



TOWN OF ARLINGTON  
REDEVELOPMENT BOARD

Application for Special Permit In Accordance with Environmental Design  
Review Procedures (Section 3.4 of the Zoning Bylaw)

Docket No. \_\_\_\_\_

1. Property Address 190 & 192-200 Massachusetts Ave  
Name of Record Owner(s) 190-200 Massachusetts Ave, LLC Phone 781-654-6306  
Address of Owner 455 Massachusetts Ave, Ste 1, Arlington, MA 02474  
Street City, State, Zip
2. Name of Applicant(s) (if different than above) Same as above  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Status Relative to Property (occupant, purchaser, etc.) \_\_\_\_\_
3. Location of Property Map 6, Block 3, Lots 1A and 1B  
Assessor's Block Plan, Block, Lot No.
4. Deed recorded in the Registry of deeds, Book \_\_\_\_\_, Page \_\_\_\_\_;  
-or- registered in Land Registration Office, Cert. No. 3413N, in Book 1362, Page 16.  
1376 27
5. Present Use of Property (include # of dwelling units, if any) Retail, Service, Restaurant
6. Proposed Use of Property (include # of dwelling units, if any) Mixed-Use  
37 Apartment Units & Retail
7. Permit applied for in accordance with \_\_\_\_\_ 3.4 \_\_\_\_\_ Environmental Design Review  
the following Zoning Bylaw section(s) 5.5.2 \_\_\_\_\_ Dimensional and Density Regulations  
SP \_\_\_\_\_ (Mixed-Use <=20,000SF)  
section(s) title(s)
8. Please attach a statement that describes your project and provide any additional information that may aid the ARB in understanding the permits you request. Include any reasons that you feel you should be granted the requested permission.  
See Attached

(In the statement below, strike out the words that do not apply)

The applicant states that 192-200 Massachusetts Ave, LLC is the owner -or- occupant -or- purchaser under agreement of the property in Arlington located at 190 & 192-200 Massachusetts Ave which is the subject of this application; and that unfavorable action -or- no unfavorable action has been taken by the Zoning Board of Appeals on a similar application regarding this property within the last two years. The applicant expressly agrees to comply with any and all conditions and qualifications imposed upon this permission, either by the Zoning Bylaw or by the Redevelopment Board, should the permit be granted.

\_\_\_\_\_  
Signature of Applicant(s)

\_\_\_\_\_  
Address Phone



Town of Arlington Redevelopment Board  
Application for Special Permit in accordance with  
Environmental Design Review (Section 3.4)

Required Submittals Checklist

Two full sets of materials and one electronic copy are required. A model may be requested. Review the ARB's Rules and Regulations, which can be found at [arlingtonma.gov/arb](http://arlingtonma.gov/arb), for the full list of required submittals.

- X   Dimensional and Parking Information Form (see attached)
- X   Site plan of proposal
- N/A  Model, if required
- X   Drawing of existing conditions
- X   Drawing of proposed structure
- X   Proposed landscaping. May be incorporated into site plan
- X   Photographs
- X   Impact statement
- N/A  Application and plans for sign permits
- X   Stormwater management plan (for stormwater management during construction for projects with new construction)

FOR OFFICE USE ONLY

_____	Special Permit Granted	Date: _____
_____	Received evidence of filing with Registry of Deeds	Date: _____
_____	Notified Building Inspector of Special Permit filing	Date: _____

## TOWN OF ARLINGTON REDEVELOPMENT BOARD

### Petition for Special Permit under Environmental Design Review (see Section 3.4 of the Arlington Zoning Bylaw for Applicability)

For projects subject to Environmental Design Review, (see Section 3.4), please submit a statement that completely describes your proposal, and addresses each of the following standards.

