to relocate telephone poles or block walls that are encroached into the Right of Way. We expect to work with the applicant and review as these plans are developed.

- We concur with the Building and the Fire Department's comments on the concerns of emergency access through the site. The Applicant has been updating the site plans over the past several days to show the emergency accessible routes as well as a pathway that can be maintained year-round consistent with the town department's requirements.

Stormwater:

- The operation and maintenance plan provided for the construction period should be updated to reflect the correct Site Name for construction Maintenance/Evaluation. We request that construction maintenance checklist state to be submitted to the Town Engineer during the construction at a minimum quarterly basis.

- Maintenance plan for after the construction of stormwater systems should include the maintenance requirements of the porous/permeable pavement that is now part of the emergency access/multi use paths, and the level spreader. Also, prepare and submit to the Town's Engineering Division a maintenance checklist of the complete stormwater system that the owner/operator will manage.

- Water Quality Unit 131 is proposed in the embankment of the detention pond and may lack sufficient grading over the unit. A slight adjustment in the location of unit may be required. Access ports should be shown the plan and noted as reference in the Operation and Maintenance manual.

- As part of the NPDES requirements, the applicant must comply with the Public Outreach & Education and Public Participation & Involvement control measures. The applicant shall submit a letter to the town identifying the measures selected and dates by which the measures will be completed in order to incorporate it into the Planning Board's decision.

If you have any questions regarding the above, please contact our office at 781-455-7550.

Truly yours,

Thomas Ryder
Town Engineer

Public Comments on 557 Highland Avenue

Received between June 4, 2022 and August 25, 2022.

1. Email from Carlos Agualimpia, Town Meeting Member - Precinct C, dated June 4, 2022.
2. Email from Steven Sussman, 30 Davenport Road, dated June 6, 2022.
3. Email from Henry Ragin, 25 Bennington Street, dated June 6, 2022.
4. Email from Casey Fedde, 16 Mills Rd, dated June 6, 2022.
5. Email from Avery, dated June 6, 2022.
6. Email from Karen Quigley, dated June 6, 2022.
7. Email from Kim Stone, Kim Stone, 45 Greendale Ave, dated June 6, 2022.
8. Email from MaeLynn Patten, 16 Ledge Street, dated June 6, 2022.
9. Email from Valerie Maio, 15 Park Ave., dated June 6, 2022.
10. Email from Maggie Flanagan, dated June 6, 2022.
11. Email from Nicole Nasson, dated June 6, 2022.
12. Email from Brooke Reilly, 41 Pine Grove Street, dated June 6, 2022.
13. Email from Jennie Jonas, 93 Sachem Road, dated June 6, 2022.
14. Email from Shannon Shavor, dated June 6, 2022.
15. Email from Matt Flanagan, 54 Sachem Road, dated June 6, 2022.
16. Email from Holly Charbonnier, 94 Sachem Road, dated June 6, 2022.
17. Email from Joanne Garabedian, dated June 6, 2022.
18. Email from Ali Dabuzhsky, 42 Aletha Road, dated June 6, 2022.
19. Email from Ashly Scheufele, 52 Greendale Avenue, dated June 6, 2022.
20. Letter from the Needham Heights Alliance, dated June 6, 2022.
21. Email from Paul Charbonnier, 94 Sachem Road, dated June 6, 2022.
22. Email from Emily Pick, 12 Mills Road, dated June 6, 2022.
23. Email from Natalie and Eugene Ho, 21 Utica Rd, dated June 26, 2022.

24. Email from Russell Smith, dated June 6, 2022.
25. Email from Julie Tracey, Beech Street, dated June 6, 2022.
26. Email from Ada Lei Chan, dated June 6, 2022.
27. Email from Elizabeth C Rich, 323 West Street, dated June 6, 202.
28. Email from Alanna Burke, dated June 6, 2022.
29. Email from Maureen and Jim DiMeo, 442 Central Avenue, dated June 6, 2022.
30. Email from Larry Tobin, 31 Greendale Ave, dated June 6, 2022.
31. Email from Michael Diener, dated June 7, 2022.
32. Email from Laura Ruch, dated June 7, 2022.
33. Email from Kelly Close, dated June 7, 2022.
34. Email from Robert Deutsch, dated June 7, 2022.
35. Email from Callie Curran Morrell, 2 Central Terrace, dated June 7, 2022.
36. Email from Jackie Boni, 13 Nichols Rd, dated June 7, 2022.
37. Letter from Deb Whitney, dated June 7, 2022.
38. Email from Kate Robey, dated June 7, 2022.
39. Email from Gilad & Rachel Skolnic, 33 Park Avenue, dated June 8, 2022.
40. Email from Kathleen Robey, 150 Warren Street, dated June 7, 2022.
41. Email from Kira Robinson-Kates, dated June 8, 2022.
42. Email from Ryan Ciporkin, 42 Park Avenue, dated June 9, 2022.
43. Email from Alex Boni, 13 Nichols Rd, dated June 9, 2022.
44. Email from Robert Dangel, 28 Hewitt Circle, dated June 11, 2022.
45. Email from Susan B. McGarvey, 66 Upland Road, dated June 11, 2022.
46. Email from Shari Stier, 23 Park Ave, dated June 14, 2022.
47. Email from Christine Dedek, 55 Hunting Road, dated June 28, 2022.
48. Email from Teresa Combs, 7 Utica Road, dated July 5, 2022.

49. Email from Joan E. Feeney, 74 Wayne Road, dated July 6, 2022.

50. Email from David M. Mindlin, 74 Hampton Avenue, dated July 7, 2022.

51. Email from Elizabeth Mercer, dated July 7, 2022.

From: Teresa Combs
To: Planning
Subject: 557 Highland Avenue project
Date: Tuesday, July 5, 2022 5:21:03 PM

Dear Members of the Planning Board,

I understand that you have the second hearing related to the Bulfinch Group's 557 Highland Avenue project July 7, 2022 . As a resident of Needham Heights who lives almost across the street from this project . I have many concerns related to this project.
I also am still being impacted by the road work on Highland Avenue that is still not completed and continues to disrupt traffic.

1. The Size - The Special Permit size is only calculating the Office, Lab and Retail space. It doesn't take into consideration the huge 7-story parking garage that will also be on the site. When you take that building's sf into consideration, the project is 1.1 million square feet. This seems way too large for our residential neighborhood.

2. Noise: I am asking that a Noise assessment be completed before anything is approved. We know that the condo owners at Nouvelle located at the Natck Mall requested a noise assessment which Bullfinch paid for .

3. Light: I also ask that Bulfinch pay for a light assessment so that we truly understand what the impact will be from the lighting . I walk at night time around Sachem and the lighting from Temple Beth Shalom is very bright and was not considered . I can only imagine what the lighting will be at night time from this project.

4. Traffic - As we discussed at the last meeting having a total of 5000 additional vehicle trips every day is going to gravely impact the Heights which is already challenging. I work in Wellesley and do not take the back roads by the Eliot school in the morning because traffic can be horrible. I am forced to take Rt 128.
At 5pm I return via the back roads as Rt 128 is a nigh mare to use to get back home due to traffic back ups getting off of Rt.128 at the former Muzi site. These additional cars are going to make it nearly impossible to get in and out of our neighborhood. I ask that you request the Bulfinch Group to do more mitigation work for the Town of Needham.

I know that this is just the second hearing and that you plan to have additional hearings. I appreciate your efforts . I ask that you listen to the concerns of the residents that will be impacted by this development. While I agree it is an important project for the Town and will move forward, I hope that there will be some changes to the scope so that the project doesn't create a situation where people no longer wish to live near the Heights. As a resident said at the last meeting- just because they are asking for a special permit does not mean we have to grant it.

Sincerely,

Teresa Combs.
7 Utica Road, Needham Heights

From: noreply@civicplus.com
To: Alexandra Clee; Lee Newman; Elisa Litchman
Subject: Online Form Submittal: Contact Planning Board
Date: Wednesday, July 6, 2022 8:01:59 AM

The following form was submitted via your website: Contact Planning Board

Full Name:: joan e feeney

Email Address:: jjfeeney@verizon.net

Address:: 74 wayne rd

City/Town:: Needham

State:: MA

Zip Code:: 02494

Telephone Number:: 781-444-8468

Comments / Questions: I am writing to state my opinion on the Muzi site development. It is extremely large for the neighborhood area. It is physically and esthetically too big, as well as the excess traffic it will generate for an already overtaxed intersection. I have followed the meetings, proposals, zoom calls etc. The suggestions the developer offers for traffic are valid and have been verified, however the sheer volume of proposed traffic is still to great for the area. The local neighbors will be taking the brunt of this, as well as the general heights neighbors. So, my suggestion is to have the project size reduced, require mandatory staggered start times for employees of the development, and to fix up Mills Park. The community area they are offering is so small. Fixing up Mills Park will benefit the neighborhood, but also their employees who wish to take a walk at lunch time. That would be the community tie in. Thank you, Joan Feeney. 74 Wayne Rd, Needham, MA 02494

Additional Information:

Form submitted on: 7/6/2022 8:01:48 AM

Submitted from IP Address: 173.76.205.83

Referrer Page: https://linkprotect.cudasvc.com/url?a=https%3a%2f%2fwww.needhamma.gov%2f1114%2fPlanning-Board&c=E,1,yl_8G4u-htGxR_WRrY3l5ofDywjN3ijar28YjQXJ9hmFrnbyYYQVA_rnzIUgKKWJ-iDckWzMSoTVGH3j7I8Gy8-T0v-MtmqlP301EfeO-jH8Lta5YjMpLFs,&typo=1

Form Address: https://linkprotect.cudasvc.com/url?a=http%3a%2f%2fwww.needhamma.gov%2fForms.aspx%3fFID%3d229&c=E,1,zetBsQlqPOJV-ks2fNj6Ja-l-2Y57TZz3h9sJ7hOEZArkJ31oDAfqvvHXS1X5sQGC8R9isZBTbFH05LVWPI2H3vs4yoBibdY0cuLnKA2zQ,,&typo=1

From:	David Mindlin
To:	Planning
Subject:	Highland Innovation Site
Date:	Thursday, July 7, 2022 2:38:24 PM

Good Day, Board Members:

My name is David Mindlin, and I own and reside at 74 Hampton Avenue in Needham (at the intersection with Crawford Street). I had hoped to be able to attend tonight's Meeting, but unfortunately, I will not be able to. Please consider my thoughts on the Project, below:

My overall feeling is that while this is an exciting and admirable proposal, it is simply too big for the site. It is being placed in the middle of two residential neighborhoods: "my" side of Highland Avenue, and the Sachem Road neighborhood on the other side. Having attended the most recent Planning Board Meeting, it is apparent that we are ALL concerned with the traffic issues, and height and bulk of the buildings.

I am also concerned that the Town went through an extensive re-zoning process, and through that process many of the original proposed dimensional requirements were reduced to a more moderate level. I believe that many of the reductions were made in deference to matters that were raised by those of us who live in the residential neighborhoods. However, this project seeks to take advantage of every Special Permit possibility, thereby bypassing the intent of the re-zoning, and bringing the buildings back up to prior proposed levels. We had objected to those levels at the outset, and I object to them now.

As for traffic, no matter what the plan, the project will be adding over a thousand vehicle trips through our neighborhoods every day. I can't see how there can be less. The garage has approximately 1400 spaces, I believe. Exiting from Hampton Avenue to Central can be difficult at best in the morning; a traffic light at Gould Street will only cause a backup down Central, with little hope of entering Central through the backup. We already have to deal with the speeding traffic to and from the businesses on Crawford and Kearney, etc. There is a park and playground, and families are already endangered crossing the street. I can't imagine what the additional truck traffic will be like as well. (Just last week, a 40 foot--or more--tractor-trailer broke down directly in front of my house. While that can happen to any vehicle, and I am certainly sympathetic, I have no idea what that rig was doing on Hampton at 8 AM to begin with. Will this become a more frequent occurrence? I can't see how it won't.

In short, I believe that this is a wonderful project, but it belongs on the Trip Advisor side of Route 128, not in the midst of multiple, modest residential neighborhoods. I do not feel that the Town is doing enough to protect the residents in the Heights, as opposed to new businesses. While I still object, at the very least, I respectfully request that the Special Permits ***not*** be granted, and that the project be confined to the dimensional requirements of the zoning amendments as written.

Thank you for your consideration.

Sincerely,
David M. Mindlin
74 Hampton Avenue, Needham
(617) 413-1832

From: mstantono@hopenergy.com
To: Planning
Subject: THe Muzi Ford Land
Date: Thursday, July 7, 2022 2:45:22 PM

Greetings I am Elizabeth Mercer and I would like to say that now that we have this piece of land why not take this opportunity to build low income housing and then to replace the other ones Linden and Chambers. These people have been living in poverty for quite sometime and nothing has been done to make it safe for the residents.
I feel that the town needs to take this into consideration thank you

PLANNING & COMMUNITY
DEVELOPMENT
PLANNING DIVISION

LEGAL NOTICE
Planning Board,
TOWN OF NEEDHAM
NOTICE OF HEARING

In accordance with the provisions of M.G.L., Chapter 40A, S.5, the Needham Planning Board will hold a public hearing on Wednesday, September 7, 2022 at 7:15 p.m. in the Needham Town Hall, Powers Hall, 1471 Highland Avenue, Needham, MA, as well as by Zoom Web ID Number 826-5899-3198 (further instructions for accessing by zoom are below), regarding a certain proposed amendment to the Needham Zoning By-Law to be considered by the Fall 2022 Special Town Meeting.

To view and participate in this virtual meeting on your phone, download the "Zoom Cloud Meetings" app in any app store or at www.zoom.us. At the above date and time, click on "Join a Meeting" and enter the following Meeting ID: 880 4672 5264

To view and participate in this virtual meeting on your computer, at the above date and time, go to www.zoom.us click "Join a Meeting" and enter the following ID: 880 4672 5264

Or to Listen by Telephone: Dial (for higher quality, dial a number based on your current location): US: +1 312 626 6799 or +1 646 558 8656 or +1 301 715 8592 or +1 346 248 7799 or +1 669 900 9128 or +1 253 215 8782 Then enter ID: 880 4672 5264

Direct Link to meeting: https://us02web.zoom.us/j/88046725264

Members of the public attending this meeting virtually will be allowed to make comments if they wish to do so, during the portion of the hearing designated for public comment through Zoom or through calling in, or by attending the in-person meeting.

Persons interested are encouraged to call the Planning Board office (781-455-7550) for more information. A copy of the complete text of the proposed article is detailed below. The article designation given has been assigned by the Planning Board for identification purposes only. An article number will subsequently be established by the Select Board for the Warrant.

ARTICLE 1: AMEND ZONING BY-LAW – SCHEDULE OF USE REGULATIONS BREW PUB AND MICROBREWERY

To see if the Town will vote to amend the Zoning By-Law as follows:

1. In Section 1.3 Definitions, by adding the following after the existing definition of "Basement" and before the existing definition of "Building (or part or parts thereof)":

   "Brew Pub – Eat-in restaurant, licensed under relevant local, state and federal statutes to produce and sell malt beverages at the location, whose primary business is the preparation and sale of food to be consumed on the premises, and whose accessory business is the production of malt beverages, including beer and ales, which may include packaging of such beverages and on-premises sale of such beverages for consumption on or off the premises. Malt beverages produced on the premises may be sold to other establishments in compliance with relevant state and federal statutes and regulations, but such sales

shall not exceed 40 percent of the establishment's production capacity. Accessory outdoor dining and live indoor entertainment is allowed if otherwise permitted in the zoning district in which the brew pub is located, if and as permitted by its license."

2. In Section 1.3 Definitions, by adding the following after the existing definition of "Medical Services Building," and before the existing definition of "Mixed-Use Building":

"Microbrewery - A facility, licensed under relevant local, state and federal statutes, for the production and packaging of malt beverages, including beer and ales, for retail sale and for consumption on or off the premises or wholesale distribution, with a capacity and production of not more than fifteen thousand (15,000) barrels per year (a barrel being equivalent to thirty-one (31) gallons), and which may include as an accessory use preparation and/or sale of food for on-premises consumption or for take-out. Any such facility may also provide samples limited in size, provided that such sampling is allowed under relevant local, state, and federal statutes, regulations and licenses issued thereunder. The facility may host marketing events, special events, and/or factory tours. The facility may include as an accessory use an eat-in or take-out restaurant that may include outdoor dining, which restaurant may occupy more than half of the area of the facility and may include live indoor entertainment if otherwise permitted in the zoning district in which the microbrewery is located, if and as permitted by its license."

3. In Section 3.2, Schedule of Use Regulations, Subsection 3.2.2, Uses in Business, Chestnut Street Business, Center Business, Avery Square Business and Hillside Avenue Business Districts, by inserting immediately below the row that reads "medical clinic" a new entry, which shall read as follows:

"USE	B	CSB	CB	ASB	HAB
Brew Pub	SP	SP*	SP	SP	N"

*Applies only to the portion of the Chestnut Street Business District that is west of Chestnut Street and south of Keith Place, otherwise N.

4. In Section 3.2, Schedule of Use Regulations, Subsection 3.2.1, Uses in the Rural Residence-Conservation, Single Residence A, Single Residence B, General Residence, Apartment A-1, Apartment A-2, Apartment A-3, Institutional, Industrial, and Industrial-1 Districts, by inserting immediately below the row that reads "medical clinic" a new entry, which shall read as follows:

"USE	RRC SRA	SRB	GR	A-1,2 &3	I	IND	IND-1
Brew Pub	N	N	N	N	N	SP*	N
Microbrewery	N	N	N	N	N	SP**	SP"

*Applies only to the Industrial District any portion of which is located within 150 feet of the Arbor Street boundary and the Industrial District that is located east of Rte. 95/128, otherwise N.

**Applies only to the Industrial District that is located east of Rte. 95/128, otherwise N.

5. In Section 3.2.4 Uses in the New England Business Center District, Subsection 3.2.4.2 Uses Permitted by Special Permit, by adding a new paragraph (k) that states "Microbrewery, allowable only in the portion of the New England Business Center District located west and south of Second Avenue." and new paragraph (l) that states "Brew Pub, allowable only in the portion of the New England Business Center District located west and south of Second Avenue."

6. In Section 3.2.5, Uses in the Highland Commercial-128 District, Subsection 3.2.5.2, Uses Permitted by Special Permit, by adding a new paragraph (q) that states "Microbrewery, allowable only in the portion of the Highland Commercial-128 District located a) north of Highland Avenue and b) south of Highland

Avenue and west of Second Avenue." and a new paragraph (r) that states "Brew Pub, allowable only in the portion of the Highland Commercial-128 District located a) north of Highland Avenue and b) south of Highland Avenue and west of Second Avenue." and by renumbering former paragraphs (q), (r) and (s) as paragraphs (s), (t) and (u) respectively.

7. In Section 3.2.6, Uses in the Mixed Use-128 District, Subsection 3.2.6.2, Uses Permitted by Special Permit, by adding a new paragraph (k) that states "Microbrewery" and a new paragraph (l) that states "Brew Pub" and by renumbering former paragraphs (k), (l) as paragraphs (m) and (n) respectively.

8. In Section 3.2.7 Uses in the Highway Commercial 1 District, Subsection 3.2.7.2 Uses Permitted by Special Permit, by adding a new paragraph (m) that states "Microbrewery" and a new paragraph (n) that states "Brew Pub" and by renumbering former paragraphs (m) and (n) as paragraphs (o) and (p) respectively.

Interested persons are encouraged to attend the public hearing and make their views known to the Planning Board. This legal notice is also posted on the Massachusetts Newspaper Publishers Association's (MNPA) website at (http://masspublicnotices.org/).

Needham Hometown Weekly, July 28, 2022 and August 4, 2022.

TOWN OF NEEDHAM

REGULATIONS FOR THE SALE OF ALCOHOLIC BEVERAGES

Licensing Authority: Select Board ***Revision Date: 07/26/2022***

The Needham Select Board, acting as local licensing authority pursuant to the provisions of Massachusetts General Laws Chapters 138 and 140 and other relevant legal authority, promulgates these regulations applicable to the sale and distribution of alcoholic beverages in the Town of Needham. These regulations are in addition and supplemental to all other legal requirements, including but not limited to applicable State and Federal law and regulations.

I. TYPES OF LICENSES TO BE GRANTED IN NEEDHAM

The Town of Needham issues the types of alcoholic beverages licenses listed below. All licenses shall comply with Chapter 138 of the Massachusetts General Laws, and Chapter 204 of the Code of Massachusetts Regulations, as they relate to the specific type of license.

1.1 Innholders All Alcoholic Beverages: issued to qualified applicants to sell all alcoholic beverages in a hotel dining area with a seating capacity of not less than ninety-nine (99) persons and a living capacity of not less than fifty (50) rooms, under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. The Service of alcoholic beverages to the room of any registered guest is prohibited unless otherwise authorized by the Select Board. (M.G.L. c.138, s.11, D; 11/7/72 election)

1.2 Restaurant All Alcoholic Beverages: issued to qualified applicants to sell all alcoholic beverages in a restaurant and/or function room under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. (M.G.L. c.138, s.11, E; 11/4/80 election; M.G.L. c.138, s.12; Chapter 32 of the Acts of 2014; 4/8/2014 election)

1.3 Restaurant Wine and Malt Beverages: issued to qualified applicants to sell only wine and malt beverages in a restaurant under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. (M.G.L. c.138, s.12; Chapter 169 of the Acts of 2001; 11/8/01 election)

1.4 Club and Veterans' Organization All Alcoholic Beverages: issued to qualified applicant Clubs existing under Chapter 180 of Massachusetts General Laws and Veterans' Organizations duly chartered or authorized by the Laws of the United States or the Commonwealth of Massachusetts to sell all alcoholic beverages under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. (M.G.L. c.138, s.12; 11/8/88 election)

1.5 One Day Special Event: issued to qualified applicants of non-profit status to sell all alcoholic beverages; or to sell wine and malt beverages only; or to qualified applicants of for-profit status to sell wine and malt beverages only under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules

& Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. (M.G.L. c.138, s.14)

1.6 Package Store All Alcoholic Beverages: issued to qualified applicants to sell all alcoholic beverages in packages not to be consumed on the premises under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages, and any and all conditions stipulated for the specific license. (Chapter 207 of the Acts of 2012; Approved 11/6/2012 election)

1.7 Package Store Wine and Malt Beverages: issued to qualified applicants to sell wine and malt beverages in packages not to be consumed on the premises under the applicable regulations of Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages and any and all conditions stipulated for the specific license. (Chapter 207 of the Acts of 2012; Approved 11/6/2012 election)

1.8 Farmer Series Pouring Permit: issued to qualified applicants to sell malt beverages, for consumption on the grounds of a licensed farmer-brewery pursuant to M.G.L. c.138, §19C, as well as on the grounds of the farm operated as appurtenant and contiguous to, and in conjunction with, such farm, and in accordance with the applicable regulations of the Massachusetts General Laws, the Town of Needham Rules & Regulations Governing the Sale of Alcoholic Beverages and any and all conditions stipulated for in the specific license. For purposes of this policy, the word "license", "licensee", and "licensed premises" shall include a "Farmer Series Pouring Permit", "Farmer Series Pouring Permittee", and "premises subject to a Farmer Series Pouring Permit", respectively, unless otherwise noted.

II. COMPLIANCE

2.1 The issuance of a license by the Select Board for the sale of alcoholic beverages under M.G.L. c. 138 applies only to said sales and does not release the licensee from compliance, nor does it assume compliance with the rules, regulations, requirements and procedures of other government boards, agencies or bodies having jurisdiction.

2.2 Failure to comply with these regulations, the laws of the Commonwealth of Massachusetts, the Regulations of the Alcoholic Beverages Control Commission (ABCC) or the Town's bylaws may result in the revocation, suspension or cancellation of the license.

III. SPECIAL LICENSE PROVISIONS (applicable to Restaurants only)

3.1 Bar Service The sale or service of alcoholic beverages for consumption at any unapproved Bar Service Area is prohibited. For the purposes of these regulations, Bar Service Area is defined as service across a counter at which alcoholic drinks are prepared to patrons who may or may not be waiting to dine. Bar Service Areas are permitted only in locations expressly approved and authorized by the Select Board. Such authorization may be granted under the following conditions:

a) The Board makes a finding that it is in the best interest of the Town to allow the service of alcoholic beverages in the Bar Service areas;
b) No more than a total of fifteen (15) seats or twenty percent (20%) of the total seats in the premises, whichever is less, shall be allowed in the Bar Service area(s), except that the Board may after hearing, with notice pursuant to M.G.L. Chapter 138 section15A, authorize a greater number where such seats are intended for food service customers as part of the licensee's business plan;
c) The seats in the Bar Service areas are included when calculating the number of seats in the premises;
d) All food and beverages on the menu served in the public dining room shall be available for service to the patrons in the Bar Service areas; and
e) Each licensee with bar seating shall annually as part of its license renewal application provide the Select Board with a statement certified by a Certified Public Accountant as to the percentage the annual sales for the previous period of October 1-September 30 of alcoholic beverages compared to the total annual sales of food and alcoholic beverages. If the percentage exceeds thirty-five percent (35%), the Select Board may investigate to determine whether the service of alcoholic beverages has become more than incidental to the service of food on the premises. If the Board determines that the sale of alcoholic beverages has become more than incidental to the sale of food on the premises, it may after hearing modify the license to require the licensee to reduce its amount of Bar Service Area seating.

IV. GENERAL RULES AND REGULATIONS APPLICABLE TO HOLDERS OF LICENSES TO SELL ALCOHOLIC BEVERAGES WITHIN THE TOWN

This section shall apply to any and all alcoholic beverages licenses issued by the Board to eligible restaurants, clubs, veterans' organizations, innholders licensees, package stores, farmer series pouring permittees, and, with noted exceptions, one-day special event licensees. The Licensing Board reserves the right to add to, amend, modify or revoke these rules and regulations at such time or times as the Licensing Board deems appropriate.

Subject to further limitations fixed or from time to time modified by the Select Board with respect to a particular license, the General Laws of Massachusetts and the regulations of the Alcoholic Beverages Control Commission, the following rules and regulations shall be in full force and effect:

4.1 Fire Safety Inspections (applicable to Restaurants, Innholders & Clubs only)
Chapter 304 of the Acts of 2004, An Act Relative to Fire Safety In the Commonwealth, requires that every license holder under M.G.L. Chapter 138 Section 12 must submit as a precondition of renewal of the license "a valid certificate of inspection issued by a local inspector and signed by the head of the fire department for the city, town or district in which the premises is located." No license shall be issued for the sale of alcoholic beverages in the Town until such time as a copy of the valid certificate of inspection has been filed with application.

4.2 Hours of Operation
4.2.1 The hours during which the sale of all alcoholic beverages to be consumed

on the premises may be made by any licensee shall be from 11:00 a.m. to 11 p.m. on secular days and from 10:00 a.m. to 11 p.m. on Sundays, unless otherwise determined by the Select Board.

4.2.2 The hours during which the sale of all alcoholic beverages to be consumed off the premises may be made by any licensee shall be from 9:00 a.m. to 10:00 p.m., Monday through Saturday, including legal holidays, and 12:00 noon to 6:00 p.m. on Sundays, unless otherwise determined by the Select Board. Holiday sales hours are further limited to the holiday schedule set by the ABCC.

4.2.3 The Board may adjust hours for individual and/or classifications of licensees upon receipt of their request(s) for consideration of special circumstances and/or occasions.

4.2.4 Except for alcohol sold by a Farmer Series Pouring Permittee, the hours during which the sale of all alcoholic beverages may be made in a dining room are further limited to the time when the dining room is open and food service is available to the public. No alcoholic beverages shall be sold or served in a dining room before the dining room is open and food service is available, or after the dining room has been closed and food service has been suspended to the public.

4.2.5 No patron shall be served or sold alcoholic beverages within the licensed premises before or after the hours stated in the license.

4.2.6 No alcoholic beverages shall be served for on premises consumption within the licensed premises during the fifteen (15) minutes preceding the hours stated on the license at which service of alcoholic beverages must cease.

4.2.7 All bottles, glasses, containers, etc., shall be cleared from all tables and bars within thirty (30) minutes of the established closing hour and all patrons will be off the licensed premises within forty-five (45) minutes of the established closing hour.

4.2.8 With the exception of the licensee and the manager, all employees shall vacate the licensed premises no later than sixty (60) minutes after the official closing hour designated on the alcohol license. Bona fide employees of the licensed establishment may remain upon or enter upon the licensed premises outside of the regular hours of operation while actually engaged in cleaning, opening, closing or preparing for the current or next day's business, but they may not dispense or consume any alcoholic beverage during such non-public hours. In any instance wherein a licensee will have employees working on the licensed premises in excess of sixty (60) minutes before or after the serving times, the licensee shall cause notification of the fact to be given by telephone to the Needham Police Department along with the estimate as to how long the work party will be on the premises. This provision shall not limit employees from being on the premises to produce

malt beverages in accordance with a license issued pursuant to G.L. c.138, §19C or §19D.

4.3 Payment of Charges and Taxes

Applicants and licensees must pay, in full, all taxes and charges owed to the Town on a current basis prior to the issuance of a new license, the transfer of an existing license and/or the annual renewal of a license.

4.4 Filing and Application Requirements (excludes One Day Special Event Licenses)

4.4.1 Abutter Notification

When conducting a public hearing to consider the issuance of a license to sell or serve wine, malt and/or alcoholic beverages, the Board shall require the applicant to notify all owners of property within a 300-foot radius of the premises to be licensed

4.4.2 Insurance

No license shall be issued for the sale of alcoholic beverages (one day special licenses excluded) in the Town until such time as the applicant shall present to the Select Board a certificate of insurance showing that the applicant carries the following policies of insurance from an insurance company licensed by the Department of Insurance of the Commonwealth of Massachusetts as follows: workers' compensation insurance as required by M.G.L. Chapter 152; and liquor liability insurance in the minimum amount of $100,000 per person/$1,000,000 aggregate for personal injury and $100,000 per occurrence for property damage.

4.4.3 Fees

All license fees of the Board are incorporated in these rules and regulations as Attachment I, Schedule of Town of Needham Liquor License Fees. These fees shall be non-refundable.

4.4.3.1 Filing Fees All required filing fees shall be paid in full at such time as the application is filed. The Board's filing fee shall be paid by check, made payable to the "Town of Needham." Filing fees required by the Commission must be by certified check or bank treasurers check made payable to the "Commonwealth of Massachusetts" and/or the "Alcoholic Beverages Control Commission." Filing fees shall not be pro-rated for any reason.

4.4.3.2 License Fees All license fees for the initial issuance of a new license, or for the transfer of an existing license, for a change in the structural composition of a licensed premises, and/or for the annual renewal of a license shall be paid in full prior to the issuance of the license. The payment of the license fee shall be by cash, certified check or bank treasurer's check payable to "Town of Needham." The initial license fee will be pro-rated based on the number of months remaining in the calendar year at the time of occupancy.

4.4.4 Floorplans – On Premises Licenses (M.G.L. Ch 138 s.12 and Farmer Series Pouring Permittee)

4.4.4.1 With the exception of applicants for package store licenses and a one-day special events license and without limiting the application of Chapter 6 of the State Building Code, applicants or licensees shall submit to the Board along with the application for license, an architectural floor plan, drawn to scale, that includes the following information, which will be clearly marked:

a) the net floor area (net floor area shall be the area of the rooms measured between the interior walls exclusive of stairways, service bars, hallways, etc.) and dimensions of the existing room or rooms and exterior premises requested to be licensed including dining rooms, function rooms, exterior premises and rooms in which alcoholic beverages are to be stored;
b) the location of any proposed Bar Service Areas, cocktail lounges (for innkeepers license only), or other area where patrons may stand while consuming alcohol;
c) areas in which seats or benches are to be securely fastened to the floor and areas in which the seats and tables are moveable;
d) entrances and exits;
e) kitchens and/or food preparation areas;
f) take out areas;
g) storage areas;
h) restrooms;
i) all rooms not being requested to be licensed shall be labeled as to their function, such as, kitchen, coatroom, lobby, etc.;
j) total occupant load;
k) areas where food trucks or other mobile food vendors may be parked for the purposes of serving patrons; and
l) other spaces, or in relevant cases, exterior premises for which approval of the Board for the sale of alcoholic beverages is requested. Approval of the use of exterior space will only be allowed if there is a physical barrier and signage restricting the transportation or possession of any alcohol, wine, or malt beverage beyond the limitation of the barrier.

4.4.4.2 The number and location of all seats, chairs, and stools upon or within the licensed premises must be approved in writing by the Board. In no event shall the total number of seats, chairs, and stools upon the licensed premises exceed the maximum seating capacity nor the maximum occupancy capacity of the licensed premises.

4.4.4.3 No physical alteration, the effect of which would be to constitute a change in the description of the licensed premises as shown on the license, shall be made without prior written approval of the Board.

4.4.4.4 Outdoor seating shall be excluded from the seating capacity used to determine the type of license granted to applicant.

4.5.5 Floor Plans – Off Premise Licenses (M.G.L. Ch 138 s. 15)

4.5.5.1 Applicants for a package store license shall submit to the Board along with the application for license, an architectural floor plan, drawn to scale, that includes the following information, which will be clearly marked:

a) the net floor area (net floor area shall be the area of the rooms measured between the interior walls exclusive of stairways, service bars, hallways, etc.) and dimensions of the existing room or rooms and exterior premises requested to be licensed;
b) gross floor area of the premises and those portions of the premises proposed to be dedicated to the sale, storage or display of alcoholic beverages;
c) entrances and exits;
d) storage areas;
e) restrooms;
f) cash register areas.

4.5.5.2 Applicants shall submit a plan for signage including window display signs.

4.6 General and Miscellaneous Provisions

4.6.1 No alcoholic beverages shall be taken from the building so approved in the licenses, with exception of approved exterior seating noted on floorplan, as noted in section 4.4.4.1(l). This does not apply to package stores and sales conducted pursuant to G.L. c.138, §19C or §19D.

4.6.2 No licensee shall sell alcoholic beverages in any part of the premises not specified on its license, including a license issued by the Alcoholic Beverages Control Commission only. No change of such area or location shall be made without prior written approval of the Select Board. The licensed premises shall meet and fully comply with all health standards and regulations applicable to the sale of alcoholic beverages.

4.6.3 The licensed premises must be well lighted at all times.

4.6.4 There shall be no indecent or immoral entertainment on the licensed premises.

4.6.5 Gambling, lotteries, or other illegal machines or games are prohibited except as otherwise permitted by law.

4.6.6 The licensed premises shall be subject, at all times, to inspection by members of the Select Board, the Town Manager, Inspector of Buildings, Board of Health or its representatives, Police Department, Fire Department, or any other department or official of the town so directed by the Select Board.

4.6.7 Food service shall be available in all areas where alcoholic beverages are to be served for consumption on premises.

4.6.8 Meals must be served on solid dinnerware with silverware accompanying the same. No paper plates or plastic cutlery is permitted. Alcoholic beverages may be consumed only from glassware. Package stores, Farmer Series Pouring Permittees, and one day licenses are excluded from this provision.

4.6.9 No licensed restaurant, Farmer Series Pouring Permittee, or package store may permit the use of any amusement service such as electronic games on the premises.

4.6.10 Service of alcoholic beverages shall be by a bartender/server/wait person (applicable to on premise licensees only, including Farmer Series Pouring Permittees).

4.6.11 At all times that the licensed premises are open for the sale or service of alcoholic beverages, the licensee shall have on the premises a manager or assistant manager who has successfully completed an in-person alcoholic beverage server training program satisfactory to the Select Board. The onsite manager/assistant manager shall be responsible for compliance with all applicable laws of the Commonwealth of Massachusetts concerning the sale of alcoholic beverages and the Town's rules and regulations for the provision and consumption of alcoholic beverages. The designated manager/assistant manager shall have full authority to make decisions concerning the operation of the establishment.

a) A current employee roster shall be available upon request to the Town for all licensed establishments. It is the obligation of the licensee to inform all employees about the rules and regulations of the Needham Select Board, the Alcoholic Beverages Control Commission, and any and all applicable Massachusetts laws.

b) Any employee engaged in the sale and handling of alcoholic beverages must complete Select Board approved courses in alcohol safety training and have on file with the licensee, and available for inspection by the Town, a copy of current training certification and proof of age. Licensee will provide an approved training program certificate of completion for the manager to the Town with the application.

c) All managers, assistant managers, and bartenders shall be required to attend an in-person alcoholic beverage server training program

satisfactory to the Select Board once every two years. Newly hired employees shall complete a Town-approved training program upon employment, or provide proof of training certification at a Town-approved course within the last three years. In addition, all employees who are engaged with the direct handling, selling, storing or the preparation for the display of any alcoholic beverages are required to watch annually a Town-approved training video as part of the license renewal process.

d) No licensee shall allow any employee to sell, or participate in the stocking, handling, or preparation for sale of beverage alcohol until such employee has viewed a town-approved training video and signed a statement, a copy of which is to be maintained by the licensee, confirming that the employee has viewed that training video and that the employee acknowledges his/her obligation to abide by the rules and regulations of the Needham Select Board, the Alcoholic Beverages Control Commission, and Massachusetts laws regarding the sale of alcohol.

4.6.12 Licensees shall make all reasonable and diligent efforts to ensure that loitering, disorder, disturbances or illegality of any kind does not occur at the licensed premises. The licensee shall ensure that business in the licensed premises is conducted in a responsible manner so that no activity shall detract from the quality of life in the Town generally, or in the neighborhood in which the licensed premises are located. The licensee may be held responsible for such activity, whether present or not. Licensees shall at all times maintain the immediate and surrounding area outside the licensed premises in a state of cleanliness and upkeep.

4.6.13 The alcoholic beverage license must be prominently displayed and available for public viewing inside the premises.

V. RULES AND REGULATIONS FOR THE SALE OF ALCOHOLIC BEVERAGES BY INNHOLDERS

Subject to further limitations fixed or from time to time modified by the Select Board with respect to a particular license, the General Laws of Massachusetts and the regulations of the Alcoholic Beverages Control Commission, the following rules and regulations shall be in full force and effect:

5.1 No application for an alcoholic beverage license shall be accepted except from qualified owners of a hotel having a dining room capacity of not less than ninety-nine [99] persons and living capacity of not less than fifty [50] rooms.

5.2 Each applicant shall submit to the Select Board with each application for a license a floor plan of the building or that portion of the building on which is clearly marked and designated the location of the proposed seating arrangement, service bars, dining rooms, function rooms or other rooms in which approval of the Select Board for the sale of alcoholic beverages is requested.

5.3 Cocktail lounges are permitted with the approval of the Select Board but limited to approved areas by the Select Board with appropriate identification of the specific location documented by the Inspector of Buildings.

5.4 The Service of alcoholic beverages to the room of any registered guest is prohibited unless otherwise authorized by the Select Board.

VI. RULES AND REGULATIONS APPLICABLE TO THE SALE OF ALCOHOLIC BEVERAGES IN RESTAURANTS AND FUNCTION ROOMS

Subject to further limitations fixed or from time to time modified or amended by the Select Board acting as the duly constituted Licensing Board of the Town of Needham with respect to this class of license, the General Laws of Massachusetts and the Regulations of the Alcoholic Beverages Commission, the following rules and regulations shall be in full force and effect:

6.1 It is the policy and purpose of the Select Board acting as the Licensing Board of the Town of Needham to limit the issuance of alcoholic licenses as an accommodating and incidental part of a Common Victualler's primary and principal business endeavor of preparing and serving food to the public in a restaurant and function room.

6.2 The issuance of alcoholic licenses will be utilized so as to both enhance the dining experience of individuals patronizing Needham restaurants and to foster the economic development of business areas in the Town by encouraging and promoting foot traffic in those areas where restaurants are located. The Board will consider when deciding upon a license application the foregoing factors and any other matter deemed appropriate by the Board including by way of description but not limitation: proximity to residential neighborhoods, traffic, parking, appropriateness of menu and other aesthetic considerations including the physical layout of the interior of the establishment. Licenses will not be granted to establishments whose principal business activity is fast food, take-out, or which has any “drive-through” component.

6.3 No function room may be separately licensed.

6.4 No alcohol license will be issued to any applicant unless such applicant is the licensee named in a common victualler's license and has operated a restaurant and function rooms for the twelve-month period immediately preceding the filing of an application. When deemed appropriate by the Select Board this provision may be waived.

6.5 Service of food must be available in all areas in which alcoholic beverages are to be served. Where a function room is available, the service of alcoholic beverages is permitted as authorized herein and may be closed to the general public.

VII. RULES AND REGULATIONS APPLICABLE TO CLUBS AND VETERANS ORGANIZATIONS SEEKING AND ISSUED ALCOHOLIC BEVERAGE

LICENSES WITHIN THE TOWN AUTHORIZED BY SPECIAL ACT OF THE GENERAL COURT (CHAPTER 3 OF THE ACTS OF 1977)

Licenses issued by the Needham Select Board shall be subject to the minimum requirements of G.L. Chapter 138, Regulations of the Alcoholic Beverage Commission and the following regulations of the local Licensing Board and any amendments thereto hereinafter adopted:

7.1 Every club applicant to be eligible to be licensed to sell any or all alcoholic beverages within the Town of Needham must be a corporation duly organized and existing under Chapter 180 of the General Laws of the Commonwealth of Massachusetts and has maintained club facilities for not less than three (3) years prior to the filing of an application. The within provisions may be waived by the Licensing Board.

7.2 Every Veterans organization to be eligible to be licensed to sell any and all alcoholic beverages within the Town of Needham must be duly chartered or authorized by the Laws of the United States or the Commonwealth of Massachusetts.

7.3 Each applicant shall furnish the Licensing Board with a copy of its Charter or other legal evidence of its eligibility as herein specified when requested by the Licensing Board.

7.4 Each eligible club and veteran's organization must have the exclusive legal right to the possession and enjoyment of indoor facilities of not less than 2,000 square feet of floor space on one or more floors and which may consist of one or more rooms.

7.5 Each licensee hereunder acting by and through its Board of Directors or other governing body shall appoint a manager or bartender who is of good moral character and a responsible person. The manager or bartender will be in charge during open hours acting for and on behalf of the Board of Directors or other governing Board. Acting for and on behalf of the Board of Directors the manager or bartender shall be responsible for the conduct of the members and guests, accountable for keeping order and the prevention of undue noise and disturbances on the licensed premises and the neighborhood.

VIII. RULES AND REGULATIONS APPLICABLE TO ONE-DAY SPECIAL EVENT LICENSES

The Board will review requests for One-Day Special Event Licenses in accordance with section 14 of Chapter 138 of the General Laws after receipt of the following documentation. A public hearing is not required for the issuance of a One-Day Special Event License.

8.1 Request for the sale of alcohol under a Special License is limited to between the hours of 11:00 a.m. and 12:00 a.m. on secular days and 12:00 p.m. and 12:00 a.m. on Sundays.

8.2 One-Day licenses are exempt from the legal notice and publication requirements.

8.3 No special event license will be granted to a licensed premise of any person whose application for a license is pending before the licensing authorities.

8.4 No person shall be granted a special license for more than 30 days in a calendar year.

8.5 Forms and documentation required for One-Day Special License:

a) ABCC Notice of Approval of Special License (completed by the Town)
b) Town of Needham Select Board Event Information Sheet
c) Descriptive information about the event (invitation, flyer, letter of explanation, etc.)
d) Written indication of the manner by which service, sale, delivery, and/or dispensing of alcoholic beverages are to be controlled.
e) Written evidence of the owner's permission to use the proposed licensed premises.
f) Proof of Non-profit Status (if request is for all alcoholic beverages).
g) Sketch/floorplan of the proposed licensed premises detailing where alcohol will be served, sold, delivered, and/or dispensed.
h) Designation and identification in writing of all individuals who will serve, sell, deliver, and/or dispense alcoholic beverages and evidence of whether or not said individuals have completed in the past three years an appropriate Massachusetts alcoholic beverages server training program.
i) Acknowledgement that the person holding the special license has purchased the alcoholic beverages from a licensed wholesaler/importer, manufacturer, farmer-winery, farmer-brewery or special permit holder. A person holding a section 14 license cannot purchase alcoholic beverages from a package store. (MGL Ch. 138, Sec 14, 23; 204 CMR 7.04)

8.6 The One-Day Special Event Manager shall provide for the orderly and safe conduct of the event, shall be responsible for the proper sale, service, delivery, dispensing and consumption of alcoholic beverages, shall be physically present during the duration of the entire event and shall sign the Event Information Sheet. The One-Day Special Event Manager shall display such special One-Day License where sale of alcoholic beverages is taking place.

IX. RULES AND REGULATIONS APPLICABLE TO PACKAGE STORES (M.G.L. CH 138, SEC. 15)

9.1 General Provisions

9.1.1 Employees at the licensed premises on which a Section 15 license is exercised must be 21 years of age except that such licensees may employ a person under the age of 21 who does not directly handle, sell, store, or prepare for display any alcoholic beverages. Notwithstanding the foregoing, food store employees 18 years of age or older may handle, store, or prepare any alcoholic beverages for display.

9.1.2 No seating, chairs, stools, or tables for use by customers or patrons shall be placed or permitted by a retail package store licensee upon or within

the licensed premises, or upon any area under the direction and control of the licensee.

9.1.3 Where the liquor licenses are granted to serve the public, licensees shall be open to the public and, except in exigent circumstances, operate on all days and hours in accordance with the terms of the issued liquor license. The closing of the licensed premises to the public, for a period of five (5) consecutive days or more, or for any period totaling ten (10) days during the calendar year without the prior approval of the Select Board may be deemed to be an abandonment of the Liquor License and sufficient grounds for revocation of the Liquor License.

9.1.4 No consumption of alcoholic beverages shall be permitted on the premises outside of the licensed hours of operation.

9.1.5 Licensees shall make all reasonable and diligent efforts to ensure that loitering, disorder, disturbances or illegality of any kind does not occur at the licensed premises. The licensee shall ensure that business in the licensed premises is conducted in a responsible manner so that no activity shall detract from the quality of life in the Town generally, or in the neighborhood in which the licensed premises are located. The licensee may be held responsible for such activity, whether present or not.

9.1.6 Licensees shall at all times maintain the immediate and surrounding area outside the licensed premises in a state of cleanliness and upkeep.

9.1.7 The licensing of liquor establishments, and what constitutes the public convenience in Needham, will be subject to the informed discretion of the Select Board. In determining suitability for licenses, the Select Board will consider the proximity of the proposed premises to neighborhoods, especially residential neighborhoods, and other sensitive areas as determined by the Board.

9.1.8 Section 15 licenses may be granted to food stores as defined in these regulations, but will not be granted to convenience stores.

9.1.9 Alcohol-related signage displayed so that it is visible to the public will be limited. As a condition of the license, the licensee will comply with the Town of Needham Sign By-law, as from time to time amended.

9.1.10 Advertisement at local sporting events or school events and sponsorships of sporting teams where participant's uniforms carry the name, logo or advertisement for any business which derives more than 25% of its gross revenues from the sale of alcoholic beverages is prohibited.

9.1.11 "Nips" or bottles of spirits containing fewer than eight (8) fluid ounces shall not be located in an area directly accessible by customers, and shall be offered for sale upon the request of a customer from a location within

the premises to which customers do not have direct access, such as behind a counter.

9.2 Hours Of Operation

9.2.1 For all deliveries conducted off the licensed premises, the licensee shall keep written records including the date of sale, quantities and sizes of items purchased, method of payment transaction, and name and address of purchaser. In addition to the preceding requirements, the amount of the beverages that were delivered, the date and time of delivery, the signature of the person receiving the delivery and the type of identification card used to confirm age. Such written records shall be maintained by the licensee within or upon the license premises for a period of not less than one year and must be readily available for inspection by the Town.

a) Deliveries must be made during the operating hours of the store.
b) Deliveries shall be made by persons no less than 21 years of age.
c) A copy of Off-Premises Transportation Permit, license to deliver issued by the ABCC, shall accompany application at time of submittal.