1. **Preservation of Landscape.** The landscape shall be preserved in its natural state, insofar as practicable, by minimizing tree and soil removal, and any grade changes shall be in keeping with the general appearance of neighboring developed areas.
2. **Relation of Buildings to Environment.** Proposed development shall be related harmoniously to the terrain and to the use, scale, and architecture of existing buildings in the vicinity that have functional or visual relationship to the proposed buildings. The Arlington Redevelopment Board may require a modification in massing to reduce the effect of shadows on abutting property in an R0, R1 or R2 district or on public open space.
3. **Open Space.** All open space (landscaped and usable) shall be so designed as to add to the visual amenities of the vicinity by maximizing its visibility for persons passing the site or overlooking it from nearby properties. The location and configuration of usable open space shall be so designed as to encourage social interaction, maximize its utility, and facilitate maintenance.
4. **Circulation.** With respect to vehicular, pedestrian and bicycle circulation, including entrances, ramps, walkways, drives, and parking, special attention shall be given to location and number of access points to the public streets (especially in relation to existing traffic controls and mass transit facilities), width of interior drives and access points, general interior circulation, separation of pedestrian and vehicular traffic, access to community facilities, and arrangement of vehicle parking and bicycle parking areas, including bicycle parking spaces required by Section 8.13 that are safe and convenient and, insofar as practicable, do not detract from the use and enjoyment of proposed buildings and structures and the neighboring properties.
5. **Surface Water Drainage.** Special attention shall be given to proper site surface drainage so that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Available Best Management Practices for the site should be employed, and include site planning to minimize impervious surface and reduce clearing and re-grading. Best Management Practices may include erosion control and storm water treatment by means of swales, filters, plantings, roof gardens, native vegetation, and leaching catch basins. Storm water should be treated at least minimally on the development site; that which cannot be handled on site shall be removed from all roofs, canopies, paved and pooling areas and carried away in an underground drainage system. Surface water in all paved areas shall be collected at intervals so that it will not obstruct the flow of vehicular or pedestrian traffic, and will not create puddles in the paved areas.

In accordance with Section 3.3.4, the Board may require from any applicant, after consultation with the Director of Public Works, security satisfactory to the Board to insure the maintenance of all storm water facilities such as catch basins, leaching catch basins, detention basins, swales, etc. within the site. The Board may use funds provided by such security to conduct maintenance that the applicant fails to do. The Board may adjust in its sole discretion the amount and type of financial security such that it is satisfied that the amount is sufficient to provide for the future maintenance needs.

6. **Utility Service.** Electric, telephone, cable TV and other such lines and equipment shall be underground. The proposed method of sanitary sewage disposal and solid waste disposal from all buildings shall be indicated.
7. **Advertising Features.** The size, location, design, color, texture, lighting and materials of all permanent signs and outdoor advertising structures or features shall not detract from the use and enjoyment of proposed buildings and structures and the surrounding properties. Advertising features are subject to the provisions of Section 6.2 of the Zoning Bylaw.

8. Special Features. Exposed storage areas, exposed machinery installations, service areas, truck loading areas, utility buildings and structures, and similar accessory areas and structures shall be subject to such setbacks, screen plantings or other screening methods as shall reasonably be required to prevent their being incongruous with the existing or contemplated environment and the surrounding properties.
9. Safety. With respect to personal safety, all open and enclosed spaces shall be designed to facilitate building evacuation and maximize accessibility by fire, police, and other emergency personnel and equipment. Insofar as practicable, all exterior spaces and interior public and semi-public spaces shall be so designed as to minimize the fear and probability of personal harm or injury by increasing the potential surveillance by neighboring residents and passersby of any accident or attempted criminal act.
10. Heritage. With respect to Arlington's heritage, removal or disruption of historic, traditional or significant uses, structures, or architectural elements shall be minimized insofar as practicable, whether these exist on the site or on adjacent properties.
11. Microclimate. With respect to the localized climatic characteristics of a given area, any development which proposes new structures, new hard-surface ground coverage, or the installation of machinery which emits heat, vapor, or fumes, shall endeavor to minimize, insofar as practicable, any adverse impact on light, air, and water resources, or on noise and temperature levels of the immediate environment.
12. Sustainable Building and Site Design. Projects are encouraged to incorporate best practices related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Applicants must submit a current Green Building Council Leadership in Energy and Environmental Design (LEED) checklist, appropriate to the type of development, annotated with narrative description that indicates how the LEED performance objectives will be incorporated into the project. [LEED checklists can be found at <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220b> ]

In addition, projects subject to Environmental Design Review must address and meet the following Special Permit Criteria (see Section 3.3.3 of the Zoning Bylaw):

1. The use requested is listed as a special permit in the use regulations for the applicable district or is so designated elsewhere in this Bylaw.
2. The requested use is essential or desirable to the public convenience or welfare.
3. The requested use will not create undue traffic congestion or unduly impair pedestrian safety.
4. The requested use will not overload any public water, drainage or sewer system or any other municipal system to such an extent that the requested use or any developed use in the immediate area or in any other area of the Town will be unduly subjected to hazards affecting health, safety or the general welfare.
5. Any special regulations for the use as may be provided in this Bylaw are fulfilled.
6. The requested use will not impair the integrity or character of the district or adjoining districts, nor be detrimental to the health, morals, or welfare.
7. The requested use will not, by its addition to a neighborhood, cause an excess of the particular use that could be detrimental to the character of said neighborhood.

# TOWN OF ARLINGTON

Dimensional and Parking Information  
for Application to  
The Arlington Redevelopment Board

Docket No. \_\_\_\_\_

Property Location 190 & 192-200 Massachusetts Ave

Zoning District B3

Owner: 192-200 Massachusetts Ave, LLC

Address: 455 Massachusetts Ave, Arlington, MA

Present Use/Occupancy: No. of Dwelling Units:

Retail, Service, Restaurant

Uses and their gross square feet:

1-Story 9,916 SF

Proposed Use/Occupancy: No. of Dwelling Units:

Mixed-Use, 37 Apartment Units & Retail

Uses and their gross square feet:

5-Story Mixed-Use

	Present Conditions	Proposed Conditions	Min. or Max. Required by Zoning for Proposed Use
Lot Size	11,134 SF	11,134 SF	min. ----
Frontage	102.1 FT	102.1 FT	min. 50 FT
Floor Area Ratio	0.9	4.1	max. 1.5
Lot Coverage (%), where applicable	N/A	N/A	max. ----
Lot Area per Dwelling Unit (square feet)	N/A	301 SF	min. ----
Front Yard Depth (feet)	0 FT	0 FT	min. 0 FT
Side Yard Width (feet) right side	0.6 FT	7.5 FT	min. 0 FT
left side	----	----	min. ----
Rear Yard Depth (feet)	----	----	min. (H+L)/6
Height	----	----	min. ----
Stories	1-STORY	5-STORY	stories 5-STORY
Feet	20 FT +/-	<60 FT	feet 60 FT
Open Space (% of G.F.A.)	----	----	min. ----
Landscaped (square feet)	97 SF/11,134 SF (lot area) → 0.9%	4.8 %	(s.f.) 10% 2,360 SF ← 1,125SF/23,600SF (Res. Floor Area)
Usable (square feet)	0 %	9.0 %	(s.f.) 20% 4,720 SF ← 23,600SF (Res. Floor Area) X 0.10 = 2,360 SF
Parking Spaces (No.)	None	15	min. 45 ← 23,600SF (Res. Floor Area) X 0.20 = 4,720SF
Parking Area Setbacks (feet), where applicable	0 FT	N/A	min. N/A ← 2,140 (deck space)/23,600SF (Res. Floor Area)
Loading Spaces (No.)	N/A	N/A	min. N/A
Type of Construction	NEW CONSTRUCTION		
Distance to Nearest Building	12.0 FT	19.2 FT	min.

# TOWN OF ARLINGTON REDEVELOPMENT BOARD

Petition for Special Permit under Environmental Design Review (see Section 3.4 of the Arlington Zoning Bylaw for Applicability)

For projects subject to Environmental Design Review, (see section 3.4), please submit a statement that completely describes your proposal, and addresses each of the following standards.