9.2.2 All transactions for the sale of alcoholic beverages must be completed on or before the closing hour set out in this section.

9.2.3 Hours for product deliveries to establishment and/or pick-up of bottle returns should be arranged so that activity does not interfere with the quiet enjoyment of the neighborhood.

9.3 Consumption On Premises Prohibited Except Sample Tastings

9.3.1 Consumption of alcoholic beverages within or upon the retail package store licensed premises, or upon any area under the direction and control of the licensee, by any person is strictly prohibited except for sample tasting.

9.4 Limitations On Transferability Of Off-Premises Section 15 Licenses

9.4.1 An application for a transfer of ownership at the same location or transfer of location may be granted by the Board after a public hearing in compliance with these regulations and state law.

9.5 Food Store Alcohol License Requirements

9.5.1 A food store is defined as a grocery store or supermarket, which sells at retail, food for consumption on or off the gross premises, whether alone, or in combination with grocery items or other non-durable items typically found in a grocery store and sold to individuals for personal, family or household use. Such food store shall carry fresh and

processed meats, poultry, dairy products, eggs, fresh fruits and produce, baked goods and baking ingredients, canned goods and dessert items. Notwithstanding the foregoing, a food store for the purposes of these regulations shall not be a convenience store, any business that sells gasoline, or a business which derives more than 25% of its gross revenues from the sale of alcoholic beverages. The retail space used to display alcoholic beverages shall not exceed twenty-five percent (25%) of the total retail space on the premises. The Select Board shall determine whether an applicant is a food store as set out herein and in compliance with any and all requirements.

9.5.2 A convenience store is defined as an establishment that sells at retail food and other non-durable items to individuals more on a daily basis, such as but not limited to small quantities of food, candy, newspapers, and tobacco products. Convenience stores are frequently open with only one staff member on duty at a time, are usually open later than 10:00 p.m. and may or may not sell gasoline. The Select Board reserves the right to consider each of these factors when determining if an applicant will be considered a convenience store.

9.5.3 Any applicant for a Section 15 License (whether for an original application, change of ownership or change of location) must provide with the application materials, a floor plan evidencing the gross floor area of the premises and those portions of the premises proposed to be dedicated to the sale, storage or display of alcoholic beverages. The licensee may not materially change the portions of its premises dedicated to sale, storage or display of alcoholic beverages without the approval of the Select Board. The licensee may not be open for business except during its licensed hours for sale of alcoholic beverages unless it has applied for and received approval by the Select Board of plan to properly secure all alcoholic beverages on the premises from public access during that time.

9.5.4 Regular sales and operation of the food store must continue during all times when the sales of wine and malt beverages are permitted.

9.5.5 Package store licenses issued to food stores shall be limited to wine and malt beverages only.

X. RULES AND REGULATIONS APPLICABLE TO FARMER SERIES POURING PERMITTEES

10.1 Applicants

Applicants for a Farmer Series Pouring Permit shall hold a Farmer-Brewery License (M.G.L. c.138, §19C) from the ABCC at all times. If an Applicant for a Permit does not have a valid ABCC Farmer-Brewery License at the time of Application, issuance of the Permit shall be conditioned on submittal of such ABCC license.

10.2 Purpose

The issuance of Farmer Series Pouring Permits shall be utilized so as to foster the economic development of the Town by encouraging and promoting patronage in those areas where Farmer Series Pouring Permittees are located. The Select Board shall consider when deciding upon a license application the foregoing factors and any other matter deemed appropriate by the Board including by way of description but not limitation: proximity to residential neighborhoods, traffic, parking, community engagement, and other aesthetic considerations including the physical layout of the interior of the establishment.

10.3 Water Station

At all times, there shall be a free, self-service water station for patrons and customers to use without staff assistance. This provision may be waived by the Select Board upon a showing of good cause and only if a sign is posted by the bar stating that tap water is available upon request and free of charge.

10.4 Occupancy

Where required by the Select Board, the licensee shall delegate a staff member to keep and maintain an accurate count of all individuals occupying the premises to ensure compliance with building code occupancy limits.

10.5 Food Service

The Permittee shall ensure that food service is available to its patrons at all times that alcohol is served for on-premises consumption. The Permittee may satisfy this provision by (i) holding a Common Victualler's license and operating a full-service kitchen; (ii) arranging for food to be brought onto the premises by mobile food truck vendors; (iii) contracting with nearby restaurants; (iv) allowing patrons to have food delivered for consumption on the premises; or (v) such other arrangement as the Select Board deems appropriate. The Permittee shall submit a plan for food service with its application.

XI. VIOLATIONS – DETERMINATION OF PENALTIES

11.1 Any violation of the Town's Liquor Regulations, Regulations of the Alcoholic Beverages Control Commission, and/or General Laws Chapter 138 may be grounds for action by the Select Board (Board), as Local Licensing Authority, including the modification, suspension, revocation, nonrenewal or cancellation of a license.

11.2 In determining the appropriate action in any given case, the Board will consider the violation alleged, the facts of the case, other relevant factors including the licensee's prior record, and aggravating or mitigating circumstances.

11.3 In ordering suspensions, the Select Board may, within its discretion, order a suspension with one or more days to be served and the remainder to be held in abeyance for such time as the Select Board may determine.

11.4 A licensee shall have a right to notice and public hearing before modification, suspension, revocation, nonrenewal or cancellation of a license by the Board, except

that the Board may under emergency circumstances as allowed by Law suspend the license pending hearing.

11.5 A licensee may waive its right to hearing, and the Board in such cases may make findings and act without hearing on recommendation of the Town Manager. The Board may, however, require that a hearing be held notwithstanding such a waiver, in which case the licensee shall have notice of hearing and an opportunity to be heard before action is taken on modification, suspension, revocation, nonrenewal or cancellation of a license, except that Select Board may under emergency circumstances as allowed by Law suspend the license pending hearing.

11.6 On the days when Suspension of License is being served, the Licensee will publicly post at its public entrance(s) a notice of the Suspension in a form as the Board or Town Manager may direct. The Board may also post notice of violation hearings, findings, decisions, and orders to the Town's website and Town's social media.

11.7 The town conducts, and expects to continue to conduct, routine compliance checks of licensees, including, but not limited to, service to underage persons checks using agents of the Needham Police Department.

11.7.1 The following schedule of recommended discipline is a guideline intended to illustrate the range of disciplinary action that the Select Board may impose for service to underage violations identified in compliance checks. The Select Board is not limited by these guidelines and may impose greater or lesser discipline based on consideration of the violation alleged, the facts of the case, other relevant factors including the licensee's prior record, and aggravating or mitigating circumstances

11.7.2 In calculating the number of prior offenses under this guideline, the Select Board will consider determined violations occurring within the five (5) years preceding the date of current violation.

11.7.3 Compliance Check Violation Guideline Penalties:

11.7.3.1 <u>FIRST OFFENSE</u>:
Written warning, or Suspension of one day.

11.7.3.2 <u>SECOND OFFENSE</u>:
Suspension, one to three days.

11.7.3.3 <u>THIRD OFFENSE</u>:
Public hearing required.
Suspension, three to five days.

11.7.3.4 <u>FOURTH OFFENSE</u>:
Public Hearing required.
Suspension, Five (5) to Ten (10) Days
Licensee shall be required as a condition of the license to

provide the Board with a satisfactory written plan, under signature of the manager of record and any person or entity holding more than a 10% ownership interest in the license, to assure that a further offence will not occur.

11.7.3.5 FIFTH OFFENSE:
Public hearing required.
Minimum ten (10) day suspension. Based on relevant circumstances as determined by the Board, the Board may order a longer suspension of any length, imposition of conditions on or other modifications of the license, disqualification of the manager of record, compulsory initiation by the licensee of transfer of ownership to a responsible party to be approved by the Board, non-renewal, or revocation of the license.

APPROVED:	6/14/77
Amended and revised:	11/18/97
Amended and revised:	2/9/99
Revised fee schedule:	12/7/99
Revised fee schedule:	12/5/00
Revised and approved:	8/20/02
Fee changes	12/21/04
Addition of Liquor Liability Insurance:	1/25/05
Addition of One-Day License:	1/25/05
Amended and revised:	11/14/06
Amended and revised:	6/22/10
Amended and revised:	12/18/12
Amended and revised:	5/13/14
Amended and revised:	9/10/2014
Amended and revised:	11/9/2016
Amended and revised:	7/25/2017
Amended and revised:	8/18/2020
Amended and revised:	7/26/2022

SELECT BOARD

ACTING AS

NEEDHAM LICENSING BOARD

Thomas M. Harkins 24 May Street

Just a brief follow-up to the remarks I made at the Public Hearing of June 28th.

This licensing provision is a necessary first step in allowing brewpubs and breweries with tap rooms in Needham, but it is only the first step.

It is also necessary to assure that the Planning Board does not propose zoning articles that are too restrictive and cumbersome.

I suggest that the Select Board, the Planning Board, and the Finance Committee, if they chose to become involved, to spend some time educating themselves on brew pubs and breweries with tap rooms. These are not restaurants or bars and should not be treated as such.

These Town Boards can best educate themselves by visiting nearby brewpubs and breweries. Or at least check out these three websites:

Massachusetts Dept. of Agriculture www.mass.gov/service-details/craft-breweries

Massachusetts Brewers Guild www.massbrewersguild.org

Mass. Brew Bros www.massbrewbros.com

The Planning Board must work with anyone who has expressed an interest in opening a brewpub or brewery in Needham.

One last comment and this refers to the issue of food trucks. I think you should make no restrictions on food trucks hosted by breweries on their own properties. And hope you'll allow the same use of town streets, sidewalks, and parking for food trucks hosted by breweries that you have allowed for brick and mortar establishments which the Board licenses.

From:	Katie King
To:	Lee Newman; Alexandra Clee
Cc:	Kristin Scoble
Subject:	FW: Brewery Support
Date:	Monday, July 25, 2022 10:59:00 AM

Sharing the comments below as they're more related to Planning.

From: Kristin Scoble <kscoble@needhamma.gov>
Sent: Monday, July 25, 2022 9:58 AM
To: Marianne Cooley <mcooley@needhamma.gov>; Marcus Nelson <mnelson@needhamma.gov>; Kevin Keane <kkeane@needhamma.gov>; Matt Borrelli <mborrelli@needhamma.gov>; Heidi Frail <hfrail@needhamma.gov>
Cc: Kate Fitzpatrick <KFitzpatrick@needhamma.gov>; Dave Davison <DDavison@needhamma.gov>; Katie King <kking@needhamma.gov>; Amy Haelsen <ahaelsen@needhamma.gov>
Subject: FW: Brewery Support

Hello,

One more Brewery email.

Thank you,
Kristin

From: Marc Regan <marcregan@gmail.com>
Sent: Friday, July 22, 2022 3:33 PM
To: Office of the Town Manager <OTM@needhamma.gov>
Subject: Brewery Support

Hi,

I just want to register my support for the movement to allow brew pub / breweries in Needham. I've spoken with many of my neighbors about it and they are also very enthusiastic. I hope a small but vocal minority of residents do not ruin this for everyone.

Needham needs a casual hub to bump into our neighbors year round. Breweries are great because you can let your kids run around, it's less formal, and it's a way to spend an afternoon rather than just sitting down for a meal.

My one concern with the amendment as written is it banishes breweries into the industrial areas, far away from town. I think this is something that would be amazing as close to the center of town as possible, or perhaps along chestnut street. A place people could walk or bike to, near other restaurants and amenities. I realize we are allowing Brew Pubs in town, but I worry that's not much

different from a typical restaurant.

I'm not sure if it's too late to change it, but I'd like to see a more liberal version of the bill and let the town decide at permitting time what it's willing to accept in different areas.

Best,
-Marc Regan
60 Eaton Rd.

George Giunta, Jr.
ATTORNEY AT LAW*
281 Chestnut Street
Needham, MASSACHUSETTS 02492
*Also admitted in Maryland
TELEPHONE (781) 449-4520 FAX (781) 449-8475

September 7, 2022

Lee Newman
Planning Director
Town of Needham
1471 Highland Avenue
Needham, MA 02492

VIA EMAIL: LNewman@needhamma.gov

Re: Amend Zoning By-Law
Brew Pub and Microbrewery

Dear Lee,

I have been asked to review and comment on the pending amendment to the Needham Zoning By-Law relative to Brew Pubs and Microbreweries, noticed for hearing September 7, 2022. While I applaud the intentions and efforts of the Board, I have several concerns relative to the amendment as it currently stands. But before I delve into those issues, a little personal background may help provide context.

I have been a craft beer enthusiast for many years. As such, I have been a member of the Beer Advocate and Untappd communities since 2010 and 2011, respectively, as well as a sometimes subscriber to the Beer Advocate print magazine. I have attended a number of beer festivals including the American Craft Beer Festival, Extreme Beer Festival, Nashua Rivers Brewers Festival and others. I have served as the organizer and co-organizer of multiple social groups whose stated purposes included the appreciation of craft beer. I have visited countless brew pubs and breweries, large, small and all sizes in between. In fact, just last week, I visited Wandering Star Craft Brewery in Pittsfield, MA and Bright Ideas Brewing in North Adams, MA. In short, I have substantial familiarity with the industry as a fan or afficionado.

As you might expect, I am therefore generally in favor of efforts that promote such businesses and make it easier for them to open and operate. However, even with that, it seems to me that the current effort may be a bit of a solution in search of a problem, especially with respect to brew pubs. And, with respect to microbreweries, would benefit from additional consideration and analysis.

In my experience and opinion, there is a marked difference between brew pubs and microbreweries. Brew pubs may generally be characterized as uses that are first and foremost restaurants that brew their own beer, usually (but not always), on premises. From operational, space utilization, and appearance perspectives, they present as restaurants, with accessory elements of brewing. Although all now defunct, excellent examples include the former John Harvard Brewhouse in Framingham, Watch City Brewing in Waltham and the Beer Works chain, with locations through the Commonwealth. From a customer perspective, the experience at these facilities is the same as at any pub style restaurant. And while they may sell beer "to go", such sales are generally accessory to the main restaurant type use and somewhat limited.

Because these uses are primarily and predominantly restaurants, with brewing as an accessory component, it is my opinion that such uses fall within the existing restaurant category of the Needham Zoning By-Law. And, in fact, the current proposed definition of Brew Pub seems to recognize this as it defines a brew pub, in pertinent part, as an "Eat-in restaurant . . . whose primary business is the preparation and sale of food to be consumed on the premises, and whose accessory business is the production of malt beverages". As a result, I do not see that a new use category is currently necessary for a brew pub to open in the Town of Needham. The only element of the current proposed definition that seems to deviate from what is currently allowed is the provision that "Malt beverages produced on the premises may be sold to other establishments in compliance with relevant state and federal statutes and regulations, but such sales shall not exceed 40 percent of the establishment's production capacity". But even here, if the sales are demonstrably accessory to the main, restaurant use, same would currently be allowable under the existing zoning.

I also note that under the current proposal, a brew pub would only be allowed in certain portions of the Chestnut Street Business and Industrial Districts; and would be entirely prohibited in the Industrail-1 District. Yet, eat-in restaurants will continue to be allowed by special permit in all portions of the Industrial, Industrial-1 and Chestnut Street Business Districts, even if the amendment is adopted. As someone who frequents and is familiar with brew pubs, and considering the proposed definition of Brew Pubs, it makes no logical or practical sense to me why a restaurant that has its beer delivered would be allowable but a restaurant that brews its beer on site as an accessory use would not.

Moreover, the portion of the proposed definition relating to sale to other establishments, which is arguably the most significant deviation from the current By-Law, does not make much sense either, especially as relating to the Industrial and Industrial-1 Districts, where manufacturing is generally allowed.

While I recognize the practical concerns behind the proposed geographical limitation, to impose them on brew pubs without addressing the currently permitted restaurant uses seems, at least from a legal perspective, a bit arbitrary. After all, the same concerns that apply to brew pubs would logically apply to restaurants.

Turning now to the provisions of the proposed amendment relating to microbreweries, it is my opinion that further analysis and consideration would be of great benefit. In my experience and opinion, microbreweries, in general, are fundamentally different than brew pubs; although I do

recognize that in recent years, it has become more a quantitative difference than qualitative. The traditional and most basic form of microbrewery is primarily a combined production, bottling and packaging facility. From an operational and space utilization perspective, they are significantly and materially more industrial in nature than brew pubs. While they may include tasting or tap rooms, such aspects are accessory to the predominant purpose of production. As a result, and likely also due to economic consideration, many microbreweries are located in industrially zoned areas or areas that allow manufacturing or similar activities. Good examples are the aforementioned Wandering Star in Pittsfield, MA, Vitamin Sea and Barrel House Z in Weymouth, MA, and Stellwagen in Marshfield, MA. In my experience, it is a bit unusual to find one in a commercial zone.

Currently, light manufacturing and bottling are both allowed as of right in the Industrial and Industrial-1 Districts. In addition, the By-Law includes a catch all category in those districts for "Any lawful purpose or special use not enumerated elsewhere in this By-Law". It is my opinion that traditional microbreweries would likely fall within the manufacturing category and if not, in the catch all category. As a result, like with brew pubs, it seems to me that such use is currently allowed or allowable under the By-Law, and, at least with respect to more traditional microbreweries, no change is necessary.

Furthermore, considering that the primary use and activity of a traditional microbrewery is consistent with the several industrial and manufacturing uses currently allowed in the Industrial and Industrial-1 Zoning Districts, the currently proposed limitation of Microbreweries to only a portion of the Industrial District does not make logical sense to me. And, as with the geographical limitation imposed in the proposed amendment for Brew Pubs, it also seems a bit arbitrary from a legal perspective.

Notwithstanding the foregoing, and as mentioned above, there has been an evolution taking place in microbreweries over the past several years. Ten years ago, the microbreweries I visited may have featured tasting or tap rooms, but those portions of the facilities were typically limited in space and activity, and usually did not have food or other beverages available. Now, due to saturation in the marketplace and the operational restrictions imposed during Covid, microbreweries have had to evolve and adapt, and that has changed.[1] Many (but not all) microbreweries now feature larger tasting areas or taprooms, open to the general public during set hours, with food options available (even if limited to pretzels, chips and hotdogs). These newer forms of microbreweries are a slide down the scale towards brew pubs, but still fall far short of the typical sit-down restaurant that characterizes a brew pub. But because they are significantly more customer oriented, they are readily distinguished from traditional microbreweries that have little, and sometimes no public involvement. While these newer types of microbreweries may be more appropriate for geographical limitation, the current proposed amendment throws the baby out with the bathwater, so to speak by failing to distinguish between the different types of facilities

[1] During Covid, facilities serving alcohol were only allowed to remain open if they also served food. As a result, many microbreweries that previously did not offer or sell any food were forced to add food sales if they wanted to remain open and viable. Some of these locations have since stopped offering food, and others have made it a part of their business model.

Moreover, even with respect to the newer, more customer oriented microbreweries, there is a wide range of types and scale of operations. For example, Second Wind Brewing in Plymouth, MA and Wandering Star, mentioned above, both features very small indoor tasting areas. Contrast this with the large open space at Stellwagen in Marshfield, MA, and it is easy to see that one size does not fit all, so to speak. And, while some microbreweries offer live music or other forms of entertainment, many, especially those that are on the smaller side, do not. So even with respect to the evolving, customer oriented microbreweries, there is a substantial range in activities and impacts.

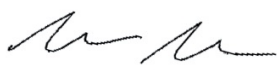
As a result, it seems to me that if the Town wants to promote and allow these dynamic, up and coming uses, the Town would be better served, with respect to microbreweries in particular, by more carefully considering the different types of facilities, their aspects and impacts. With further analysis and more precise drafting, it should be possible to continue to allow the more traditional types of microbreweries in the Industrial and Industrial-1 Districts without geographic limitaion, while regulating those particular aspects of the more customer oriented microbreweries that might be problematic. In that regard, I note that a facility with a tap room that is open to the public, can fit 100 people and serves food is fundamentally different in operation and impact from a facility that might fit only 5-10 people by appointment, or a facility like Trillium in Canton, which is a combined brew pub and production facility, in one location.

Finally, I am concerned about the possible unintended consequences that may arise from adding the microbrewery category to the By-Law as currently proposed. Like many other zoning bylaws, the Needham Zoning By-Law is of the "permissive" variety. As a result, a use is only allowed if explicitly permitted, and once permitted, is only allowed in the specific district or location where and as specified. As a result, if adopted, the current proposed amendment could easily and legitimately be construed to prohibit similar production facilities, such as those making hard cider and spirits; both of which are also up and coming uses, and both of which bear a close relationship and many similarities to microbreweries.

I hope my comments will assist the Board in consideration of the pending zoning amendment.

Your courtesy and attention are appreciated.

Sincerely,



George Giunta, Jr

PLANNING & COMMUNITY DEVELOPMENT
PLANNING DIVISION

MAJOR PROJECT SITE PLAN REVIEW SPECIAL PERMIT
AMENDMENT TO DECISION
Application No. 2012-04

1063 Great Plain Avenue and 0 Garden Street, Needham, MA

Town of Needham
September 7, 2022
(Original Decision dated June 12, 2012,
Amended August 6, 2013, April 16, 2014, October 7, 2014 and December 15, 2015)

DECISION of the Planning Board (hereinafter referred to as the Board) on the petition of Needham Bank, 1063 Great Plain Avenue, Needham, MA, (hereinafter referred to as the Petitioner) for property located at 1063 Great Plain Avenue and 0 Garden Street, Needham, Massachusetts. Said property at 1063 Great Plain Avenue is shown on Assessors Plan No. 51 as Parcel 86 containing a total of 44,978 square feet in the Center Business and Chestnut Street Business Zoning Districts. Said property at 0 Garden Street is shown on Assessors Plan No. 51 as Parcel 22 containing a total of 10,000 square feet in the Chestnut Street Business Zoning District.

This Decision is in response to an application submitted to the Board on July 7, 2022 by the Petitioner for: a Major Project Site Plan Review Special Permit amendment under Section 7.4 of the Needham Zoning By-Law (hereinafter the By-Law) and Section 4.2 of Major Project Site Plan Review Special Permit No. 2012-04, dated June 12, 2012. In accordance with the By-Law, Section 7.4, a Site Plan Special Permit is required. In accordance with the By-Law, Section 3.2.2, a Special Permit is required, for a drive-up teller building with a drive-up ATM in the Chestnut Street Business Zoning District (as "other accessory uses allowed incidental to lawful principle uses" and/or as "other customary and proper accessory uses, such as but not limited to garages, tool sheds, greenhouses, and cabanas"). In accordance with the By-Law, Section 3.2.2, a Special Permit is required, for off-street parking for vehicles associated with a principal use, located on a separate lot owned or leased by the owner of the land in which the principal use is located, within a zoning district in which the principal use is permitted. In accordance with the By-Law, Sections 5.1.1.5 and 5.1.1.6, a Special Permit is required to waive strict adherence to the off-street parking requirements of Sections 5.1.2 and 5.1.3 of the Zoning By-Law.

The requested Major Project Site Plan Review Special Permit Amendment would permit the Petitioner to convert the existing bank building mezzanine space into 1,325 square feet of floor area for executive offices, as well as demolish the existing drive-thru free-standing automatic teller machine (ATM) and to construct a 321square foot drive-up teller building with a drive-up ATM. The property is the subject of Major Project Site Plan Special Permit No. 2012-04, issued to Needham Bank, 1063 Great Plain Avenue, Needham, MA, dated June 12, 2012, amended August 6, 2013, April 16, 2014, October 7, 2014, and December 15, 2015.

After causing notice of the time and place of the public hearing and of the subject matter thereof to be published, posted and mailed to the Petitioner, abutters and other parties in interest as required by law, the hearing was called to order by the Chair, Adam Block, on Tuesday, August 16, 2022 at 7:45 p.m. in the Needham Town Hall, Powers Hall, 1471 Highland Avenue, Needham, MA, as well as by Zoom Web ID Number 826-5899-3198. Board members Adam Block, Jeanne S. McKnight, Paul S. Alpert, and Artie Crocker were present throughout the August 16, 2022 proceedings. Pursuant to Massachusetts General Laws Chapter 39, Section 23D, Adjudicatory Hearing, adopted by the Town of Needham in May of 2009, Ms. Espada examined all evidence received at the missed session and listened to an audio recording of the meeting. The record of the proceedings and the submission upon which this Decision is based may be referred to in the office of the Town Clerk or the office of the Board.

Submitted for the Board's deliberation prior to the close of the public hearing were the following exhibits:

Exhibit 1 Application for an Amendment to Major Project Special Permit No. 2012-04, with Addendum.

Exhibit 2 Plans entitled "Needham Bank, Renovation and New Accessory Drive-Thru," prepared by Highpoint Engineering, Inc., 980 Washington Street, Suite 216, Dedham, MA 02026, Studio Q Architecture, 301 Highland Ave, Waterbury, CT, 06708, Field Resources, 281 Chestnut Street, Needham, MA, consisting of 15 sheets: Sheet 1, Sheet G100, entitled "Title Sheet," dated June 14, 2022; Sheet 2, entitled "Existing Conditions Plan, 1052 Great Plain Avenue" dated June 13, 2022; Sheet 3, Sheet C100, entitled "Site Preparation & Erosion Control Plan," dated June 14, 2022; Sheet 4, Sheet C200, entitled "Layout Plan," dated June 14, 2022; Sheet 5, Sheet C300, entitled "Grading, Drainage and Utility Plan," dated June 14, 2022; Sheet 6, Sheet C400, entitled "Construction Details," dated June 14, 2022; Sheet 7, Sheet C401, entitled "Construction Details," dated June 14, 2022; Sheet 8, Sheet L100, entitled "Landscape Plan," dated June 14, 2022; Sheet 9, Sheet L101, entitled "Landscape Plan," dated June 14, 2022; Sheet 10, Sheet A1.01, entitled "Main Level Floor Plan," dated June 1, 2022; Sheet 11, Sheet A2.01, entitled "Site Area," dated June 1, 2022; Sheet 12, Sheet A3.01, entitled "Materials," dated June 1, 2022; Sheet 13, Sheet A4.01, entitled "Elevation," dated June 1, 2022; Sheet 14, Sheet A5.01, entitled "3D Views," dated June 1, 2022; Sheet 15, Sheet A6.01, entitled "Wall Section," dated June 1, 2022.

Exhibit 3 Plan entitled "Needham Bank," prepared by Studio Q Architecture, 301 Highland Ave, Waterbury, CT, 06708, consisting of 2 sheets: Sheet 1, Sheet A1.00, entitled "Existing Floor Plan," dated June 1, 2022; Sheet 2, Sheet A1.01, entitled "Main Level Floor Plan," dated June 1, 2022.

Exhibit 4 Letter from the Design Review Bord dated August 8, 2022.

Exhibit 5 Interdepartmental Communication (IDC) to the Board from Chief Tom Conroy, Needham Fire Department, dated August 2, 2022; IDC to the Board from Chief John Schlittler, Police Department, dated August 12, 2022; IDC to the Board from Tara Gurge, Needham Health Department, dated August 10, 2022; and IDC to the Board from Thomas Ryder, Town Engineer, dated August 10, 2022.

EXHIBITS 1, 2 and 3 are referred to hereinafter as the Plan.

FINDINGS AND CONCLUSIONS

1.1 The subject property is located at 1063 Great Plain Avenue and 0 Garden Street, Needham, Massachusetts. The property located at 1063 Great Plain Avenue is shown on Assessors Plan No. 51 as Parcel 86 containing a total of 44,978 square feet in the Center Business and Chestnut Street Business Zoning Districts. The property located at 0 Garden Street is shown on Assessors Plan No. 51 as Parcel 22 containing a total of 10,000 square feet in the Chestnut Street Business Zoning District.

1.2 The property is the subject of Major Project Site Plan Special Permit No. 2012-04, issued to Needham Bank, 1063 Great Plain Avenue, Needham, MA, dated June 12, 2012, Amended August 6, 2013, April 16, 2014, October 7, 2014 and December 15, 2015.

1.3 On August 6, 2013, under Amendment to Major Project Site Plan Special Permit No. 2012-04, dated August 6, 2013, the Board approved the redevelopment of Eaton Square as a pedestrian plaza.

1.4 Additional amendments dated April 16, 2014, October 7, 2014 and December 15, 2015 allowed certain other minor changes to the site plan, including the temporary permission of the Needham Farmer's Market to utilize the Plaza.

1.5 The Bank has been an institution in the Town of Needham since 1892. In 1922 it commenced occupancy of its current location at 1063 Great Plain Avenue. In 1997, it purchased a lot on Garden Street for use as an ancillary parking lot. This was approved by the Planning Board on May 19, 1997. (See, Major Project Site Plan Review Special Permit No. 1997-03). In November 1997, the Bank purchased the adjacent building at 1055 Great Plain Avenue. On July 20, 2006, the Planning Board authorized the Bank to renovate and connect the buildings at 1055 and 1063 Great Plain Avenue. (See, Major Project Site Plan Review Special Permit No. 2006-02, as amended). The decision also authorized a new common entrance, an ATM enclosure, an increase in floor space, and various waivers and/or special permits including a reduction in the required number of parking spaces. In April 2007, the Bank purchased the adjacent building at 10 Eaton Square. On September 8, 2008, the Planning Board authorized the Bank to renovate and expand and connect this building to the buildings at 1055 and 1063 Great Plain Avenue. (See, Major Project Site Plan Review Special Permit No. 2008-07). The decision also authorized various waivers and/or special permits for an increase in floor area ratio and reduction in the required number of parking spaces.

1.6 On October 22, 2010, the Bank purchased the property at 232 and 244 Garden Street containing of approximately 18,800 square feet (.4037 acres) of land upon and which was then occupied by two dwellings. At that time, this property was physically separated from the remaining Bank property by Eaton Square. However, on or about November 7, 2011, the Town of Needham abandoned and discontinued Eaton Square as a public way. With the abandonment and discontinuance of Eaton Square that portion of the roadway formerly separating the various Bank land is now in Bank ownership (and the entire property is now known as 1063 Great Plain Avenue). On June 12, 2012, the Planning Board authorized the Major Project Site Plan Special Permit No. 2012-04, approving the construction of an approximately 11,696 square foot addition to the existing Bank building at 1055 and 1063 Great Plain Avenue/10 Eaton Square that will, when completed, extend from the rear of the building northward, and to expand the Bank parking facilities utilizing property at 232 and 244 Garden Street. The addition comprised 3,643 square of basement space, 3,972 square feet of first floor space and 4,081 square feet of second floor space. In addition, the project

involved the redevelopment of the Town owned parking lot abutting the Bank property as well as development of a pedestrian plaza on a portion of the discontinued Eaton Square. One of the automatic teller machines ("ATM") facilities within the existing Bank building was removed and a drive-through free-standing ATM was placed in the Chestnut Street Business Zoning District located approximately 80 feet north of the rear of the proposed Bank building along Garden Street. The queuing area for the drive-thru was designed to allow for 2 cars to be on the property at the ATM and to allow for an escape lane to run the full length of the drive. (See, Major Project Site Plan Review Special Permit No. 2012-04). That project required 94 parking spaces. However, the decision approved 62 parking spaces (i.e., a waiver of 32 parking spaces) of which 35 parking spaces at located in the Bank lot at 1063 Great Plain Avenue and 27 parking spaces (including tandem spaces) are located at 0 Garden Street.

1.7 As a result of the COVID pandemic and technological improvements, there have been significant changes to the manner in which people conduct their banking activities. Specifically, Petitioner has noticed a dramatic increase in the utilization of on-line and electronic banking with a corresponding decrease in the customers physically coming to the Bank itself. Furthermore, it is the Petitioner's experience that when customers do need to come to the Bank, it is a preference to utilize drive-through tellers and ATMs. The exception is when a customer needs to meet privately with Bank personnel (as opposed to simple deposits and withdrawals). In addition, during the COVID pandemic a majority of the Bank employees were required and able to work remotely. It is the Bank's intention to maintain this type of remote work for these employees at least a couple of days per week. To address the above, the Petitioner proposes to convert an existing mezzanine area in the Bank building to executive offices by adding approximately 1,365 square feet of floor area (thus freeing up other office space for use for private customer conferences). In addition, the Petitioner proposes to demolish the existing drive-up free-standing ATM, and replace the same with an approximate 321 square foot drive-up teller building with a drive-up ATM. The new drive through building will be located in entirely in the Chestnut Street Business Zoning District.

1.8 Upon completion of the Project, the total floor area at the premises will increase from the current 34,580 square feet to 36,266 square feet (i.e., an increase of 1,365 square feet within the bank building and by 321 square feet dedicated to the drive-up teller and drive-up ATM). Currently, 24,007 square feet is dedicated to office use and 10,573 square feet is dedicated to utility/storage space. Upon completion of the Project, there will be 25,693 square feet of office use and 10,573 square feet dedicated to utility/storage space. Per Section 5.1.2 of the By-Law, banks require 1 parking space per 300 square feet of floor area and utility/storage requires 1 space per 850 square feet of floor area. Accordingly, the Bank currently requires 94 parking spaces. In accordance with the 2012 site plan approval, a waiver of 32 parking spaces was granted and the Bank is currently served by 62 parking spaces. Upon completion of this Project, the Bank will require 99 parking spaces and is providing 57 parking spaces. Therefore, a waiver of 42 parking spaces is required, which is a waiver above the previously approved waiver of 10 spaces. As stated above, with the change in consumer banking practices as well as the Petitioner's own business practices (i.e., remote workers, etc.), the Petitioner submits that 57 parking spaces are more than sufficient. In addition, the Petitioner has and will continue to lease spaces in the abutting municipal lot.

1.9 The By-Law for the Town of Needham prescribes the uses which are permitted as of right, the uses permitted only upon issuance of a special permit, and the uses not permitted in the Center Business and Chestnut Street Business Zoning Districts. Per the schedule of use regulations sets forth in Section 3.2.2 of the By-Law, "banks" are allowed as of right in the Center Business and Chestnut Street Business Zoning Districts. The By-Law is silent as to

teller windows. However, the schedule of use regulations in said Section 3.2.2 provides that "other accessory uses incidental to lawful principle uses" are allowed in the Chestnut Street Business Zoning District by special permit. Section 1.3 (Definitions) of the By-Law defines an "accessory building" as a "building devoted exclusively to a use subordinate to and customarily incidental to the principal use" and defines an "accessory use" as "a use subordinate to and customarily incidental to the principal use". The proposed drive-up teller building with a drive-up ATM is an "accessory use" to the bank use and is therefore allowed by special permit in the Chestnut Street Business Zoning District.

1.10 The By-Law prescribes dimensional requirements (lot area, frontage, setbacks, etc.) for the buildings and structures in the Center Business and Chestnut Street Business Zoning Districts. As shown on the Plan, the Project satisfies these dimensional requirements. All of the "changes" to the Bank building are internal to the same (and therefore there are no modifications to the same in terms of any required setbacks). The only "new" structure/building involved in the Project is the proposed drive-up teller building with the drive-up ATM and same has been setback at minimum of 10 feet from Garden Street.

1.11 The Petitioner appeared before the Design Review Board and received approval on August 8, 2022.

1.12 Under the terms of Major Project Site Plan Special Permit No. 2012-04, dated June 12, 2012, the bank was permitted to operate Monday through Saturday as follows. On Monday, Tuesday, Wednesday and Thursday, between the hours of 7:00 a.m. and 3:00 p.m., on Friday, between the hours of 7:00 a.m. and 5:30 p.m., and on Saturday between the hours of 8:00 a.m. and 12:00 p.m. The bank now seeks to revise its hours of operation so as to operate as follows. On Monday, Tuesday, and Wednesday, between the hours of 7:00 a.m. and 4:00 p.m., on Thursday and Friday, between the hours of 7:00 a.m. and 5:30 p.m., and on Saturday between the hours of 8:00 a.m. and 12:00 p.m.

1.13 Currently the Bank employs between 60 and 70 persons at 1063 Great Plain Avenue. The current proposal will not increase the number of employees at the property. Presently not more than 70 employees are permitted on site at any given time. If the Bank intends to have an excess of 70 employees at the facility at the same time, the Bank must submit an application for amendment to this Special Permit addressing the parking for such additional employees. Said plan may include provisions for car-pooling, shuttle service, additional or expanded parking lot and the like.

1.14 As indicated above, under the By-Law the Project requires 99 parking spaces. The Petitioner proposes to provide 57 parking spaces with 30 such spaces parking spaces adjacent to the Bank building at 1063 Great Plain Avenue and 27 parking spaces (including 4 tandem spaces) at 0 Garden Street. This will require relief from the following:

Section 5.1.2 - Required Parking: There are 57 parking spaces (including 4 tandem spaces in the Garden Street Parking Lot) available to serve the Subject Property. The Bank requires 99 parking spaces. Therefore, the Petitioner requires and requests a waiver of 42 parking spaces. As reported above, the Bank currently has been granted a 32-parking space waiver (and is leasing spaces in the municipal lot).

Section 5.1.3(b) - Loading Requirements: The Petitioner requests relief from the requirement of providing off-street loading facilities. There are currently no such facilities at the subject property, and this has not been problematic for Bank activity.

Section 5.1.3(h) – Parking Space Layout: The Petitioner requests relief from the parking space layout requirement to the extent necessary for the proposed tandem spaces in the Garden Street Parking Lot and the parking spaces located on both Bank and Town property.

Sections 5.1.3(i), (j), (k), (l) and (m) – Aisle, Parking Setbacks, Landscaped Areas, Trees, and Location: The Petitioner requests relief from the requirements of parking setbacks, landscaped areas, and trees. Strict compliance with these requirements will reduce the number of parking spaces available on the site. This will allow the utilization of the Bank and Town lots as an integrated parking lot.

Section 3.2.2 – Location of Parking: The Petitioner proposes parking in separate lots including the Bank owned Garden Street Parking Lot. In addition, there are parking spaces proposed to traverse both Bank property and Town property. This will allow the maximization of parking spaces available to both the Bank and the Town.

1.15 Adjoining premises will be protected against seriously detrimental uses on the site by provision of surface water drainage, sound and site buffers, and preservation of views, light and air. The site is presently fully developed and the proposed 321 square feet of teller building and the ATM has been approved by the Design Review Board. The major renovation is inside the building. The existing drainage and landscaping will remain.

1.16 Convenience and safety of vehicular and pedestrian movement within the site and on adjacent streets, the location of driveway openings in relation to traffic or to adjacent streets and, when necessary, compliance with other regulations for the handicapped, minors and the elderly has been assured. In light of the changes in consumer banking habits as well as the Petitioner's allowance of workers to work remotely, no increase in traffic is anticipated. Furthermore, the new drive-up teller building is small (321 square feet) and has been designed to allow easy access.

1.17 Adequacy of the arrangement of parking and loading spaces in relation to the proposed uses of the premises has been assured. The Bank does not require loading facilities. The site layout has been arranged to optimize the parking configuration.

1.18 Adequate methods for disposal of refuse and waste will be provided. The Bank does not require exterior storage of refuse for removal. The Bank maintains contracts for proper handling, shredding, removal, and disposal of all waste materials.

1.19 Relationship of structures and open spaces to the natural landscape, existing buildings and other community assets in the area and compliance with other requirements of this By-law has been assured. The existing site is fully developed. The Project does not require destruction of existing undeveloped sites and is a sustainable design practice. Setbacks to other existing buildings and community assets are being maintained.

1.20 The proposed project will not have any adverse impacts on the Town's resources, including the Town's water supply and distribution system, sewer collection and treatment, fire protection and streets. The Project consists of a small (321 square foot) drive-up building replacing an existing drive-up ATM as well as expansion of floor area interior to the Bank building. As such, the Project does not constitute a new significant strain on the Town's resources. The grant of (or modification to existing) Special Permits will allow the Bank to continue to provide service to the community in more efficient and effective manner. The Bank is an established community business, a considerate neighbor, and will comply with all state and local conditions, limitations, and safeguards.

1.21 Under Section 7.4 of the By-Law, a Major Project Site Plan Special Permit amendment may be granted within the Center Business Zoning District and the Chestnut Street Business Zoning District provided the Board finds that the proposed development will be in compliance with the provisions of the By-Law. On the basis of the above findings and conclusions, the Board finds the proposed development Plan, as conditioned and limited herein, for the site plan review, to be in harmony with the purposes and intent of the By-Law, to comply with all applicable By-Law requirements, to have minimized adverse impact, and to have promoted a development which is harmonious with the surrounding area.

1.22 Under Section 3.2.2 of the By-Law, a Special Permit may be granted to allow for a drive-up teller building with a drive-up ATM in Chestnut Street Business Zoning District as an accessory use allowed incidental to a lawful principle use, provided the Board finds that the proposed use is in harmony with the general purposes and intent of the By-Law. On the basis of the above findings and conclusions, the Board finds the proposed development Plan, as conditioned and limited herein, to be in harmony with the purposes and intent of the By-Law.

1.23 Under Section 3.2.2 of the By-Law, a Special Permit may be granted to allow for the off-street parking of vehicles associated with the principle use, located on a separate lot owned or leased by the owner of the land in which the principle use is located, within a zoning district in which the principle use is permitted, provided the Board finds that the proposed use is in harmony with the general purposes and intent of the By-Law. On the basis of the above findings and conclusions, the Board finds the proposed development Plan, as conditioned and limited herein, to be in harmony with the purposes and intent of the By-Law.

1.24 Under Section 5.1.1.5 and Section 5.1.1.6 of the By-Law, a Special Permit to waive strict adherence with the requirements of Section 5.1.2 (Required Parking) and Section 5.1.3 (Off Street Parking Requirements) of the By-Law may be granted provided the Board finds that owing to special and unique circumstances, the particular use, structure or lot does not warrant the application of certain design requirements, and that a reduction in the number of spaces and certain design requirements is warranted. On the basis of the above findings and conclusions, the Board finds that there are special; and inquire circumstances justifying the reduction in the number of required parking spaces and design requirements, as conditioned and limited herein, which will also be consistent with intent of the By-Law and which will not increase the detriment to the Town's and neighborhood's inherent use.

THEREFORE, the Board voted 5-0 to GRANT: (1) the requested Major Project Site Plan Special Permit amendment under Section 7.4 of the By-Law and Section 4.2 of Major Project Site Plan Special Permit No. 2012-04, issued to Needham Bank, 1063 Great Plain Avenue, Needham, MA, dated June 12, 2012, amended August 6, 2013, April 16, 2014, October 7, 2014 and December 15, 2015; (2) the requested Special under Section 3.2.2 of the By-law to allow for a drive-up teller building with a drive-up ATM in the Chestnut Street Business Zoning District as an accessory use allowed incidental to a lawful principal use; (3) the requested Special Permit under Section 3.2.2 of the By-Law for off-street parking for vehicles associated with a principal use, located on a separate lot owned or leased by the owner of the land in which the principal use is located, within a zoning district in which the principal use is permitted; and (4) the requested Special Permit under Sections 5.1.1.5 and 5.1.1.6 of the By-Law to waive strict adherence to the off-street parking requirements of Sections 5.1.2 and 5.1.3 of the By-Law, subject to and with the benefit of the following Plan modifications, conditions and limitations.

PLAN MODIFICATIONS

Prior to the issuance of a building permit or the start of any construction on the site, the Petitioner shall cause the Plan to be revised to show the following additional, corrected, or modified information. The Building Commissioner shall not issue any building permit, nor shall he permit any construction activity on the site to begin on the site until and unless he finds that the Plan is revised to include the following additional corrected, or modified information. Except where otherwise provided, all such information shall be subject to the approval of the Building Commissioner. Where approvals are required from persons other than the Building Commissioner, the Petitioner shall be responsible for providing a written copy of such approvals to the Building Commissioner before the Commissioner shall issue any building permit or permit for any construction on the site. The Petitioner shall submit nine copies of the final Plans as approved for construction by the Building Commissioner to the Board prior to the issuance of a Building Permit.

2.1 No Plan Modifications.

CONDITIONS

3.0 The following conditions of this approval shall be strictly adhered to. Failure to adhere to these conditions or to comply with all applicable laws and permit conditions shall give the Board the rights and remedies set forth in Section 3.20 hereof.

3.1 The conditions and limitations set forth in Major Project Site Plan Special Permit No. 2012-04, issued to Needham Bank, 1063 Great Plain Avenue, Needham, MA, dated June 12, 2012, Amended August 6, 2013, April 16, 2014, October 7, 2014 and December 15, 2015, as further amended by this Amendment are ratified and confirmed.

3.2 The Board approves the renovation of the mezzanine area of the bank as well as approves the construction of the drive-up teller building and the drive through ATM, as shown on the Plan. The development of the site shall be as described under the support materials provided under Exhibits 1, 2 and 3 of this Decision. Any changes, revision or modifications to the Plan shall require approval by the Board.

3.3 The subject site shall be used for bank purposes as well as the noted and permitted accessory uses.

3.4 The buildings, parking areas, driveways, walkways, landscape areas, and other site and off-site features shall be constructed in accordance with the Plan, as modified by this Decision. Any changes, revisions or modifications to the Plan, as modified by this Decision, shall require approval by the Board.

3.5 All new utilities, including telephone and electrical service, shall be installed underground from the street line.

3.6 The maintenance of the site and associated infrastructure and landscaping shall be the responsibility of the Petitioner and the site, infrastructure and landscaping shall be maintained in good condition.

3.7 All buildings and land constituting the Petitioner's premises (i.e. as shown on Assessors Plan No. 51, Parcel 86 and Parcel 22 shall remain under a single ownership.

3.8 The bank may be open for business between the hours of 7:00 a.m. and 4:00 p.m., Monday through Wednesday, between the hours of 7:00 a.m. and 5:30 p.m. Thursday and Friday, and between the hours of 8:00 a.m. and 12:00 p.m. on Saturday. The drive through teller building

shall have the same hours as the bank. Additionally, the two ATM machines, one free-standing ATM located in the rear parking lot, and one installed and accessed from the main Great Plain Avenue entrance, are permitted to operate twenty-four hours a day, seven days a week.

3.9 The Petitioner may utilize the services of no more than 70 employees on site at the same time; provided further that if the Bank intends to have an excess of 70 employees at the facility at the same time, the Bank must submit an application for Amendment to this Special Permit addressing the parking for such additional employees. Said plan may include provisions for car-pooling, shuttle service, additional or expanded parking lot, satellite parking and the like.

3.10 57 parking spaces shall be provided at all times; 30 such spaces parking spaces adjacent to the Bank building and 27 parking spaces (including 4 tandem spaces) at 0 Garden Street

3.11 All construction staging shall be on-site. No construction parking shall be on public streets. Construction parking shall be all on site or a combination of on-site and off-site parking at locations in which the Petitioner can make suitable arrangements. If required by the Building Commissioner, construction staging plans shall be included in the final construction documents prior to the filing of a Building Permit and shall be subject to the review and approval of the Building Commissioner.

3.12 The Petitioner shall seal all abandoned drainage connections and other drainage connections where the developer cannot identify the sources of the discharges.

3.13 The Petitioner shall secure from the Needham Department of Public Works a Street Opening Permit, if applicable.

3.14 In constructing and operating the proposed Bank ATM, drive-up teller building and drive-up ATM on the locus pursuant to this Special Permit, due diligence shall be exercised, and reasonable efforts be made at all times to avoid damage to the surrounding areas or adverse impact on the environment.