1. **Preservation of Landscape.** The landscape shall be preserved in its natural state, insofar as practicable, by minimizing tree and soil removal, and any grade changes shall be in keeping with the general appearance of neighboring developed areas.

**There will be landscaped areas on site as provided with respect to Applicant's plans.**

2. **Relation of Buildings to Environment.** Proposed development shall be related harmoniously to the terrain and to the use, scale, and architecture of existing buildings in the vicinity that have functional or visual relationship to the proposed buildings. The Arlington Redevelopment Board may require a modification in massing so as to reduce the effect of shadows on abutting property in an RU, RI or R2 district or on public open space.

**The proposed building would be related harmoniously to the terrain and to the use, scale, and architecture of the existing buildings in the vicinity that have functional or visual relationship to the proposed buildings as can be seen from the Applicant's plans along with the statements contained in the Environmental Impact Statement.**

3. **Open Space.** All open space (landscaped and usable) shall be so designed as to add to the visual amenities of the vicinity by maximizing its visibility for persons passing the site or overlooking it from nearby properties. The location and configuration of usable open space shall be so designed as to encourage social interaction, maximize its utility, and facilitate maintenance.

**There is essentially no open space at the site and the Applicant's plans would create some open space as set forth within the substance of the Environmental Impact Statement.**

4. **Circulation.** With respect to vehicular, pedestrian and bicycle circulation, including entrances, ramps, walkways, drives, and parking, special attention shall be given to location and number of access points to the public streets (especially in relation to existing traffic controls and mass transit facilities), width of interior drives and access points, general interior circulation, separation of pedestrian and vehicular traffic, access to community facilities, and arrangement of vehicle parking and bicycle parking areas, including bicycle parking spaces required by Section 8.13 that are safe and convenient and, insofar as practicable, do not detract from the use and enjoyment of proposed buildings and structures and the neighboring properties.

**The circulation is as shown on the Applicant's plans along with the bicycle parking areas and the vehicular parking spaces.**

**The parking areas are also shown on the plans and are mentioned in the Environmental Impact Statement. The Applicant proposes fifteen (15) parking spaces and also proposes an electric charging station, potential parking for a Zipcar vehicle which would benefit not only residents within the building but other residents in the Town who would want to use a Zipcar or a similar type of vehicle and bicycle parking both covered and uncovered as shown on the Applicant's plans.**

5. **Surface Water Drainage.** Special attention shall be given to proper site surface drainage so that removal of surface waters will not adversely affect neighboring properties or the public storm drainage system. Available Best Management Practices for the site should be employed and include site planning to minimize impervious surface and reduce clearing and re-grading. Best Management Practices may include erosion control and storm water treatment by means of swales, filters, plantings, roof gardens, native vegetation, and leaching catch basins. Storm water should be treated at least minimally on the development site; that which cannot be handled on site shall be removed from all roofs, canopies, paved and pooling areas and carried away in an underground drainage system. Surface water in all paved areas shall be collected at intervals so that it will not obstruct the flow of vehicular or pedestrian traffic and will not create puddles in the paved areas.

In accordance with Section 3.3.4, the Board may require from any applicant, after consultation with the Director of Public Works, security satisfactory to the Board to insure the maintenance of all storm water facilities such as catch basins, leaching catch basins, detention basins, swales, etc. within the site. The Board may use funds provided by such security to conduct maintenance that the applicant fails to do. The Board may adjust in its sole discretion the amount and type of financial security such that it is satisfied that the amount is sufficient to provide for the future maintenance needs.