3.15 The following interim safeguards shall be implemented during construction:

a. The hours of construction shall be 7:00 a.m. to 5:00 p.m. Monday through Saturday unless otherwise authorized by approval of the Board of Selectmen pursuant to the Needham General By-Laws, Section 3.8.1.

b. The Petitioner’s contractor shall provide temporary security chain-link or similar type fencing around the portions of the project site which require excavation or otherwise pose a danger to public safety.

c. The Petitioner's contractor shall designate a person who shall be responsible for the construction process. That person shall be identified to the Police Department, the Department of Public Works, the Building Commissioner, and the abutters and shall be contacted if problems arise during the construction process. The designee shall also be responsible for assuring that truck traffic and the delivery of construction material does not interfere with or endanger traffic flow on Great Plain Avenue, Garden Street or the adjacent roads.

d. The Petitioner shall take the appropriate steps to minimize, to the maximum extent feasible, dust generated by the construction including, but not limited to, requiring subcontractors to place covers over open trucks transporting construction debris and keeping Great Plain Avenue and Garden Street clean of dirt and debris.

3.16 No building permit shall be issued in pursuance of the Special Permit and Site Plan approval for the newly renovated Bank ATM or teller building with drive-up ATM or renovated mezzanine until:

a. The final plans are in conformity with those approved by the Board, and a statement certifying such approval shall have been filed by this Board with the Building Commissioner.

b. A construction management and staging plan has been submitted to the Police Chief and Building Commissioner for their review and approval.

c. The Petitioner has recorded with the Norfolk County Registry of Deeds a certified copy of this decision granting this Special Permit and Site Plan Approval with the appropriate reference to the book and page number of the recording of the Petitioner's title deed or notice endorsed thereon.

3.17 No portion of the newly renovated Bank ATM or teller building with drive-up ATM or renovated mezzanine shall be occupied or made available for public use until the following conditions are met:

a. An as-built plan, supplied by the engineer of record certifying that the on-site and off-site project improvements were built according to the approved documents, has been submitted to the Board and Department of Public Works. The as-built plan shall show the building, all finished grades and final construction details of the driveways, parking areas, drainage systems, utility installations, and sidewalk and curbing improvements on-site and off-site, in their true relationship to the lot lines. In addition to the engineer of record, said plan shall be certified by a Massachusetts Registered Land Surveyor.

b. There is filed with the Building Commissioner and Board a statement by the Department of Public Works certifying that the finished grades and final construction details of the driveways, parking areas, drainage systems, utility installations, and sidewalks and curbing improvements on site, have been constructed to the standards of the Town of Needham Department of Public Works and in accordance with the approved Plan.

c. There is filed with the Board and Building Commissioner an as-built Landscaping Plan showing the final location, number and type of plant material, final landscape features, parking areas, and lighting installations. Said plan shall be prepared by the landscape designer of record and shall include a certification that such improvements were completed according to the approved documents.

3.18 In addition to the provisions of this approval, the Petitioner must comply with all requirements of all state, federal, and local boards, commission or other agencies, including, but not limited to the Building Commissioner, Fire Department, Department of Public Works, Conservation Commission, Police Department, and Board of Health.

3.19 The Petitioner, by accepting this Approval, warrants that the Petitioner has included all relevant documentation, reports, and information available to the Petitioner in the application submitted, and that this information is true and valid to the best of the Petitioner’s knowledge.

3.20 Violation of any of the conditions of this Approval shall be grounds for revocation of any building permit or certificate of occupancy granted hereunder as follows: In the case of violation of any conditions of this Approval, the Town will notify the owner of such violation and give the owner reasonable time, not to exceed thirty (30) days, to cure the violation. If, at the end of said thirty (30) day period, the Petitioner has not cured the violation, or in the case of violations requiring more than thirty (30) days to cure, has not commenced the cure and prosecuted the cure continuously, the permit granting authority may, after notice to the Petitioner, conduct a hearing in order to determine whether the failure to abide by the conditions contained herein should result in a recommendation to the Building Commissioner to revoke any building permit or certificate of occupancy granted hereunder. This provision is not intended to limit or curtail the Town's other remedies to enforce compliance with the conditions of this Approval including, without limitation, by an action for injunctive relief before any court of competent jurisdiction. The Petitioner agrees to reimburse the Town for its reasonable costs in connection with the enforcement of the conditions of this Approval if the Town prevails in such enforcement action.

LIMITATIONS

4.0 The authority granted to the Petitioner by this permit is limited as follows:

4.1 This permit applies only to the site improvements, which are the subject of this petition. All construction to be conducted on site shall be conducted in accordance with the terms of this permit and shall be limited to the improvements on the Plan, as modified by this decision.

4.2 There shall be no further development of this site without further site plan approval as required under Section 7.4 of the By-Law. The Board, in accordance with M.G.L., Ch. 40A, Section 9 and said Section 7.4, hereby retains jurisdiction to (after hearing) modify and/or amend the conditions to, or otherwise modify, amend or supplement, this decision and to take other action necessary to determine and ensure compliance with the decision.

4.3 This decision applies only to the requested Special Permits and Site Plan Review. Other permits or approvals required by the By-Law, other governmental boards, agencies or bodies having jurisdiction shall not be assumed or implied by this decision.

4.4 No approval of any indicated signs or advertising devices is implied by this Decision.

4.5 The foregoing restrictions are stated for the purpose of emphasizing their importance but are not intended to be all-inclusive or to negate the remainder of the By-Law.

4.6 This Site Plan Special Permit shall lapse on September 7, 2024 if substantial use thereof has not sooner commenced, except for good cause. Any requests for an extension of the time limits set forth herein must be in writing to the Board at least 30 days prior to September 7, 2024. The Board herein reserves its rights and powers to grant or deny such extension without a public hearing. The Board, however, shall not grant an extension as herein provided unless it finds that the use of the property in question or the construction of the site has not begun, except for good cause.

4.7 This decision shall be recorded in the Norfolk District Registry of Deeds and shall not become effective until the Petitioner has delivered a certified copy of the document to the Board. In accordance with M.G.L. Chapter 40A, Section 11, this Major Site Plan Special Permit shall not take effect until a copy of this decision bearing the certification of the Town

Clerk that twenty (20) days have elapsed after the decision has been filed in the office of the Town Clerk and either that no appeal has been filed or the appeal has been filed within such time is recorded in the Norfolk District Registry of Deeds and is indexed in the grantor index under the name of the owner of record or is recorded and noted on the owner's certificate of title. The person exercising rights under a duly appealed Special Permit does so at the risk that a court will reverse the permit and that any construction performed under the permit may be ordered undone.

The provisions of this Special Permit shall be binding upon every owner or owner of the lots and the executors, administrators, heirs, successors and assigns of such owners, and the obligations and restrictions herein set forth shall run with the land, as shown on the Plan, as modified by this decision, in full force and effect for the benefit of and enforceable by the Town of Needham.

Any person aggrieved by this decision may appeal pursuant to the General Laws, Chapter 40A, Section 17, within twenty (20) days after filing of this decision with the Needham Town Clerk.

Witness our hands this 7th day of September, 2022.

NEEDHAM PLANNING BOARD

_____
Adam Block, Chair

_____
Jeanne S. McKnight, Vice Chair

_____
Paul S. Alpert

_____
Artie Crocker

_____
Natasha Espada

COMMONWEALTH OF MASSACHUSETTS

_____2022

On this _____day of September, 2022, before me, the undersigned notary public, personally appeared _____, one of the members of the Planning Board of the Town of Needham, Massachusetts, proved to me through satisfactory evidence of identification, which was _____, to be the person whose name is signed on the proceeding or attached document, and acknowledged the foregoing to be the free act and deed of said Board before me.

_____
Notary Public
My Commission Expires: _____

TO WHOM IT MAY CONCERN: This is to certify that the 20-day appeal period on the Amendment to Decision of the project proposed by the Needham Bank, 1063 Great Plain Avenue, Needham, MA, for property located at 1063 Great Plain Avenue and 0 Garden Street, Needham, Massachusetts, has passed,

____and there have been no appeals filed in the Office of the Town Clerk or
____there has been an appeal filed.

_____ _____
Date Theodora K. Eaton, Town Clerk

Copy sent to:

Petitioner - Certified Mail #	Board of Selectmen
Town Clerk	Engineering
Building Commissioner	Fire Department
Director, PWD	Police Department

Board of Health	Peter Zahka, Attorney
Conservation Commission	Parties in Interest

For Planning Board Usage Only

NEEDHAM
ZONING BOARD OF APPEALS
AGENDA

THURSDAY, SEPTEMBER 15, 2022 - 7:30PM

Zoom Meeting ID Number: 869-6475-7241

To view and participate in this virtual meeting on your computer, at the above date and time, go to www.zoom.us, click "Join a Meeting" and enter the Meeting ID: 869-6475-7241

Or join the meeting at link: https://us02web.zoom.us/j/86964757241

AGENDA

Minutes	Review and approve Minutes from August 10, 2022 meeting.
Case #1 – 7:30PM	**150 Gould Street –**Bakers' Best, Inc, applicant, applied to the Board of Appeals for a Special Permit Amendment under Sections 1.4.2, 3.2.1, 5.1.1.5, 5.1.2, 5.1.3 and any other applicable Sections of the By-Law to extend or renew the Special Permit dated September 17, 2020 issued to Bakers' Best, Inc. to authorize take-out food service for an additional period of not less than two (2) years or such other time the Board may allow. The property is located at 150 Gould Street, Needham, MA in the Industrial-1(IND-1) District.
Case #2 – 7:30 PM	**377 Chestnut Street –** Public notice is hereby given that Plan B Retail Design and Project Management, LLC, applicant, applied to the Board of Appeals for a Special Permit under Sections 1.4.6, 5.1.3j and 5.1.3k and any other applicable Sections of the By-Law to allow the change of a pre-existing non-conforming building and to waive the parking design requirements associated with the modification of the parking lot and reduction of two curb cuts into Chestnut Street. The relief sought is part of the renovations of the existing building at Roche Brothers supermarket. The property is located at 377 Chestnut Street, Needham, MA in the Chestnut Street Business (CSB) and Lower Chestnut Street Overlay (LCSO) District.

.

Next ZBA Meeting – October 20, 2022

GEORGE GIUNTA, JR.
ATTORNEY AT LAW*
281 CHESTNUT STREET
NEEDHAM, MASSACHUSETTS 02492
*Also admitted in Maryland

TELEPHONE (781) 449-4520 FAX (781) 465-6059

August 22, 2022

Town of Needham
Zoning Board of Appeals
Needham, Massachusetts 02492

Attn: Daphne M. Collins, Administrative Specialist

Re: Bakers' Best, Inc.
150 Gould Street
Extension / Renewal Take-Out Special Permit

Dear Ms. Collins,

Please be advised this office represents Bakers' Best, Inc. (hereinafter "Bakers'") with respect to the property known and numbered 150 Gould Street, Needham, MA (hereinafter the "Premises"). In connection therewith, submitted herewith, please find the following:

1. Seven copies of a Completed Application for Hearing; and

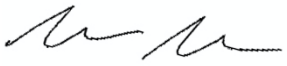
2. Check in the amount of $200 for the applicable filing fee.

The Premises is situated in an Industrial-1 (Ind-1) Zoning District and is occupied by an existing commercial structure. From 2006 through 2019, Bakers' used and occupied approximately one-half of the existing building and a portion of the exterior area at the Premises for commercial catering and commissary purposes. Then, by Decision dated July 11, 2019, filed with the Town Clerk on August 19, 2019, the Board of Appeals authorized the expansion of such use into the entire building. Subsequently, by Decision dated September 17, 2020, filed with the Town Clerk on October 13, 2020, the Board authorized take-out food service for a period of two years, subject to extension or renewal.

Bakers' is now seeking to extend or renew the aforesaid take-out food service special permit. While there are transactions pending that will transfer the Bakers' special permits as well as ownership of the building, Bakers' desires to continue its take-out service until those transactions are consummated.

Kindly schedule this matter for the next hearing of the Board of Appeals. I will submit additional information prior to the hearing. In the meantime, if you have any comments, questions or concerns, or if you require any further information, please contact me so that I may be of assistance.

Sincerely,



George Giunta, Jr.

ZBA Application For Hearing

Applicants must consult with the Building Inspector prior to filing this Application. *Failure to do so will delay the scheduling of the hearing.*

Applicant Information

Applicant Name	Bakers' Best, Inc.		Date: 8/22/22
Applicant Address	150 Gould Street, Needham, MA 02492		
Phone	857-255-2554	email	tferraro@bakersbestcatering.com

Applicant is ☐ Owner; X Tenant; ☐ Purchaser; ☐ Other ☐ Prospective Purchaser

If not the owner, a letter from the owner certifying authorization to apply must be included

Representative Name	George Giunta, Jr., Esq.		
Address	281 Chestnut Street, Needham, MA 02492		
Phone	617-840-3570	email	george.giuntajr@needhamlaw.net

Representative is X Attorney; ☐Contractor; ☐Architect; ☐Other_____

Contact ☐Me X Representative in connection with this application.

Subject Property Information

Property Address	150 Gould Street, Needham, MA 02494		
Map/Parcel Number	Map 79 / Parcel 10	Zone of Property	Industrial-1 (Ind-1)

Is property within 100 feet of wetlands, 200 feet of stream or in flood Plain?
☐Yes X No

Is property ☐Residential or X Commercial

If residential renovation, will renovation constitute "new construction"?
Yes ☐No N/A

If commercial, does the number of parking spaces meet the By-Law requirement? ☐Yes X No
Do the spaces meet design requirements? ☐Yes X No

Application Type (*select one*): X Special Permit ☐Variance ☐Comprehensive Permit X Amendment ☐ Appeal Building Inspector Decision

ZBA Application For Hearing

Existing Conditions:
Commercial catering and commissary operation with accessory take-out in a lawful, pre-existing, commercial building, which is non-conforming as to side-yard setbacks; such use authorized pursuant to special permits issued by the Board of Appeals to Bakers' Best, Inc. in 2006, as amended, in 2019 and in 2020.

Statement of Relief Sought:
a. Extension or renewal of Special Permit dated September 17, 2020, filed with the Town Clerk on October 13, 2020, authorizing take-out food service, for an additional period of not less than two (2) years, or such other time as the Board may allow; and c. any and all other relief as may be necessary for the continued use of the Premises as a commercial catering and commissary operation with accessory take-out by the Applicant.

Applicable Section(s) of the Zoning By-Law:
1.4.6, 3.2.1, 5.1.1.5, 5.1.2, 5.1.3, 7.5.2 and any other applicable Section or By-Law

If application under Zoning Section 1.4 above, list non-conformities:

	Existing Conditions	**Proposed Conditions**
Use		
# Dwelling Units		
Lot Area *(square feet)*		
Front Setback *(feet)*		
Rear Setback *(feet)*		
Left Setback *(feet)*		
Right Setback *(feet)*		
Frontage *(feet)*		
Lot Coverage *(%)*		
FAR *(Floor area divided by the lot area)*		

Numbers must match those on the certified plot plan and supporting materials

ZBA Application For Hearing

Date Structure Constructed including additions:	**Date Lot was created:**

Submission Materials	**Provided**
Certified Signed Plot Plan of Existing and Proposed Conditions ***(Required)***	
Application Fee, check made payable to the Town of Needham Check holders name, address, and phone number to appear on check and in the Memo line state: "ZBA Fee – Address of Subject Property" ***(Required)***	
If applicant is tenant, letter of authorization from owner ***(Required)***	
Electronic submission of the complete application with attachments ***(Required)***	
Elevations of Proposed Conditions *(when necessary)*	
Floor Plans of Proposed Conditions *(when necessary)*	

Feel free to attach any additional information relative to the application. Additional information may be requested by the Board at any time during the application or hearing process.

❖❖❖❖

I hereby request a hearing before the Needham Zoning Board of Appeals. I have reviewed the Board Rules and instructions.

I certify that I have consulted with the Building Inspector.

Date: August 22, 2022 Applicant Signature

Bakers' Best, Inc.

By its attorney, George Giunta, Jr., Esq.

An application must be submitted to the Town Clerk's Office at townclerk@needhamma.gov and the ZBA Office at dcollins@needhamma.gov

1142

GEORGE GIUNTA JR. ESQ.
MASSACHUSETTS IOLTA COMMITTEE
281 CHESTNUT ST
NEEDHAM, MA 02492

DATE Aug 22, 2022 5-13-110

PAY TO THE ORDER OF Town of Needham $200 00/100

Two Hundred and 00/100 DOLLARS

Security Features Included Details on Back.

BANK OF AMERICA
ACH R/T 011000138

FOR ZBA Filing - Bakers Block, Inc. 150 Gould St.

MP

⑈001142⑈ ⑆011000138⑆ 000054169335⑈

ZBA Application For Hearing

2022 AUG 15 AM 9:48

Applicants must consult with the Building Inspector prior to filing this Application. *Failure to do so will delay the scheduling of the hearing.*

Applicant Information

Applicant Name	Plan B Retail Design & Project Management, LLC Charles A. Bomely		Date: 08.18.22
Applicant Address	12 Goose Lane Tolland, CT 06084		
Phone	860.870.5380	email	cbomelyeplanbretail.com

Applicant is ☐Owner; ☐Tenant; ☐Purchaser; ☒Other Design Office

If not the owner, a letter from the owner certifying authorization to apply must be included

Representative Name	Charles A. Bomely		
Address	12 Goose Lane, Tolland, CT 06084		
Phone	860.870.5380	email	cbomelyeplanbretail.com

Representative is ☐Attorney; ☐Contractor; ☒Architect; ☐Other_____

Contact ☒Me ☐Representative in connection with this application.

Subject Property Information

Property Address	377 Chestnut Street		
Map/Parcel Number	Map 199, Book 46 Lot 60	Zone of Property	Lower Chestnut St., Overlay District

Is property within 100 feet of wetlands, 200 feet of stream or in flood Plain?
☐Yes ☒No

Is property ☐Residential or ☒Commercial

If residential renovation, will renovation constitute "new construction"?
☐Yes ☐No

If commercial, does the number of parking spaces meet the By-Law requirement? ☒Yes ☐No
Do the spaces meet design requirements? ☐Yes ☐ No

Application Type (*select one*): ☒Special Permit ☐Variance ☐Comprehensive Permit ☐Amendment ☐Appeal Building Inspector Decision

ZBA Application For Hearing

Existing Conditions: Operating Supermarket is to be renovated within existing building. A new Facade will be part of Project including a reconstructed Mezzanine. Site Plan to be modified and reduction of two (2) curb cuts into Chestnut Street.

Statement of Relief Sought: Attached

Applicable Section(s) of the Zoning By-Law: 5.1.3-J & 5.1.3-K

If application under Zoning Section 1.4 above, list non-conformities:

	Existing Conditions	**Proposed Conditions**
Use	Merc	Merc
# Dwelling Units	—	—
Lot Area *(square feet)*	62,873 SF	62,873 SF
Front Setback *(feet)*	5'	104'
Rear Setback *(feet)*	25'	22.5'
Left Setback *(feet)*	0'	45'
Right Setback *(feet)*	0'	2'
Frontage *(feet)*	100'	161'
Lot Coverage *(%)*	0.29	0.30
FAR *(Floor area divided by the lot area)*	0.281	0.281
Numbers must match those on the certified plot plan and supporting materials		

ROCHE BROS. SUPERMARKET
377 CHESTNUT STREET
NEEDHAM, MA 02492

STATEMENT OF RELIEF SOUGHT

Request relief of Section 5.1.3-J as existing non-conforming parking spaces that are on property lines without the required four foot (4'-0") setbacks is allowed to remain as spaces are placed in the repaved lot. This occurs on the North, East and West property lines.

Request relief of Section 5.1.3-K as even though the landscaped pervious area has increased by nearly six (6) times, it is not meeting the ten percent (10%) requirement and requested allowance for the eighty-five percent (85%) indicated.

PLAN
RETAIL DESIGN

08.18.2022

ZBA Application For Hearing

Date Structure Constructed including additions:	Date Lot was created:
NOT KNOWN, PRIOR TO 1960	

Submission Materials	Provided
Certified Signed Plot Plan of Existing and Proposed Conditions *(Required)*	YES
Application Fee, check made payable to the Town of Needham Check holders name, address, and phone number to appear on check and in the Memo line state: "ZBA Fee – Address of Subject Property" *(Required)*	TO BE HAND DELIVERED MONDAY 8/22
If applicant is tenant, letter of authorization from owner *(Required)*	
Electronic submission of the complete application with attachments *(Required)*	YES
Elevations of Proposed Conditions *(when necessary)*	YES
Floor Plans of Proposed Conditions *(when necessary)*	YES

Feel free to attach any additional information relative to the application. Additional information may be requested by the Board at any time during the application or hearing process.

❖❖❖❖

I hereby request a hearing before the Needham Zoning Board of Appeals. I have reviewed the Board Rules and instructions.

I certify that I have consulted with the Building Inspector 8/2/22
date of consult

Date: 8/18/22 Applicant Signature Charles A Gomely

An application must be submitted to the Town Clerk's Office at townclerk@needhamma.gov and the ZBA Office at dcollins@needhamma.gov

Chestnut Street

Front Entrance Tower

Roche Bros.

377 Chestnut Street, Needham, MA

Perspective Views

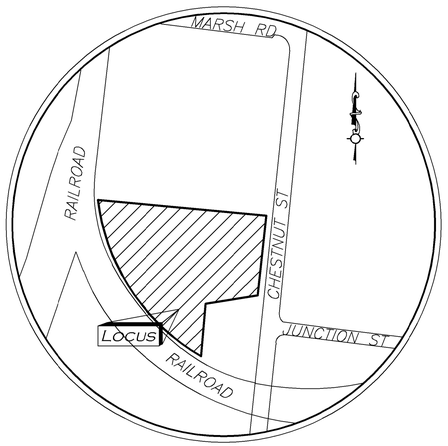
PLAN RETAIL DESIGN

SITE DEVELOPMENT PLANS FOR

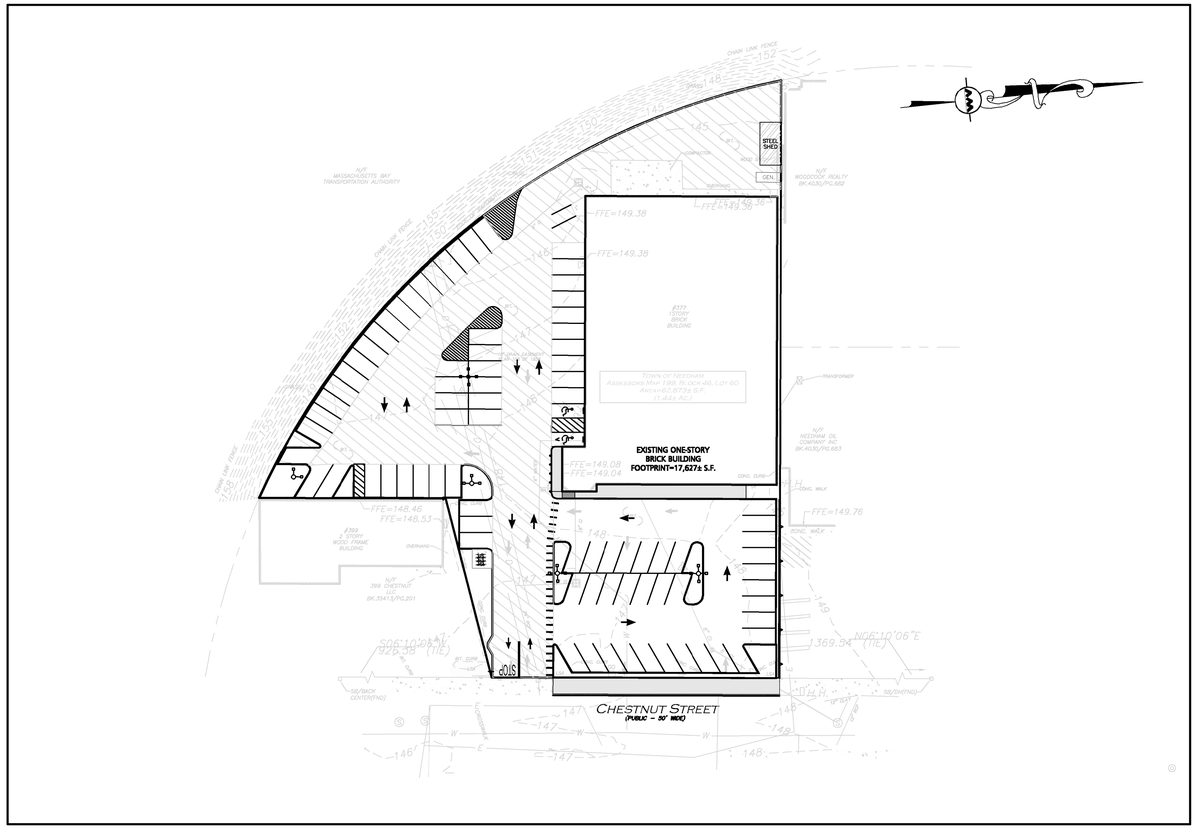
PARKING LOT RENOVATION

377 CHESTNUT STREET

NEEDHAM, MA 02492



LOCUS MAP
NOT TO SCALE



OWNER:
CHESTNUT STREET 1962 TRUST
SARAH BROUGHEL, TRUSTEE
CHOATE HALL & STUART
2 INTERNATIONAL PLACE
BOSTON, MA 02110

TENANT:
ROCHE BROTHERS SUPERMARKET
11 HAMPSHIRE STREET
MANSFIELD, MA 02048

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

SITE ENGINEER & SURVEYOR:
ALLEN & MAJOR ASSOCIATES, INC.
100 COMMERCE WAY, SUITE #5
WOBURN, MA 01801

LIST OF DRAWINGS

DRAWING TITLE	SHEET NO.	ISSUED	REVISED
EXISTING CONDITIONS PLAN	V-101	8/11/2022	-
DEMOLITION & EROSION CONTROL PLAN	C-101	8/12/2022	-
LAYOUT & MATERIALS PLAN	C-102	8/12/2022	-
GRADING, DRAINAGE, & UTILITY PLAN	C-103	8/12/2022	-
TRUCK TURNING PLAN - FIRE TRUCK	C-104.1	8/12/2022	-
TRUCK TURNING PLAN - WB-62 TRUCK	C-104.2	8/12/2022	-
SITE PHOTOMETRICS PLAN	C-105	8/12/2022	-
DETAILS	C-501	8/12/2022	-
DETAILS	C-502	8/12/2022	-
DETAILS	C-503	8/12/2022	-
DETAILS	C-504	8/12/2022	-
DETAILS	C-505	8/12/2022	-
LANDSCAPE PLAN	L-101	8/12/2022	-
LANDSCAPE NOTES & DETAILS	L-501	8/12/2022	-

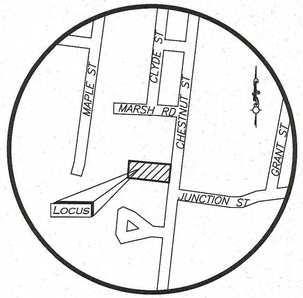
GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

8/12/22
COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43110
REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

ISSUED FOR APPROVAL: AUGUST 12, 2022

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01 - COVER.DWG



LOCUS MAP
(NOT TO SCALE)

LOCUS REFERENCES
- –ASSESSORS MAP 199, BLOCK 46, LOT 60
- –DEED BOOK 12663, PAGE 252
- –PLAN 158 OF 1956
- –OWNER OF RECORD: J WILLIAM LINSE REVOCABLE TRUST

PLAN REFERENCES
- –PLAN 36 OF 1986
- –PLAN 409 OF 1994
- –PLAN BOOK 646, PLAN 23
- –PLAN 699 OF 1982
- –1857 COUNTY LAYOUT OF CHESTNUT STREET
- –NORFOLK COUNTY ENGINEERS FIELDBOOK #314, PAGE 82

FOR REGISTRY USE ONLY

PARKING SUMMARY	
STANDARD STALLS	82
HANDICAPPED STALLS	2
TOTAL STALLS	84

BENCHMARK SUMMARY		
TBM #	DESCRIPTION	ELEV.
1	CHISEL SQ. SET IN NW COR. OF CONC LP BASE	148.83
2	CHISEL SQ. SET IN NW COR. OF CONC. LP BASE	149.36

UTILITY STATEMENT
THE UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. ALLEN & MAJOR ASSOCIATES, INC. (A&M) MAKES NO GUARANTEE THAT THE UTILITIES SHOWN HEREON COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. A&M FURTHER DOES NOT WARRANT THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. A&M HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

TOWN OF NEEDHAM
ASSESSORS MAP 199, BLOCK 46, LOT 60
AREA=62,873± S.F.
(1.44± AC.)

#377
1 STORY
BRICK
BUILDING

#399
2 STORY
WOOD FRAME
BUILDING

N/F
MASSACHUSETTS BAY
TRANSPORTATION AUTHORITY

N/F
WOODCOCK REALTY
BK.4030/PG.682

N/F
NEEDHAM OIL
COMPANY INC.
BK.4030/PG.683

N/F
399 CHESTNUT
LLC
BK.35413/PG.201

CHESTNUT STREET
(PUBLIC – 50' WIDE)

LEGEND

STONE BOUND (SB)	⊡
SEWER MANHOLE (SMH)	Ⓢ
ELECTRIC MANHOLE (EMH)	Ⓔ
MISC. MANHOLE (MH)	Ⓜ
CATCH BASIN (CB)	□
ROUND CATCH BASIN (RCB)	⊞
WATER GATE	
GAS GATE	
BOLLARD	
CLEANOUT	
LIGHT	
TREE	
SIGN	
MONITOR WELL	MW
HAND HOLE	H.H.
AIR CONDITIONER	AC
GAS METER	G
HANDICAPPED PARKING SPACE	
POSITION INDICATOR VALVE	PIV
PAINTED ARROW	
PARKING SPACE COUNT	16
CONCRETE	
LANDSCAPED AREA (LSA)	
BUILDING	
BUILDING OVERHANG	
1' CONTOUR	53
5' CONTOUR	55
EDGE OF PAVEMENT	
CURB	
CHAIN LINK FENCE	x
GUARDRAIL	
SEWER LINE	S
DRAIN LINE	D
GAS LINE	G
ELECTRIC LINE	E
WATER LINE	W
FINISHED FLOOR ELEVATION	FFE
CONCRETE	CONC.
GRANITE	GRAN.
SQUARE	SQ.
REINFORCED CONCRETE PIPE	RCP
CAST IRON PIPE	CI
NO PIPES VISIBLE	NPV
FOUND	FND
NOW OR FORMERLY	N/F
BOOK	BK.
PAGE	PG.

NOTES
1. NORTH ARROW IS BASED ON MASSACHUSETTS GRID COORDINATE SYSTEM (MAINLAND ZONE) (NAD 83).
2. BOOK/PAGE AND PLAN REFERENCES ARE TAKEN FROM MIDDLESEX (SOUTH) REGISTRY OF DEEDS IN CAMBRIDGE, MA.
3. VERTICAL DATUM IS NAVD 88.
4. CONTOUR INTERVAL IS ONE FOOT (1').
5. ALL CURBING SHOWN HEREON IS GRANITE UNLESS OTHERWISE NOTED.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\3106-01\SURVEY\DRAWINGS\CURRENT\S-3106-01-EC.DWG

WE HEREBY CERTIFY THAT:

THIS PLAN IS THE RESULT OF AN ACTUAL ON THE GROUND SURVEY PERFORMED ON OR BETWEEN MARCH 16, 2022 AND MARCH 29, 2022.

THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS DATED JANUARY 1, 1976 AND REVISED JANUARY 12, 1988.

ACCORDING TO DEEDS AND PLANS OF RECORD, THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIP, AND THE LINES OF THE STREETS OR WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS AND WAYS ALREADY ESTABLISHED, AND THAT NO NEW LINES FOR THE DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

THE ABOVE CERTIFICATION IS INTENDED TO MEET REGISTRY OF DEEDS REQUIREMENTS FOR THE RECORDING OF PLANS AND IS NOT A CERTIFICATION TO THE TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT TOWN OF NEEDHAM ASSESSOR'S INFORMATION.

THE ABOVE IS CERTIFIED TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF.

ALLEN & MAJOR ASSOCIATES, INC.

Aug 11, 2022
PROFESSIONAL LAND SURVEYOR FOR ALLEN & MAJOR ASSOCIATES, INC.

COMMONWEALTH OF MASSACHUSETTS
NO. 35414
PROFESSIONAL LAND SURVEYOR
8/11/22

REV	DATE	DESCRIPTION
2.	08/11/22	VARIOUS REVISIONS
1.	08/05/22	VARIOUS REVISIONS

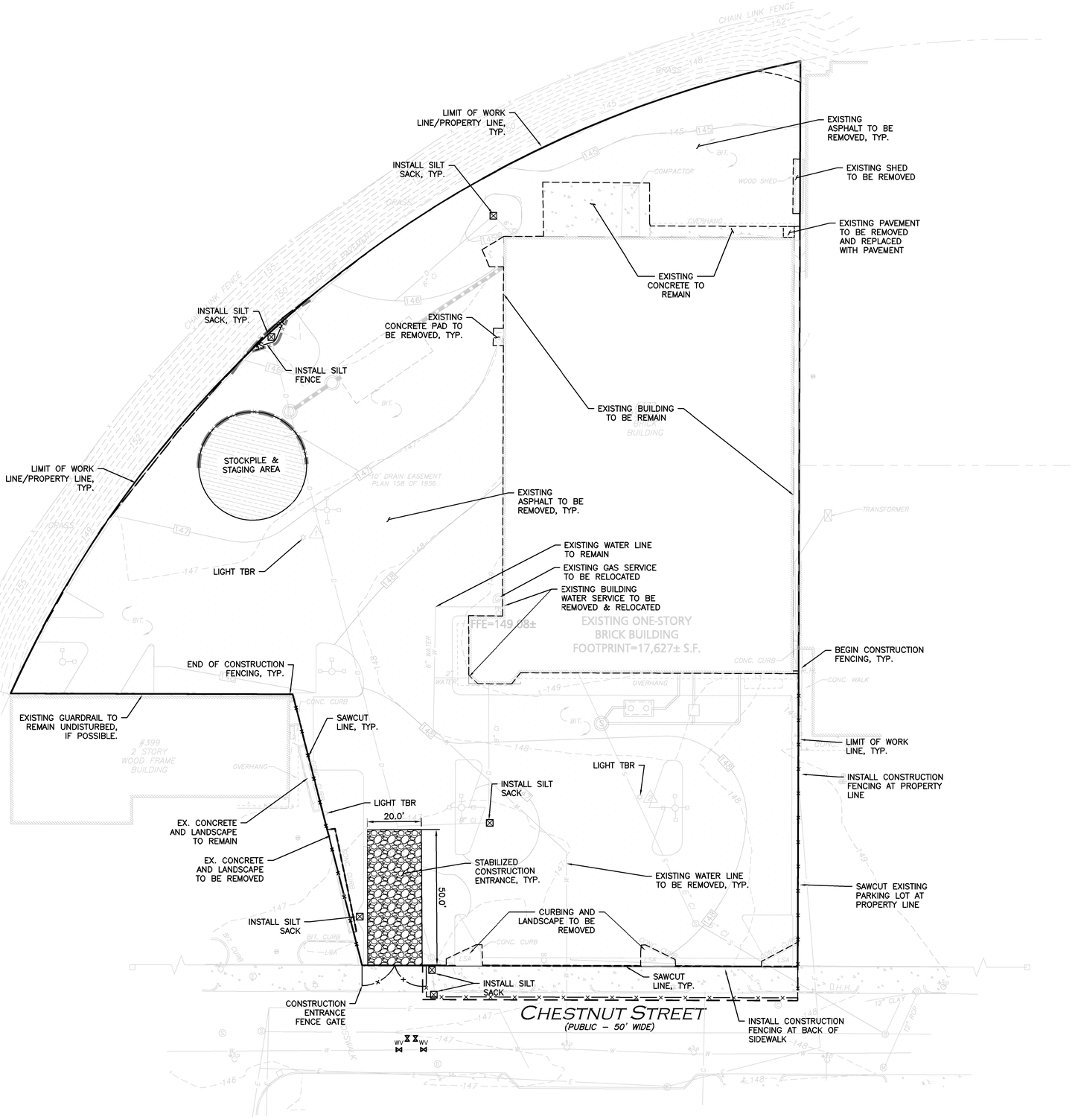
APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	07/25/22
SCALE:	1" = 20'	DWG. NAME:	S-3106-01-EC
DRAFTED BY:	SMM	CHECKED BY:	KAC/NIL

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: EXISTING CONDITIONS
SHEET No. V-101



LEGEND

SILT FENCE	SF
TUBULAR BARRIER	
EROSION CONTROL FABRIC	
CATCH BASIN FILTER	
LIMIT OF WORK	
STABILIZED ENTRANCE	
SAWCUT	
STOCKPILE/STAGING AREA	
CONSTRUCTION FENCE	
PAVEMENT TO BE REMOVED	

NOTES:

1. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
2. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
3. ALTHOUGH CERTAIN ITEMS HAVE BEEN NOTED ON THIS DRAWING FOR DEMOLITION, NO ATTEMPT HAS BEEN MADE TO DELINEATE EACH AND EVERY ITEM THAT REQUIRES DEMOLITION FOR THE COMPLETION OF THE PROJECT AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL NECESSARY DEMOLITION WORK TO COMPLETE THE PROJECT. ALLEN & MAJOR ASSOCIATES, INC. IS NOT RESPONSIBLE FOR SITE DEMOLITION ITEMS NOT SHOWN ON THE SURVEY, OR SPECIFICALLY NOTED. THE DEMOLITION NOTES AND ARROWS ON THIS PLAN ARE TYPICAL AND DO NOT REFLECT QUANTITY.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DEMO & EROSION CONTROL.DWG

8/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43116
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

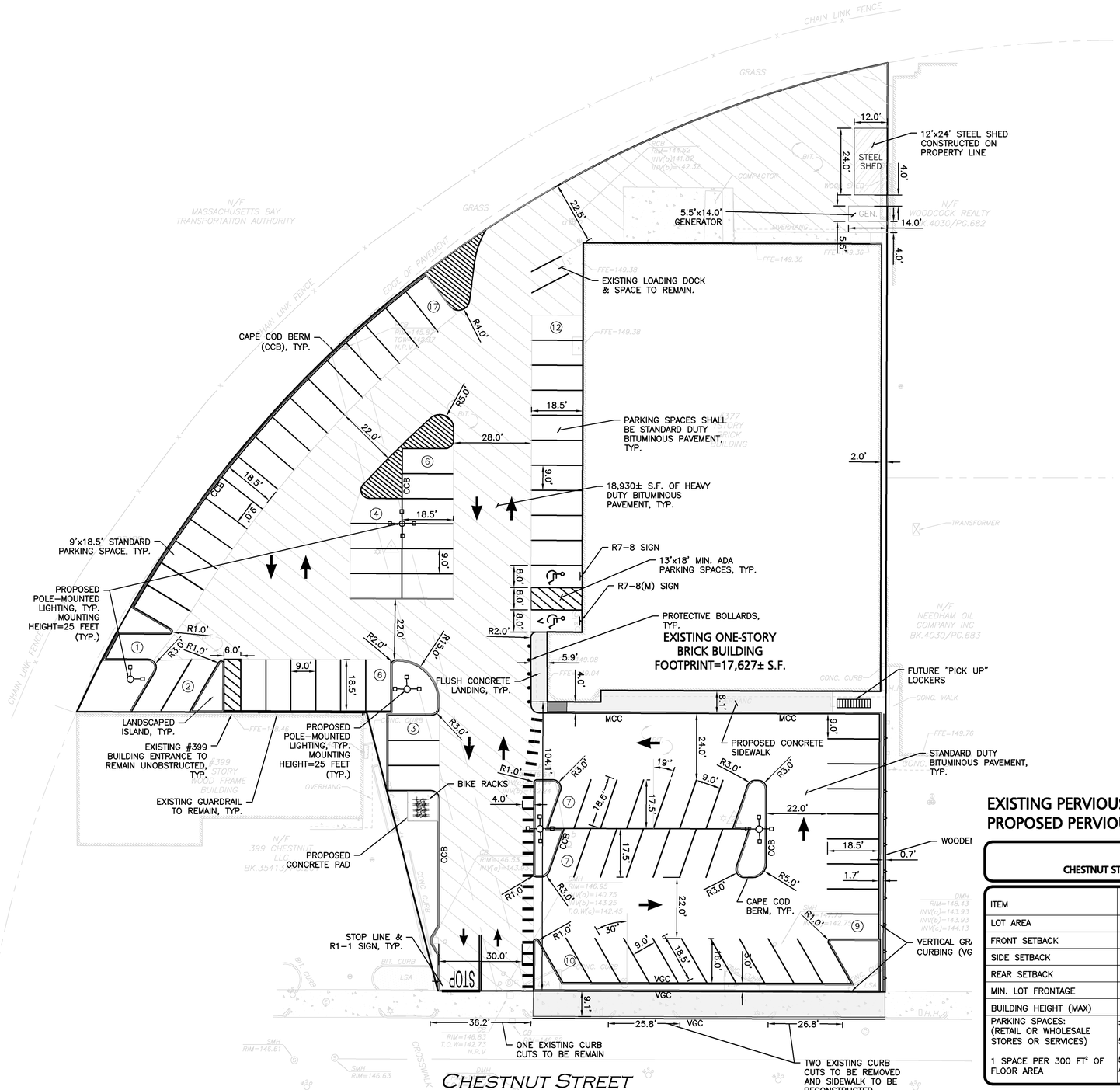
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consultng ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
DEMOLITION & EROSION CONTROL PLAN

SHEET No.
C-101



LEGEND

- PROPERTY LINE
- SIGN
- CURB
- PARKING STRIPING
- TRAFFIC ARROWS
- SIDEWALK
- ADA ACCESSIBLE RAMP
- PARKING COUNT
- COMPACT PARKING STALL
- LIGHT POLE
- EXISTING BUILDING
- HEAVY DUTY PAVEMENT
- HEAVY DUTY CONCRETE

NOTES:

1. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. ITS INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
2. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE TOWN OF NEEDHAM DEPARTMENT OF PUBLIC WORKS AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   DIGSAFE: 1-800-344-7233
   NEEDHAM DPW: (781) 455-7550
3. SEE THE ABBREVIATIONS AND NOTES PLAN AND DETAILS FOR FURTHER INFORMATION.
4. ALL CURBING RADII SHALL BE 3' UNLESS OTHERWISE NOTED. ALL RADII AND DIMENSIONS MEASURED AT FACE OF CURB.
5. ALL ADA RAMPS ARE TO BE CONCRETE UNLESS SPECIFIED OTHERWISE.
6. EXISTING CONDITIONS BASE PLAN TAKEN FROM AN EXISTING CONDITIONS BASE PLAN ENTITLED "EXISTING CONDITIONS", PREPARED BY ALLEN & MAJOR ASSOCIATES, INC., ORIGINAL SCALE 1"=20'.
7. ALL PAVEMENT MARKINGS AND SIGNAGE SHALL BE COORDINATED WITH THE NEEDHAM DPW AND SHALL CONFIRM TO THE LATEST MUTCD STANDARDS.
8. SECTION 4.4.2(c) - BUILDINGS AND STRUCTURES LOCATED IN THE CHESTNUT STREET BUSINESS DISTRICT ARE NOT LIMITED TO THE MAXIMUM LOT COVERAGE REQUIREMENTS OF SECTION 4.4.2 AS SPECIFIED, BUT SHALL HAVE A MAXIMUM FLOOR AREA RATIO OF 0.7.

EXISTING PERVIOUS AREA = 660± S.F. (1.05%)
PROPOSED PERVIOUS AREA = 3,810± S.F. (6.06%)

LAND USAGE TABLE
CHESTNUT STREET BUSINESS & LOWER CHESTNUT STREET OVERLAY DISTRICT

ITEM	REQUIRED/ ALLOWED	EXISTING	PROPOSED
LOT AREA	15,000 FT²	±62,873 FT²	±62,873 FT²
FRONT SETBACK	5'	104.0'	104.0'
SIDE SETBACK	0'	2.0'	2.0'
REAR SETBACK	25'	22.5'	22.5'
MIN. LOT FRONTAGE	100'	161.0'	161.0'
BUILDING HEIGHT (MAX)	35'/2.5 STORIES	N/A	N/A
PARKING SPACES: (RETAIL OR WHOLESALE STORES OR SERVICES)	±17,622 FT²/300 FT²=58.74 59 TOTAL SPACES REQUIRED	STANDARD SPACES: 82 ADA SPACES: 2	STANDARD SPACES: 82 ADA SPACES: 2
1 SPACE PER 300 FT² OF FLOOR AREA	50% COMPACT SPACES ALLOWED	TOTAL SPACES: 84	TOTAL SPACES: 84

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

DIG SAFE
BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_LAYOUT & MATERIALS.DWG

9/12/22
COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

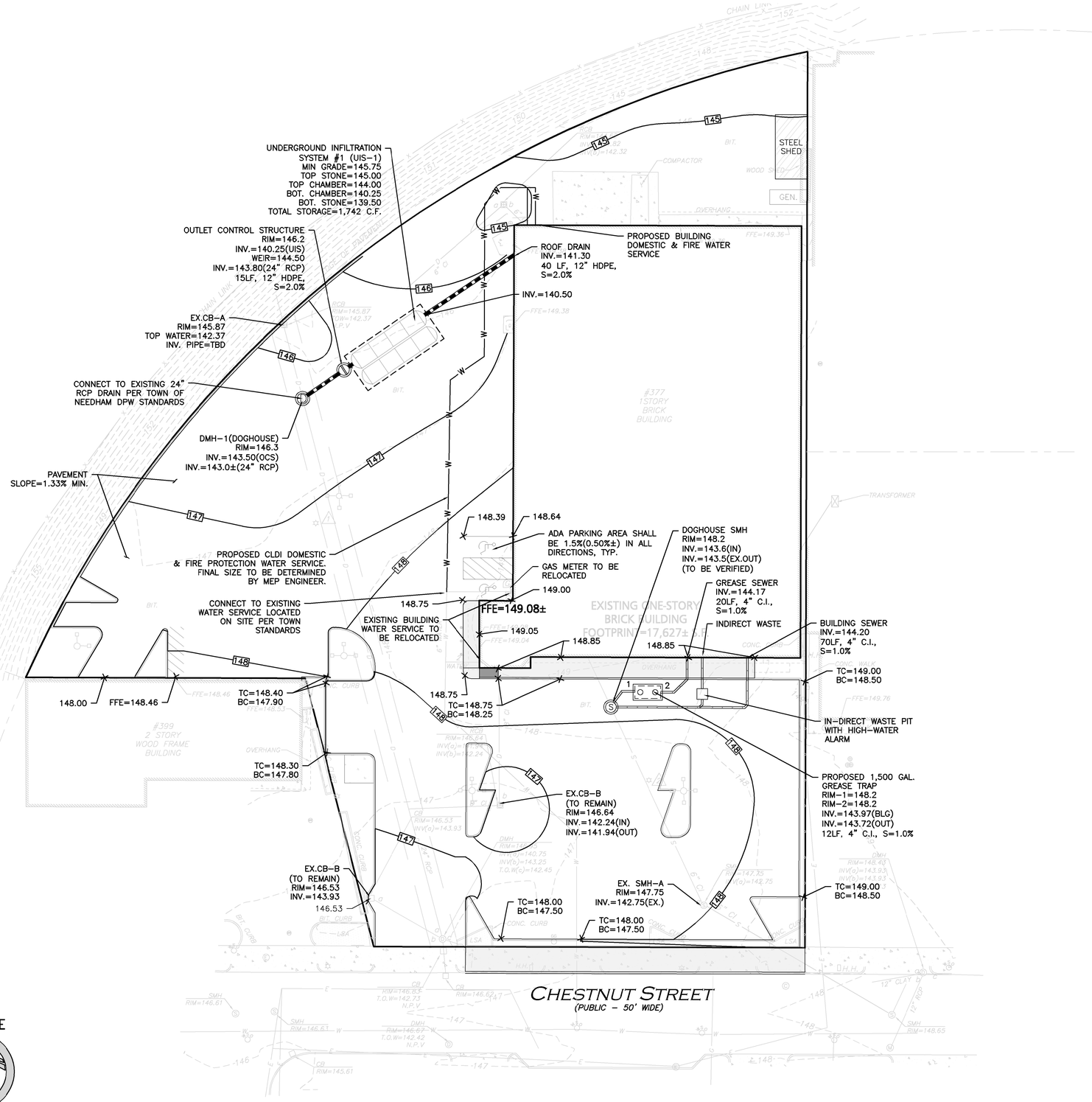
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
LAYOUT & MATERIALS PLAN

SHEET No.
C-102



DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

LEGEND

- DRAIN MANHOLE
- CATCH BASIN
- CATCH BASIN – DOUBLE GRATE
- OUTLET CONTROL
- DIVERSION WEIR
- WATER QUALITY UNIT (WQ)
- AREA DRAIN
- FLARED END SECTION
- DRAIN LINE
- RIPRAP OUTFALL
- HEADWALL
- 10' CONTOUR (150)
- 2' CONTOUR (128)
- SPOT GRADE ×128.00
- INFILTRATION SYSTEM
- INFILTRATION PIPE
- DETENTION PIPE
- UNDERDRAIN (UD)
- FLOW DIRECTION

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
3. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   NEEDHAM DPW: (781) 455-7550
   DIGSAFE: 1-888-344-7233
4. ANY ROOF DRAINAGE PIPE LOCATED WITHIN 10' OF THE BUILDING FOUNDATION SHALL BE CAST IRON PIPE PER MA PLUMBING CODE.

STORMWATER INFILTRATION POND CALCULATIONS:

SYSTEM WAS SIZED TO INFILTRATE THE 1" STORM FOR THE ENTIRE ROOF AREA
TOTAL ROOF AREA (SF) = 17,627± (IMPERVIOUS BUILDING)

REQUIRED RECHARGE = 1" STORM = WATER QUALITY VOLUME

REQUIRED STORAGE VOLUME = IMPERVIOUS AREA X 1.0" (STORM DEPTH)
= 17,627 S.F. X (1"/12")
= 1,469 C.F.

MC-3500 CHAMBERS - 8 CHAMBERS
STORAGE AVAILABLE IN RECHARGE SYSTEM:
CHAMBER STORAGE:
(8 CHAMBERS X 110 CF/CHAMBER) + 14.9 CF END CAPS (x4) = 939.2 CF

STONE STORAGE:
2,946.7 CF FIELD - 939.2 CF CHAMBERS = 2,007.4 CF STONE X 40% VOIDS
= 803 CF
TOTAL STORAGE PROVIDED = 1,742.2 CF

WEIR ELEVATION = 144.50
RECHARGE CREDIT = 1,635 CF (SEE DETAILS FOR HYDRO-CAD MODEL)

TOTAL RECHARGE CREDIT ON-SITE = 1,635 CF > 1,469 CF

GRAPHIC SCALE

20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_GRADING & DRAINAGE.DWG

8/12/22
COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43116
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

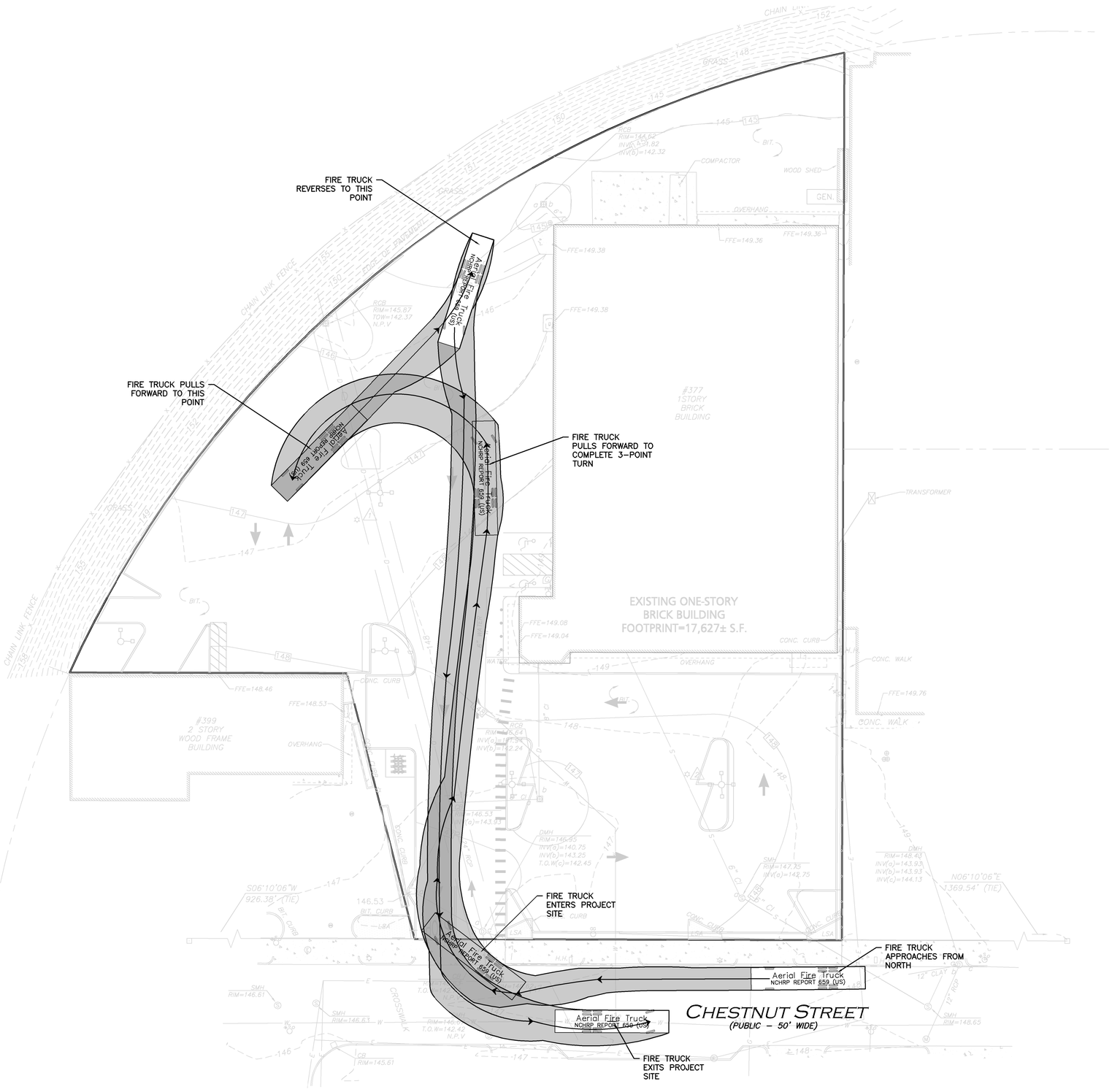
APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

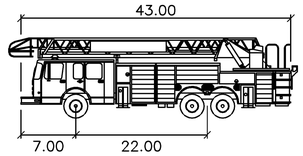
PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consultrg ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
GRADING, DRAINAGE, & UTILITY PLAN	C-103



NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.



Aerial Fire Truck

	feet
Width	: 8.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 33.3

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_TRUCK TURNING.DWG

8/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43116
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

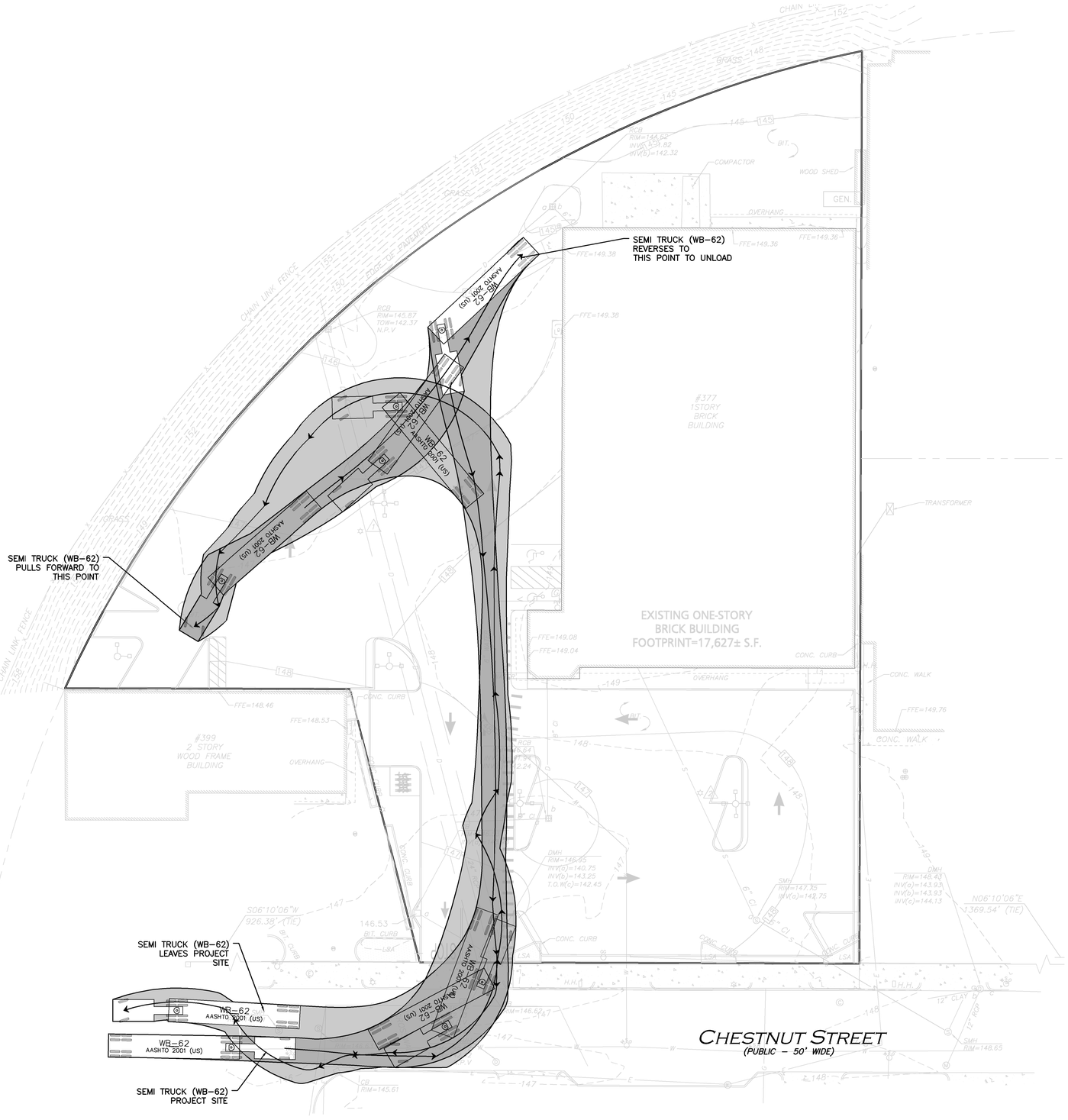
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
TRUCK TURNING PLAN - FIRE TRUCK

SHEET No.
C-104.1

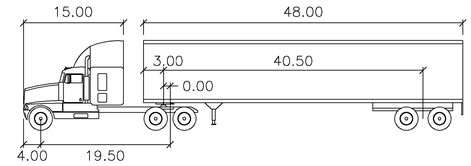


DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.



WB-62

	feet		
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_TRUCK TURNING.DWG

8/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:

377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
TRUCK TURNING PLAN - WB-62 TRUCK

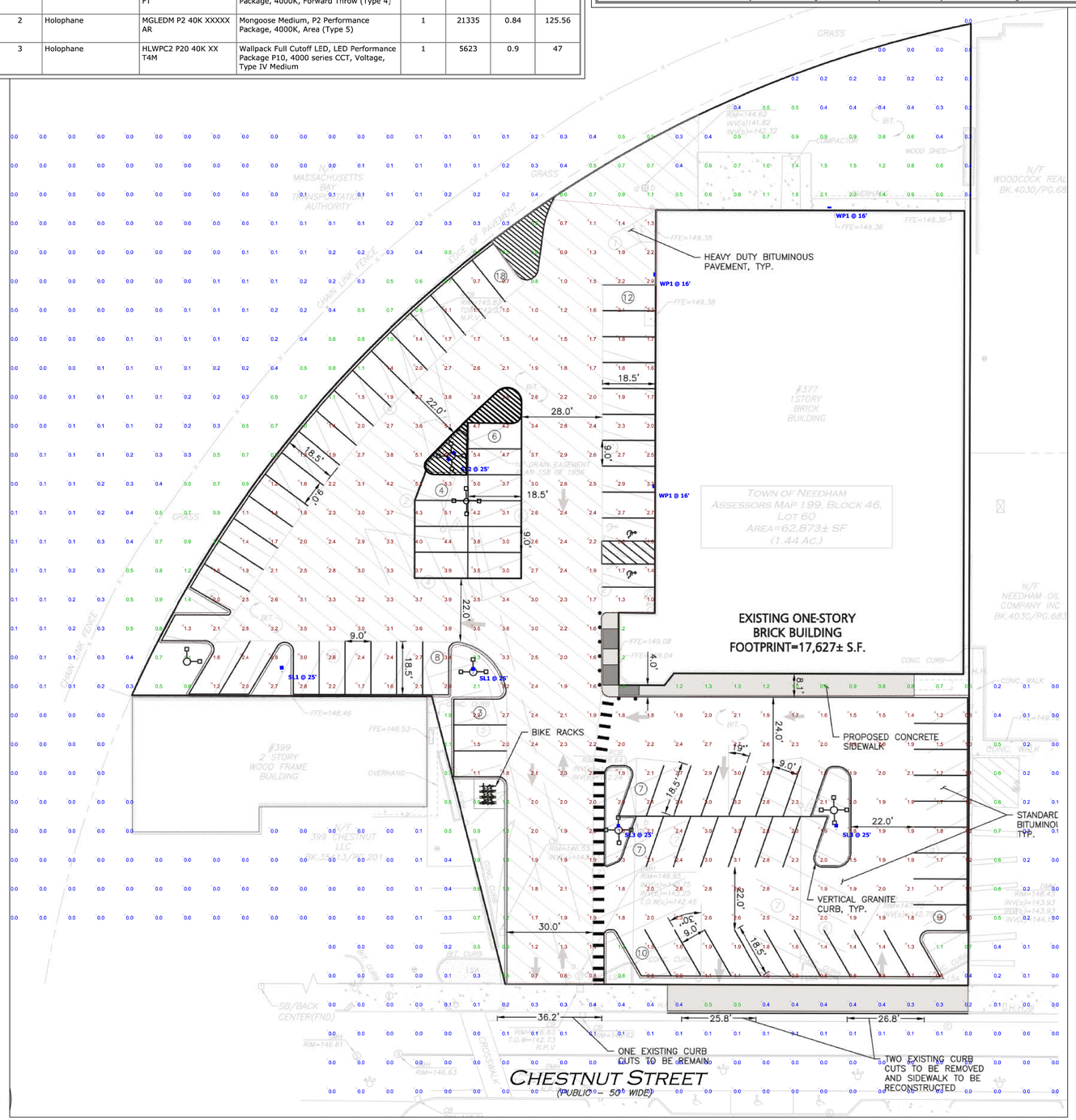
SHEET No.
C-104.2

Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
	SL1	2	Holophane	MGLEDM P1 40K XXXXX FT	Mongoose Medium, P1 Performance Package, 4000K, Forward Throw (Type 4)	1	16215	0.84	104.9
	SL2	1	Holophane	MGLEDM P1 40K XXXXX FT	Mongoose Medium, P1 Performance Package, 4000K, Forward Throw (Type 4)	1	16215	0.84	209.8
	SL3	2	Holophane	MGLEDM P2 40K XXXXX AR	Mongoose Medium, P2 Performance Package, 4000K, Area (Type 5)	1	21335	0.84	125.56
	WP1	3	Holophane	HLWPC2 P20 40K XX T4M	Wallpack Full Cutoff LED, LED Performance Package P10, 4000 series CCT, Voltage, Type IV Medium	1	5623	0.9	47

Statistics

Description	Symbol	Avg	Min	Max/Min	Max	Avg/Min
Parking & Driveways	✳	2.2 fc	0.6 fc	9.0:1	5.4 fc	3.7:1



LEGEND

- PROPERTY LINE
- SIGN
- CURB
- PARKING STRIPING
- TRAFFIC ARROWS
- SIDEWALK
- ADA ACCESSIBLE RAMP
- PARKING COUNT
- COMPACT PARKING STALL
- LIGHT POLE
- EXISTING BUILDING
- HEAVY DUTY PAVEMENT
- HEAVY DUTY CONCRETE

NOTES:

1. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. ITS INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
2. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE TOWN OF NEEDHAM DEPARTMENT OF PUBLIC WORKS AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   DIGSAFE: 1–800–344–7233
   NEEDHAM DPW: (781) 455–7550
3. PHOTOMETRICS CALCULATION PROVIDED BY OTHERS. HEIGHTS SHOWN ARE OPTICAL EFFECTIVE ±1.0'. LIGHT POLE BASE SHALL BE 3.0' WITH A 22.0' POLE EQUALING A 25–FOOT MOUNTING HEIGHT.
4. CALCULATION VALUES SHOWN ARE MAINTAINED AT 100,000 HOURS. INITIAL VALUES MAY BE HIGHER.

GRAPHIC SCALE

(IN FEET)
1 inch = ___ ft.

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1–888–DIG–SAFE
1–888–344–7233

N:\PROJECTS\3106–01\CIVIL\DRAWINGS\CURRENT\C–3106–01_LAYOUT & MATERIALS.DWG

9/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

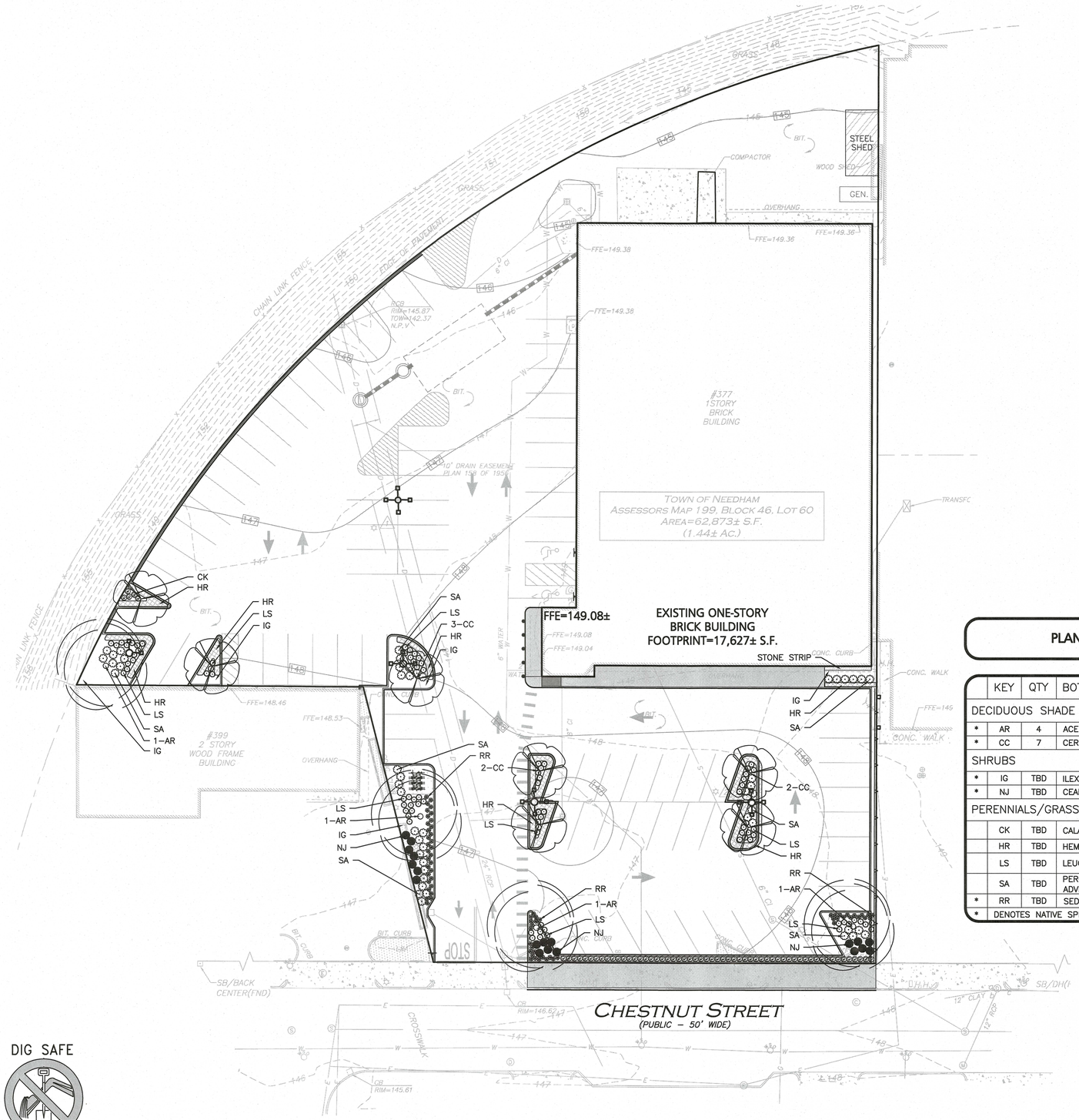
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = ##'	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
PHOTOMETRICS PLAN

SHEET No.
C-105



DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1–888–DIG–SAFE
1–888–344–7233

LEGEND

DECIDUOUS TREE

FLOWERING TREE

SHRUBS

PERENNIALS/GROUNDCOVER

STONE STRIP

NOTES:

1. EXISTING CONDITIONS BASE PLAN TAKEN FROM AN EXISTING CONDITIONS BASE PLAN ENTITLED "EXISTING CONDITIONS", PREPARED BY ALLEN & MAJOR ASSOCIATES, INC., ORIGINAL SCALE 1"=20'.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. ITS INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
3. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE TOWN OF NEEDHAM DEPARTMENT OF PUBLIC WORKS AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   DIGSAFE: 1–800–344–7233
   NEEDHAM DPW: (781) 455–7550

4. SEE THE ABBREVIATIONS AND NOTES PLAN AND DETAILS FOR FURTHER INFORMATION.

PLANTING SCHEDULE -TREES, SHRUBS, GROUNDCOVERS & PERENNIALS

	KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	COMMENTS
DECIDUOUS SHADE AND FLOWERING TREES							
*	AR	4	ACER RUBRUM	RED MAPLE	3" CAL.	AS SHOWN	B&B
*	CC	7	CERCIS CANADENSIS	REDBUD	3" CAL.	AS SHOWN	B&B
SHRUBS							
*	IG	TBD	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY	2–2.5'	36" O.C.	B&B
*	NJ	TBD	CEANOTHUS AMERICANUS	NEW JERSEY TEA	2.5'–3' HT.	AS SHOWN	B&B
PERENNIALS/GRASSES							
	CK	TBD	CALAMAGROSTIS 'KARL FOERSTER'	KARL FOERSTER FEATHER REED GRASS	#3	24" O.C	STAGGERED
	HR	TBD	HEMEROCALLIS 'HAPPY RETURNS'	HAPPY RETURNS DAYLILY	#1	18" O.C.	STAGGERED
	LS	TBD	LEUCANTHEMUM SUPERBUM	AMAZING DAISIES® 'SPUN SILK' SHASTA DAISY	#2	24" O.C.	STAGGERED
	SA	TBD	PEROVSKIA ATRIPLICIFOLIA 'SAGE ADVICE'	'SAGE ADVICE' RUSSIAN SAGE	#1	36" O.C.	STAGGERED
*	RR	TBD	SEDUM HYBRID ROCK 'N ROUND	'SUPERSTAR' STONECROP	#1	18" O.C.	STAGGERED
*	DENOTES NATIVE SPECIES						

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\L-3106-01_LANDSCAPE.DWG

REGISTERED LANDSCAPE ARCHITECT
JOSEPH B. TYLUTKI
NO. 1526
COMMONWEALTH OF MASSACHUSETTS

12-12-2022

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:

377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	1" = 20'	DWG. NAME:	L-3106-01
DESIGNED BY:	JBT	CHECKED BY:	CQ

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
LANDSCAPE PLAN

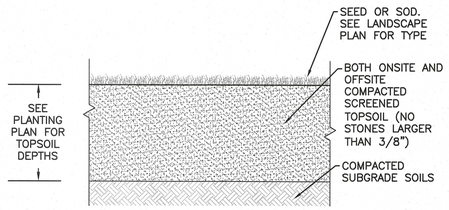
SHEET No.
L-101

LANDSCAPE NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY/TOWN OF NEEDHAM.
2. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT OF PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES, ANY PERMITTING AGENCIES, AND "DIG–SAFE" (1–888–344–7233) AT LEAST 72 HOURS IN ADVANCE OF ANY WORK THAT WILL REQUIRE EXCAVATION. CONTRACTOR SHALL NOTIFY THE OWNERS REPRESENTATIVE OF NAY CONFLICTS IN WRITING.
4. NO PLANT MATERIAL SHALL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
5. ANY TREES NOTED AS "SEAL OR SELECTED SPECIMEN" SHALL BE TAGGED AND SEALED BY THE LANDSCAPE ARCHITECT.
6. ALL TREES SHALL BE BALLED AND BURLAPPED (B&B) UNLESS OTHERWISE NOTED OR APPROVED BY THE OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
7. CONTRACTOR SHALL VERIFY QUANTITIES SHOWN ON PLANT LIST. QUANTITIES SHOWN ON PLANS SHALL GOVERN OVER PLANT LIST.
8. ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
9. ALL PLANT MATERIALS INSTALLED SHALL MEET THE GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY AMERICANHORT (LATEST EDITION).
10. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF ACCEPTANCE.
11. ALL DISTURBED AREAS NOT OTHERWISE NOTED SHALL RECEIVE 6" OF SUITABLE LOAM & SEED. LAWNS WITH 3:1 OR GREATER SLOPES SHALL BE PROTECTED WITH AN EROSION CONTROL BLANKET.
12. ANY FALL TRANSPLANTING HAZARD PLANTS SHALL BE DUG IN THE SPRING AND STORED FOR FALL PLANTING.
13. TREES SHALL HAVE A MINIMUM CALIPER AS INDICATED ON THE PLANTING SCHEDULE TAKEN ONE FOOT ABOVE THE ROOT CROWN.
14. ALL PLANT BEDS AND TREE SAUCERS TO RECEIVE 3" OF PINE BARK MULCH. GROUNDCOVER AREAS SHALL RECEIVE 1" OF PINE BARK MULCH.
15. ALL DECIDUOUS TREES ADJACENT TO WALKWAYS AND ROADWAYS SHALL HAVE A BRANCHING PATTERN TO ALLOW FOR A MINIMUM OF 7' OF CLEARANCE BETWEEN THE GROUND AND THE LOWEST BRANCH.
16. ALL TREE STAKES SHALL BE STAINED DARK BROWN.
17. CONTRACTOR RESPONSIBLE FOR WATERING AND RESEEDING OF BARE SPOTS UNTIL A UNIFORM STAND OF VEGETATION IS ESTABLISHED AND ACCEPTED.
18. ALL PARKING ISLANDS PLANTED WITH SHRUBS SHALL HAVE 24" OF TOP SOIL. FINISH GRADE SHALL BE SIX INCHES (6") ABOVE THE TOP OF CURB.
19. SOIL SAMPLES, TESTS, AND SHOP DRAWINGS SHALL BE PROVIDED TO THE LANDSCAPE ARCHITECT OR THE OWNER FOR APPROVAL PRIOR TO CONSTRUCTION.
20. NO MULCH IS ALLOWED WITHIN 18" OF ALL BUILDINGS PER THE LATEST EXECUTIVE OFFICE OF PUBLIC SAFETY AND SECURITY DEPARTMENT OF FIRE SERVICES REGULATION (527 CMR 17.00).

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1–888–DIG–SAFE
1–888–344–7233

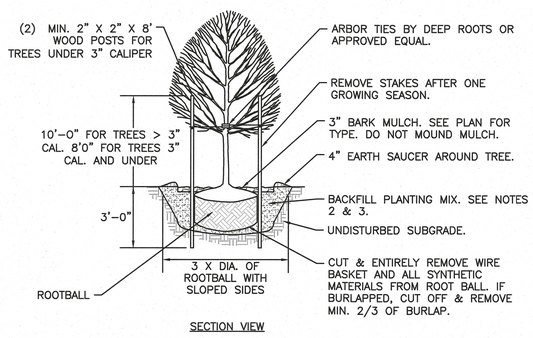


TEXTURE CLASS	% OF TOTAL WEIGHT
SAND	45% – 65%
SILT	15% – 35%
CLAY	5% – 20%

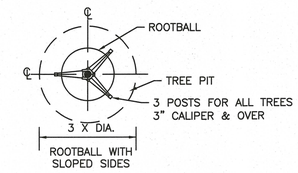
SIEVE	% PASSING
3/8"	100
NO. 4	85–100
NO. 40	60–85
NO. 100	38–60
NO. 200	28–40

NOTES:
1. TOP OF LOAM (TOPSOIL) IS FINISH GRADE.
2. ALL TOPSOIL (BOTH ONSITE AND OFFSITE SOURCES) SHALL BE COMPOSED OF A NATURAL, FERTILE, FRIABLE SOIL TYPICAL OF CULTIVATED TOPSOILS OF THE LOCALITY. SOIL SHALL BE SUITABLE FOR THE GERMINATION OF SEEDS AND SUPPORT OF VEGETATIVE GROWTH, WITH ADDITIVES, IF REQUIRED, TO ACHIEVE PARTICLE DISTRIBUTION AND ORGANIC CONTENT BELOW. TOPSOIL SHALL BE TAKEN FROM A WELL–DRAINED, ARIABLE SITE, FREE OF SUBSOIL, LARGE STONES, EARTH CLODS, STICKS, TRASH, STUMPS, CLAY LUMPS, ROOTS, OTHER OBJECTIONABLE, EXTRANEOUS MATTER OR DEBRIS NOR CONTAIN TOXIC SUBSTANCES.
3. THE CONTRACTOR SHALL PROVIDE THE OWNER / LANDSCAPE ARCHITECT WITH TOPSOIL TEST RESULTS (RECOMMEND UMASS AMHERST SOIL TESTING LAB) FOR APPROVAL PRIOR TO OBTAINING AND PLACING THE SOIL. IF THE PLANTING SOIL (BOTH ONSITE AND OFFSITE SOURCES) DOES NOT FALL WITHIN THE REQUIRED SIEVE ANALYSIS, TEXTURAL CLASS, ORGANIC CONTENT, OR PH RANGE, IT SHALL BE ADJUSTED TO MEET THE SPECIFICATIONS THROUGH THE ADDITION OF SAND, COMPOST, LIMESTONE, OR ALUMINUM SULFATE TO BRING IT WITHIN THE SPECIFIED LIMITS AT NO ADDITIONAL COST TO THE OWNER.
4. TOPSOIL SHALL HAVE A PH VALUE BETWEEN 5.5 AND 6.5. TOPSOIL SHALL CONTAIN BETWEEN 4% AND 8% ORGANIC MATTER OF TOTAL DRY WEIGHT AND SHALL CONFORM TO THE FOLLOWING GRADATION AND TEXTURE CLASS ABOVE.

TOPSOIL FOR TREES, SHRUBS, & PERENNIALS (2)
NOT TO SCALE



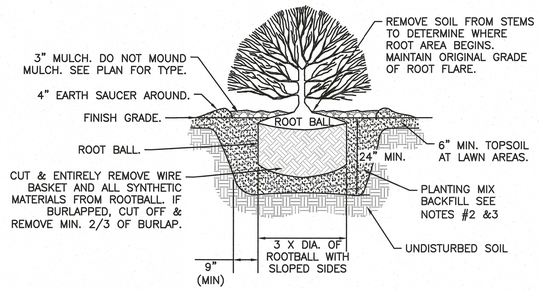
SECTION VIEW



PLAN VIEW

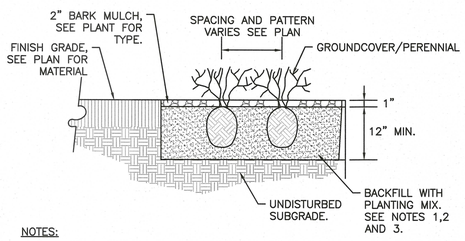
NOTES:
1. ALL TREES SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING. ROOT FLARE SHALL BE 2" ABOVE FINISH GRADE. REMOVE SOIL FROM TRUNK FLARE OF TREE TO DETERMINE ACTUAL ROOTBALL AREA.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% BLENDED AND GROUND COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH OR TOXIC MATERIALS) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED AND WATER THOROUGHLY AT COMPLETION.

DECIDUOUS TREE (1)
NOT TO SCALE



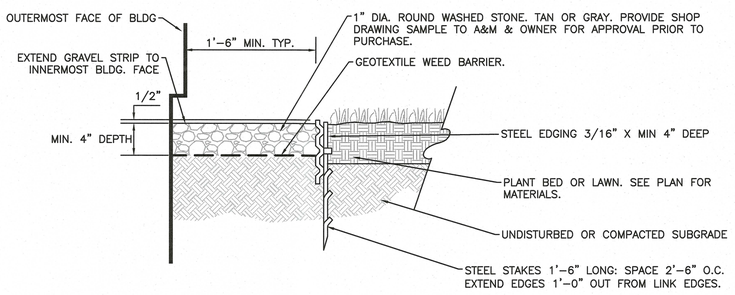
NOTES:
1. ALL SHRUBS ROOT FLARE SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED. WATER THOROUGHLY AT COMPLETION.
4. SHRUB BEDS TO HAVE 24" MIN. OF CONTINUOUS PLANTING SOIL.

SHRUB (3)
NOT TO SCALE



NOTES:
1. ALL GROUNDCOVER/PERENNIALS SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING. ROOT FLARE SHALL BE 2" ABOVE FINISH GRADE. REMOVE SOIL FROM STEM OF GROUND COVER/ PERENNIAL TO DETERMINE ACTUAL ROOTBALL AREA.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% BLENDED AND GROUND COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH OR TOXIC MATERIALS) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED AND WATER THOROUGHLY AT COMPLETION.

GROUNDCOVER/PERENNIAL PLANTING (4)
NOT TO SCALE



NOTES:
1. STONE STRIP IS TO BE INSTALLED CONTINUOUS ADJACENT TO THE ENTIRE FACE OF BUILDINGS EXCEPT WHERE OTHER HARD SURFACING MATERIALS ARE SPECIFIED OR IF SHOWN OTHERWISE ON PLAN.
2. STONE STRIP TO BE INSTALLED UNDER ALL BUILDING OVERHANGS.
3. COORDINATE INSTALLATION OF STONE STRIP WITH INSTALLATION OF FOUNDATION DRAIN & TO BE LOCATED BEYOND ROOF OVERHANG.

STONE STRIP (5)
NOT TO SCALE

8-12-2022

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	L-3106-01
DESIGNED BY:	JBT	CHECKED BY:	CQ

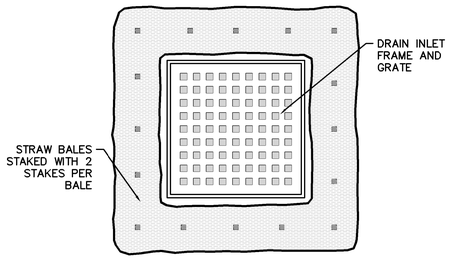
PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
LANDSCAPE NOTES & DETAILS

SHEET No.
L-501

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\L-3106-01_LANDSCAPE.DWG



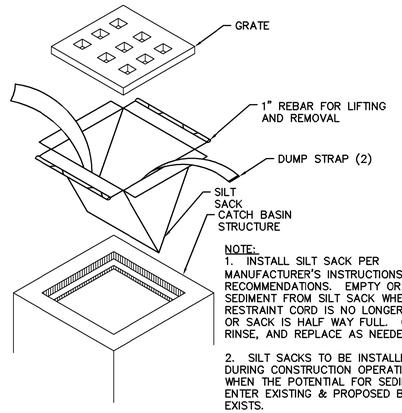
NOTES:

1. STRAW BALES SHALL BE POSITIONED IN A ROW SO THAT EACH END TIGHTLY ABUTS THE ADJACENT BALE.

2. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.

3. FREQUENT INSPECTIONS SHALL BE CONDUCTED AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY IF NECESSARY.

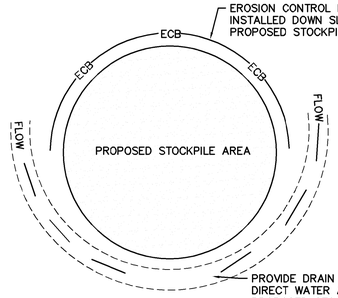
TYPICAL CATCH BASIN FILTER — NOT TO SCALE — 1



NOTE:
1. INSTALL SILT SACK PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. EMPTY OR REMOVE SEDIMENT FROM SILT SACK WHEN RESTRAINT CORD IS NO LONGER VISIBLE OR SACK IS HALF WAY FULL. CLEAN, RINSE, AND REPLACE AS NEEDED.

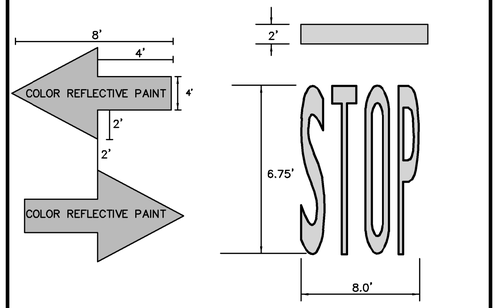
2. SILT SACKS TO BE INSTALLED DURING CONSTRUCTION OPERATIONS WHEN THE POTENTIAL FOR SEDIMENT TO ENTER EXISTING & PROPOSED BASINS EXISTS.

SILT SACK INLET DETAIL — NOT TO SCALE — 2

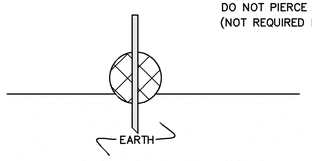


NOTES:
1. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR LESS THAN 90 DAYS SHALL BE COVERED WITH STRAW AND MULCH (AT 100 LBS/1,000 S.F.), OR WITH AN ANCHORED TARP WITHIN 7 DAYS OR PRIOR TO ANY RAINFALL.
2. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR 90 DAYS OR MORE SHALL BE SEEDED WITH WINTER RYE (FOR FALL SEEDING AT 1LB/1,000 SF) OR OATS (FOR SUMMER SEEDING AT 2LB/1,000 SF) AND THEN COVERED WITH STRAW MULCH (AT 100LB/1,000 SF) OR AN ANCHORED TARP WITHIN 7 DAYS OR PRIOR TO ANY RAINFALL.

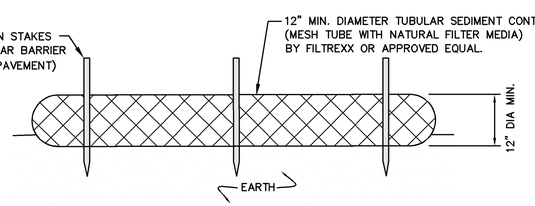
STOCKPILE PROTECTION — NOT TO SCALE — 3



WHITE THERMOPLASTIC LETTERING/ARROWS — NOT TO SCALE — 4



SECTION

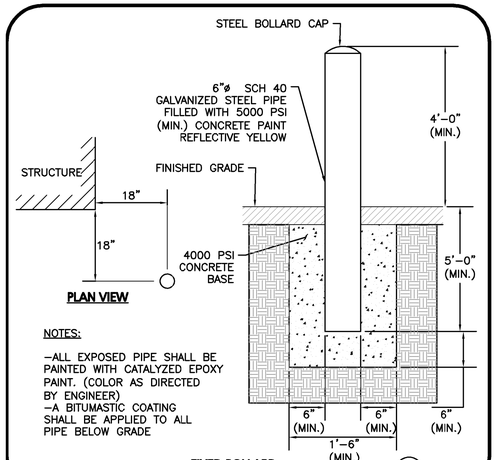


PROFILE

NOTES:

1. ALL MATERIALS TO MEET MANUFACTURERS SPECIFICATIONS.
2. INSTALL WOODEN STAKES IN A CRISS-CROSS PATTERN EVERY 8' ON CENTER.
2. OVERLAP TUBULAR BARRIER SEGMENTS A MINIMUM OF 12".
3. THE CONTRACTOR SHALL MAINTAIN THE TUBULAR BARRIERS IN A FUNCTIONAL CONDITION AT ALL TIMES. THE CONTROLS SHALL BE ROUTINELY INSPECTED BY THE CONTRACTOR.
4. WHERE THE TUBULAR BARRIERS REQUIRE REPAIR OR SEDIMENT REMOVAL, IT WILL BE COMPLETED BY THE CONTRACTOR AT NO ADDITIONAL COST.
5. AT A MINIMUM, THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE WHEN THEY REACH 1/3 THE EXPOSED HEIGHT OF THE BARRIER.

TUBULAR SEDIMENT BARRIER DETAIL — NOT TO SCALE — 5



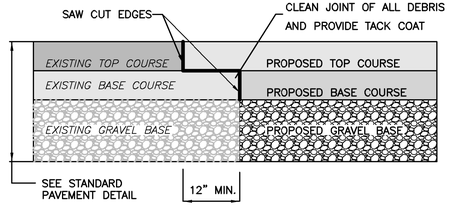
PLAN VIEW

NOTES:

-ALL EXPOSED PIPE SHALL BE PAINTED WITH CATALYZED EPOXY PAINT. (COLOR AS DIRECTED BY ENGINEER)
-A BITUMASTIC COATING SHALL BE APPLIED TO ALL PIPE BELOW GRADE

FIXED BOLLARD — NOT TO SCALE — 6

NOTE:
TACK COAT - PROVIDE EMULSIFIED ASPHALT WHICH CONFORMS TO THE REQUIREMENTS OF THE STATE SPECIFICATIONS, DILUTED WITH ONE PART WATER TO ONE ONE PART ASPHALT FOLLOWING AASHTO M140/ASTM D997, OR AASHTO M208/ASTM D2397, SS-1H, CSS-1, OR CSS-1H.



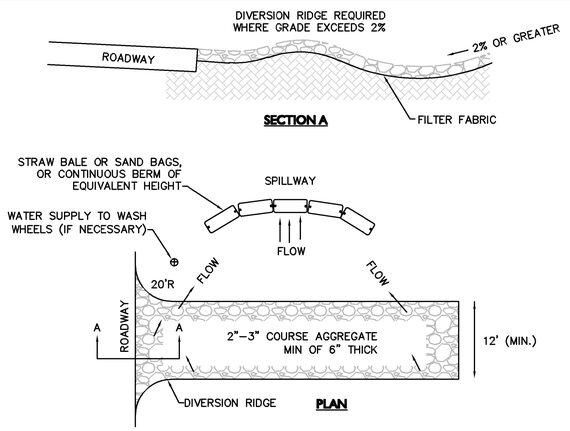
PAVEMENT KEY CUT DETAIL — NOT TO SCALE — 7

NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTERING THE PUBLIC RIGHT-OF-WAY.

3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

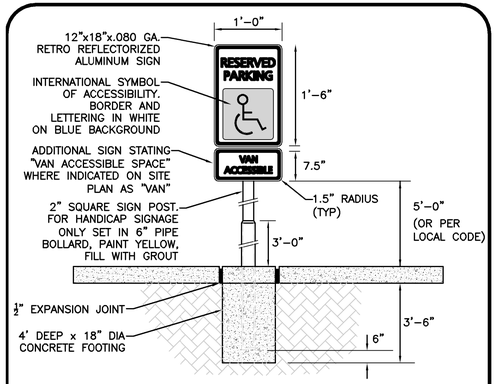
4. USE SANDBAGS, STRAWBALES, OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED.



SECTION A

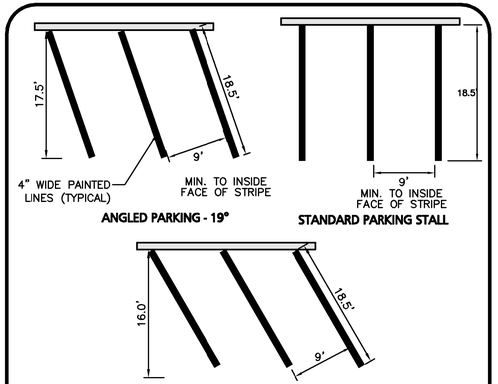
PLAN

TEMPORARY CONSTRUCTION ENTRANCE/EXIT — NOT TO SCALE — 8



NOTES:
1. SPECIFIC CODE SHALL BE REFERENCED FOR LOCAL AND STATE REQUIREMENTS.
2. PROVIDE (1) SIGN PER HANDICAP SPACE. SEE SITE PLAN FOR EXACT LOCATION.
3. EXPANSION JOINT MATERIAL NOT REQUIRED WITH FLEXIBLE PAVEMENT.

ADA ACCESSIBLE PARKING SIGN W/ PIPE BOLLARD — NOT TO SCALE — 9



PARKING STRIPING — NOT TO SCALE — 10

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DETAILS.DWG

9/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:

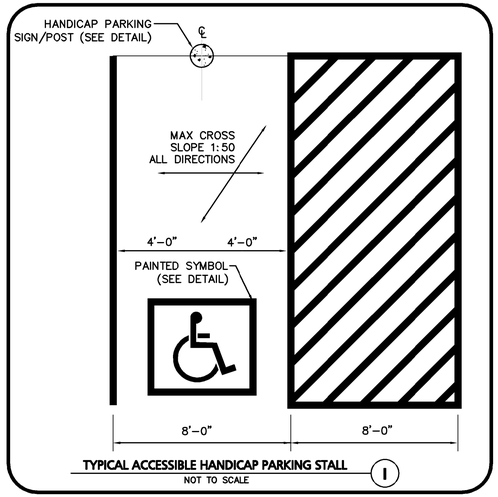
377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

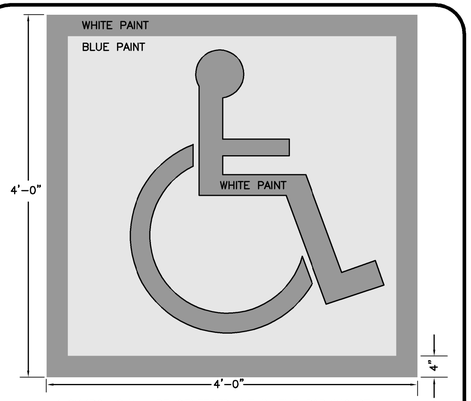
PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-5889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: DETAILS

SHEET No. C-501

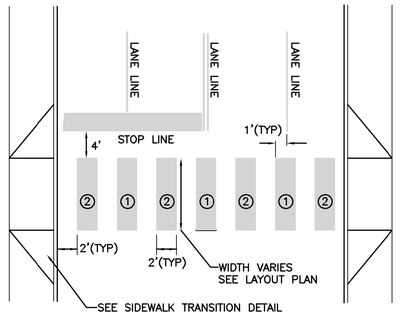


TYPICAL ACCESSIBLE HANDICAP PARKING STALL — NOT TO SCALE — 1



1. SYMBOL SHALL BE CENTERED WITHIN THE PARKING STALL.
2. SYMBOL IS REQUIRED TO CONTRACT WITH BACKGROUND. USE WHITE PAINT ON BLACK ASPHALT, BLUE ON WHITE WHERE APPLICABLE.