**The Applicant's engineer and architect have provided information with respect to service water drainage in the report of Allen & Major Associates, Inc. which is part of the plans being submitted to the ARB.**

**Allen & Major Associates, Inc. reports indicates as follows:**

**"The project proposes to demolish a portion of the existing structure to construct a five story 9,764 square foot mixed-use building with apartment and retail uses.**

**There are fifteen (15) parking spaces on the first level.**

**The storm water management system will be improved with a new drainage pipe connected. The quantity of storm water runoff will be reduced with the installation of landscaped areas on site.**

**The proposed work will result in approximately 701 feet of impervious material being replaced with landscaped areas."**

**The balance of the Allen & Major Associates, Inc. report spells out the details with respect the Applicant's proposal regarding surface water drainage.**

6. **Utility Service.** Electric, telephone, cable TV and other such lines and equipment shall be underground. The proposed method of sanitary sewage disposal and solid waste disposal from all buildings shall be indicated.

**All utility service, electric, telephone, cable TV and other such lines and equipment will be underground, and the proposed method of sanitary sewage disposal and solid waste disposal are as indicated within the substance of the Applicant's plan.**

7. **Advertising Features.** The size, location, design, color, texture, lighting and materials of all permanent signs and outdoor advertising structures or features shall not detract from the use and enjoyment of proposed buildings and structures and the surrounding properties. Advertising features are subject to the provisions of Section 6.2 of the Zoning Bylaw.

**There are currently no plans for advertising features and once a determination has been made with respect to advertising it is expected any such issues could be handled administratively**

through the Planning Department.

8. **Special Features.** Exposed storage areas, exposed machinery installations, service areas, truck loading areas, utility buildings and structures, and similar accessory areas and structures shall be subject to such setbacks, screen plantings or other screening methods as shall reasonably be required to prevent their being incongruous with the existing or contemplated environment and the surrounding properties.

**All such areas are buffered and screened as shown on the Applicant's plans.**

9. **Safety.** With respect to personal safety, all open and enclosed spaces shall be designed to facilitate building evacuation and maximize accessibility by fire, police, and other emergency personnel and equipment. Insofar as practicable, all exterior spaces and interior public and semi-public spaces shall be so designed as to minimize the fear and probability of personal harm or injury by increasing the potential surveillance by neighboring residents and passersby of any accident or attempted criminal act.

**All open and enclosed spaces will be designated to facilitate building evacuation and maximize accessibility by fire, police and other emergency personnel and equipment as required.**

10. **Heritage.** With respect to Arlington's heritage, removal, or disruption of historic, traditional, or significant uses, structures, or architectural elements shall be minimized insofar as practicable, whether these exist on the site or on adjacent properties.

**There will be no removal of historical, traditional, or significant uses, structures, or architectural elements or in any case, if there is any impact on any such matters efforts shall be made to minimize as so far as practicable any effect on those matters, whether on site or on adjacent properties.**

11. **Microclimate.** With respect to the localized climatic characteristics of a given area, any development which proposes new structures, new hard-surface ground coverage, or the installation of machinery which emits heat, vapor, or fumes, shall endeavor to minimize, insofar as practicable, any adverse impact on light, air, and water resources, or on noise and temperature levels of the immediate environment.

**The Applicant does not anticipate installation of machinery which will emit unreasonable heat, vapor or fumes or have any adverse impact on light, air, and water resources, or on noise and temperature levels of the immediate environment.**

12. **Sustainable Building and Site Design.** Projects are encouraged to incorporate best practices related to sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. Applicants must submit a current Green Building Council Leadership in Energy and Environmental Design (LEED) checklist, appropriate to the type of development, annotated with narrative description that indicates how the LEED performance objectives will be incorporated into the project.  
[LEED checklists can be found at <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220b> ]

**The Applicant has submitted a LEED checklist in connection with this matter.**

In addition, projects subject to Environmental Design Review must address and meet the following Special Permit Criteria (see Section 3.3.3 of the Zoning Bylaw)

1. The use requested is listed in the Table of Use Regulations as a special permit in the district for which application is made or is so designated elsewhere in this Bylaw.