ACCESSIBLE PARKING STALL PAVEMENT MARKING — NOT TO SCALE — 2

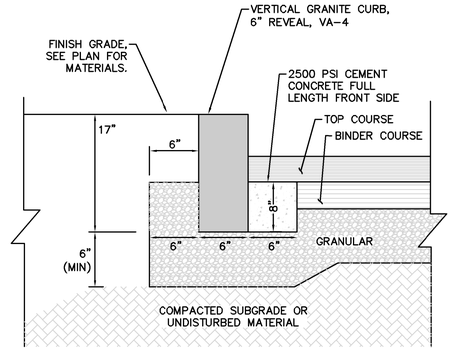


NOTE:

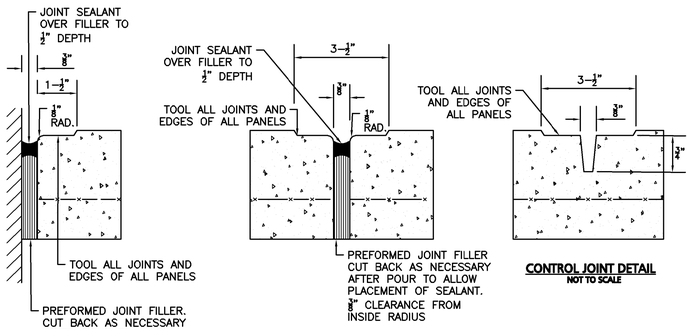
① LANE LINE STRIP: THIS IS LOCATED IN THE LINE WITH EACH LANE LINE AND HALF THE STRIP ON EACH SIDE.

② MID LINE STRIP: THIS IS LOCATED MIDWAY BETWEEN EACH LANE LINE STRIP.

CROSSWAK STRIPING — NOT TO SCALE — 3

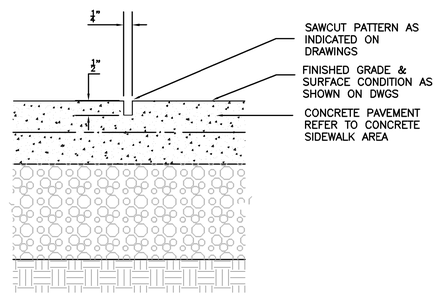


VERTICAL GRANITE CURB — NOT TO SCALE — 4

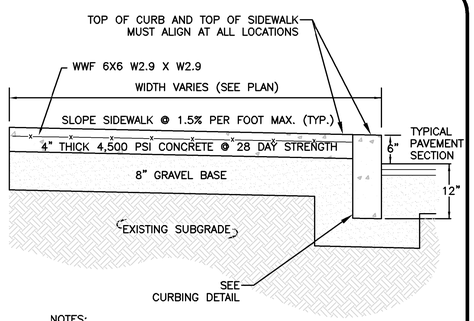


NOTES:
1. PROVIDE EXPANSION JOINTS AT MIN. 15' O.C. MIN.
2. PROVIDE CONTROL JOINTS AT 5' O.C. UNLESS SHOWN OTHERWISE.
3. PROVIDE BROOM FINISH IN DIRECTION PERPENDICULAR TO DIRECTION OF TRAVEL.
4. CEMENT CONCRETE SHALL BE 4,500 PSI AIR ENTRAINED.
5. REFER TO LANDSCAPING PLANS FOR ADDITIONAL JOINTS.
6. JOINT FILLERS SHALL BE RESILIENT PREMOLDED BITUMINOUS IMPREGNATED FIBERBOARD. SUBMIT SHOP DRAWINGS.
7. JOINT SEALANTS SHALL BE NON-PRIMING POURABLE SELF-LEVELING TYPE. SUBMIT SHOP DRAWINGS.
8. ALL CURBS TO HAVE ½" EXPANSION JOINTS AT MAXIMUM 100 FEET WITH DOWELS AND CONTROL JOINTS AT MAXIMUM 30 FEET

CONCRETE SIDEWALK JOINTS — NOT TO SCALE — 5



TYPICAL CONCRETE SAWCUT JOINT CONTROL — NOT TO SCALE — 6

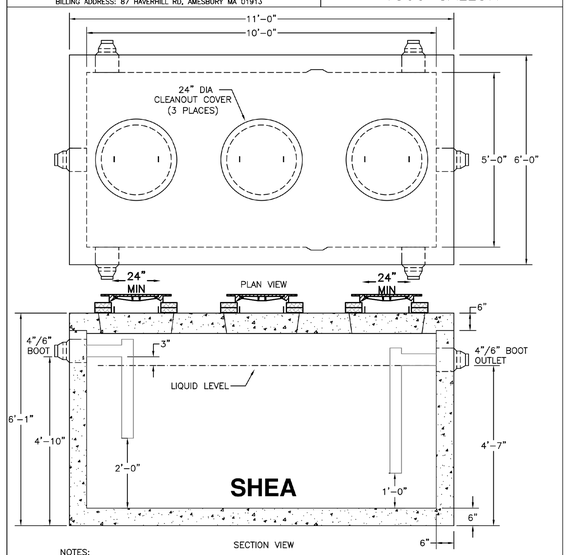


NOTES:
1. SIDEWALK TO HAVE TOOLED JOINTS IN A 5' x 5' (TYP.) GRID WITH EXPANSION JOINTS 15' ON CENTER AND PREMOLDED FILLER
2. TOOLED JOINT 6" FROM FACE OF CURB
3. SEE PLAN FOR ELEVATIONS AT CURB
4. SIDEWALK CROSS SLOPE TO BE 1.5% MAX & SIDEWALK LONGITUDINAL SLOPE TO BE 4.5% MAX, TYP.

CONCRETE SIDEWALK DETAIL — NOT TO SCALE — 7

SHEA CONCRETE PRODUCTS — *New England's Premier Precaster* — 800-696-7432 (SHEA) — www.sheaconcrete.com
BILLING ADDRESS: 87 HAVERHILL RD, AMESBURY MA 01913

GREASE TRAP
1500 GALLON



NOTES:
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGN CONFORMS WITH 310 CMR 15.00, DEP TITLE 5 REGS, FOR GREASE TRAPS.
3. ALL REINFORCEMENT PER ASTM C1227.
4. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 5 FT COVER.
5. TONGUE & GROOVE JOINT SEALED WITH BUTYL RESIN
6. TEES AND BAFFLES SOLD SEPARATELY

	WEIGHT	TOP	BOTTOM
ITEM NO. TK-M1500C	22,600#	5,400#	17,200#
TK-M1500C2C	24,400#	5,400#	19,000#

SHEA PRODUCT ID: SEE TABLE	PREPARED FOR:	FILE NAME: GTM1500.dwg	NPCA CERTIFIED
WEIGHT (LBS): SEE TABLE	DRAWN BY: ARO	DATE: 06/11/2018	PAGE: K2

773 Salem Street-Wilmington, MA | 153 Cranberry Hwy-Rochester, MA | 87 Haverhill Road-Amesbury, MA | 160 Old Turnpike Rd-Nottingham, NH

Specifications subject to change without notice

1,500 GALLON GREASE TRAP — NOT TO SCALE — 8

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:

377 CHESTNUT STREET
NEEDHAM, MA

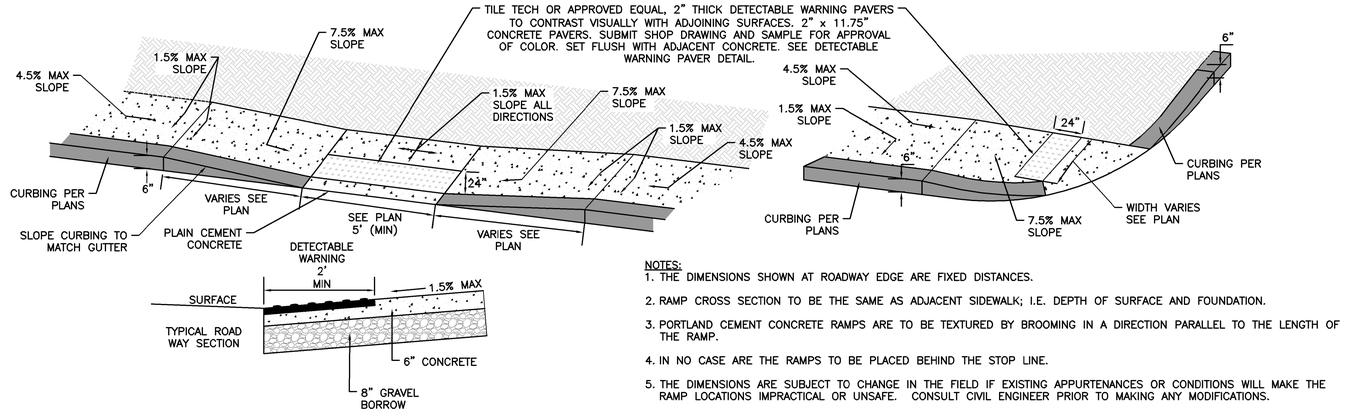
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-5889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: DETAILS

SHEET No. C-502

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DETAILS.DWG



NOTES:

1. THE DIMENSIONS SHOWN AT ROADWAY EDGE ARE FIXED DISTANCES.
2. RAMP CROSS SECTION TO BE THE SAME AS ADJACENT SIDEWALK; I.E. DEPTH OF SURFACE AND FOUNDATION.
3. PORTLAND CEMENT CONCRETE RAMPS ARE TO BE TEXTURED BY BROOMING IN A DIRECTION PARALLEL TO THE LENGTH OF THE RAMP.
4. IN NO CASE ARE THE RAMPS TO BE PLACED BEHIND THE STOP LINE.
5. THE DIMENSIONS ARE SUBJECT TO CHANGE IN THE FIELD IF EXISTING APPURTENANCES OR CONDITIONS WILL MAKE THE RAMP LOCATIONS IMPRACTICAL OR UNSAFE. CONSULT CIVIL ENGINEER PRIOR TO MAKING ANY MODIFICATIONS.

HANDICAP CURB CUT AND CURB TRANSITION — NOT TO SCALE — 1

DESC.	SIGN	SIZE	MOUNTING HEIGHT	DESCRIPTION	REFLEC-TORIZED
R1-1[1]	STOP	30"x30"	7' - 0"	WHITE ON RED	YES
R7-8	YIELD TO BIKE PATH / BICYCLES MAY USE FULL LANE	12"x20"	7' - 0"	WHITE ON BLUE	YES
R7-8 (MODIFIED)	YIELD TO BIKE PATH / BICYCLES MAY USE FULL LANE / NOT TO SCALE	12"x20"	7' - 0"	WHITE ON BLUE	YES

1. TRAFFIC AND SAFETY SIGNAGE SHALL COMPLY WITH MUTCD STANDARDS.

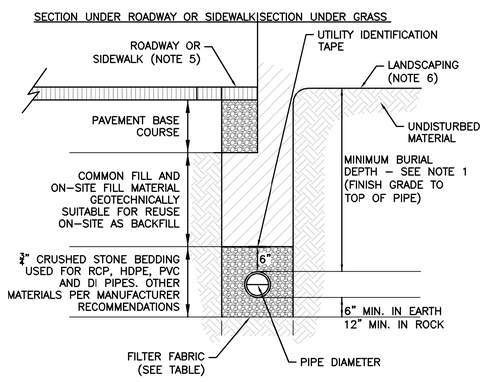
SIGN TABLE — NOT TO SCALE — 2

NOTES:

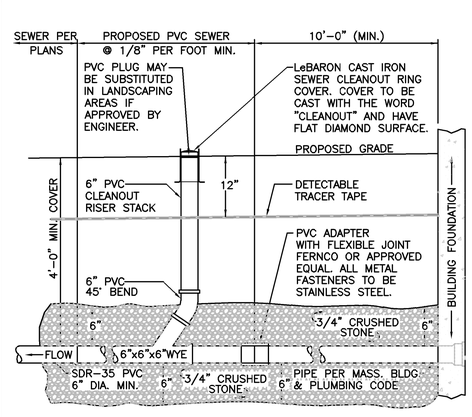
1. MINIMUM BURIAL DEPTH (FINISH GRADE TO TOP OF PIPE)
   GRAVITY PIPE (SEWER & DRAIN) – SEE PLAN OR PROFILE
   PRESSURE PIPE UNDER PAVING – 4'
   PRESSURE PIPE BENEATH UNPAVED – 3'
   WATER PIPE – 5'
2. WHERE BACKFILL IS DESIGNATED AS COMPACTED, THIS MEANS 90 TO 95% STANDARD PROCTOR. AASHTO T-99. ALL FILL PLACED BELOW PIPES AND STRUCTURES MUST MEET THIS REQUIREMENT.
3. TRENCHES WITHIN PUBLIC RIGHT OF WAY MAY REQUIRE FLOWABLE FILL. VERIFY WITH MUNICIPAL ENGINEER.
4. WHERE WASTE FILLS ARE ENCOUNTERED AT SUBGRADE LEVEL FOR NEW UTILITIES, THE FILL SHOULD BE OVER-EXCAVATED, THE SUBGRADE SHOULD BE RE-COMPACTED, AND BACKFILL CONSISTING OF PIPE BEDDING MATERIAL, CRUSHED STONE OR OTHER SUITABLE GRANULAR FILL SHOULD BE PLACED TO A SUFFICIENT DEPTH TO CREATE A FIRM AND STABLE SUBGRADE (TYPICALLY 12 TO 18 INCHES OVER-EXCAVATION).
5. REFER TO PAVING, CURBS, WALKS AND DRIVEWAY DETAILS.
6. REFER TO LANDSCAPING DETAILS.

FILTER FABRIC USE

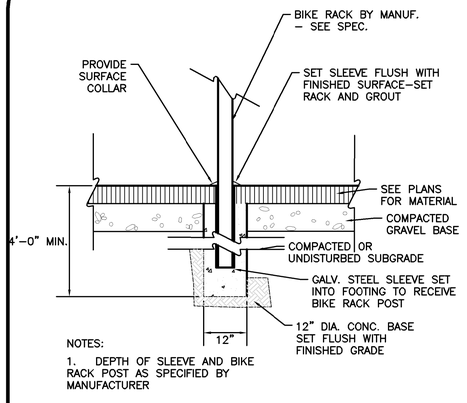
	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED



UTILITY TRENCH — NOT TO SCALE — 3

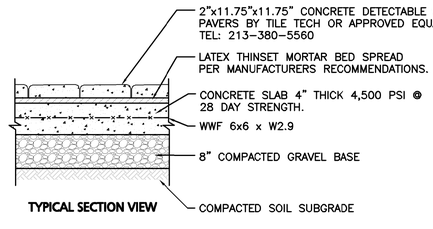


BUILDING SEWER SERVICE — NOT TO SCALE — 4

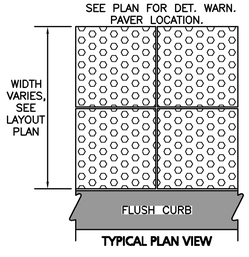


NOTES:
1. DEPTH OF SLEEVE AND BIKE RACK POST AS SPECIFIED BY MANUFACTURER

BIKE RACK ANCHOR WITH SLEEVE — NOT TO SCALE — 5



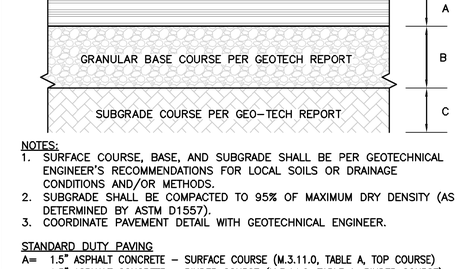
TYPICAL SECTION VIEW



TYPICAL PLAN VIEW

NOTES:
1. CONCRETE SLAB SHALL BE SLOPED 1.5% CROSS PITCH MAX TO PROVIDE COMPLETE SURFACE DRAINAGE. SEE GRADING PLAN & HANDICAP CURB CUT / CURB TRANSISTION DETAIL.
2. SLAB TO HAVE STEEL TROWEL AND FINE BROOM FINISH. DO NOT USE CURING COMPOUNDS. CONTRACTOR TO ADD EXPANSION JOINTS AND PREMOLDED FILLER AT EDGE OF TILES AND ADJACENT MATERIAL.
3. SET TILES FLUSH WITH ADJACENT MATERIALS.
4. SUBMIT SHOP DRAWINGS OF TILES AND SAMPLE FOR APPROVAL OF COLOR TO OWNER / ARCH.
5. INSTALL DETECTABLE WARNING PAVERS PER MANUFACTURER'S RECOMMENDATIONS.
6. ALL DET. WARN. PAVERS SHALL COMPLY WITH ADA REGULATIONS.

DETECTABLE WARNING PAVERS — NOT TO SCALE — 6



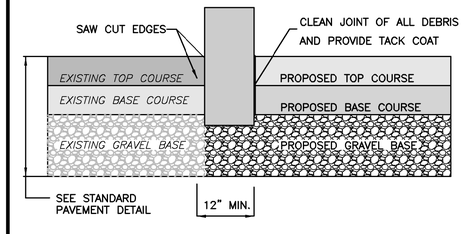
NOTES:
1. SURFACE COURSE, BASE, AND SUBGRADE SHALL BE PER GEOTECHNICAL ENGINEER'S RECOMMENDATIONS FOR LOCAL SOILS OR DRAINAGE CONDITIONS AND/OR METHODS.
2. SUBGRADE SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (AS DETERMINED BY ASTM D1557).
3. COORDINATE PAVEMENT DETAIL WITH GEOTECHNICAL ENGINEER.

STANDARD DUTY PAVING
A= 1.5" ASPHALT CONCRETE – SURFACE COURSE (M.3.11.0, TABLE A, TOP COURSE)
1.5" ASPHALT CONCRETE – BINDER COURSE (M.3.11.0, TABLE A, BINDER COURSE)
B= 4" BASE COURSE (MHD 2.01.7)
C= 12" SUBBASE COURSE (MHD 1.03.0, TYPE B)

HEAVY DUTY PAVING
A= 2" ASPHALT CONCRETE – SURFACE COURSE (M.3.11.0, TABLE A, TOP COURSE)
2" ASPHALT CONCRETE – BINDER COURSE (M.3.11.0, TABLE A, BINDER COURSE)
B= 6" BASE COURSE (MHD 2.01.7)
C= 15" SUBBASE COURSE (MHD 1.03.0, TYPE B)

STANDARD/HEAVY DUTY BITUMINOUS PAVEMENT — NOT TO SCALE — 7

NOTE:
TACK COAT – PROVIDE EMULSIFIED ASPHALT WHICH CONFORMS TO THE REQUIREMENTS OF THE STATE SPECIFICATIONS, DILUTED WITH ONE PART WATER TO ONE ONE PART ASPHALT FOLLOWING AASHTO M140/ASTM D997, OR AASHTO M208/ASTM D2397, SS-1H, CSS-1, OR CSS-1H.



CURBING INSTALLED IN PAVEMENT SAWCUT — NOT TO SCALE — 8

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DETAILS.DWG

8/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:

377 CHESTNUT STREET
NEEDHAM, MA

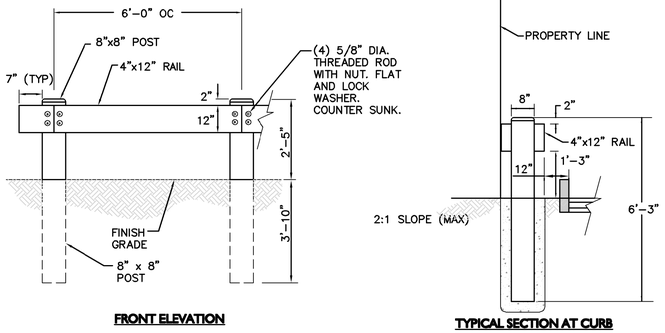
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
DETAILS

SHEET No.
C-503

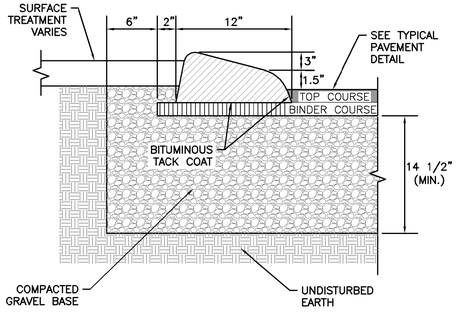


FRONT ELEVATION

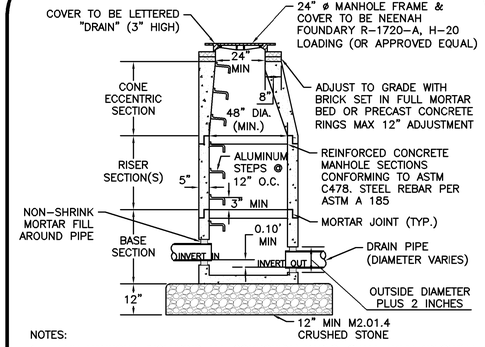
TYPICAL SECTION AT CURB

NOTES:
1. ALL TIMBER STOCK TO BE PRESSURE TREATED.
2. ALL HARDWARE TO BE GALVANIZED STEEL.

DOUBLE-SIDED WOOD BEAM GUARD RAIL — NOT TO SCALE — 1



CAPE COD BERM — NOT TO SCALE — 2



NOTES:
1. THE MANHOLE, INCLUDING ALL COMPONENT PARTS, SHALL HAVE ADEQUATE SPACE AND STRENGTH QUALITIES CONSIDERED NECESSARY FOR THE INTENDED SERVICE. SPACE REQUIREMENT AND CONFIGURATIONS SHALL BE AS SHOWN ON THE DRAWING. THE COMPLETE STRUCTURE SHALL BE OF SUCH MATERIAL AND QUALITY AS TO WITHSTAND (H-20 LOADING) WITHOUT FAILURE.

VERTICAL FOOT OF MANHOLE.

DRAIN MANHOLE — NOT TO SCALE — 3

3106-01_Proposed HydroCAD *Type III 24-hr 100-Year Rainfall=8.74"*
Prepared by Allen & Major Associates, Inc Printed 8/5/2022
HydroCAD® 10.20-2d s/n 02681 © 2021 HydroCAD Software Solutions LLC

Summary for Pond UIS-1: UIS-1 - Stormtech MC-3500 Chambers

Inflow Area = 17.627 sf,100.00% Impervious, Inflow Depth = 8.50" for 100-Year event
Inflow = 3.47 cfs @ 12.08 hrs, Volume= 12,485 cf
Outflow = 3.46 cfs @ 12.09 hrs, Volume= 12,485 cf, Atten= 0%, Lag= 0.3 min
Discarded = 0.01 cfs @ 1.42 hrs, Volume= 2,688 cf
Primary = 3.45 cfs @ 12.09 hrs, Volume= 9,798 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 145.38' @ 12.09 hrs Surf.Area= 536 sf Storage= 1,717 cf

Plug-Flow detention time= 273.2 min calculated for 12,485 cf (100% of inflow)
Center-of-Mass det. time= 273.2 min (1,013.3 - 740.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.00'	803 cf	**15.58'W x 34.38'L x 5.50'H Field A** 2,947 cf Overall - 939 cf Embedded = 2,007 cf x 40.0% Voids
#2A	140.75'	939 cf	**ADS_StormTech MC-3500 d +Cap** x 8 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 8 Chambers in 2 Rows Cap Storage= 14.9 cf x 2 x 2 rows = 59.6 cf
		1,742 cf	Total Available Storage

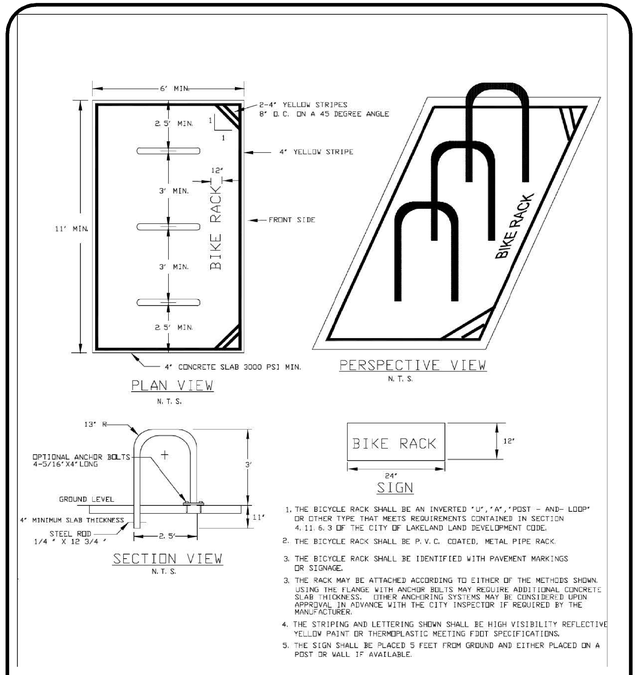
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	140.75'	**12.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 140.75' / 140.25' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	145.00'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	140.00'	**1.020 in/hr Sand & Gravel (HSG-B) over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.01 cfs @ 1.42 hrs HW=140.06' (Free Discharge)
└**3=Sand & Gravel (HSG-B)** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.42 cfs @ 12.09 hrs HW=145.38' (Free Discharge)
└**1=Culvert** (Passes 3.42 cfs of 6.07 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 3.42 cfs @ 1.80 fps)

HYDROCAD SUMMARY OF UIS-1 — NOT TO SCALE — 4



1. THE BICYCLE RACK SHALL BE AN INVERTED "U," "A," POST - AND- LOOP" OR OTHER TYPE THAT MEETS REQUIREMENTS CONTAINED IN SECTION 4.11.6.3 OF THE CITY OF LAKELAND LAND DEVELOPMENT CODE.
2. THE BICYCLE RACK SHALL BE P.V.C. COATED, METAL PIPE RACK.
3. THE BICYCLE RACK SHALL BE IDENTIFIED WITH PAVEMENT MARKINGS OR SIGNAGE.
3. THE RACK MAY BE ATTACHED ACCORDING TO EITHER OF THE METHODS SHOWN. USING THE FLANGE WITH ANCHOR BOLTS MAY REQUIRE ADDITIONAL CONCRETE SLAB THICKNESS. (OTHER ANCHORING SYSTEMS MAY BE CONSIDERED UPON APPROVAL IN ADVANCE WITH THE CITY INSPECTOR IF REQUIRED BY THE MANUFACTURER.
4. THE STRIPING AND LETTERING SHOWN SHALL BE HIGH VISIBILITY REFLECTIVE YELLOW PAINT OR THERMOPLASTIC MEETING FDOT SPECIFICATIONS.
5. THE SIGN SHALL BE PLACED 5 FEET FROM GROUND AND EITHER PLACED ON A POST OR WALL IF AVAILABLE.

BICYCLE RACK — NOT TO SCALE — 5

9/12/22
COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER
PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

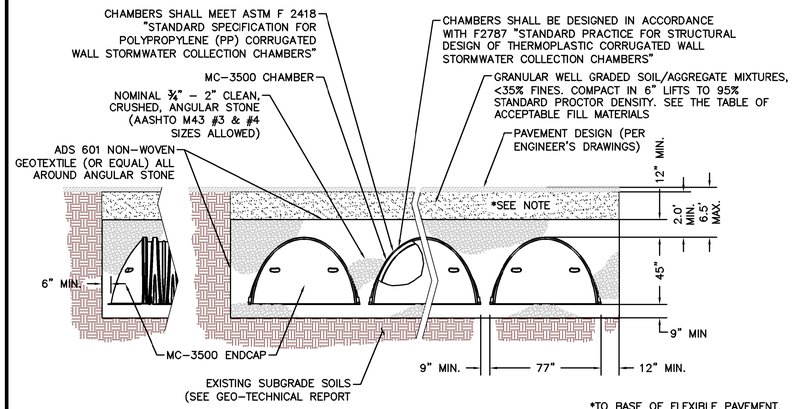
PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
DETAILS

SHEET No.
C-504

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DETAILS.DWG



*TO BASE OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS, WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30".

NOTES:

1. PERIMETER STONE MUST ALWAYS BE BROUGHT UP EVENLY WITH BACKFILL OF BED.
2. PERIMETER STONE MUST EXTEND HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH STRAIGHT OR SLOPED SIDEWALLS.
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

NOTE:
1. THE CONTRACTOR SHALL SUBMIT A SHOP DRAWING OF THE STORMTECH INFILTRATION CHAMBERS, OR APPROVED EQUAL, TO A&M FOR REVIEW PRIOR TO INSTALLATION IN THE FIELD.

StormTech®
Detention · Retention · Water Quality

70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

STORMTECH MC-3500 TYPICAL CROSS-SECTION (1)
NOT TO SCALE

N:\PROJECTS\3106-01\CIVIL\DRAWINGS\CURRENT\C-3106-01_DETAILS.DWG

8/12/22

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. WILLIAMS
CIVIL
NO. 43119
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT:
PLAN B RETAIL DESIGN AND PROJECT-MANAGEMENT
12 GOOSE LANE
TOLLAND, CT 06084

PROJECT:
377 CHESTNUT STREET
NEEDHAM, MA

PROJECT NO.	3106-01	DATE:	08/12/2022
SCALE:	AS SHOWN	DWG. NAME:	C-3106-01
DESIGNED BY:	JPS/SJL/WJS	CHECKED BY:	CQ

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
DETAILS

SHEET No.
C-505

CODE REVIEW

ROCHE BROS. SUPERMARKET
377 CHESTNUT STRET
NEEDHAM, MA

CODE REVIEW

APPLICABLE CODES:

- Work shall conform to the requirements of the following partial list of applicable codes and regulations. The General Contractor shall comply with all applicable codes, ordinances, regulations and requirements of all authorities having jurisdiction:
- Accessibility: Massachusetts Architectural Access Board (MAAB), 521-CMR and the 2010 Americans with Disabilities Act Standards for Accessible Design (ADAAG) and FHA Design Guidelines.
- Building: Massachusetts State Building Code (780 CRM) 9th Edition. 780 CMR is an amended version of the 2015 International Building Code (IBC).
- Electrical: Massachusetts Electrical Code, 527 CMR S12.00. The Massachusetts Electrical Code is an amended version of the 2017 National Electrical Code (NFPA 70).
- Energy: 2017 International Energy Conservation Code (IECC) and ASHRAE 90.1=-2013 as amended by 780 CMR 13 and Appendix AA-Stretch Energy Code, 2017.
- Fire Prevention: Massachusetts Comprehensive Fire Safety Code, 527 CMR 1.00(Based on the 2012 Edition of NFPA 1, Fire Code).
- Mechanical: International Mechanical Code 2015, as adopted and amended by 780 CMR (IMC).
- Plumbing: Massachusetts Fuel Gas and Plumbing Codes, 248 CMR.
- Other: Selected National Fire Protection Association (NFPA) Standards as referenced by 780 CMR and 521 CMR.

BUILDING DESCRIPTION:

- Construction Type: 3B
- Use of this Space: Mercantile
- Building is Fully Sprinklered

SIZE OF DEMISED SPACE:

- Area of Grade Level: 17,667 SF
- Area of Mezzanine:
  - To be Rebuilt 476 SF
- Total 18,143 SF

FIRE RATING OF MATERIALS:

- All fire ratings of materials will satisfy referenced Codes.

OCCUPANCY:

Occupancy is calculated for a 3B Type Building, Mercantile Use as follows:

- Grade Floor:
  - 16,023 SF General Area @ 60 SF per Occupant = 268 Occupants
  - 2,121 SF Storage and Receiving Area at 300 SF per Occupant = 8 Occupants
- Mezzanine Level:
  - 476 SF Occupied Area @ 60 SF per Occupant = 8 Occupants
- Total Occupancy of Building = 284 Occupants

EGRESS CAPACITY:

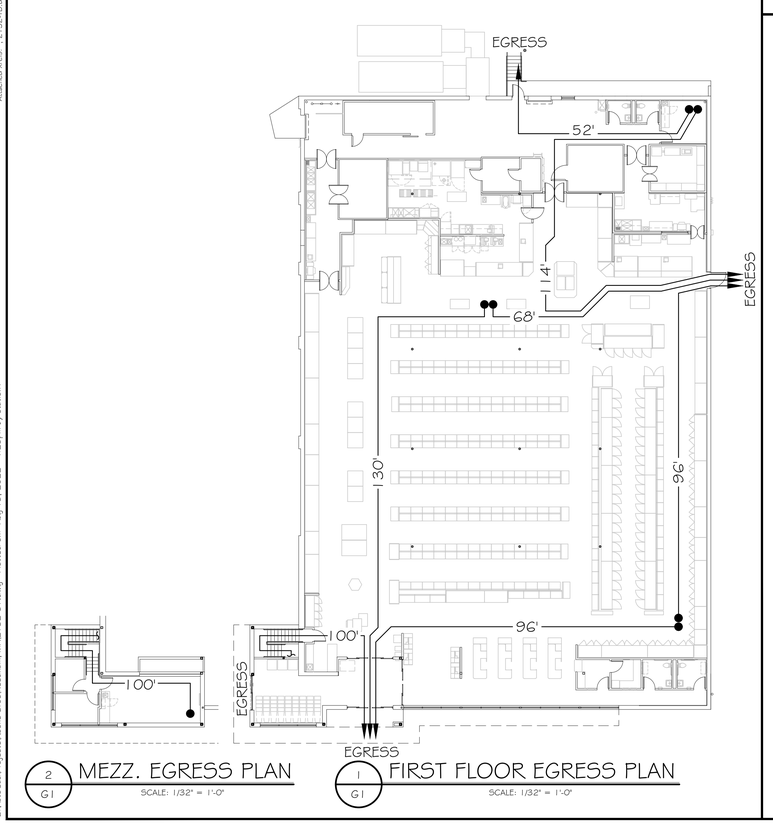
- Based on Total Occupancy of 284 Occupants at 0.2" per Occupant, Total Egress Size is 57" and 130" is provided.

TRAVEL DISTANCE:

- As a fully sprinklered building, 250' is allowed as travel distance and 130' is provided.

ACCESSIBILITY:

- This building satisfies all requirements for complete accessibility as set by the Massachusetts Architectural Access Board including aisles, heights and Lavatories.
- Mezzanine Level is a redundant use.



2 / G1 MEZZ. EGRESS PLAN
SCALE: 1/32" = 1'-0"

1 / G1 FIRST FLOOR EGRESS PLAN
SCALE: 1/32" = 1'-0"

ZBA Submission

Proposed Renovation Plans for:

Roche Bros.

377 Chestnut Street
Needham, MA

SHEET INDEX

REVISIONS:

ARCHITECT:
D. F. VALENTE
ARCHITECTURE PLANNING
STRUCTURE STREET LANDMARK
SOUTH MEDFORD
MASSACHUSETTS 02155-0120
781-395-0120
TELEPHONE
FACSIMILE
781-395-6702
9903

SEAL:
COMMONWEALTH OF MASSACHUSETTS
No. 3597
REGISTERED ARCHITECT

PROJECT NAME:
Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE:
GENERAL INFORMATION

SCALE: AS NOTED
DRAWN BY: GGL
CHECKED BY: CAB

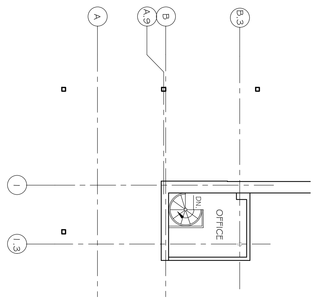
PLAN B RETAIL DESIGN & PROJECT MANAGEMENT, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

PLAN RETAIL design

DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: G1

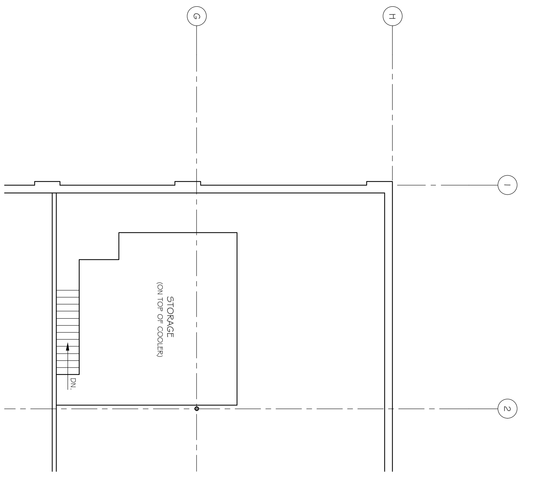
2 EX EXIST. MEZZANINE FIXTURE PLAN

SCALE: 1/8" = 1'-0"



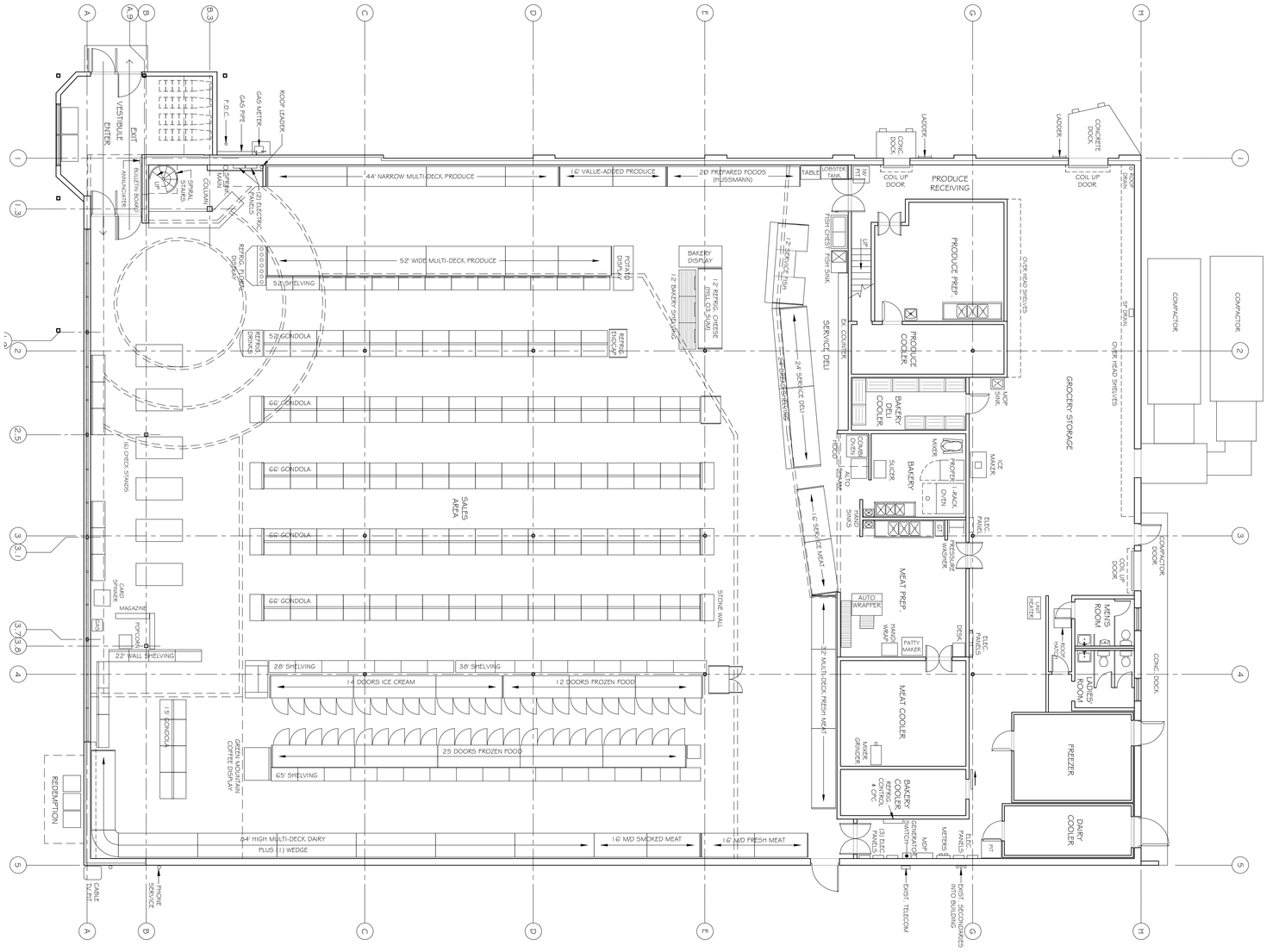
3 EX EXIST. REAR MEZZANINE FIXTURE PLAN

SCALE: 1/8" = 1'-0"



1 EX EXIST. FIXTURE PLAN

SCALE: 1/8" = 1'-0"



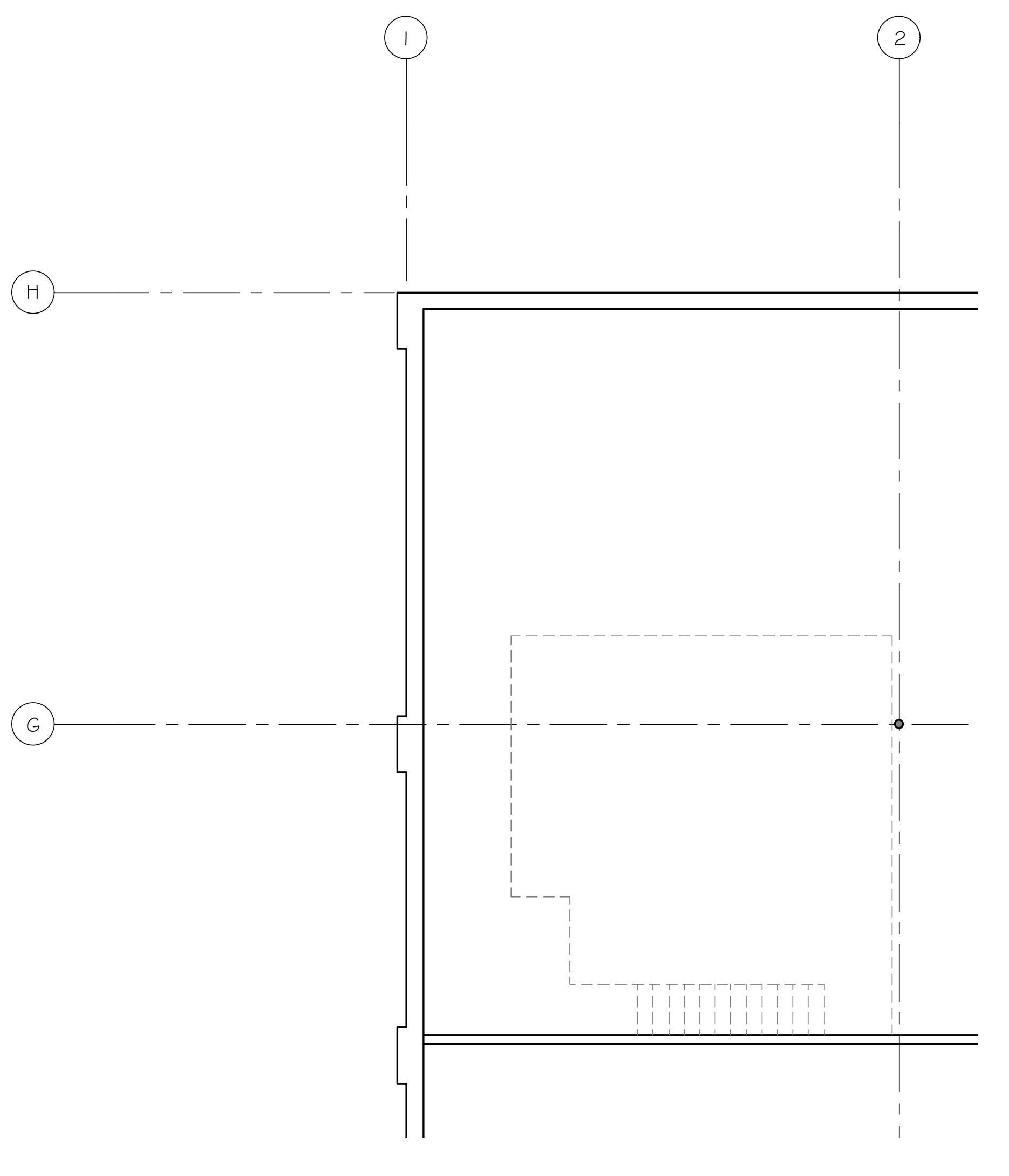
N
REF.

DATE: Aug 18, 2022	DRAWING TITLE: EXISTING FIXTURE PLAN	PROJECT NAME: Roche Bros. 377 Chestnut Street Needham, MA	ARCHITECT: # 9903
PROJECT NO: 2132	SCALE: 1/8" = 1'-0"	DRAWN BY: dw / GGL	CHECKED BY:
SHEET NO: EX			REVISIONS:

PLAN B RETAIL DESIGN & PROJECT MANAGEMENT, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

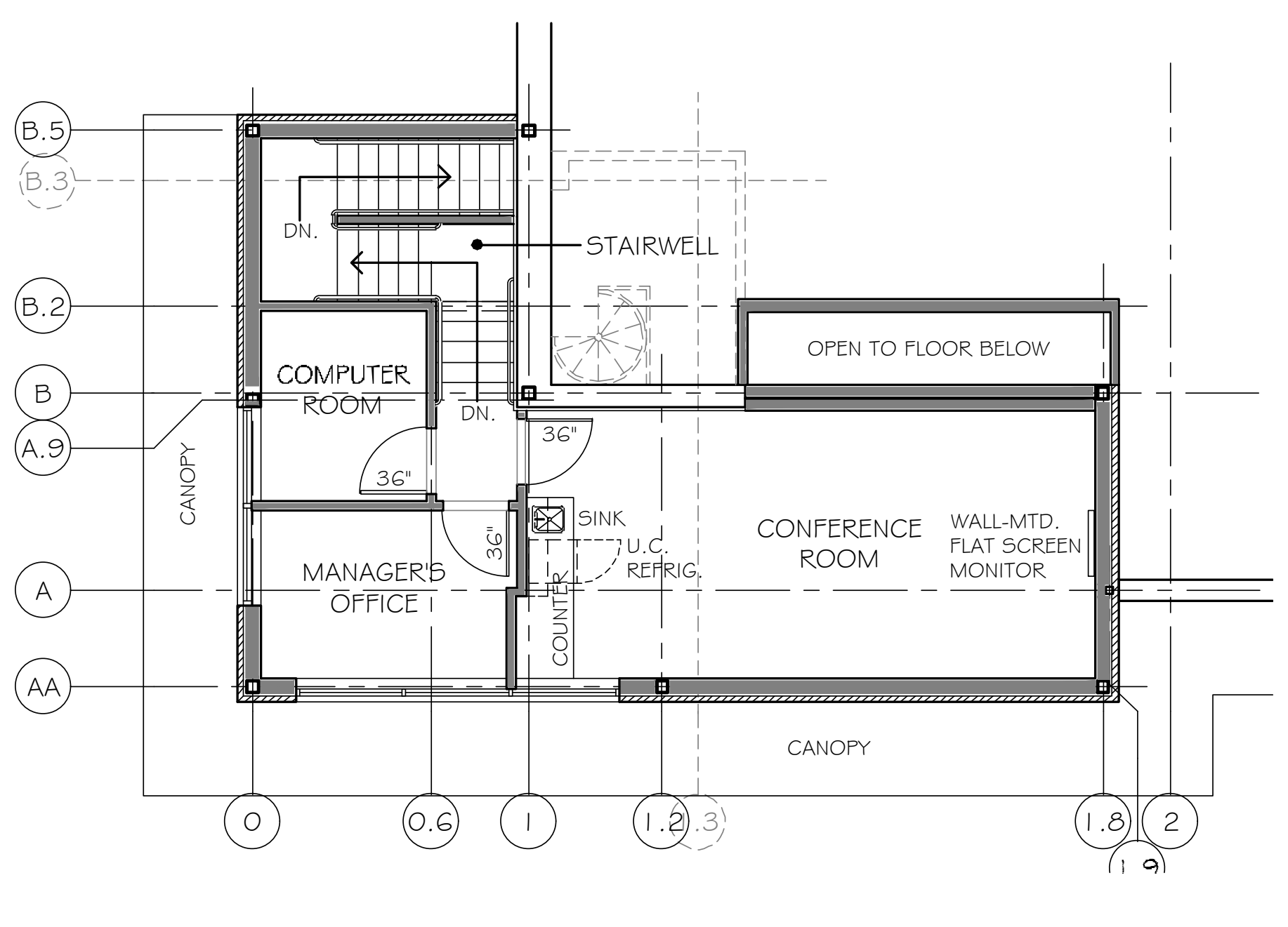
SEAL: REGISTERED ARCHITECT DAVID F. VALENTE No. 3597 BOSTON MASS COMMONWEALTH OF MASSACHUSETTS

D. F. VALENTE
ARCHITECT + PLANNER
571 MAIN STREET • REAR
SOUTH MEDFORD
MEDFORD, MASSACHUSETTS 02155-6552
TELEPHONE 781-395-0120
FACSIMILE 781-395-8702



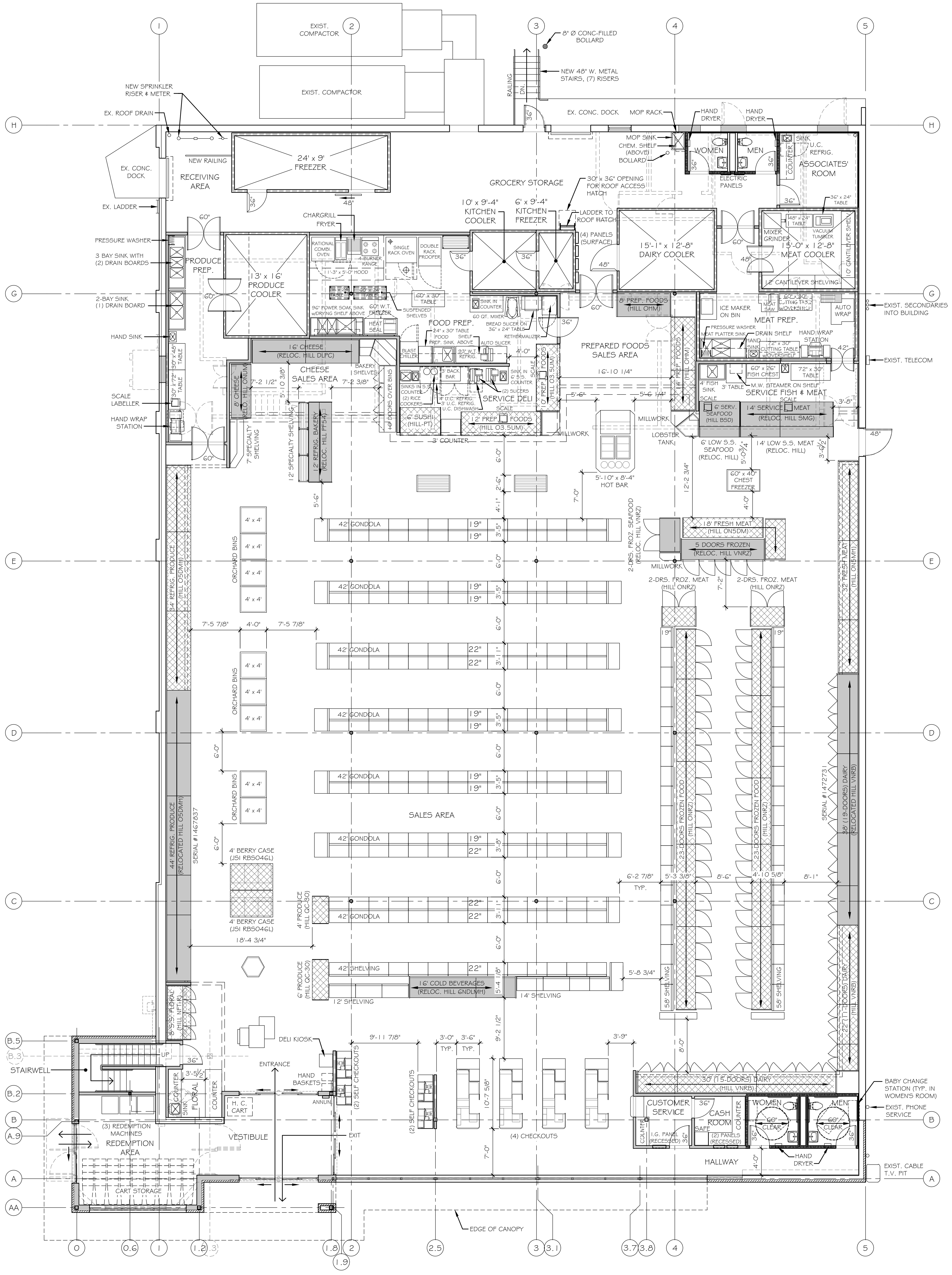
3 FP FIXTURE PLAN (REAR MEZZANINE)

SCALE: 1/8" = 1'-0"



2 FP FIXTURE PLAN (2nd. FLOOR)

SCALE: 1/8" = 1'-0"



1 FP FIXTURE PLAN

SCALE: 1/8" = 1'-0"

REFRIG. CASE LEGEND

🟫	REFRIGERATED CASE RELOCATED FROM "BROTHERS" STORE, WALTHAM, MA
▨	NEW REFRIGERATED CASE

REVISIONS:

SEAL:

No. 3597

PROJECT NAME:

Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE:

FIXTURE PLANS

SCALE:	DRAWN BY:	CHECKED BY:
1/8" = 1'-0"	dw	CAB

Plan B Retail Design & Project Management, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

PLAN RETAIL DESIGN

DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: FP

Sheet File Save Date: 18 Aug 2022, 3:57pm

Attached Xrefs: ; 2132-COL.dwg ; 2132-TB.dwg ; 2132-FPA.dwg ; 2132-RCP.dwg ; 2132-COL-Wrong location.dwg ; 2132-FPB.dwg

Z:\AutoCad\Projects\Roche Bros\Needham, MA\2132-FP.dwg - Plotted on: Aug 18, 2022 - 4:25pm by station1

EQUIPMENT LIST

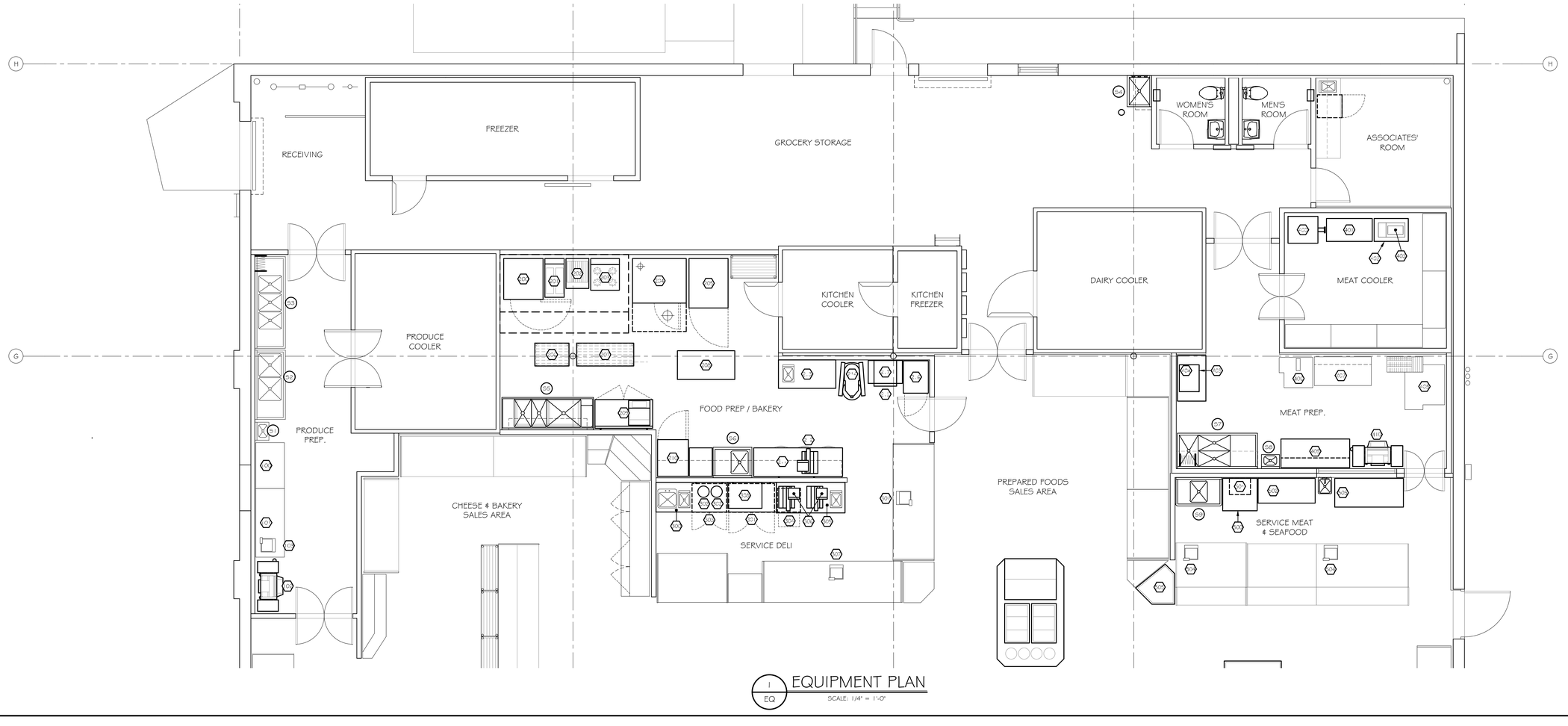
TAG	DESCRIPTION	MANUFACTURER	MODEL NO.	LOCATION	ELECTRICAL	GAS	WATER	DRAIN	EXHAUST	RELOCATED EQUIP.
100	S.S. TABLE		24" x 60"	PRODUCE PREP.	---	---	---	---	---	(FROM WALTHAM STORE)
101	S.S. TABLE		24" x 72"	PRODUCE PREP.	---	---	---	---	---	(FROM WALTHAM STORE)
102	HANDWRAP STATION	BIZERBA	MANUAL WRAP/LABELER	PRODUCE PREP.	115V, 60hz, 6.5A	NO	NO	NO	NO	
103	SCALE / LABELLER			PRODUCE PREP.	120V + DATA	NO	NO	NO	NO	(FROM WALTHAM STORE)
200	COMBI OVEN	RATIONAL	I COMBI CLASSIC 10	FOOD PREP.	208V, (2) @ 16.0A	152,000 BTU	CW / HW	YES	HOOD	
201	FRYER	HENNY PENNY	320 SERIES	FOOD PREP.		120,000 BTU	NO	NO	HOOD	(FROM WALTHAM STORE)
202	CHARBROILER	GARLAND	MST24B	FOOD PREP.		60,000 BTU	NO	NO	HOOD	(FROM WALTHAM STORE)
203	4-BURNER GAS RANGE	GARLAND	M28	FOOD PREP.		24,000 BTU	NO	NO	HOOD	(FROM WALTHAM STORE)
204	SINGLE-RACK GAS OVEN	REVENT	726-G	BAKERY	208V, 3φ, 13.0A	170,000 BTU	CW	YES	CANOPY & FLUE	
205	DOUBLE-RACK PROOFER	REVENT	P7112	BAKERY	208V, 3φ, 15.0A	NO	CW	YES		
206	S.S. TABLE		36" x 24"	FOOD PREP.	---	---	---	---	---	
207	S.S. TABLE		60" x 24"	FOOD PREP.	---	---	---	---	---	
208	S.S. TABLE		60" x 31"	FOOD PREP.	---	---	---	---	---	
209	60" WORKTOP FREEZER	TRUE	TWT-60	FOOD PREP.	115/60/1φ 4.0A	NO	NO	NO	NO	
210	48" WORKTOP BLAST CHILLER	TRAULSEN	TBC5	FOOD PREP.	115/60/1φ 16.0A	NO	NO	NO	NO	
211	93" WORKTOP REFRIGERATOR	TRUE	TWT-93	FOOD PREP.	115V, 60Hz, 4.5A	NO	NO	NO	NO	
212	AUTOMATIC SLICER	BIZERBA	VSI-400	FOOD PREP.	115V, 60, 1φ	NO	NO	NO	NO	
213	S.S. COUNTER w/INTEGRATED SINK		60" x 30"	FOOD PREP.	NO	NO	YES	YES	NO	
214	60-QUART MIXER	HOBART	HL600-15TD	FOOD PREP.	240/60/3φ 12.0A	NO	NO	NO	NO	
215	36" x 24" TABLE			FOOD PREP.	---	---	---	---	---	
216	RETHERMALIZER	ELKAY	RTB-14-SL	FOOD PREP.	208/60/1φ 28.8A	NO	YES	YES	NO	
217	AUTOMATIC BREAD SLICER	JAC	PICOMATIC ONE	FOOD PREP.	120V/60/1φ 7.3A	NO	NO	NO	NO	
218	24" x 30" TABLE			FOOD PREP.	---	---	---	---	---	
300	S.S. COUNTER w/INTEGRATED SINKS		126" X 31"	SERVICE DELI	NO	NO	YES	YES	NO	
301	48" UNDERCOUNTER REFRIGERATOR	TRUE	TUC-48	SERVICE DELI	115V, 4.8A	NO	NO	NO	NO	
302	RICE COOKER	PANASONIC	SP-GA721	SERVICE DELI	208V, 2235W	NO	NO	NO	NO	
303	36" UNDERCOUNTER REFRIGERATOR	TRUE	TUC-36	SERVICE DELI	115V, 2.0A	NO	NO	NO	NO	
304	UNDERCOUNTER DISHWASHER	CHAMPION	UHT230B	SERVICE DELI	208V, _____ A	NO	YES	YES	NO	
305	S.S. COUNTER w/INTEGRATED SINK		72" x 32"	SERVICE DELI	NO	NO	YES	YES	NO	
306	SLICER	BIZERBA	GSP H	SERVICE DELI	115/60/1φ 3.1A	NO	NO	NO	NO	
307	SCALE / LABELLER			SERVICE DELI		NO	NO	NO	NO	(FROM WALTHAM STORE)
308	DELI BACKBAR (SELF-CONTAINED)	SPECIALTY FABRICATORS	3PS55-CC	SERVICE DELI	115V / 20.0A	NO	NO	NO	NO	
400	MEAT MIXER GRINDER	BIRO	EMG-32	MEAT COOLER	220/60/3φ 24.0A	NO	NO	NO	NO	
401	48" x 24" TABLE			MEAT COOLER	---	---	---	---	---	
402	36" x 36" TABLE			MEAT COOLER	---	---	---	---	---	
403	VACUUM TUMBLER	LYCO SALES	LT40	MEAT COOLER	115/60/1φ 3.0A	NO	NO	NO	NO	(FROM WALTHAM STORE)
404	ICE FLAKER	HOWE	RLE-1000	MEAT PREP.	230/60/1φ 15.0A	NO	YES	YES	NO	
405	ICE STORAGE BIN (1-CART)	HOWE	CP1000	MEAT PREP.	NO	NO	NO	YES	NO	
406	MEAT SAW	BIRO	1433FH	MEAT PREP.	208V/60/3, 6.4A	NO	NO	NO	NO	(FROM WALTHAM STORE)
407	POLYTOP CUTTING TABLE w/SHELF		60" x 30"	MEAT PREP.	---	---	---	---	---	(FROM WALTHAM STORE)
408	LABELER / WRAPPER	DIGI	AW 4600	MEAT PREP.	220/60/1φ 7.5A	NO	NO	NO	NO	(FROM NEEDHAM STORE)

EQUIPMENT LIST

TAG	DESCRIPTION	MANUFACTURER	MODEL NO.	LOCATION	ELECTRICAL	GAS	WATER	DRAIN	EXHAUST	RELOCATED EQUIP.
409	POLYTOP CUTTING TABLE w/SHELF		72" x 30"	MEAT PREP.	---	---	---	---	---	
410	HANDWRAP STATION	BIZERBA	MANUAL WRAP/LABELER	MEAT PREP.	115V, 60hz, 6.5A	NO	NO	NO	NO	
500	S.S. TABLE		36" x 34"	SERVICE MEAT / FISH	NO	NO	NO	NO	RP	
501	MICROWAVE OVEN (ON SHELF)	PANASONIC	NE 3280	SERVICE MEAT / FISH	28A (208V), 25.3A (230-240V)	NO	NO	NO	NO	
502	72" x 26" FISH CHEST	BUFFALO OUTFRONT METAWORKS		SERVICE MEAT / FISH		NO	NO		NO	
503	S.S. TABLE		72" x 30"	SERVICE MEAT / FISH		NO	NO	NO	NO	
504	SCALE / LABELLER			SERVICE MEAT / FISH		NO	NO	NO	NO	(FROM WALTHAM STORE)
505	LOBSTER TANK			SERVICE MEAT / FISH		NO			NO	(FROM WALTHAM STORE)

SINK LIST

TAG	DESCRIPTION	MANUFACTURER	MODEL NO.	LOCATION	NOTES	RELOCATED EQUIP.
51	HAND SINK	EAGLE GROUP	HSA-10-1FK	PRODUCE PREP.	WITH SPLASHGUARDS. PLUMBING CONTRACTOR TO PROVIDE TEMPERING VALVE	(FROM WALTHAM STORE)
52	2-BAY SINK w/L.H. DRAINBOARD	EAGLE GROUP	314-24-2-18L	PRODUCE PREP.	ADD-ON FAUCET, T & S SPRAYER, LEVER DRAINS	(FROM WALTHAM STORE)
53	3-BAY SINK w/(2) DRAINBOARDS	EAGLE GROUP	314-18-3-18	PRODUCE PREP.	ADD-ON FAUCET, T & S SPRAYER, LEVER DRAINS	(FROM WALTHAM STORE)
54	MOP SINK	FLORSTONE		PRODUCE PREP.	T & S BRASS FAUCET #B-0657, MOP HANGER, HOSE	
55	POWER SOAK SINK SYSTEM	UNIFIED BRANDS	PSA-9GL-36-S	FOOD PREP.	WITH DRYING SHELF ABOVE. ELECTRICAL: 208V/60/1PH 8.8 AMP	
56	1-BAY SINK w/R.H. DRAINBOARD	EAGLE GROUP	314-18-1-18R	FOOD PREP.	ADD-ON FAUCET, T & S SPRAYER, LEVER DRAINS	
57	MEAT FLATTER SINK	EAGLE GROUP		MEAT PREP.	ADD-ON FAUCET, T & S SPRAYER, LEVER DRAINS	(FROM WALTHAM STORE)
58	HAND SINK	EAGLE GROUP	HSA-10-1FK	MEAT PREP.	WITH SPLASHGUARDS. PLUMBING CONTRACTOR TO PROVIDE TEMPERING VALVE	(FROM WALTHAM STORE)
59	4' FISH PREP. SINK (CUSTOM)			SERVICE MEAT / FISH		(FROM WALTHAM STORE)



1 EQ EQUIPMENT PLAN
SCALE: 1/4" = 1'-0"

N

REVISIONS: # 9903

ARCHITECT:
D. F. VALENTE
SYCAMORE STREET • LANDMARK
SOUTH MEDFORD
MASSACHUSETTS 02155-5120
TELEPHONE 781-395-0120
FACSIMILE 781-395-6702

SEAL:

PROJECT NAME:
Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE: EQUIPMENT PLAN AND SCHEDULE

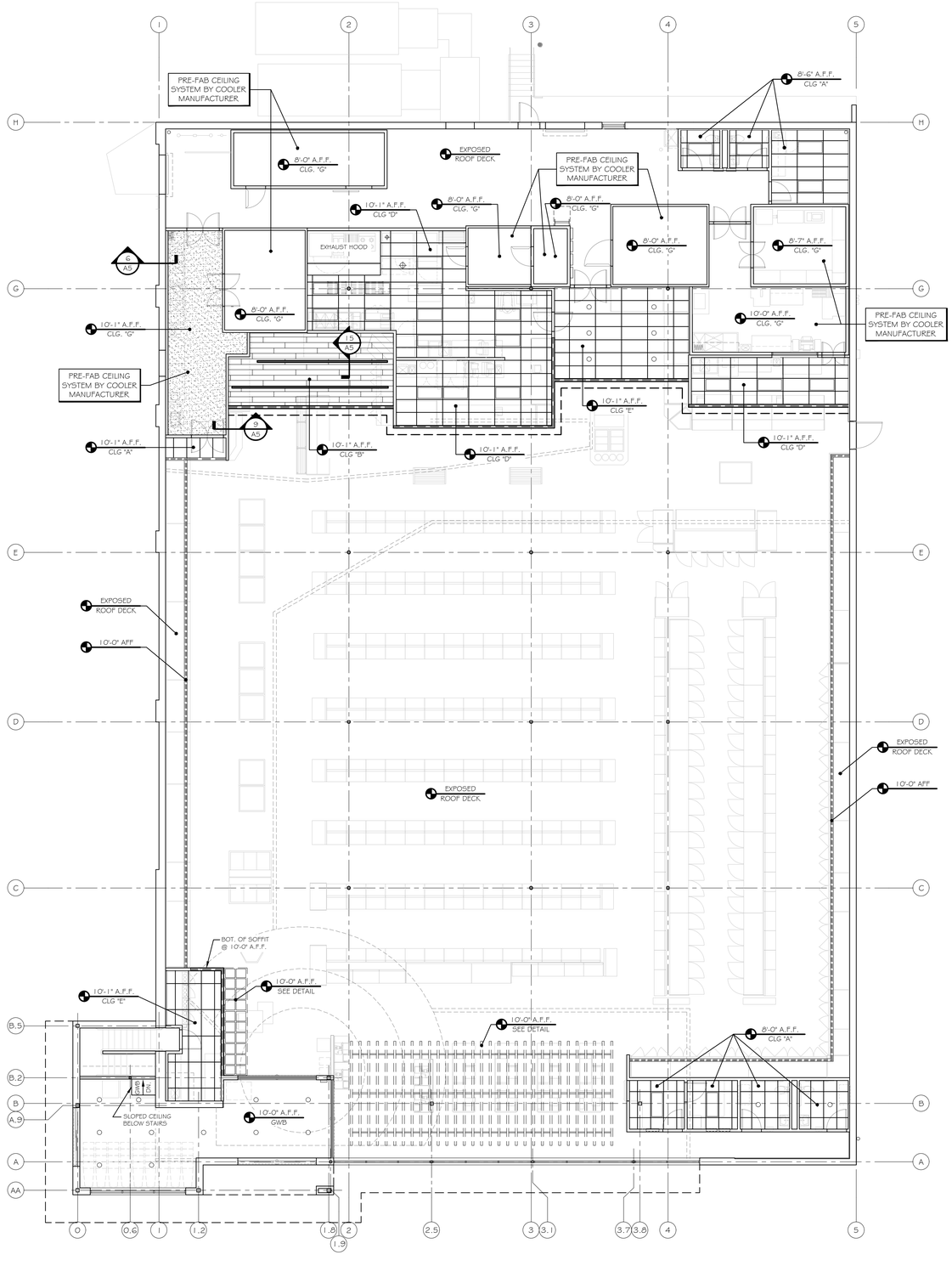
SCALE: 1/4" = 1'-0" | DRAWN BY: dtw / GCL | CHECKED BY:

PLAN B RETAIL DESIGN & PROJECT MANAGEMENT, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cboomely@planbretail.com

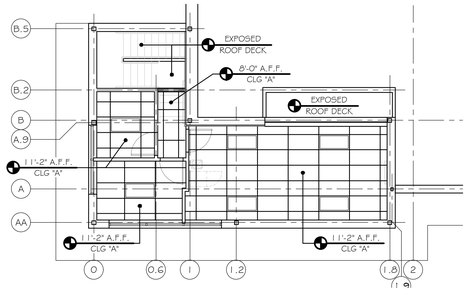
DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: EQ

CEILING SCHEDULE

SYMBOL	MANUF.	DESCRIPTION	GRID	REMARKS
CLG. "A"	USG INTERIORS	RADAR "CLIMAPLUS" 22325	DONN DX/DXL 15/16 EXPOSED TEE SYSTEM LOW-GLOSS WHITE (FIRE CODE)	COLOR, OAK PEARL 9/16" x 5", ULTRA MATTE URETHANE FINISH
CLG. "B"	JUNKERT	HARMONY HARDWOOD PLANK		
CLG. "C"	ARMSTRONG	KITCHEN ZONE SQUARE LAY-IN 672	DONN AX ENVIRONMENTAL 15/16 EXPOSED TEE SYSTEM LOW-GLOSS WHITE ON ALUMINUM.	CLASS "A" PANEL
CLG. "D"	PRIME PANELS	INSULATED FRP PANEL 2235.7410.2235	DONN AX ENVIRONMENTAL 15/16 EXPOSED TEE SYSTEM LOW-GLOSS WHITE ON ALUMINUM.	CLASS "A" PANEL
CLG. "E"	USG INTERIORS	"AURATONE - ASPEN ILLUSION FOUR/48 SHADOWLINE TAPERED (SLT) 24" x 48" x 3/4" PRODUCT #653	DONN DX 15/16" EXPOSED TEE GRID SYSTEM LOW-GLOSS WHITE FINISH ON ELECTROGALVINIZED STEEL	
CLG. "G"	A.I.P. PANELS	COOLER CEILING	DONN AX ENVIRONMENTAL 15/16 EXPOSED TEE SYSTEM LOW-GLOSS WHITE ON ALUMINUM.	



1 / A2 REFLECTED CEILING PLAN
SCALE: 1/8" = 1'-0"



2 / A2 REFLECTED CEILING PLAN (2nd. FLOOR)
SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. DO NOT SCALE DRAWING FOR LAYOUT PURPOSES. ALL DIMENSIONS SHALL VERIFIED IN FIELD.
2. ALL CEILINGS AND HANGING ELEMENTS SHALL BE SUSPENDED FROM THE TOP CHORD OF STRUCTURE.
3. PROVIDE CLIPS FOR ALL CEILING TILES IN AREAS THAT MAY BE SUBJECT TO LIFTING CAUSED BY WINDS OR DRAFTS. (i.e. IN VESTIBULES, ETC.)

CEILING LEGEND

- SUSPENDED ACOUSTICAL CEILING GRID SYSTEM (SEE CEILING SCHEDULE)
- RECESSED LIGHT FIXTURES (SEE LIGHTING PLAN)
- NEW SOFFIT
- EXIST. SOFFIT TO REMAIN
- EXIST. SOFFIT TO BE REMOVED

ARCHITECT:
D. F. VALENTE
ARCHITECTURAL LANDMARK
PLANNING STREETSCAPE
SOUTH MEDFORD
MASSACHUSETTS 02155
781-395-0120
TELEPHONE
781-395-8702

9903 REVISIONS:

SEAL:

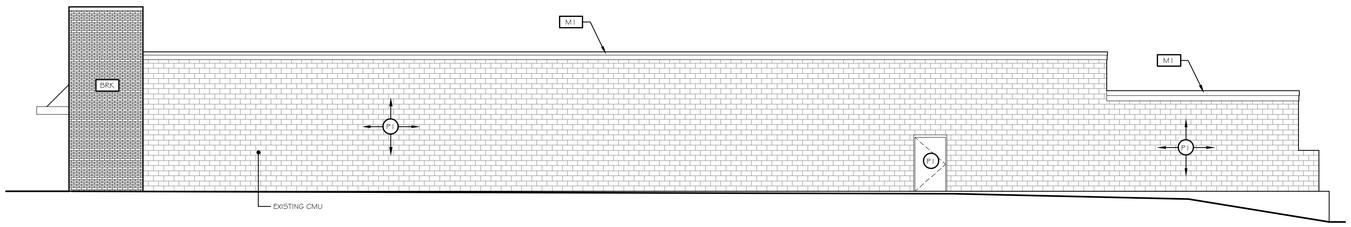
PROJECT NAME:
Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE:
REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0" | DRAWN BY: dw | CHECKED BY: CAB

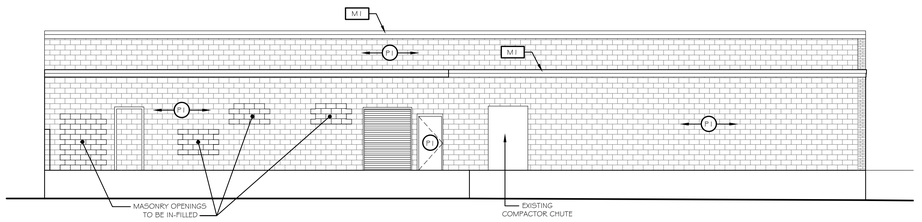
Plan B Retail Design & Project Management, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: A2



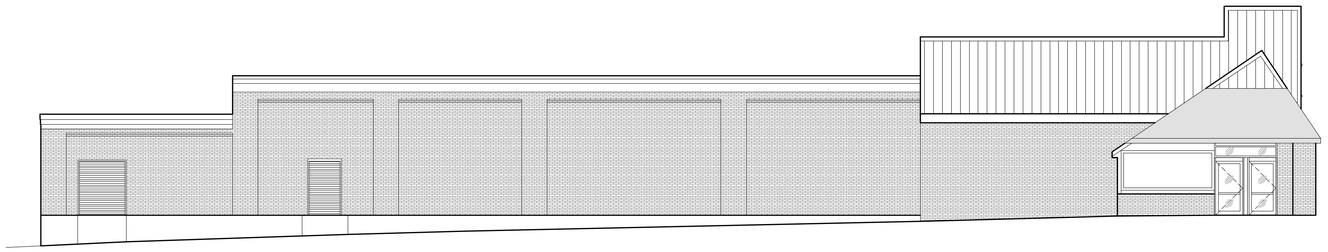
4-PR / A3 PROPOSED RIGHT SIDE WALL ELEVATION

SCALE: 1/8" = 1'-0"



3-PR / A3 PROPOSED REAR WALL ELEVATION

SCALE: 1/8" = 1'-0"

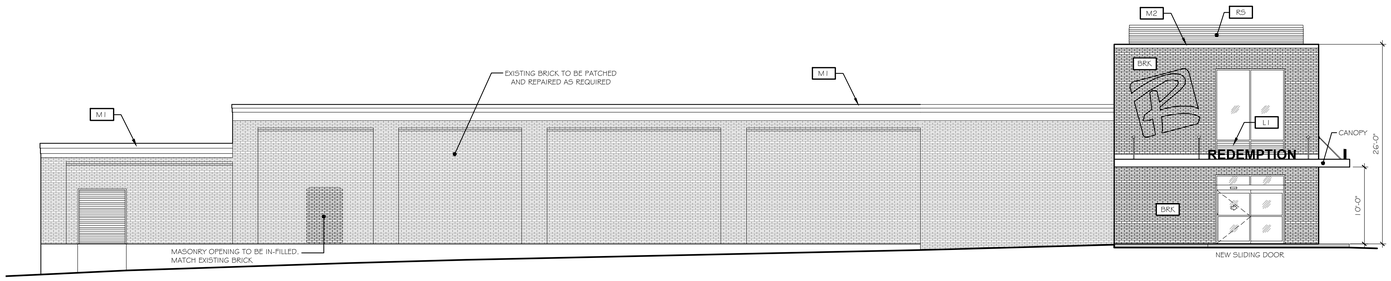


2-EX / A3 EXISTING LEFT SIDE WALL ELEVATION

SCALE: 1/8" = 1'-0"

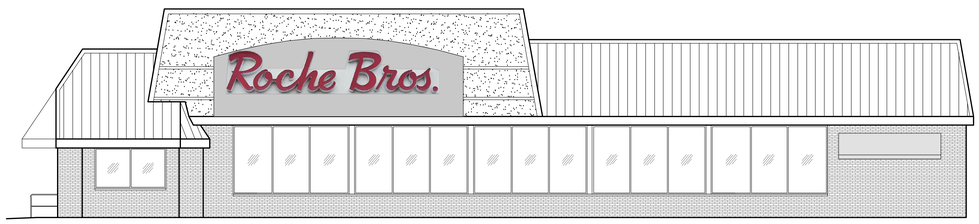
EXTERIOR FINISH SCHEDULE					
PAINTS & STAINS					
TAG	MANUFACTURER	PAINT TYPE	COLOR	FINISH	REMARKS
P1	BENJAMIN MOORE		2137-30 DURANGO		
-					

MISCELLANEOUS					
TAG	MANUFACTURER	DESCRIPTION / SERIES	COLOR	FINISH	REMARKS
BRK		MODULAR 3-5/8" x 2-1/4" x 7-5/8"			
L1	DECORATIVE LOUVER		DARK BRONZE		
L5	ARRISCRAFT	ARRISCLIP 24" x 24"	LIMESTONE		
M1		PRE-FINISHED METAL EDGE	DARK BRONZE		
M2		PRE-FINISHED METAL EDGE	MATCH "RAL-1015"		
R5	ROOF SCREEN MFG.	DECORATIVE ROOF SCREEN			POWDER-COATED ALUMINUM
S1	HARDI PLANK	SELECT CEDAR MILL	TIMBER BARK		



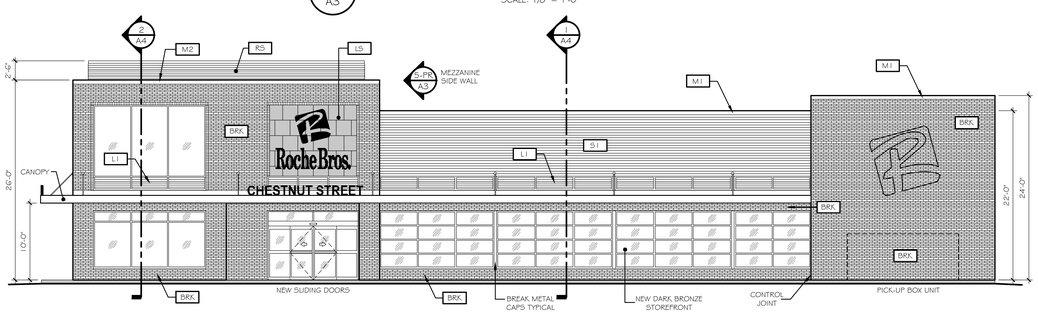
2-PR / A3 PROPOSED LEFT SIDE WALL ELEVATION

SCALE: 1/8" = 1'-0"



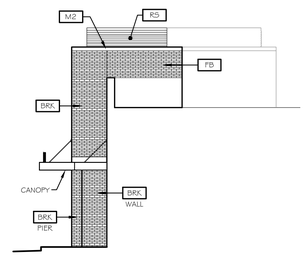
1-EX / A3 EXISTING STOREFRONT ELEVATION

SCALE: 1/8" = 1'-0"



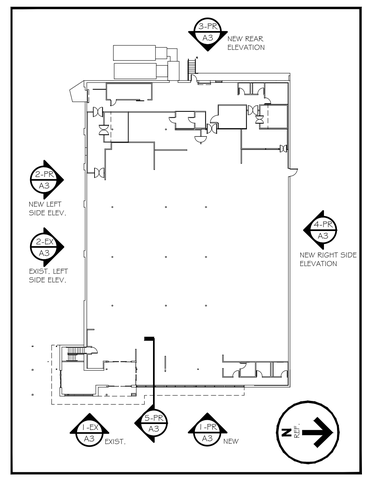
1-PR / A3 PROPOSED STOREFRONT ELEVATION

SCALE: 1/8" = 1'-0"



5-PR / A3 PROPOSED MEZZ. RIGHT SIDE WALL

SCALE: 1/8" = 1'-0"



A / A3 KEY PLAN

SCALE: 1/32" = 1'-0"

REVISIONS: # 9903

ARCHITECT: D. F. VALENTE
PLANNING LANDMARK
STUDIO
377 CHESTNUT STREET
SOUTH MEDFORD
MIDDLESEX COUNTY, MASSACHUSETTS 02155
TEL. 781-395-0120
FAX. 781-395-8702

SEAL: REGISTERED ARCHITECT No. 3597 COMMONWEALTH OF MASSACHUSETTS

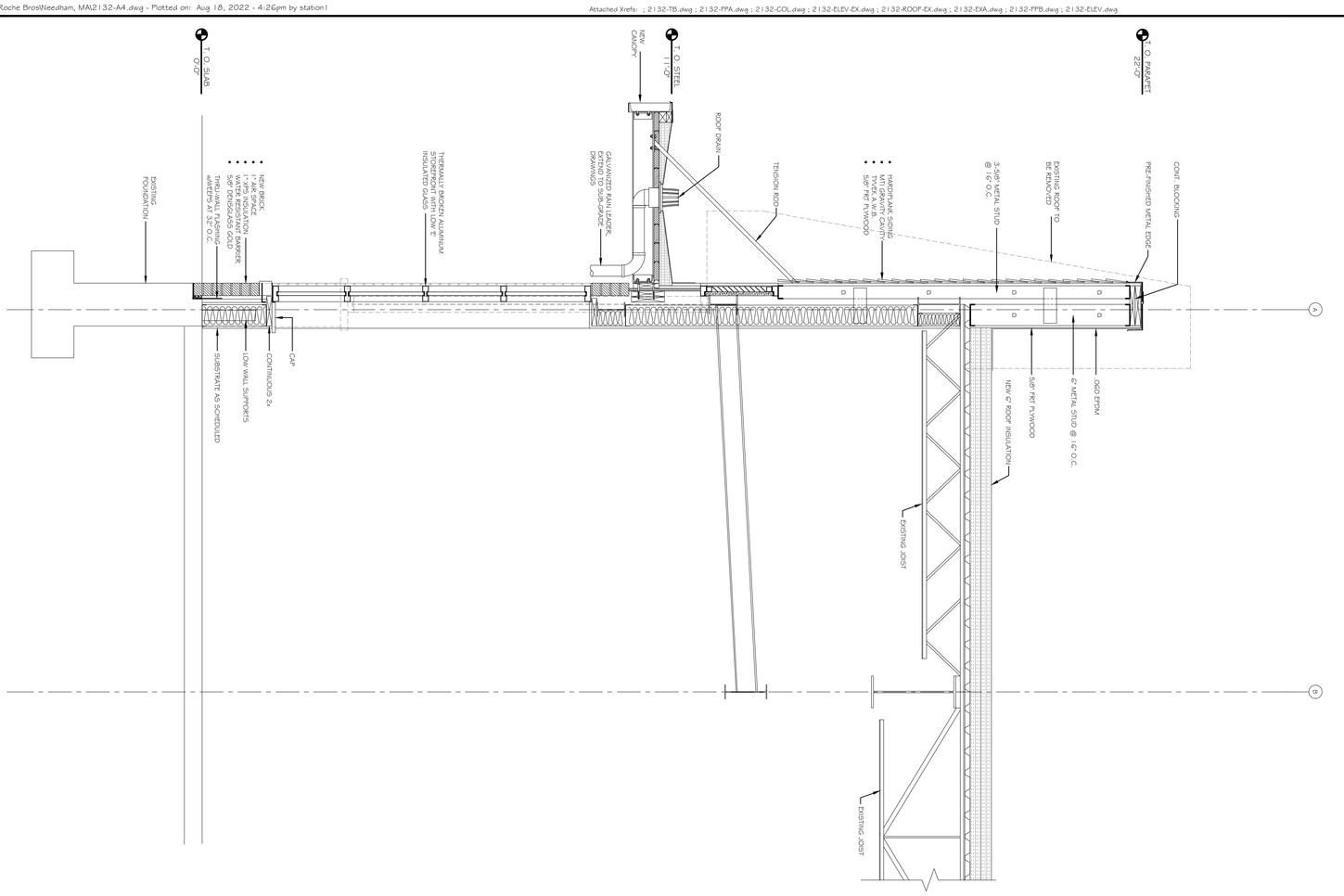
PROJECT NAME: Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE: EXISTING & PROPOSED EXTERIOR ELEVATIONS

SCALE: 1/8" = 1'-0" | DRAWN BY: CGL | CHECKED BY:

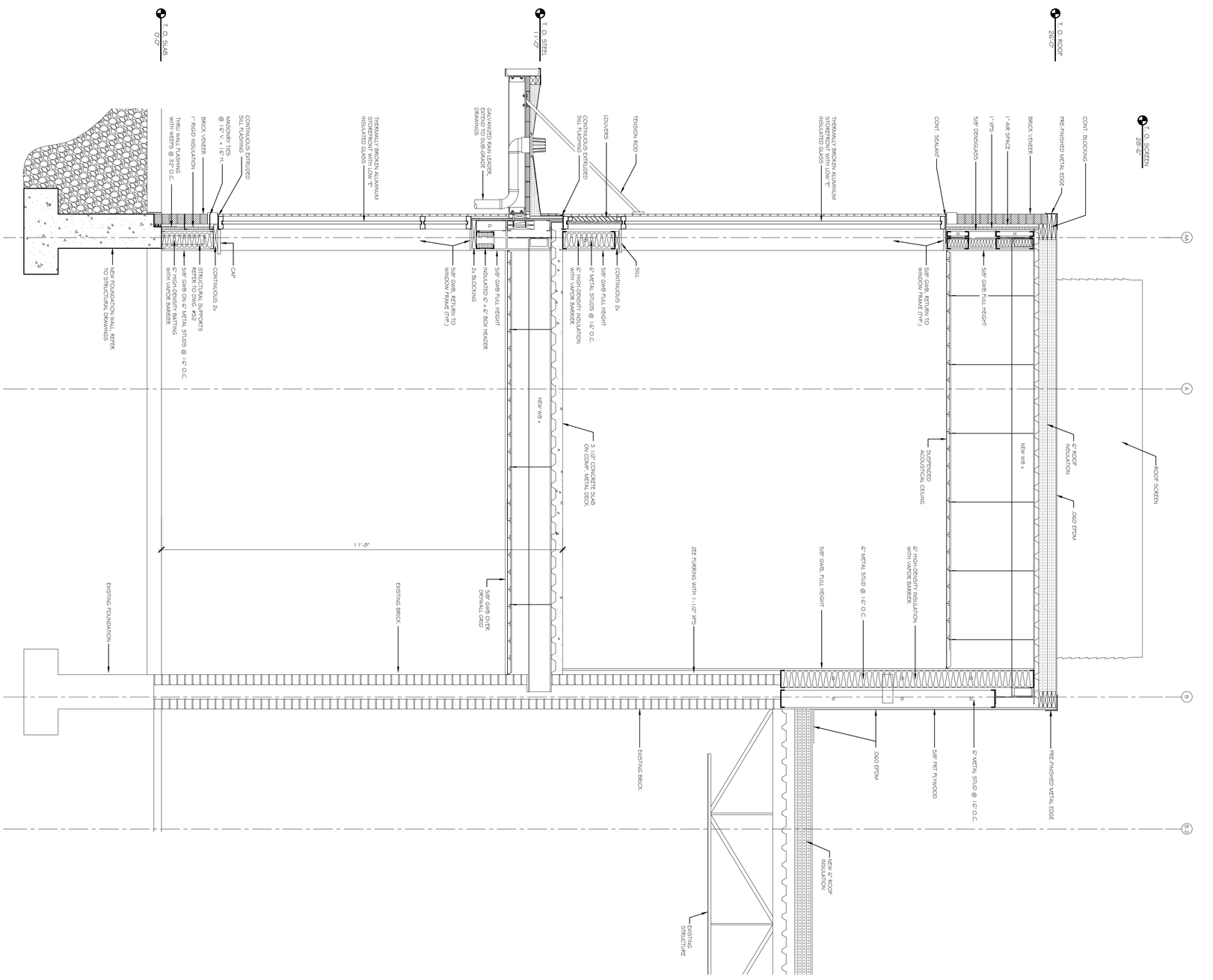
PLAN B RETAIL DESIGN & PROJECT MANAGEMENT, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cboomely@planbretail.com

DATE: Aug 16, 2022
PROJECT NO. 2132
SHEET NO. A3



1 A4 SECTION THRU STOREFRONT

SCALE: 3/4" = 1'-0"



2 A4 SECTION THRU VESTIBULE

SCALE: 3/4" = 1'-0"

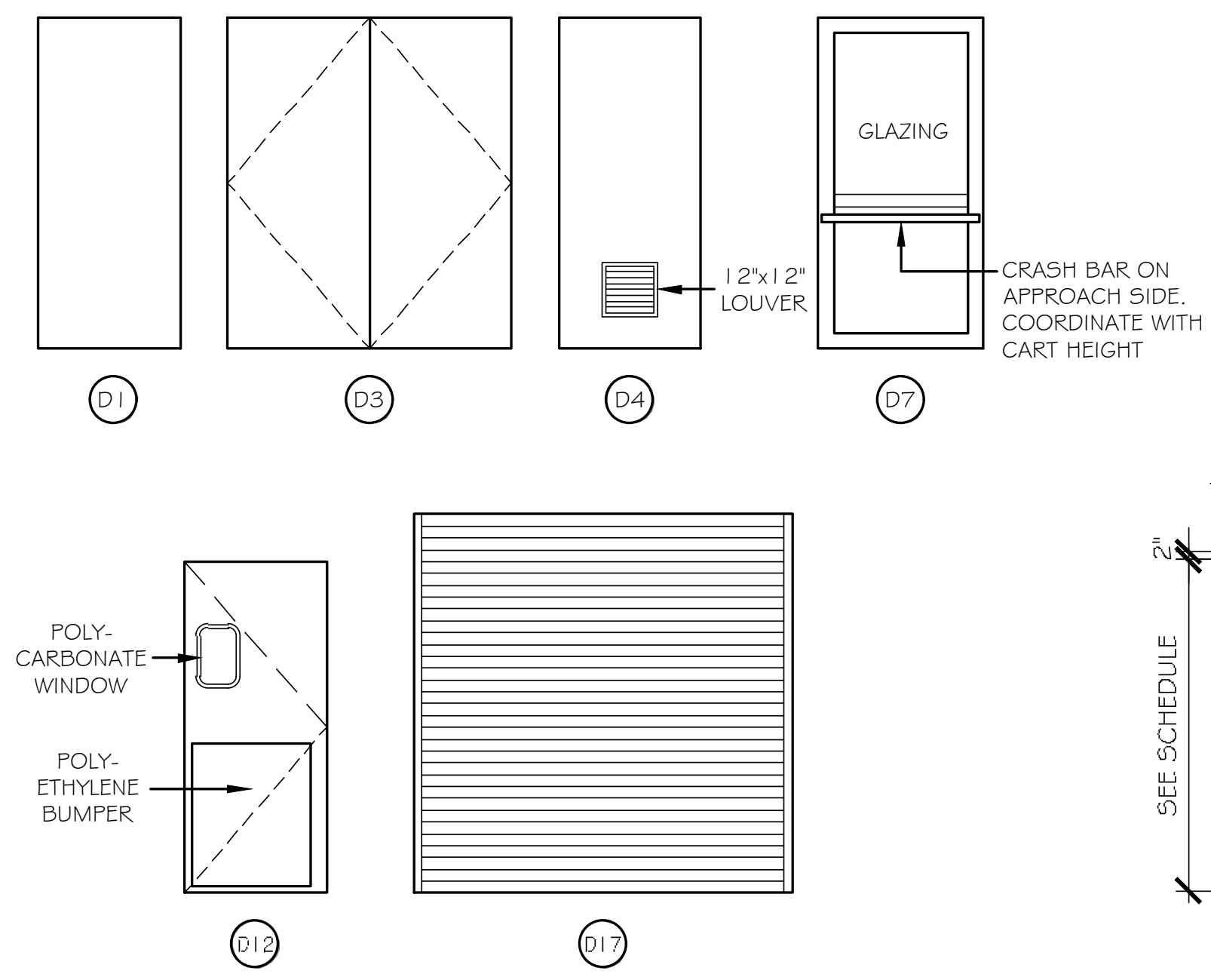
DATE: Aug 18, 2022	PLAN B RETAIL DESIGN & PROJECT MANAGEMENT, LLC 12 Goose Lane, Tolland, CT 06084 Tel: 860.870.5380 Fax: 860.870.5382 e-mail: cbomely@planbretail.com	DRAWING TITLE: WALL SECTIONS	PROJECT NAME: Roche Bros. 377 Chestnut Street Needham, MA
PROJECT NO: 2132		SCALE: 1/2" = 1'-0"	DRAWN BY: GGL
SHEET NO: A4		CHECKED BY:	

SEAL: REGISTERED ARCHITECT D. F. VALENTE No. 3597 COMMONWEALTH OF MASSACHUSETTS

ARCHITECT: # 9903

D. F. VALENTE
ARCHITECT & PLANNER
571 MAIN STREET • REAR
SOUTH MEDFORD
MEDFORD, MASSACHUSETTS 02155-6552
TELEPHONE 781-395-0120
FACSIMILE 781-395-6702

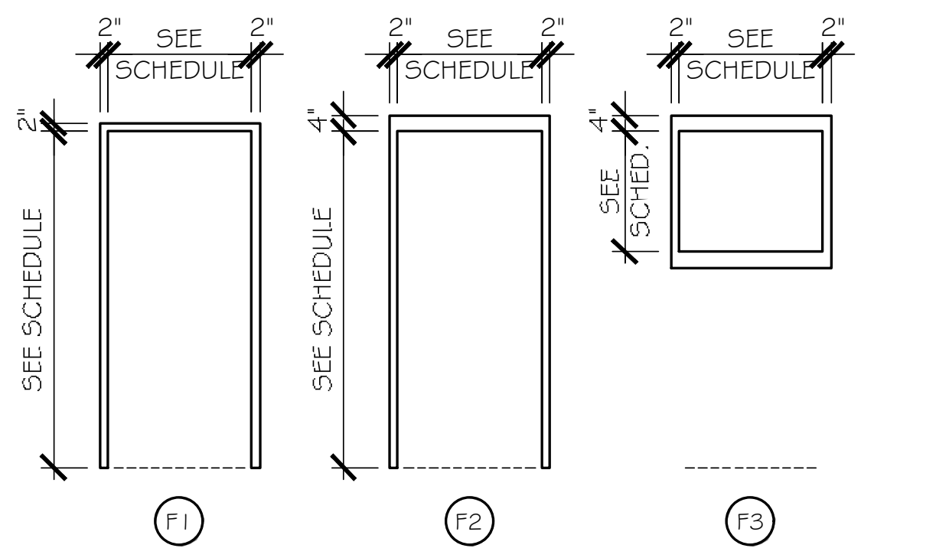
REVISIONS:



1 A7

TYP. DOOR ELEVATIONS

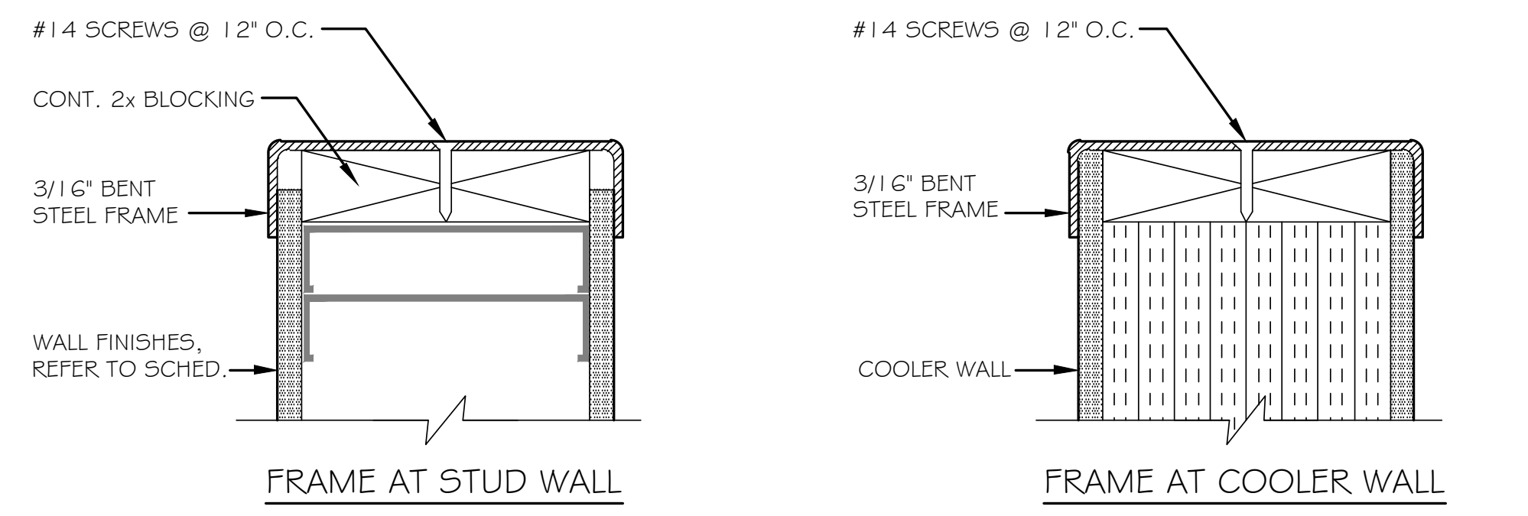
SCALE: 1/4" = 1'-0"



2 A7

TYP. DOOR FRAME ELEVS.