**The use is listed as a Special Permit in the Use Regulations in the B3 District.**

2. The requested use is essential or desirable to the public convenience or welfare.

**The requested use is essential or desirable to the public convenience or welfare because the use would provide additional residential apartments in the Town which objectives are encouraged by the substance of the master plan and will also provide retail and/or restaurant space on the first level of the building which comports with the intent of the mixed-use portion of the Bylaw.**

3. The requested use will not create undue traffic congestion, or unduly impair pedestrian safety.

**It is not anticipated that there will be undue traffic congestion, or an impairment of pedestrian safety with respect to the proposal as indicated in the MDM Transportation Report.**

4. The requested use will not overload any public water, drainage or sewer system or any other municipal system to such an extent that the requested use or any developed use in the immediate area or in any other area of the Town will be unduly subjected to hazards affecting health, safety, or the general welfare.]

**The Applicant is providing 15 parking spaces and intends to contact a Zipcar type company for the purpose of determining whether a Zipcar vehicle could be located at the property which would benefit both residents of the building and other residents in the Town who would care to use a Zipcar type vehicle. There is also ample bicycle parking, both covered and uncovered, provided in the proposal for those individuals who do not own a car and those individuals would have nearby access to the bicycle path and would also have direct access to the MBTA and as is mentioned in the Environmental Impact Statement, many individuals now use Uber or Lyft for the purpose of satisfying their transportation needs.**

5. Any special regulations for the use, set forth in Article 11, are fulfilled.

**Any special regulations for the use, set forth in Article 11, are fulfilled.**

6. The requested use will not impair the integrity or character of the district or adjoining districts, nor be detrimental to the health, morals, or welfare.

**The substance of the Applicant's plans indicate that there will be no impairment of the integrity or character of the district or adjoining districts, nor be detrimental to the health, morals, or welfare**

7. The requested use will not, by its addition to a neighborhood, cause an excess of that particular use that could be detrimental to the character of said neighborhood.

**The requested use as mentioned in item No. 7 will not by its addition to the neighborhood in which the property is located cause an excess of that particular use that could be detrimental to the character of the neighborhood but rather will compliment other uses in the neighborhood and, as mentioned previously, provide additional residential apartment units and a retail and/or restaurant use, all of which will be in line with other uses in the neighborhood of the property.**

190 & 192-200 Massachusetts Avenue

Arlington, MA

**Environmental Impact Statement**

The property located at 190 & 192-200 Massachusetts Avenue real estate is located in a B3 zone as defined with the Zoning Bylaw for the Town.

The Districts and Purposes provisions of the Zoning Bylaw in Section 5.5.1 further subsection D, provide the following with respect to a B3 zoning district:

"B3: Village Business District. The Village Business District's predominant uses include retail, service, and office establishments catering to both convenience and comparison-goods shoppers and oriented to pedestrian traffic. Mixed-use structures are allowed and encouraged in this district. The three locations include portions of the principal business areas of Arlington: Lake Street, Arlington Center, and Arlington Heights. Businesses which consume large amounts of land and activities which interrupt pedestrian circulation and shopping patterns or otherwise interfere with the intent of this bylaw are discouraged."

A mixed-use development is allowed in a B3 zone as contained in the 5-26 District & Uses section of the Zoning Bylaw.

The minimum lot frontage required is 50 feet, the front yard requirement is 0 and the side yard requirement is also 0.

The rear yard requirement is (H+L) 6. The landscaped open space and useable open space requirements are contained in Section 5-28 with a requirement of 10% for landscaped open space and Section 5.3.21 would be applicable with respect to a determination with regard to useable open space. See Dimensional form submitted by the Applicant in connection with its plan.

An apartment building is allowed in a B3 zoning district in accordance with Section 5-28 of the Zoning Bylaw.

Five (5) stories are allowed in the B3 zone in accordance with Section 5-29 and the Applicant's Dimensional form indicates that the height would be five (5) stories. There is also a limit of 60 feet in height for an apartment building in a B3 zone and the Applicant's plans will comply with that requirement.

The maximum floor area ratio or FAR is 1.50 in the B3 zone and the Applicant's plans do request an increase in the FAR premised upon the fact that the mixed-use bylaw does apply to its development proposal.