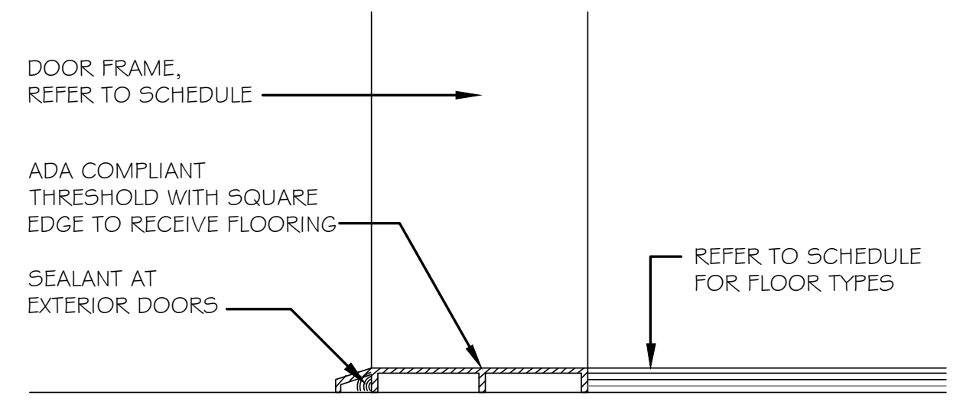
SCALE: 1/4" = 1'-0"



3 A7

TYP. STEEL CHANNEL DOOR FRAME DETAILS

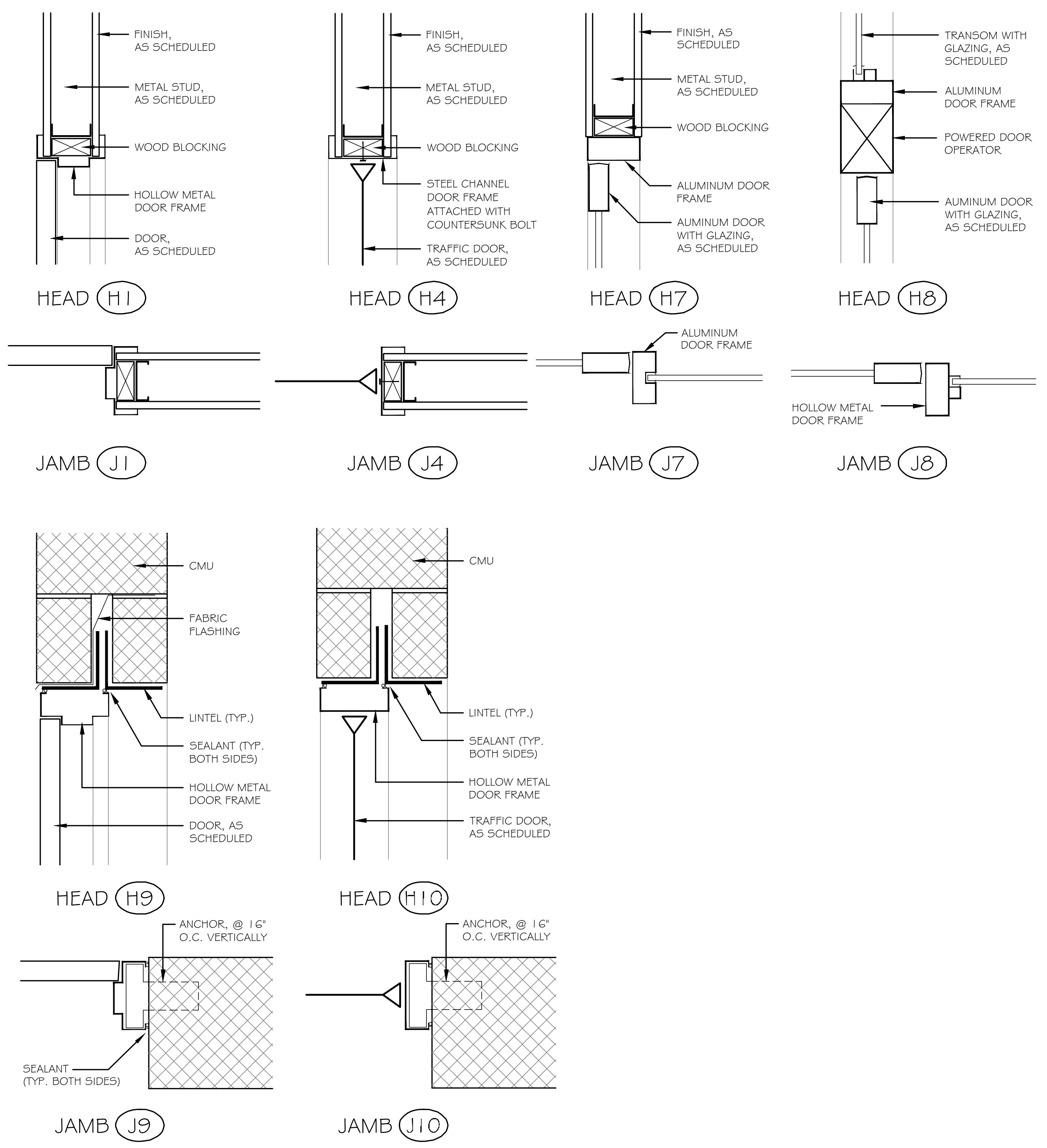
N.T.S.



4 A7

THRESHOLD TRANSITION DETAIL

N.T.S.



5 A7

TYPICAL DOOR & JAMB DETAILS

N.T.S.

DOOR & HARDWARE SCHEDULE

DOOR NUMBER	DOOR LOCATION		DOOR																				FRAME								SILL DTL.	FIRE RATING				HARDWARE & ACCESSORIES - SEE SPECIFICATIONS																			REMARKS - NOTES
	FROM	TO	OVERALL SIZE										TYPE					MAT'L.			FINISH			TYPE				FIN.		DTL.							TYPE						LOCK TYPE	CLOSER			ACC.			MISCELLANEOUS						NOTES: 1. ALL METAL FRAMES TO BE WELDED. 2. CAULK DOOR FRAMES TO WALLS PRIOR TO INSTALLATION OF FINISHES 3. SEE SPECS. FOR ALLOWANCE ON LOCKS. 4. TRAFFIC DOORS DURALITE RETAILER MANUFACTURED BY CHASE DOORS. 5. ALL LOCK SETS TO ACCEPT "BEST" CORES.
			DOUBLE LEAF DOOR	2'-8" W x 7'-0" H	3'-0" W x 7'-0" H	3'-6" W x 7'-0" H	4'-0" W x 7'-0" H	5'-0" W x 7'-0" H	6'-0" W x 7'-0" H	7'-0" W x 8'-0" H	8'-0" W x 8'-0" H	(SEE REMARKS)	SEE TYP. DOOR ELEVATION	IMPACT TRAFFIC DOOR (DOUBLE- ACTING)	DURONODIC ALUMINUM / SAFETY GLASS	OVERHEAD DOOR	FLUSH	HOLLOW METAL	INSULATED	SOLID CORE WOOD VENEER	PAINT	STAIN & POLYURETHANE	POLYETHYLENE	SEE TYPICAL FRAME ELEVATION	HOLLOW METAL	STEEL CHANNEL	DURONODIC ALUMINUM	PAINT	STAIN & POLYURETHANE	SEE TYP. HEAD DETAIL	SEE TYP. JAMB DETAIL	SEE TYP. SILL DETAIL (IF APPLICABLE)	3 HOUR - "A" LABEL	1-1/2 HOUR - "B" LABEL	3/4 HOUR - "C" LABEL	20 MINUTES	PANIC RELEASE LATCH	ALARMED PANIC DEVICE	CYLINDRICAL LOCKSET	OFFICE LOCK	PRIVACY LOCK	PASSAGE	LOCK FUNCTION NO. (ANSI)	AUTOMATIC CLOSER	DELAYED-ACTION CLOSER	SPRING HINGE	DOORSTOP	KICK PLATES	WEATHERSTRIP	BREAK-AWAY CAPABILITY	LEVER HANDSET	HANDICAP-ACCESS THRESHOLD	CHAIN HOIST	POWERED DOOR OPERATOR	VERTICAL ROD ON INACTIVE LEAF	
101	VESTIBULE	EXTERIOR	✱						✱				D10		✱												✱			H8	J8								✱										✱	✱						
102	SALES AREA	VESTIBULE	✱						✱				D10		✱												✱			H8	J8																									
103	VESTIBULE	SALES AREA	✱						✱				D10		✱												✱			H8	J8																			✱						
104	REDEMPTION AREA	EXTERIOR					✱						D9		✱												✱			H8	J8								✱										✱							
105	STAIRWELL	FLORAL			✱								D2							✱		✱		F1	✱			✱		H1	J1											✱									✱					
106	HALLWAY	CUSTOMER SERVICE			✱								D1							✱		✱		F1	✱			✱		HI	J1									✱							✱				✱					
107	CUSTOMER SERVICE	CASH ROOM			✱								D1							✱		✱		F1	✱			✱		H1	J1									✱							✱				✱					
108	HALLWAY	WOMEN'S ROOM			✱								D4							✱		✱		F1	✱			✱		HI	J1										✱						✱				✱					
109	HALLWAY	MEN'S ROOM			✱								D4							✱		✱		F1	✱			✱		H1	J1										✱						✱				✱					
110	SALES AREA	PRODUCE PREP.	✱					✱					D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANELS, FULL GASKET
111	PRODUCE PREP.	RECEIVING	✱					✱					D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANELS, FULL GASKET
112	PRODUCE PREP.	PRODUCE COOLER	✱					✱					D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANELS, FULL GASKET
113	FOOD PREP. AREA	PREP. FOOD SALES			✱								D12	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANEL, FULL GASKET
114	PREP. FOOD SALES	GROCERY STORAGE	✱					✱					D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANELS, FULL GASKET
115	MEAT PREP.	GROCERY STORAGE	✱					✱					D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANEL, FULL GASKET
116	MEAT PREP.	MEAT COOLER	✱				✱						D11	✱										✱	F1		✱		✱		DTL. 3/A7																										TEARDROP BUMPER, LOWER HINGE GUARDS, VISION PANELS, FULL GASKET
117	GROCERY STORAGE	ASSOCIATES' ROOM			✱								D1							✱		✱		F1	✱			✱		H1	J1											✱					✱				✱					
118	GROCERY STORAGE	MEN'S ROOM			✱								D4							✱		✱		F1	✱			✱		HI	J1										✱						✱				✱					
119	GROCERY STORAGE	WOMEN'S ROOM			✱								D4							✱		✱		F1	✱			✱		H1	J1										✱						✱				✱					
120	GROCERY STORAGE	EXTERIOR			✱								D1																																											
121	SALES AREA	EXTERIOR					✱						D1																																											

ROOM FINISH SCHEDULE

NO	ROOM NAME	FLOOR FINISH									WALL BASE								WALL FINISH																																								CEILING FINISH									REMARKS - NOTES
																			NORTH										SOUTH										EAST										WEST																			NOTES: 1. ANY ELEVATED WALL SUPERSEDES THIS SCHEDULE. 2. PROVIDE & INSTALL CEMENTIOUS PANEL SUBSTRATE (DUROCK OR EQUAL) IN LIEU OF GWB WHERE INTERIOR ELEVATIONS INDICATE A TILE OR STONE MATERIAL FOR FINISH. 3. FRP PANELS SHALL BE SEALED WITH URETHANE SEALANT (TO MATCH PANEL COLOR). ALL FRP PANELS SHALL HAVE CLASS "A" FINISH. TYPICAL AT ALL PREP. AREAS UNLESS OTHERWISE NOTED.
		VINYL COMPOSITE TILE	RESILIENT SHEET FLOORING	VINYL STRIP FLOORING	PORCELAIN TILE	POLISHED CONCRETE	RUBBER FLOORING	SEALED CONCRETE	EPOXY	CARPET TILE	VINYL COVE	METAL BASE	PORCELAIN TILE		EPOXY COVE	WOOD MOULDING	WOOD (DOUBLE 2 x 10)	EXTRUDED ALUMINUM COVE	PAINT	WALL COVERING	TILE (SEE NOTE #2)	PRE-FINISHED COOLER PANEL	FRP PANELS (SEE NOTE #3)	SEALED PLYWOOD (8'-0" HIGH)	UNFINISHED GWB (FIRE-TAPED)	MASONRY	STAINLESS STEEL	ALUMINUM / INSULATED GLASS	PAINT	WALL COVERING	TILE (SEE NOTE #2)	PRE-FINISHED COOLER PANEL	FRP PANELS (SEE NOTE #3)	SEALED PLYWOOD (8'-0" HIGH)	UNFINISHED GWB (FIRE-TAPED)	MASONRY	STAINLESS STEEL	ALUMINUM / INSULATED GLASS	PAINT	WALL COVERING	TILE (SEE NOTE #2)	PRE-FINISHED COOLER PANEL	FRP PANELS (SEE NOTE #3)	SEALED PLYWOOD (8'-0" HIGH)	UNFINISHED GWB (FIRE-TAPED)	MASONRY	STAINLESS STEEL	ALUMINUM / INSULATED GLASS	PAINT	WALL COVERING	TILE (SEE NOTE #2)	PRE-FINISHED COOLER PANEL	FRP PANELS (SEE NOTE #3)	SEALED PLYWOOD (8'-0" HIGH)	UNFINISHED GWB (FIRE-TAPED)	MASONRY	STAINLESS STEEL	ALUMINUM / INSULATED GLASS	ACOUSTICAL TILE	ACOUSTICAL TILE (VINYL-FACED)	ACOUSTICAL TILE (FIRE-RATED)	GYPSUM BOARD (PAINTED)	EXPOSED STRUCTURE (PAINTED)	MOISTURE-RESISTANT GWB (PAINTED)	PRE-FINISHED VINYL	PRE-FINISHED COOLER PANEL	PRE-FINISHED WOOD PLANK	
101	SALES AREA					✱						✱							← WALL FINISHES VARY, REFER TO INTERIOR ELEVATIONS →																																													✱					
102	VESTIBULE					✱						✱								✱										✱										✱										✱												✱						
103	REDEMPTION AREA					✱						✱							✱										✱																					✱									✱									
104	FLORAL					✱						✱									✱										✱									✱										✱									✱									
105	HALLWAY					✱						✱								✱										✱										✱										✱													✱					
106	CUSTOMER SERVICE					✱					✱								✱										✱										✱										✱										✱									
107	CASH ROOM					✱					✱								✱										✱										✱										✱										✱									
108	WOMEN'S ROOM				✱								✱								✱										✱										✱										✱								✱									
109	MEN'S ROOM				✱								✱								✱										✱										✱										✱								✱									
110	PRODUCE PREP.								✱						✱								✱										✱										✱										✱														✱		
111	CHEESE SALES AREA					✱						✱									✱										✱										✱										✱								✱								✱	
112	SERVICE DELI								✱						✱						✱										✱										✱										✱									✱								
113	PREP. FOOD SALES					✱						✱																			✱										✱																		✱									
114	SERVICE MEAT & FISH								✱						✱							✱										✱										✱										✱													✱		
115	MEAT PREP.								✱						✱							✱										✱										✱										✱													✱		
116	MEAT COOLER								✱						✱							✱										✱										✱										✱													✱		
117	DAIRY COOLER							✱										✱				✱										✱										✱										✱													✱		
118	KITCHEN FREEZER							✱										✱				✱										✱										✱										✱													✱		
119	KITCHEN COOLER								✱									✱				✱										✱										✱										✱													✱		
120	FOOD PREP.								✱						✱						✱												✱										✱								✱							✱			✱								SEE A9 ELEVATIONS
121	PRODUCE COOLER								✱									✱				✱										✱										✱										✱													✱		
122	RECEIVING AREA							✱									✱		✱										✱										✱											✱																		EXPOSED STRUCTURE UN-PAINTED
123	FREEZER							✱										✱				✱										✱										✱										✱													✱		
124	GROCERY STORAGE							✱									✱		✱										✱										✱											✱																		EXPOSED STRUCTURE UN-PAINTED
125	WOMEN'S ROOM				✱								✱								✱										✱										✱										✱								✱									
126	MEN'S ROOM				✱								✱								✱										✱										✱										✱								✱									
127	ASSOCIATES' ROOM	✱									✱								✱	✱									✱	✱									✱	✱									✱	✱									✱									
128	STAIRWELL						✱				✱								✱										✱										✱										✱														✱					
	MEZZANINE																																																																					
201	CONFERENCE ROOM									✱	✱								✱	✱									✱	✱									✱	✱									✱	✱									✱									
202	MANAGER'S OFFICE									✱	✱								✱										✱										✱										✱										✱									
203	COMPUTER ROOM	✱									✱								✱										✱										✱										✱										✱									
204	STAIRWELL						✱			✱	✱								✱										✱										✱										✱										✱				✱					

REVISIONS:

ARCHITECT:
9903
D. F. VALENTE
ARCHITECT & PLANNER
571 MAIN STREET • REAR
SOUTH MEDFORD
MEDFORD, MASSACHUSETTS 02155-6552
TELEPHONE 781-395-0120
FACSIMILE 781-395-8702

SEAL:
DOMENIC F. VALENTE, JR.
No. 3597

PROJECT NAME:
Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE:
DOOR SCHEDULE,
ROOM FINISH SCHEDULE
AND DETAILS

SCALE: AS NOTED
DRAWN BY:
CHECKED BY:

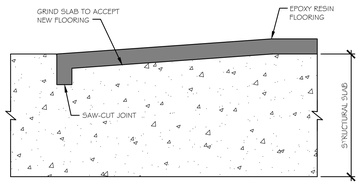
Plan B Retail Design
& Project Management, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: A7

Sheet File Save Date: 18 Aug 2022, 3:41 pm
Attached Xrefs: ; 2132-TB.dwg
Z:\AutoCad\Projects\Roche Bros\Needham, MA\2132-A7.dwg - Plotted on: Aug 18, 2022 - 4:26pm by station1

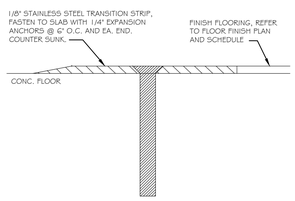
FLOOR FINISH SCHEDULE						
TILE						
TAG	TYPE	SIZE	MANUFACTURER	SERIES	COLOR	REMARKS
PT	TILE					
VCT	VINYL TILE					
CT	CARPET TILE					

FINISHES / TREATMENTS / MISC.						
TAG	TYPE	SIZE	MANUFACTURER	SERIES	COLOR	REMARKS
E	EPOXY		DURAFLEX			
EB	EPOXY BASE		DURAFLEX			
M1	WALK OFF MAT		MATS INC.	ULTRA ENTRY		
R1	RUBBER TREADS & RISERS		MUSSON			
R2	RUBBER TILE		MUSSON			
PC	POLISHED CONCRETE					REFER TO SPECIFICATIONS
SC	SEALED CONCRETE		PROSOCO	CONSOLDECK		CONCRETE PROTECTOR



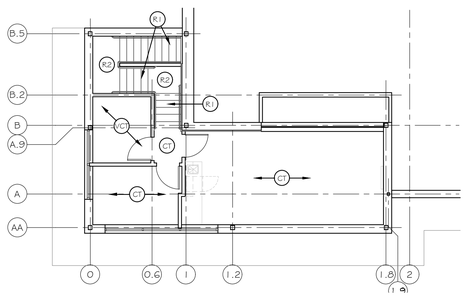
4 / A8.1 EPOXY KEY-IN TERMINATION

SCALE: N.T.S.



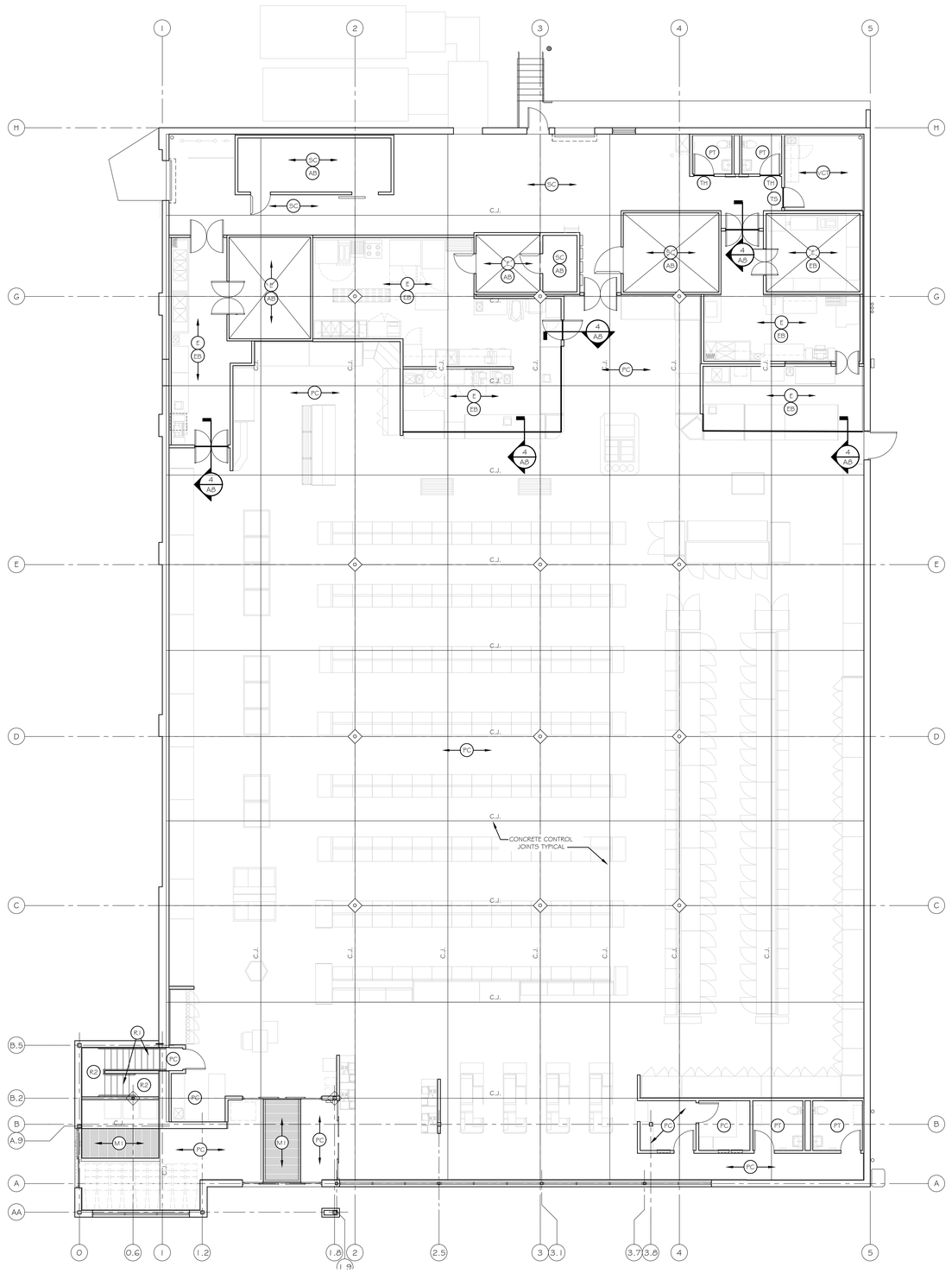
3 / A8.1 TRANSITION STRIP

SCALE: N.T.S.



2 / A8.1 FLOOR FINISH PLAN (2nd. FLOOR)

SCALE: 1/8" = 1'-0"



1 / A8.1 FLOOR FINISH PLAN

SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. CONTRACTOR IS RESPONSIBLE FOR PATCHING. "FLASH PATCH" AS REQUIRED.
2. EXTEND ALL SALES AREA TILE, MINIMUM 2'-0" INTO BACKROOMS. INSTALL 1/8" x 1-1/1 2" STAINLESS STEEL STRIP ON SLAB AT EDGE OF FLOORING. ADHERE WITH TWO-PART EPOXY ADHESIVE AND MECHANICALLY ATTACH WITH COUNTERSUNK FLAT-HEAD SCREW ANCHORS AT 6" O.C. INTO SLAB. REFER TO DETAIL #B/A8".
3. PROVIDE AN EXTRA 5% OF ALL FLOOR FINISHING MATERIAL TO TENANT FOR FUTURE PATCHING NEEDS.
4. CONFIRM TILE PATTERN LOCATION WITH TENANT'S REPRESENTATIVE.
5. ALL EXPOSED WALLS, MILLWORK, AND FINISHED COLUMNS TO RECEIVE WALL BASE. (SEE PARTITION PLAN AND / OR ROOM FINISH SCHEDULE FOR TYPE OF WALL BASE TO BE INSTALLED IN BACKROOMS). WALL BASE TO BE INSTALLED USING LONGEST LENGTHS AVAILABLE FROM MANUFACTURER.
6. INSTALL V.C.T. AFTER OTHER FINISHING PROCEDURES, INCLUDING PAINTING HAVE BEEN COMPLETED. COORDINATE WORK WITH OTHER DISCIPLINES.
7. INSTALL ALL MATERIALS PER MANUFACTURERS' WRITTEN SPECIFICATIONS, PROCEDURES, AND DIRECTIONS. INSTALLATIONS MUST CONFORM TO MANUFACTURERS' ADHESIVES AND SPECIFIC INSTALLATION PROCEDURES. ALL WORK MUST CONFORM TO NATIONAL, STATE, AND LOCAL CODES. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION, AND SUBSTITUTE TILE SUBMITTAL PROCEDURES.
8. PROVIDE IN-FILL IN AREAS WHERE EXISTING EQUIPMENT HAS BEEN REMOVED, I.E. REFRIGERATED CASES, SHELVING, DISPLAYS, ETC. CONTRACTOR TO FIELD VERIFY LOCATIONS AND QUALITY AT TIME OF BID.
9. CONFIRM HOURS OF INSTALLATION WITH OWNER'S REPRESENTATIVE. OFF-HOUR INSTALLATION WILL BE REQUIRED FOR STORE RENOVATIONS (ALLOW FOR FULL OPERATION OF STORE).

REVISIONS: # 9903

ARCHITECT:
D. F. VALENTE
ARCHITECTURE PLANNING
STRATEGIC PLANNING
SOUTH MEDFORD
MEDFORD, MASSACHUSETTS 02155
781-395-0120
781-395-6702

SEAL:

PROJECT NAME:
Roche Bros.
377 Chestnut Street
Needham, MA

DRAWING TITLE:
FLOOR FINISH PLAN

SCALE: 1/8" = 1'-0" | DRAWN BY: | CHECKED BY:

Plan B Retail Design & Project Management, LLC
12 Goose Lane, Tolland, CT 06084
Tel: 860.870.5380 Fax: 860.870.5382
e-mail: cbomely@planbretail.com

DATE: Aug 18, 2022
PROJECT NO: 2132
SHEET NO: A8.1

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS

Wallpack® Full Cutoff LED

Decorative Building Mounted Luminaire

Typical Applications

Building

Security

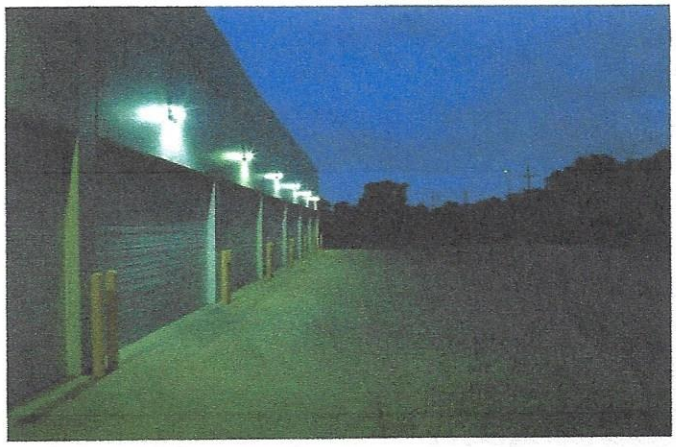
The Wallpack Full Cutoff LED brings a modern architectural style that will blend into the building during the day and provide superior performance using the latest LED technology. The Wallpack is designed for mounting heights up to 30' and offers a variety of distributions, colors and controls. To meet local requirements, emergency battery backup and a variety of motion sensor options are available.

- Replaces 50–400W metal halide wallpacks or 50-250W HPS wallpacks
- Energy savings up to 76% and more than $153 per luminaire, per year vs. comparable metal halide
- IESNA Type II (short & medium), III (short & medium), Type IV Medium, Type V and asymmetric diffuse lighting distributions
- 3000K, 4000K & 5000K CCT
- Five LED Performance Packages from 3,000 to 11,000 lumens
- Up to 120 lumens per watt
- L70 driver life > 100,000 hours
- IP65 rated electrical housing; IP66 rated optics
- ANSI C136 20kV/10kA "Extreme" surge protection
- 3/4" threaded knock-out (3/4"-14 NPT) on each side
- 3 and 7-pin NEMA receptacle available
- Acuity Controls ROAM® compatible for wireless control and monitoring

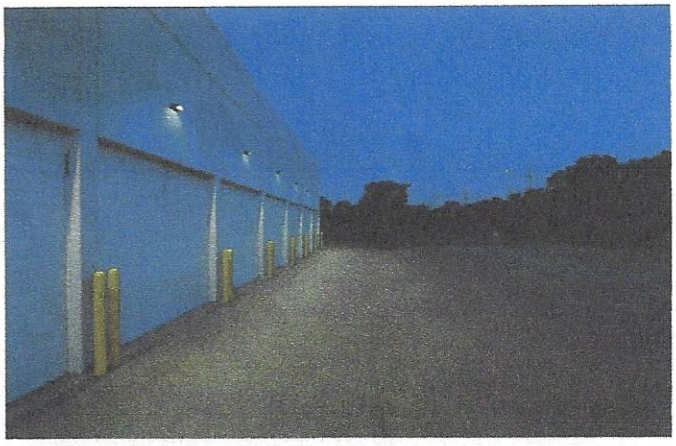
NIGHTTIME FRIENDLY™

Wallpack® Full Cutoff LED

Decorative Building Mounted Luminaire

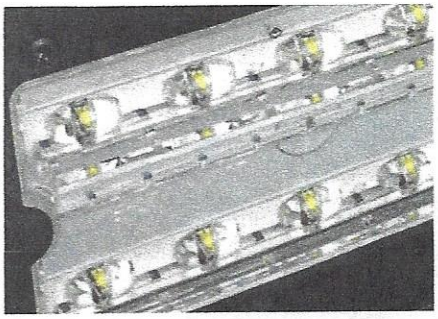


BEFORE: Many HID sources like high pressure sodium or mercury vapor provide poor color rendering and non-uniform distribution.



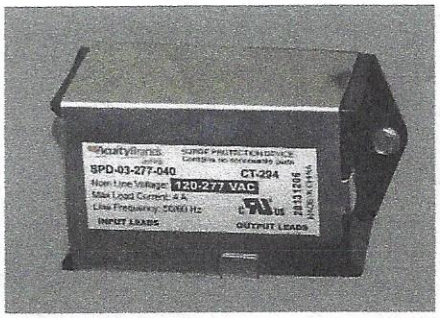
AFTER: Wallpack Full Cutoff LED luminaires provide crisp white light with excellent color rendering and uniform distribution.

Engineered with your needs in mind



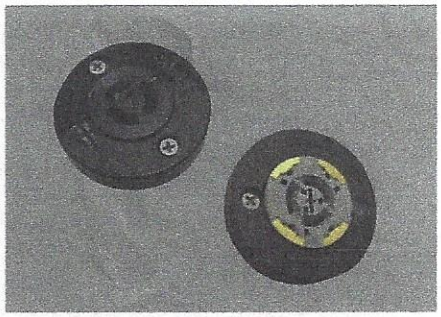
System Performance

Leading engineering and optical design from Acuity Brands means you get more light where you need it with lower operating costs and increased system life. Improved performance and reliability also translate into an improved level of visibility, which can enhance patron satisfaction and safety.



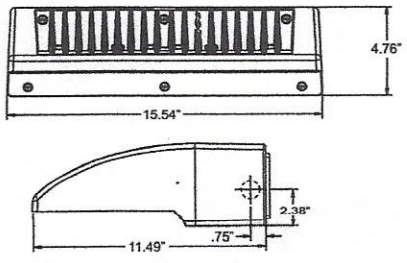
Protection

The Wallpack Full Cutoff LED luminaire has several features built into its design to provide reliable operation. For example, it offers 20kV/10kA "Extreme" surge protection to protect your investment against high current inrush.



Controls

Optional 3 or 7-pin photocontrol receptacles provide additional energy savings through everything from simple dusk-to-dawn photocells to advanced dimming, scheduling, monitoring and diagnostics with Acuity Controls ROAM® technology.



One Lithonia Way | Conyers, Georgia 30012 | Phone: 770.922.9000 | www.acuitybrands.com

AcuityBrands.

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS

Mongoose® LED Medium

Area and Site Lighting

Typical Applications

Military Bases

Airport Parking

Stadium Parking

Industrial Parking

Rooftop Parking Decks

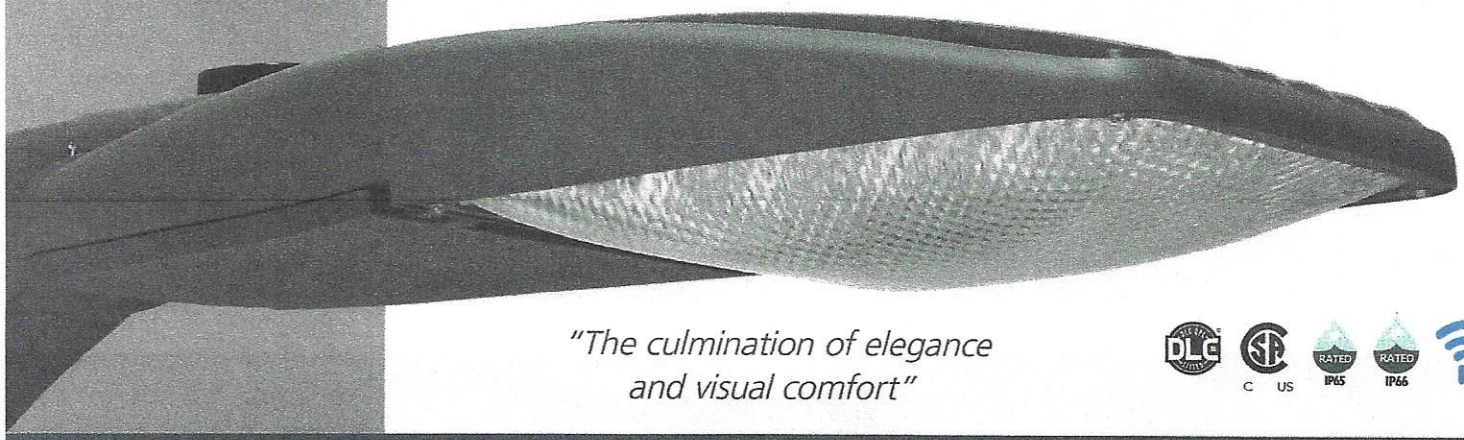
Automotive Dealerships

Security Flood & Facade

Sleek, attractive form balanced with flexibility and performance

For area and site lighting, the Mongoose LED Medium provides a very attractive and flexible alternative to traditional 150-400 watt HID shoebox and cobra head luminaires. It typically achieves up to 60% reduction in energy cost, and a minimum of 50% reduction in maintenance costs with a system life rated for 100K hours. This combined with multiple lighting distributions, several mounting options, and the ability to tilt the fixture up to 45 degrees offers unequalled performance in a diverse set of area lighting applications.

+ 150-400 watt HID replacement
+ Prismatic glass refractor for visual comfort
+ Multiple area lighting distributions
+ Acuity Brands nLight® AIR wireless network controls
+ 0° to 45° fixture tilt for application flexibility
+ Horizontal mast arm, vertical tenon and square or round architectural pole mounting
+ Optional zero-uplight skirt
+ IP66 rated glass optical
+ IP65 rated electrical enclosure
+ System life rate for > 100,000 at 25°C, L70
+ 3,000K, 4,000K & 5,000K CCT, 70 CRI minimum



"The culmination of elegance and visual comfort"

C US

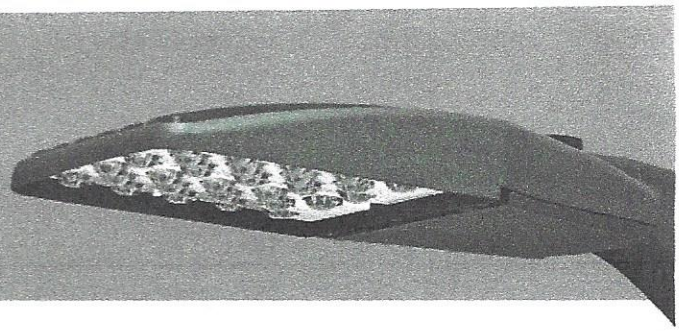
RATED IP65

RATED IP66

AcuityBrands.

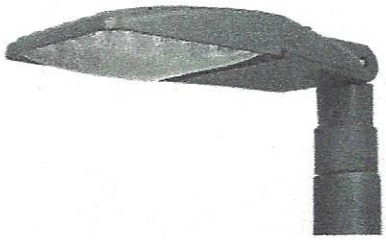
Mongoose® LED Medium

Area and Site Lighting



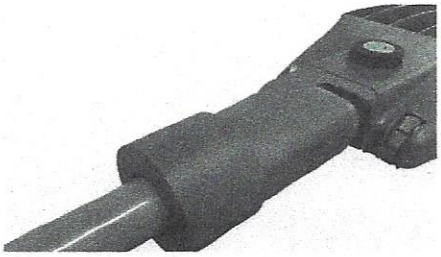
From durable, high-performance glass optics and highly engineered thermal management, to tilt options, toolless entry and multiple mounting configurations, the new Mongoose LED Medium is a true game changer for the outdoor lighting industry. One that is ultimately worthy of the name and legacy of the Holophane Mongoose.

Features and Options



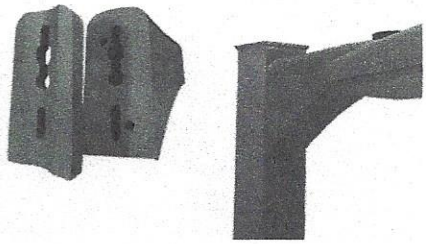
Vertical Tenon Mounting

Attaches to 2" Vertical Tenon



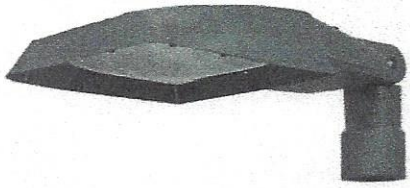
Horizontal Mast Arm Mounting

Attaches to 2" Horizontal Arm



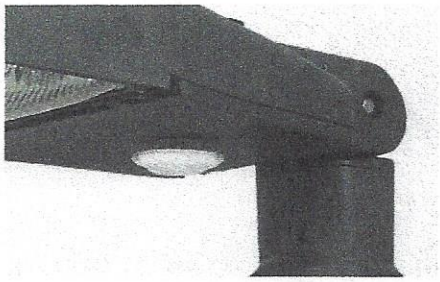
Universal Mount Architectural Arm

Attaches to any square or round pole bolt pattern



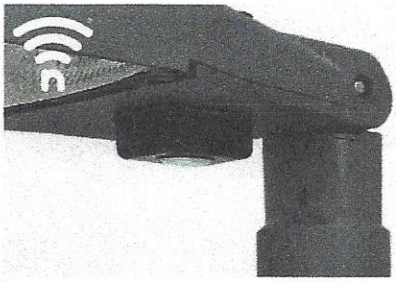
Optional VC Lens and Uplight Skirt

Preserve night skies and enhance visual comfort with optional uplight skirt and prismatic glass refractor lens



Non-networked Occupancy Sensor

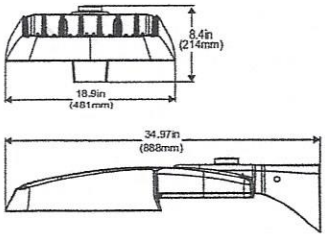
Occupancy sensor option saves energy by dimming down to a preset level until until motion is detected



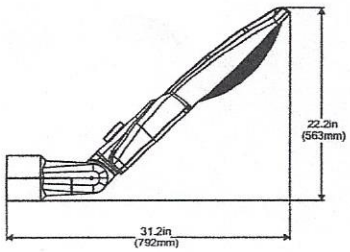
nLight Air Networked Controls

Networked control, monitoring and diagnostics through the Acuity Brands nLight® AIR option enhances safety while reducing energy and maintenance costs

Uplight Skirt Option

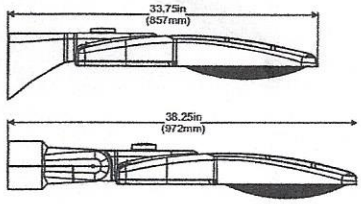


Tilt Options



Mongoose LED Medium

Weight: Knuckle = 35lbs; Universal = 31
Add: 6lbs for Glass Refractor; 3lbs Uplight Skirt
Max E.P.A.: 0° = 1.64 sq. ft.; 45° = 2.85 sq. ft.



C US IP65 IP66

HOLOPHANE®
LEADER IN LIGHTING SOLUTIONS

Specifications are subject to change without notice.

Warranty Five-year limited warranty. Full warranty terms located at www.acuitybrands.com/CustomerResource/Terms_conditions.aspx
Product specifications may change without notice. Please contact your sale representative for the latest product information.

Contact your local Holophane factory sales representative for application assistance, and computer-aided design and cost studies.
For more information on other Holophane products and systems, call the Inside Sales Service Department at 966-759-1577.
In Canada call 905-886-8967 or fax 905-896-7973.

3825 Columbus Rd., Granville, OH 43023 | 800-334-8694 | www.acuitybrands.com

AcuityBrands

NEEDHAM PLANNING BOARD MINUTES

June 21, 2022

The Needham Planning Board Virtual meeting, using Zoom, was remotely called to order by Adam Block, Chairman, on Tuesday, June 21, 2022, at 7:00 p.m. with Messrs. Alpert and Crocker and Mmes. McKnight and Espada, as well as Planning Director, Ms. Newman, and Assistant Planner, Ms. Clee.

Mr. Block took a roll call attendance of the Board members and staff. He noted this is an open meeting that is being held in a hybrid model per state guidelines. He reviewed the rules of conduct for zoom meetings. He noted this meeting does include one public hearing and there will be public comment allowed. If any votes are taken at the meeting the vote will be conducted by roll call. All supporting materials, including the agenda, are posted on the town's website.

De Minimus Change: Major Project Site Plan Special Permit No. 99-2: BP 140 Kendrick Street LLC c/o Boston Properties Limited Partnership, 800 Boylston Street, Suite 1900, Boston, MA, Petitioner (Property located at 140 Kendrick Street, Needham MA). Regarding proposal for outdoor roof deck.

Frederick DeAngelis, Senior Counsel for Boston Properties, noted the original project was permitted in 1999. This is a minor modification to create a rooftop deck on a low-rise building. The applicant went to the Design Review Board (DRB) and received approval with some constructive comments they found helpful. The Building Commissioner had one question on whether there were 2 means of egress. He had a deadline to write his comments and did not have an answer to his question. Mr. DeAngelis noted there is a second means of egress, and it complies with all requirements.

Brett Lambert, architect for Stantec Architecture and Engineering P.C., noted this is at the corner of Kendrick Street and Route 95 with the pond abutting. The roof deck will be between Building A, a three-story building, and the new curved building. It will be on the second level of the building accessed by Building A. At 40 feet by 40 feet the whole roof will become the new terrace. Two new doors will be added into Building A, a distance apart to support the overall terrace. Mr. Block asked if it would be accessible from the other building and was informed it would only serve Building A. The entire roof will be black locust pavers grown domestically. The existing brick parapet will have a glass rail system 42 inches above the roof surface to act as a guard rail, topped with a ~~and~~ stainless-steel rail. Two gates will be in the design. The gates will be locked for occupants and will only be for maintenance. The terrace will have furniture by tenant. They are trying to make sure there is not a lot of visual effect.

Mr. Block noted the following correspondence for the record: an email from the Building Commission with the comment he was unclear on 2 means of egress and a memo from the Design Review Board with approval without conditions. The Building Commissioner has confirmed there are 2 means of egress and noted his satisfaction. Ms. Espada asked what the occupancy limit is~~was~~. Mr. Lambert noted it can be over 50 with 2 means of egress. The doors are roughly 50 feet apart. Ms. Espada noted there is only one stair inside the building and asked if the Building Commissioner was ok with that. Mr. Lambert stated there are 2 stairs existing in the building. Ms. Espada noted both doors go to one stairway. She asked if the Fire Department had any comments. Ms. Newman has not heard from the Fire Department.

Ms. Espada asked if the wood would age naturally or if they will be staining it. She also asked about the lighting and hours. Mr. Lambert stated it could be stained but they will let it age naturally. There will be lights to light the egress doors and exit signs. Ellesse Lunde, of Stantec Architecture and Engineering, stated there are no hours right now. She can ask the tenant what they plan. She does not foresee usage during the nighttime hours. Ms. McKnight stated the plans do not clearly show the 2 doors. Mr. Block noted on page 6 in the packet the red outline shows the doors. He could ask the applicant to revise the sheet of plan and mark in yellow where the outline of the doors are for the files. Ms. Newman will add as a condition to clean up the plans.

Ms. Lunde noted the applicant has a building permit. Mr. Alpert noted there needs to be something from the DRB or revised plans in the file. Mr. Lambert showed pages of the plan that show the doors with a dashed line.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:

VOTED: to determine this is a de minimus change.

Upon a motion made by Mr. Alpert, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to approve this with updated revised plans as discussed.

ANR Plan – Four Forty-Four Group, Inc., Petitioner, (Property located at 444 Hillside Avenue, Needham, MA).

George Giunta Jr., representative for the applicant, noted this is a minor revision to the site plan. There was an inadequate lot width shown for ~~on~~ the 422 parcel. The second survey results came in after the hearing and it determined there was sufficient lot width to carve off as a separate piece. There is an ANR plan to create a stand-alone lot. He noted the tenant wants a lot with parking in front and back. The piece cut off will be added to the 444 property. If the Board votes in favor of the ANR plan it will make the other application moot and the applicant will withdraw it. Adam Dash, representative for Gentle Giant, explained the survey discrepancy. Mr. Block noted the line going through the building shows 115 feet. Mr. Dash stated it only shows the ~~worst case~~worst-case scenario.

Ms. McKnight stated she is concerned with the lack of maintenance of the landscaping. She asked how that will be addressed. Mr. Dash noted it will be the same as was discussed at the last meeting. It will still be what was proposed before. Ms. McKnight asked if they would need a modification of the original permit as there is a different arrangement for parking through an easement. Mr. Giunta Jr. stated they will need to come back with respect to the 444 building to add parking. Ms. McKnight noted the 422 parking is changing also. Mr. Giunta Jr. noted it is, but does not require a special permit. The landscaping was approved through a minor project review. He noted the landscaping was there and has died off over the years. Ms. Espada asked if there was a landscape plan or if they are replacing with the same kind. Mr. Giunta Jr. stated there will be limited landscaping put in to begin with. He feels it was ~~rhododendrums~~rhododendrons and other shrubs. Ms. McKnight commented this is across the street from a residential district. She wants it to be nice. Mr. Giunta Jr. showed the As-Built with the original. Mr. Block stated the applicant has committed to refreshing the landscaping now.

Upon a motion made by Mr. Alpert, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to endorse the proposed ANR plan.

Upon a motion made by Ms. McKnight, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to accept the request to withdraw the previous special permit application without prejudice.

Upon a motion made by Ms. McKnight, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to approve a waiver of the filing fee seeking endorsement of ANR.

Public Hearing:

7:20 p.m. – Major Project Site Plan Special Permit No. 2005-02: Babson College, 231 Forest Street, Needham, MA, Petitioner (Property located at 0 Olin Way, Needham, MA, Assessors Plan No. 309, Parcel 17). Regarding request to construct a baseball batting building to be located at Govoni Field.

Upon a motion made by Mr. Alpert, and seconded by Ms. McKnight, it was by a roll call vote of the five members present unanimously:
VOTED: to waive the reading of the public hearing notice.

Jonathan Charwick, Landscape Architect with Activitas, noted this is Govoni Field at 0 Olin Way. It is the northwest corner of the existing baseball field. The Sudbury Aqueduct goes through the ~~field~~field, and this will be north of that. There are 2 existing outdoor batting tunnels in this location. This is to enclose the 2 batting cages and make adjustments in the layout. There will be an exterior building with 2 batting tunnels, men's and women's bathrooms, storage room and utility closet. There is a 25-foot side yard setback from the northern property line and the aqueduct. They also have a drainage easement

on the northwest corner. They have rotated the building slightly. A permit with the MWRA has been filed as they are crossing the aqueduct, the Conservation Commission has reviewed and approved and the DRB has approved with comments. The DPW comment is there needs to be one inch capacity for stormwater recharging. The area needs to be revised as there is only ½ inch proposed. He believes they will be adding a leeaching basin to meet that requirement.

Thomas Scarlotti, architect, note the batting cages are covered but will be open on the sides and will be 90 feet by 40 feet. There will be netted batting cages. The toilets have outside doors. This will be a pre-engineered structure with a metal roof and corrugated metal siding. It will be open but enclosed on the bottom. Doors lead into the space for security. There will be emergency lightinglighting, but it will basically be a daytime use. Mr. Charwick stated there will be electric and water. The sewer system will be tied to the system on the Olin property as there is an agreement between Babson and Olin.

Mr. Block stated this was a creative use of the space. He noted the following correspondence for the record: correspondence from the Design Review Board approving the design; a memo from Fire Chief Dennis Condon, dated 5/25/22, with no objections; a memo from Police Chief John Schlittler, dated 5/25/22, with no issues; approval from the Conservation Commission and a letter from Town Engineer Thomas Ryder commenting about the capacity change from a ½ inch pipe to a 1-inch pipe. Mr. Block thanked the applicant for their proactivity to the town comments. Ms. McKnight asked for clarification as to whetherclarified all construction is on land that is already hardscaped or impervious so the ground cover is not changing. Mr. Charwick stated the ground cover is changing slightly. A small amount of lawn may be removed. It is mostly impervious now.

Ms. Espada commented it is open air and was informed it will have small, heated spaces for the rest rooms. Ms. Espada asked if there are any mechanicals with acoustic implications and was informed there were no acoustic implications. Mr. Alpert stated the Board needs a copy of the agreement with Olin in the file. Sharon Daly, of 30 Curtis Road, asked if the facility will be locked during off hours. Mr. Charwick assumes so, but it has not been discussed. It is for the college use only although they may allow the rest rooms for when there are activities.

Upon a motion made by Mr. Crocker, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: to close the hearing.

Ms. Newman stated she will prepare a decision that can be voted at the next meeting. She would like some direction. Mr. Block stated it should be approved with a condition regarding the agreement with Olin College as discussed and plan modifications on the impervious calculation as requested by Engineering. Mr. Alpert suggested there be a condition the building be locked when not in use. Ms. McKnight agreed with that. Ms. Newman will draft the decision with these and the other usual comments.

De Minimus Change: Major Project Site Plan Special Permit No. 2009-06: Town of Needham, 1471 Highland Avenue, Needham, MA, Petitioner (Property located at 1471 Highland Avenue, Needham, MA). Regarding minor design changes to the proposed renovation of the Town Common.

Christopher Heep, Town Counsel, noted this is a site plan approval for the Town Common. He stated there are 2 proposed changes. The project will shift from exposed aggregate concrete to concrete pavers and there will be a reduction in the caliper of some trees on the planting plan. This is intended to keep the project within the appropriation by Town Meeting and the reduced caliper is what is available. Mr. Block commented that the DRB approved the plan. Ms. McKnight stated that the applicant shows a change in the way the crescent shape of the sidewalk will meet the other pavement. She asked what the change is as it is not clear. Mr. Heep stated the walking path meets the entrance path from Garrity Way. The prior joinder was square. At the request of the DRB the path was extended in a curved shape to continue the oval path.

Mr. Crocker asked about the longevity of the new pavers and the longevity of the 2 materials. Mr. Heep stated, with the substitution, it remains fully accessible. He noted the new material is easier to repair and maintain. Mr. Crocker stated the question was longevity. The pavers are on the subsurface. DeFazio needed repair after 10 years. The original pathway had a life expectancy and so does this new one. He asked what the life expectancy is. Justin Savignano, Project Manager, noted this material will be used for the high impact area. All concrete will inevitably crack. The original material cracks and

never goes back to original. Mr. Crocker asked what the life expectancy was of the substrate system if installed correctly and maintained. Will it exceed the life expectancy of the previously proposed aggregate concrete?

Ms. Espada asked what the substrate is. It says 4-inch concrete that is continuous. She asked if concrete pavers were going to be on the concrete base. Mr. Savignano does not think there will be 4 inches throughout the walking path. It will be a compacted gravel base. The curved inner walkway will have concrete pavers. It will be cast in place along Garrity Way. They will not have concrete subsurface under the walking path. Only under the furniture. Mr. Crocker asked what was under the walking path and was informed compacted gravel and pea stone. Ms. Espada commented her concern is things will start shifting and there will be a lot of tripping hazards. She does not feel it has the same longevity as pavers with concrete substrate has. Mr. Savignano stated the entire perimeter of the entire walkway will have a set border course set in concrete. Mr. Crocker noted the walkway does not have it but just the border. He asked if it was fair to say it will have minimal effect on the structure of the walkway. Mr. Savignano stated, if prepared perby specifications, there should not be any issue with movement of pavers.

Mr. Block asked if the Town will recognize any liability due to movement and tripping hazards and replace quickly. Mr. Heep stated this is an important piece of public property. The Board can expect the Town will move quickly to address any issues. Mr. Block asked if these 2 changes reflect deminimus changes. Mr. Crocker stated the changes are being made for financial reasons and no other reason. He appreciates why it is being done. He does not know if the changes are deminimus but part of him says no. Ms. McKnight explained the difference between a deminimus change and the alternate. She recalls the comments made by the public at the public hearing and feels it is unnecessary to go through the process again.

Mr. Alpert stated he would like to hear from Ms. Espada. The caliper of the trees change is deminimus, but he is not sure about the paving. Ms. Espada agrees with the trees but has a concern with a right type of substrate. This is a public bidding process. She is worried with something that would need repair sooner rather than later. It seems more significant than the trees. Mr. Heep stated the layout of the walkway is staying and the overall layout is the same. There was no real discussion during the hearing about materials used for the walkway. There could be a condition it is to be installed to the manufacturer's specification. He can attest the Town has a strong desire to keep it walkable in the future. Mr. Crocker stated there were no comments about the walkway because it was solid concrete. There may have been comments with pavers. The odds of issues increasesincrease with the change.

Mr. Block asked what the recourse is if there are issues. He asked if the Board could register comments formally with the Select Board. Ms. Newman noted it could be addressed in the decision the Board drafts. Ms. Espada stated she is not concerned with pavers but the installation and substrate part of it. It is a less expensive installation but what is the warranty of it. She noted many towns require concrete substrates. A lot of things will make it move and it is a durability issues. She asked if the savings was enough to warrant it. Mr. Savignano stated the DPW has no concerns. Cataldo will be installing the projectproject, but it is not the cheapest alternative. They could have gone with broom swept concrete, but it is not a good product. Mr. Crocker asked the cost difference between them. Mr. Savignano stated the savings on pavers rather than concrete is roughly $23,000.

Ms. McKnight clarified there are 2 ways to go – deny the request or allow the applicant to use one of 2 approaches. They can either do the original proposed material or concrete pavers with a concrete base that would preserve the walkway. Mr. Heep stated they would be maintained to the manufacturer's specifications. He is concerned with the idea of reengineering the installation and is struggling to see what the concern is. Mr. Crocker feels it is a legitimate concern with the extended use of the walkway. Ms. Espada understands it would be built to specifications, but the issue is things start shifting after a period of time unless it is on something solid. It needs to be built well so it lasts a long time. Her recommendation is to do concrete with aggregate that would last longer for the Town. She respects they are trying to save money but does not want to lose the integrity of the project. Mr. Heep stated the Town will maintain the walkway. The Board could include a condition it needs to be maintained in good repair at all times. Ms. Espada is comfortable with thatthat, but it is short money for longevity.

Mr. Alpert stated $23,000 is not a lot of money. He understands time constraints but feels there may be a way to get that money from the Finance Committee. Towns have problems getting money for repairs all the time. He feels the applicants are being penny wise and pound foolish. Mr. Heep stated he has not heard objections to pavers themselves. The sub material on the long-term runs a higher risk of needing maintenance. Mr. Alpert commented a lot in Town is in disrepair as they

defer maintenance all the time. Mr. Heep does not believe a change in material runs afoul of any site plan review By-Laws. Mr. Crocker agrees with Mr. Alpert. There is a visual difference and a longevity issue. Mr. Alpert asked the Planning Director if the Board is going beyond their authority under Site Plan Review if the issue is cost and maintenance. He stated pavers may look better. Ms. Espada stated pavers are nicer but need a concrete substrate.

Ms. McKnight clarified the 3 issues are the caliper of trees, the shape of the oval walkway where it meets the other walkway and a change in material. The Board needs to determine if all 3 are deminimus changes and treat each request separately. Mr. Heep stated there is no purview in the Special Permit Review criteria that would allow the Planning Board to deny the request as the applicant has stated it will be maintained in good condition. He appreciates Ms. Espada's comments how other towns are handling their substrates. He listened to that comment and will think about it. It does not change the request. The applicant needs to get moving on this. They will comply with all By-Laws and regulations they need to. He noted the applicant has come to the Board after considering all options. The DPW has given this a lot of thought and come up with this solution.

Mr. Alpert stated the project cannot wait until a Special Town Meeting. He would appreciate if the Town considers Ms. Espada's comments and see if they can do a different substrate for the base and save money elsewhere. Ms. Espada stated if the DPW is ok making sure they repair it she is fine. If there is enough budget to make it stronger the applicant should go that route. This needs to be universally used by the entire town. Mr. Savignano stated the Town will maintain the front yard of the Town to the highest standards possible. As the Project Manager he intends to ensure all products are installed to the Manufacturer's specifications.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: the changes proposed by the Town as applicable to the Site Plan approved by the Planning Board for the renovation of the Town Common, as provided in the Special Permit Amendment granted, are determined to be deminimus.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: the proposed change in caliper of trees to be a smaller caliper as compared to those approved in the Site Plan, which was part of the Special Permit Amendment, be approved by this Board.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: to approve a minor change to the dimensions of the oval shaped walkway where is meets the walkway from Garrity Way, as compared to what was shown on the Site Plan approved with this Special Permit Amendment, be approved by this Board.

A motion was made that the changes proposed by the applicant in the composition of the paving material for the oval walkway from exposed aggregate concrete to concrete pavers be approved by this Board with the condition the concrete pavers will be installed to manufacturer's specifications and maintained in good repair in safe, passable, walkable condition at all times. Mr. Crocker stated he appreciates what the Town is trying to do but does not think it will hold much weight with what could happen over time. The Board always wants thing to be maintained. Mr. Alpert stated when there is a condition that is not met it carries a lot of weight. Ms. Espada suggested an amendment to the motion to add "to meet the standards of universal design. The amendment was accepted.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: to accept the amendment to the motion.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of four of the five members present (Mr. Crocker voted in the negative):
VOTED: the changes proposed by the applicant in the composition of the paving material for the oval walkway from exposed aggregate concrete to concrete pavers be approved by this Board with the condition the concrete

pavers will be installed to manufacturer's specifications to meet the standards of universal design and be maintained in good repair in safe, passable, walkable condition at all times.

Parking Determination—Sira Naturals, Inc., dba Ayr, formerly Sage Naturals (Property located at 29-37 Franklin Street).

Scott Thornton, of Sira Naturals, prepared a letter dated 6/7/22 with the changes he would like to ~~implement~~implement, and Town Engineer Thomas Ryder sent a letter dated 6/16/22 that summarizes the changes. Mr. Block stated there is a parking determination as a result of changes from 5 to 7 sales stations~~;~~ it will no longer be by appointment only, it will offer other products and to allow for vans to be parked overnight in a locked indoor facility. He feels there is enough on and off-site parking available. The Town Engineer concurred there is sufficient parking.

Mr. Alpert would like a condition included that no product can be stored in the vans overnight. Ms. Newman clarified this is just establishing parking for this use. There will be a hearing for the other changes in August. The purpose is to set the parking requirement for the medical marijuana use and selling other items. Engineering has gone along with the 18 spaces recommended by the applicant. Mr. Thornton stated he will be requesting a hearing. Ms. Newman noted there is no parking standard for the ~~use~~use, and she is asking the Board to set a standard for the use as has been described.

Upon a motion made by Mr. Crocker, and seconded by Ms. Espada, it was by a roll call vote of the five members present unanimously:
VOTED: to determine the Board finds 18 spaces sufficient for the proposed uses.

Discussion and Comment on Select Board Goals for FY 2023.

Mr. Block stated the Select Board has identified a number of goals that include: making Needham livable with 8 initiatives within that goal; economically vital with 5 initiatives; accessible and connected with 5 initiatives; to propose a healthy and socially thriving community with 13 initiatives; ensure public safety with 2 initiatives; for the Town to be responsibly governed with 10 initiatives; and ensure environmental sustainability with 4 initiatives. He noted a lot of these initiatives intersect. Ms. McKnight likes what has been listed in Goal 1 particularly bullets 2, 4 and 5. She would like the Board to continue those goals. She hopes initiative 1.4 will continue. Mr. Block stated he supports each initiative. He asked, for the Planning Board goals, should exempting municipal buildings from the site plan process be considered. Ms. McKnight stated it is common for Zoning By-Laws to exempt municipal buildings and is something to be considered.

Mr. Crocker stated, as a Planning Board, environmental impacts are important. Mr. Block stated the Board can propose certain standards for municipal buildings administered internally. They will deal more substantively when dealing with the Planning Board goals. For the second goal, he asked the Council of Economic Advisors (CEA) to focus on 3 components – the community, the district-~~-~~focused subcommittee, and a third component is cluster-~~-~~based economic development strategy, to build an inventory of the retail in town to better understand the composition of the economy, to ensure a diverse workforce and a diverse mix of businesses in Town. The CEA subcommittee is focused on the Chestnut Street area and the center of town. They will still meet to determine if any action the subcommittee would make would be for the CEA or the whole town. Chestnut Street remains a vital opportunity for the town to increase housing and affordable housing stock. People can walk to the ~~t~~Town Center from Chestnut Street and it is close to transportation.

Ms. McKnight stated she has language she wants to put in. She asked if the Board wants to include it in the list of initiatives that the Select Board is encouraging and then list the initiatives. She feels, in the goals somewhere, there should be a statement the Town intends to respond to the MBTA Communities Act requirements. She is not sure where it belongs, but it should be said. She thinks the Select Board should make a statement that it intends to respond. She noted for Initiative 1.2 this is what she was thinking for Chestnut Street – evaluate zoning for Mixed- Use buildings in the town center, Chestnut Street and Avery Square to encourage such development ~~pursuit of sites~~. She noted the Board needs to revisit that zoning. Mr. Block agreed with the suggestion. Mr. Alpert stated that is a Planning Board goal. The Board is looking at the Select Board goals. They are all laudable goals but are all part of the Planning Board's charge. He does not want the Select Board evaluating Planning Board goals.

Ms. Espada asked if there was something in the Select Board goals missing that the Planning Board would like to include. She stated it is imperative the Planning Board set goals for themselves as well. She asked if there is anything that should be global as opposed to Planning Board specific goals. Mr. Block noted there is specific action he feels the Board should take. He would like to see the Planning Board modify the applications to take on more information like minority or women owned businesses. Ms. Espada asked what their equitable goals are. She noted they appoint committees and asked what are the goals for the appointed committees. The Board may want to talk about policies for different things.

Mr. Crocker stated the Board needs to have what their goals are, then look at the goals from the Select Board and other committees to see how their goals fit with the Planning Board's. The Board may want to reframe their goals. Does the Planning Board have some unnecessary regulations? What can the Board do to make it easier to be a developer in town but still meet the regulations? Mr. Alpert agreed with Ms. Espada and Mr. Crocker. The goals they are raising, such as diversity, climate, environmental, are all goals for both Board~~'~~s. These should be brought up as goals that should be at the forefront of the Select Board list and the Planning Board list. It is appropriate for this Board to have conditions when a site plan use comes up and where there is diversity.

Mr. Block stated he is looking to build a framework for the Board, so they set aside dedicated time to set goals and set aside time going forward to peruse each of the initiatives. He met with Green Needham regarding some of their initiatives and will be meeting with Climate Action tomorrow. Mr. Alpert stated the Board had special meetings beginning a few years ago quarterly for planning purposes and they should consider starting that again. Ms. McKnight noted Select Board Goal 6.1(b). The Select Board acknowledged the Tree Strategy needs to be discussed. It also needs to mention "and housing plan strategies implementation." She feels it should include those words. These goals should also mention responding to the MBTA Communities Act requirements and insert in 6.1(b) the housing plan strategies implementation. The Select Board talks about amending the Accessory Dwelling Unit (ADU) By-Laws, so perhaps that should be a goal.

Mr. Alpert likes the first part but does not want to include ADUs. The Select Board did not put that ~~in~~in, but it is encompassed in the generality of housing. He is not sure he wants to invite the Select Board to focus in on that. He likes the housing plan strategies and responding to the MBTA Act. It makes sense to include it. Mr. Block thanked Ms. McKnight for her thorough review of the goals.

Minutes

Ms. McKnight noted in the 3/28/22 minutes, page 2, 3rd paragraph, "He stated they are open until 9:00 p.m." It is not clear who "He" is. It will be deleted. On page 3, it references "decorate dumpsters." Mr. Block noted it was jersey barriers. The reference to dumpsters will be deleted. Ms. McKnight noted on page 5, it notes seat limits and dates, which are different from above. Mr. Block stated it is relating to different service hours. It should be left as is. Ms. McKnight noted on page 7, there are 214 commercial breweries. Is that in Massachusetts? Mr. Block stated it was and Massachusetts should be added. Ms. McKnight asked on page 8, state regulations, is it ok to make the change the way she suggested and was informed it was.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of four of the five members present (Mr. Crocker abstained):
VOTED: to accept the minutes of 3/28/22 with the red line changes as shown and the additional changes discussed.

Ms. McKnight noted in the minutes of 4/5/22, page 3, 2nd paragraph, the reference to the opinion by Foley and Lardner is not clear. Mr. Block stated there were varying opinions. It relates to the Panera Bread complex. It was dealing with the technical question of what is regarded as a medical clinic. It was their opinion the applicants are not required to apply for a license as a clinic as a whole. Ms. McKnight stated it could be deleted or left alone. Mr. Block stated it should be left in. Ms. McKnight noted on page 4, 3rd paragraph, Jill Kahn did not give an address. Ms. Newman stated it will be looked up in the list of residents. In the 5th paragraph, it should be "more" rather than "less." That was agreed. On page 7, 1st paragraph, "the amendment to the Zoning By-Law should be made." She feels the word "carefully" should be added. This was agreed.

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of four of the five members present (Mr. Crocker abstained):

VOTED: to accept the minutes of 4/5/22 with the red line changes as shown and the changes discussed tonight.

Report from Planning Director and Board members.

Ms. McKnight noted at the last meeting of the Housing Working Group, the zoning subgroup had a presentation given by Oscar Mertz on the zoning subgroup's ~~his~~ ideas for rezoning, particularly to respond to the MBTA Communities Act requirements, although the MBTA Act guidelines are still in draft form, and to suggest some other zones for multi-family housing. There are just a couple of areas along the Highland Avenue spine but mostly he had suggestions for responding to the MBTA Communities Act guidelines.

Ms. Espada noted there are 3 subgroups – preservation, zoning and then Ms. Espada's housing capacity subgroup. The~~y~~ capacity subgroup talked about racial equity and diversity, Needham Housing Authority, town owned land, school capacity and the capacity of the town for zoning, ADUs, new neighborhood development, communication and transportation. She noted they will implicate the first draft of the housing plan. By the end of the summer there should be a first draft for members to review. Then there will be a community meeting and a final draft by October. Ms. Newman stated this will be on the agenda for the meeting at the end of July. Strategic action items will be looked at. Ms. McKnight stated the Preservation Subgroup~~Committee~~ also focused on the Large House By-Law as a restudy is needed. The Zoning Subgroup~~Committee~~ mentioned 3 or 4 areas like Hunting Road~~Avenue~~ that are now in the Single Residence A Zone, but are developed ~~-~~with smaller lots.

Ms. McKnight mentioned~~stated~~ the zoning for breweries. The goal is to have a zoning article on the Planning Board's ~~an~~ agenda in July regarding brewery zoning. There are 2 things – the definition of tasting room and what zoning districts to allow the brew pub and brewery uses in. She will get the materials to the Board members.

Correspondence

Mr. Block noted there was correspondence from The DeWolfe's at 242 Dedham Avenue, regarding the streetscape project and an email from Rob Petitt regarding the same.

Minutes (Continued)

Upon a motion made by Ms. McKnight, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: to accept the minutes of 4/19/22 with the red line changes as shown.

Upon a motion made by Ms. McKnight, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to accept the minutes of 4/25/22 with the red line changes as shown.

Upon a motion made by Mr. Alpert, and seconded by Mr. Crocker, it was by a roll call vote of the five members present unanimously:
VOTED: to adjourn the meeting at 10:35 p.m.

Respectfully submitted,
Donna J. Kalinowski, Notetaker

_____
Jeanne S. McKnight, Vice-Chairman and Clerk

NEEDHAM PLANNING BOARD MINUTES

October 19, 2021

All Planning Board members, Planning Board staff, and all those expected to present during the course of the meeting were admitted to the Zoom prior to the commencement of the October 19, 2021 meeting. The following people were present on the Zoom at or about 7:15 p.m.: Planning Board members Paul Alpert, Adam Block, Natasha Espada, Martin Jacobs and Jeanne McKnight; Director of Planning and Community Development Lee Newman; Assistant Town Planner Alex Clee; and the following panelists for the items on the meeting agenda Reg Foster, Margaret Moran, Nathalie Janson, Carys Lustig, Town Counsel Christopher Heep, George Giunta, Jr., Michael Tedoldi, Evans Huber, Pat Day, Susanne [unknown last name], John Glossa, John Gillon and John Diaz.

Beginning at approximately 7:15 p.m., Chairman Paul Alpert stated that the Planning Department had received an email that same afternoon from Mike Connelly. In this email, Mr. Connelly stated that Mr. Alpert had a conflict of interest pursuant to Chapter 268A, the *State Ethics Law*, with respect to the pending application concerning property located at 1688 Central Avenue. The public hearing on the application concerning 1688 Central Avenue was on the Planning Board's agenda for 7:45 p.m. that evening. Mr. Alpert stated that he intended to recuse himself from matter of 1688 Central Avenue that evening, and to postpone the public hearing on that matter until the Planning Board's next scheduled meeting, to allow time for him to obtain an opinion from the State Ethics Commission as to whether any conflict of interest affected his ability to participate in the matter further.

Planning Board member Martin Jacobs asked Town Counsel Christopher H. Heep what would happen in the event Mr. Alpert was found to have a conflict of interest with respect to the 1688 Central Avenue application. Mr. Jacobs' question was prompted by the prior recusal of Planning Board member Natasha Espada from participation on the 1688 Central Avenue application, which meant that a recusal by Mr. Alpert would result in only three (3) Planning Board members being able to vote on the application, fewer than the four (4) required by law to grant the requested zoning relief.

Mr. Heep stated he did not believe it likely that the State Ethics Commission would find Mr. Alpert to have a conflict of interest, but that in any event everyone would need to wait and see what guidance the State Ethics Commission would ultimately provide.

Evans Huber, counsel to the applicant for 1688 Central Avenue (Needham Enterprises, LLC), stated that in the event Mr. Alpert was found to possess a conflict of interest, he believed that Town Counsel would need to determine if another board within Town, such as the Zoning Board of Appeals, had the ability to hear the application in place of the Planning Board. Mr. Huber offered the opinion that if no other board was able to hear the application, the Planning Board might invoke the so-called "rule of necessity."

Mr. Heep responded to Mr. Huber that did not believe it possible for one permitting board to be substituted for another in response to a conflict of interest. Mr. Heep stated that the "rule of necessity" might be applicable, subject to consideration at a later date as to whether it might be properly invoked, in the event of a conflict of interest.

Mr. Huber asked whether the public hearing on 1688 Central Avenue could proceed as scheduled that evening with only three (3) of the five (5) Planning Board members participating. Mr. Heep stated that it could not: Because four (4) affirmative votes are needed to grant the requested zoning relief, a quorum of the Planning Board for purposes of the public hearing on the application is four (4) board members. Given Mr. Alpert's recusal that evening, the Planning Board did not possess a quorum for purposes of the application for 1688 Central Avenue.

Pat Day, representative of Needham Children's Center, stated her disappointment with the delay of the public hearing on the 1688 Central Avenue application, and with the overall length of the public hearing to date. Ms. Day stated that had not played any part relative to Mr. Connelly sending the email accusing Mr. Alpert of having a conflict of interest.

Planning Board members Adam Block, Natasha Espada, and Jeanne McKnight did not comment.

At approximately 7:31 p.m., members of the general public were admitted to the Zoom and the recording of the meeting began.

The Needham Planning Board Virtual Meeting using Zoom was remotely called to order by Paul Alpert, Chairman, on Tuesday, October 19, 2021, at 7:15 p.m. with Messrs. Jacobs and Block and Mmes. McKnight and Espada, as well as Planning Director, Ms. Newman and Assistant Planner, Ms. Clee.

Mr. Alpert took a roll call attendance of the Board members and staff. He noted this is an open meeting that is being held remotely because of Governor Baker's executive order on March 12, 2020 due to the COVID Virus. All attendees are present by video conference. He reviewed the rules of conduct for zoom meetings. He noted this meeting does include one public hearing. A matter has arisen that will be discussed at 7:45 p.m. which will necessitate opening and postponing the hearing to 11/2/21. There will be no public comment allowed. If any votes are taken at the meeting the vote will be conducted by roll call. All supporting materials, including the agenda, are posted on the town's website.

Appointment:

7:15 p.m. – Discussion of Needham Housing Authority Modernization and Redevelopment Initiative.

Mr. Alpert introduced Reg Foster, Chair of the Needham Housing Authority, and Margaret Moran and Nathalie Janson both of the Cambridge Housing Authority, which is the NHA's consultant. Mr. Foster stated he has been on the NHA Board of Housing Commissioners since 2010. He wanted to introduce Ms. Moran and Ms. Janson and give the Planning Board a heads up. In mid-summer this year they launched the Modernization and Redevelopment Initiative (MRI). He wanted to give a brief opportunity for comments. The Housing Authority is starting a 5-to-10-year initiative. They were before the Planning Board 12/4/18 and presented a draft Facilities Master Plan. It was circulated to other parties and the final plan was published in 2019. He prepared a briefing document and reviewed it for the Board members. The first page is an excerpt from the Management Summary. There is a description of the 5 projects under consideration; modernize and preserve the Cook's Bridge property; redevelop the High Rock property; redevelop the Linden-Chambers property as it is not economical to do anything else, and add a new 61 unit senior/low income housing development to Seabeds/Cook. This is being done with non-taxpayer money. There is $5 million in CPA money then private, state, and other sources for the rest.

Mr. Foster stated the Request For Proposals went out in April 2021 and they selected Cambridge Housing Authority as the consultant. He laid out the work plan for Phase 1 which will be 7/2021 through 3/2022. That will include the Cambridge Housing Authority presentation and their skills and abilities. Cambridge was chosen as they offered key advantages. He received 2 proposals from the private sector, but the most cost effective was the Cambridge Housing Authority who spent the last 10 years redoing all its public housing units. They have tremendous experience and have assisted other towns. He noted Ms. Moran played a key role in the High Rock redevelopment in 2005-2008 so she knows Needham. They are here to answer any questions and receive input from the Board members.

Ms. McKnight stated the Housing Plan Working Group will be studying their proposal. She stated she read the report a couple of years ago and does not understand what zoning is applicable to these projects. Cooks Bridge is in the Single Residence B District (SRB) and Lindenhambers is in the Single Residence A (SRA) and General Residence Districts. What legal authority were those developments originally built under? Was it state and federal funding so they were exempt from local zoning? Were any units built under 40B? She wants to understand any barriers our current zoning may present. Mr. Foster stated one task is to look into any zoning implications. Ms. Moran noted in 2005 the zoning was changed to create the duplex homes. Some may have been built under the zoning in place at the time and would be grandfathered in. They will be looking at the zoning implications to make sure all are compliant. Mr. Foster stated they will be working with the Planning Department moving forward and have a transparent process.

Mr. Jacobs noted they are trying to anticipate any zoning change that may be needed to try to begin working on it as soon as possible. Mr. Foster stated they did a conceptual plan in 2019 and are trying to make it an actionable plan. Ms. Espada stated she is working with Ms. McKnight on the Housing Plan Working Group, and the next couple of months will be exploratory. It would be helpful if someone from his group could attend and help gather information. Mr. Foster stated the

Housing Authority started working on this 10 years ago and has a large repository of information. The Planning Board can have access to all of that. Mr. Alpert thanked them all for coming.

Public Hearing:

7:45 p.m. – Major Project Site Plan: Needham Enterprises, LLC, 105 Chestnut Street, Suite 28 Needham, MA, Petitioner (Property located at 1688 Central Avenue, Needham, MA). Regarding proposal to construct a new child care facility of 9,966 square feet and 30 parking spaces, that would house an existing Needham child-care business, Needham Children's Center (NCC). ***Please note: this hearing was continued from the June 14, 2021, July 20, 2021, August 17, 2021, September 8, 2021 and October 5, 2021 meetings of the Planning Board.***

Mr. Alpert explained the hearing will be continued to the next meeting on 11/2/21 due to some communication that came in today forcing them to postpone. They received an email from David Lazarus, a neighbor, saying the hearing should be postponed to get the traffic study. They want the corridor analysis of that area of Central Avenue, specifically the intersections at Central and Charles River and Central and Country Way. That was not able to be done for this meeting. There was also an email from Mike Connolly who does not live in Needham. He stated his children went to Needham Children's Center and he is speaking in favor of the proponents. The email says there is a "conflict of interest with the Chair," and it has been reported to the Ethics Board, in that Mr. Alpert was a trustee of another child care center in Needham. Mr. Connolly wants to file a formal complaint as it was not disclosed. His e-mail stated the Chair has a conflict and should not be participating. Mr. Alpert stated he spoke with Town Counsel Christopher Heep today. They both feel Mr. Alpert should consult with the State Ethics Commission as to whether he should recuse himself. He will not participate tonight. If there were a hearing it would need 4 votes and there would not be a quorum to proceed tonight. Ms. Espada has recused herself from this at the beginning. Mr. Alpert hopes it will be resolved for the 11/2/21 meeting.

Upon a motion made by Mr. Block, and seconded by Mr. Jacobs, it was by a roll call vote of the four members present unanimously:
VOTED: to continue the hearing to 11/2/21 at 7:45 p.m.

De Minimus Change: Amendment to Major Project Site Plan Review No. 2013-02: Town of Needham, 1471 Highland Avenue, Needham, MA, Petitioner (Property located at 1407 Central Avenue, Needham, MA). Regarding staffing at the Jack Cogswell Building.

Town Counsel Christopher Heep noted this is a request for a deminimus change. This is the DPW equipment storage building that was permitted in 2018. The intent was for it to be unstaffed and just for storage for equipment and that was captured in the Special Permit. At the onset of Covid 19 the DPW found the need to identify additional spaces to space people out. In January 2021 the applicant asked for up to 16 employees to report to the building in the a.m. and occasionally work there on a temporary basis. The Planning Board approved this request and incorporated it into the decision in January. The temporary application was for 45 days beyond the lifting of the state of emergency. The need to use the building is continuous. They are asking that the temporary occupancy permit be allowed to continue up to and including the end of April 2022 with all the same conditions.

Carys Lustig, of the DPW, has concerns with the operations if this is not allowed. They still need to keep the staff spread out due to Covid and quarantines if someone gets sick. They will vacate the Cogswell Building if all is better. Mr. Alpert commented he hopes they are not back here in April. Mr. Block asked whether, if there are 16 employees, are 16 parking spaces enough for the additional equipment and trucks. Ms. Lustig stated there have not been any issues or complaints. Mr. Block stated the request is for a particular period of time. He asked if there is a reason it should not say 8/31/22. Mr. Heep stated that would be beneficial. Coming to the Board he wanted to keep it a reasonably short timeline. Ms. McKnight asked if all DPW employees are under the federal vaccination guidelines. Ms. Lustig stated there is no order for the employees but about 95% are compliant. There are small clusters of breakthrough cases.

Mr. Alpert noted a letter from the DPW with no comment. There is a draft decision that will need the date changed in 2 places to 8/31/22.

Upon a motion made by Mr. Jacobs, and seconded by Ms. McKnight, it was by a roll call vote of the five members present unanimously:
VOTED: to accept as a minor modification.

Upon a motion made by Mr. Block, and seconded by Mr. Jacobs, it was by a roll call vote of the five members present unanimously:
VOTED: to grant the minor modification amendment to the decision in respect of application 2013-02 with the original decision dated April 2, 2013, Amended June 10, 2014, July 8, 2014, January 20, 2015, May 6, 2015, January 26, 2016, July 19, 2016, November 20, 2018, August 6, 2019, September 3, 2019, October 19, 2019, January 4, 2021 and June 1, 2021 and Insignificant Change on September 15, 2020 to effectively enable DPW staff totaling no more than 16 to be able to work in the premises currently in through August 31, 2022.

Upon a motion made by Ms. McKnight, and seconded by Mr. Jacobs it was by a roll call vote of the five members present unanimously:
VOTED: with a change to the date, adopt the decision as drafted.

De Minimus Change: Major Project Site Plan Special Permit No. 2016-01: 57 Dedham Ave. LLC, 471 Hunnewell Street, Needham, MA, Petitioner (Property located at 15 & 17 Oak Street, Needham, MA). Regarding proposed changes to the approved plan.

George Giunta Jr., representative for the applicant, stated this is a request for a deminimus change to the Special Permit. The issue with the survey resulted in an incorrect property line and an improper setback distance was used. It measured from the building's wall rather than the overhang. Neither is significant but this will bring the plans into conformity. They are also requesting a minor change to the front landing and steps that are a bit different. The original plan showed a handicap ramp in front. This has been removed and has been moved to the back. Several minor changes were voted by the Board such as approving a transformer location change, installation of a pole and changes to the parking and handicap ramp. This was all approved by vote but there is not a revised decision. This will clean up all the issues, the applicant can finish the project and close it out.

Mr. Block asked what the intention was of having the handicap ramp in front. Mr. Giunta Jr. stated there was going to be commercial space in front, but it did not work out well. People will be pulling into the parking lot around the back of the building. It is a more logical location for the ramp in the back. The interior of the building changed a bit, and the front door does not access the spaces. The front door is more of an emergency egress. Ms. Espada asked where the public would come into the building. Mr. Giunta Jr. noted, with the redesign, people will come in the back of the building where the parking is. The back is the main entrance and accesses the elevator.

Ms. McKnight noted someone not familiar with the building, arriving by vehicle, who uses a wheelchair or walker, how would they know where to go. Mr. Giunta Jr. stated there is no immediate parking in the front of the building or on Oak Street. They would turn into the drive and there is signage that the handicap ramp is around back. Ms. McKnight asked where the handicap parking is located. Mr. Giunta Jr. stated there are 2 spaces next to the ramp and he showed her the location on the plan.

Upon a motion made by Ms. McKnight, and seconded by Mr. Block, it was by a roll call vote of four of the five members present (Mr. Jacobs abstained):
VOTED: that the requested changes to the Special Permit for 15 & 17 Oak Street be considered a deminimus change not requiring notice or a hearing.

Upon a motion made by Ms. McKnight, and seconded by Mr. Block, it was by a roll call vote of four of the five members present (Mr. Jacobs abstained):
VOTED: to approve the amendment to a Major Project Site Plan Special Permit dated October 19, 2021 pursuant to Application No. 2016-01, originally dated March 29, 2016, amended by First Amendment and Restated Major Site Plan Special Permit dated November 1, 2016.

Upon a motion made by Mr. Block, and seconded by Ms. McKnight, it was by a roll call vote of four of the five members present (Mr. Jacobs abstained):
VOTED: to accept the decision as drafted.

Ms. Newman will modify the vote.

Request to Authorize Director to Authorize Occupancy Permit or Temporary Occupancy Permit: Major Project Site Plan Special Permit No. 2018-04: Town of Needham, 1471 Highland Avenue, Needham, MA, Petitioner (Property located at 707 Highland Avenue and 257 Webster Street, Needham, MA). regarding replacement of Fire Station 2, Town of Needham, 1471 Highland Avenue, Needham, MA, Petitioner (Property located at 1407 Central Avenue, Needham, MA).

Ms. Newman stated she was approached by Steven Popper regarding getting an occupancy permit over the next 3 weeks. She wants to make sure she has the authority to issue a temporary Certificate of Occupancy provided there is adequate money held back under the contract to cover work on the exterior of the building that is not completed at the time of occupancy. Mr. Alpert asked how the holdback amount is determined. Ms. Newman noted there will be an estimate for unfinished work done by an engineer, then certification from the project manager and the town will hold back that amount of funds at 135%.

Upon a motion made by Ms. McKnight, and seconded by Mr. Block, it was by a roll call vote of the five members present unanimously:
VOTED: to grant permission to the Planning Director to issue the necessary instruction to the Building Department for a temporary Certificate of Occupancy upon receipt of required documentation and sufficient holdback to complete any unfinished work.

Discussion of Warrant Articles for October 2021 Special Town Meeting.

Ms. Newman stated she wanted to talk about protocol and how the meeting will be run. It will be at Powers Hall. There will be 2 tables at the front of the hall and the Planning Board will be seated in the front row as a group. Presentations have been recorded but the Moderator wants people to make very short 2-to-3-minute presentations. Mr. Jacobs and Ms. Newman will not be at the meeting. Ms. Newman will watch on cable and will be available by phone. Mr. Jacobs will also be available by phone. Ms. McKnight noted their position on Article 12 Accessory Dwelling Units. The proponents are seeking to refer to the Planning Board for further study. She anticipated the Board would recommend a positive vote to refer. Mr. Alpert assumed it would be a report back to a future Town Meeting without a future date attached. He would like to keep it open ended as the committee will be discussing it.

Upon a motion made by Ms. McKnight, and seconded by Mr. Block, it was by a roll call vote of the five members present unanimously:
VOTED: to recommend to Town Meeting Article 12 be referred to the Planning Board for a report back to Town Meeting at a later date.

Ms. Newman stated the Board voted the recommendations on the Planning Board Article. The members need to sign so she can get them to the Town Clerk before Town Meeting. Usually, the Board schedules a meeting ahead of Town Meeting and holds it open through Town Meeting. She is looking for a time for a zoom pre-meeting. She was thinking maybe 15 minutes on Monday the 25th. After discussion, it was decided there would be a meeting on the 25th at noon with a vote to continue that Board meeting through Town Meeting.

Minutes

Ms. McKnight noted the vote on the 6/29/21 minutes is different than in the decision on allowing convenience stores. Mr. Alpert agreed it should not include convenience stores. Ms. Clee stated the Board could verify with verification to be done.

Upon a motion made by Ms. McKnight, and seconded by Mr. Block, it was by a roll call vote of the five members present unanimously:
VOTED: to give approval to the minutes of 6/29/21 and 7/20/21 pending final verification by Planning Board Staff.

Report from Planning Director and Board members.

Ms. Newman stated she was approached by the Town Manager's office regarding the policy on outdoor dining. The Board had relaxed the rules through 10/31/21. The Town Manager's office has received some requests to extend that to the end of November.

Upon a motion made by Ms. McKnight, and seconded by Mr. Jacobs, it was by a roll call vote of the five members present unanimously:
VOTED: to continue the relaxation of the outdoor seating policy rules from 10/31/21 through 11/30/21.

Ms. Newman noted the first meeting of the Housing Plan Working Group is this Friday. She is working on an agenda. Ms. McKnight stated Karen Sunnarborg put together an agenda, and they put together a timeline for tasks to be completed through the Fall of 2022. The collection of data and housing needs were put together. There will be monthly meetings then a community input meeting to hear needs and ideas for housing strategy. Then they will prepare the housing plan with goals and strategies. Then there will be community meeting to present the plan. They are likely looking at not the 2022 Fall Town Meeting but the 2023 Annual Town Meeting for action on any recommended zoning amendment. Ms. Newman noted Marcus has a conflicting meeting and cannot attend this first meeting.

Mr. Block stated he has reconstituted the Council of Economic Advisors (CEA) and created 3 subdivisions – 1) small business conditions in town; 2) cluster-based economic strategy and 3) other commercial districts that could be improved. They took a walk around downtown Chapel Street, upper Chestnut Street and Great Plain Avenue. Next, they will go down lower Chestnut Street. They will make recommendation to the Board of Selectmen. He will keep the Planning Board posted. He noted there may be the consideration of a brewery in town. He wanted to keep the Board posted. Mr. Jacobs stated all members of the CEA should have a copy of the Needham 2025 plan. Also, all Planning Board members should have a copy. Ms. McKnight stated his subgroup on small business should meet with the Housing Plan Working Group.

Ms. Newman stated electric cars needs clarification. The Board has approved installation of infrastructure of electric cars and had approved installations at the Public Service Administration Building at 500 Dedham Avenue. All was supposed to be underground except the mechanics in front of the cars. They needed additional electric lines with overhead wires. They got rid of that option, but it will require the installation of a new transformer and the continuation of the fencing. She wanted to get feedback and if the Board is comfortable with her approving this. Ms. Espada clarified this is the front of the building and was informed it was. She asked if it could be screened with landscaping as it is encroaching into the front yard. Ms. Newman would suggest a deminimus process so the Board could be involved. Ms. McKnight asked if it was necessary to fence it for safety and was informed no. Ms. Newman will talk with Henry Haff and tell him the Board wants to see the proposal.

Upon a motion made by Mr. Block, and seconded by Mr. Jacobs, it was by a roll call vote of the five members present unanimously:
VOTED: to adjourn the meeting at 9:17 p.m.

Respectfully submitted,
Donna J. Kalinowski, Notetaker

_____
Adam Block Vice-Chairman and Clerk