The Applicant's plans propose a combination of units with respect to its development i.e., retail/commercial as well as thirty-seven (37) residential apartment units.

Commercial/restaurant/retail space would be provided for on the first floor facing Massachusetts Avenue with podium parking in the back of the building consisting of fifteen (15) parking spaces.

Access to the site will be by way of a full access/egress driveway along Chandler Street as shown on the Allen & Major Associates, Inc. site layout.

Chandler Street is one way street in a northerly direction with traffic traversing Chandler Street heading up Chandler Street towards Massachusetts Avenue with access to Chandler Street being available off of Lake Street and the Brooks Ave intersection as well as Egerton Road.

The Applicant intends to have its traffic consultant participate in the Zoom Hearing for the purpose of providing information with respect to existing and proposed traffic conditions relating to Chandler Street as well as Massachusetts Avenue with respect to the volume of traffic coming from Chandler Street on to Massachusetts Avenue and the effect of the development on the traffic.

The apartment mix would consist of ten studios, twenty-three one-bedroom units and four two-bedroom units.

There would be an outdoor roof deck on the fourth story of the building to provide an amenity for the residential tenants.

The current building essentially has no open space, and the Applicant has attempted to create open space with respect to its plans and the roof deck would be an area that would provide useable open space.

The building is surrounded by three (3) streets and an alleyway and the building footprint takes up nearly the entire parcel with the result that there would be no extra space for other outdoor amenities.

Eight (8) of the residential units will be designated as affordable and the unit mix for those units includes: (1) two-bedroom unit, 4 (1) one-bedroom units and 3 studio units.

The Applicant's plans provide for short-term bicycle parking as well as indoor long-term secure bicycle parking.

There will be an electric charging station at the property and approaches will be made to a "Zipcar" company or a Zipcar like company to have a Zipcar or similar type car located at the property as the Applicant feels this would be an amenity for the building as well as other residents in the neighborhood of the property who would like to have use of a Zipcar type vehicle.

As can be seen from the Applicant's Dimensional form fifteen (15) parking spaces are being proposed and the Zoning Bylaw would require forty-five (45) parking spaces.

The Applicant's plans do not contemplate a satisfaction of the parking requirement contained in the Bylaw but would instead propose that the Zipcar approach, bicycle parking and the electric charging station to be provided at the property could be used for the purpose of gaining a reduction in the parking requirement as set forth within the provisions of Section 6.1.5, further subsection C of the Zoning Bylaw.

It is clear that many individuals now use Uber and Lyft for transportation purposes with the result that the Applicant suggests that the parking requirement can be modified because some individuals may not even own a motor vehicle while residing in the building and particularly so in light of the fact that the property is in close proximity to MBTA access areas.

In addition, it is equally clear that most of the restaurants and other uses in the area also do not satisfy the parking requirements contained in the Zoning Bylaw.

It would be impossible for most of the uses in the neighborhood of the property to satisfy the parking requirements as there is no land available for that purpose.

The Applicant has, through its architect, Market Square Architects PLLC, conducted solar studies as well as massing studies with respect to the property and the effect of the proposed construction on surrounding properties and buildings as can be seen from the Market Square Architects PLLC's solar comments. The proposed structure would only cast shadows on existing structures in the R2 zone during the evenings of winter months when long shadows are already cast by existing structures and foliage.

However, the Applicant will supplement the shadow study provided by spreading the study out over different times of the day and a representative of Market Square Architect PLLC will discuss how the shadow study was prepared and how the proposed development will not adversely impact neighborhood properties.

The studies indicate that properties on Cleveland Street are located farther from the boundary which triggers the height buffer contained in the Zoning Bylaw as shown on the Allen & Major Associates, Inc. diagram on FIG-01 with the result that no existing structure in an R2 zone is close enough to be impacted by a shadow emanating from the proposed building.

The massing study indicates that the proposed building exaggerates the upper story setback, minimizing the impact of the taller structure and creating a pedestrian friendly streetscape along Massachusetts Avenue which harmonizes with the massing of the adjacent existing structures i.e., Capital Theater, 2054 Massachusetts Avenue, and the Leader Bank Corporate Offices at 180 Massachusetts Avenue.

The massing study also concludes that utilizing the taller maximum height allowed would have a minimal impact on the nearby R2 lots.

All utilities will be located underground.

The storm water management report of Allen & Major Associates, Inc. suggests that the quantity of storm water runoff will be reduced with the installation of landscaped areas on site and that the steps taken to create the landscaped area will result in approximately 725 of impervious material being replaced with landscaped areas.

The table contained in the October 23, 2020 Allen & Major Associates, Inc. report identified as study point 1 i.e., flow to municipal system indicates that Article 15 of the Town Stormwater Mitigation Bylaw will not apply as the proposed development will introduce a reduction in impervious area. The report further indicates that the proposed landscaped areas for the project will reduce the runoff rates for all design storms by reducing the rate and volume of stormwater runoff from the site with the result that there will be a positive impact on the stormwater management system.

It is the position of the Applicant that the proposed building will not result in an increase in vehicular activity compared to the existing historic uses at the site.

The Transportation Management Report of MDM Transportation Consultants, Inc. dated September 21, 2020 indicates that implementation of access improvements, proposed pedestrian improvements, and a TDM will establish a framework for minimizing site traffic impacts and encourage non-motorized travel modes and pedestrian accommodations and will be compatible with the other projects in the area.

The Applicant has submitted a Traffic Study by MDM Transportation Consultants, Inc. dated December 21, 2020 which provides in part as follows:

- “Safety Characteristics. A review of the crash data indicated that no immediate safety countermeasures are warranted based on the crash history at the study intersections. Likewise, available sight lines at the site driveway intersection with Chandler Street will exceed the sight line requirements published by AASHTO.”
- “Public Transportation. The project is in close proximity to an extensive sidewalk system, three nearby multi-use paths (Minuteman Bikeway, Alewife Greenway Bike Path, and Alewife Linear Path), adjacent MBTA bus routes, and the nearby redline subway connections. A review of Census data for Arlington indicates alternative transportation (transit, walk, and bike) are available for use of 50% of the residents of the immediate study area (Census tract 3561).”
- “Reduced Trip Generation. Based on ITE methodology the proposed mixed-

use development is estimated to reduce peak hour trips by up to 25 vehicle trips and approximately 228 fewer vehicle trips on a weekday relative to existing/historic site uses.”

- “Qualitative Impact Assessment. the incremental traffic associated with the proposed development will result in a reduction in vehicular activity compared to the existing/historic uses; consequently, no material impact in operating conditions at the study intersections and area roadways is projected as a result of the redevelopment.”

The report is based upon the Applicant retaining approximately 1,735 + square feet of commercial space and construction of 37 residential apartments with access to the site by way of a full access/egress driveway along Chandler Street with off street parking for 15 vehicles.

While the traffic report discusses MTBA Route 79 which previously provided service between Arlington Heights and the Alewife Station *via* Massachusetts Avenue and Alewife Brook Parkway, that service has been suspended but the inclusion of information with respect to Route 79 does not change the conclusions of MDM with respect to its traffic report.

The Conclusion of MDM in the traffic study is as follows:

“In summary, access improvements, pedestrian/bicycle improvements, and TDM programs are outlined under *Recommendations and Conclusions*. These improvements will establish a framework of minimizing Site traffic impacts and encourage non-motorized travel modes and pedestrian accommodation that is compatible with other projects in the area.”

Bicycle travel will be encouraged with the Applicant's proposal and there will be secure, and weather protected indoor bicycle racks within the site containing 60 total spaces to facilitate this mode of transportation to and from the site by residents and building tenants and there will be additional short-term bicycle racks consisting of eight exterior spaces adjacent to the building as well.

A LEEDS project checklist has also been provided to the ARB in this filing.

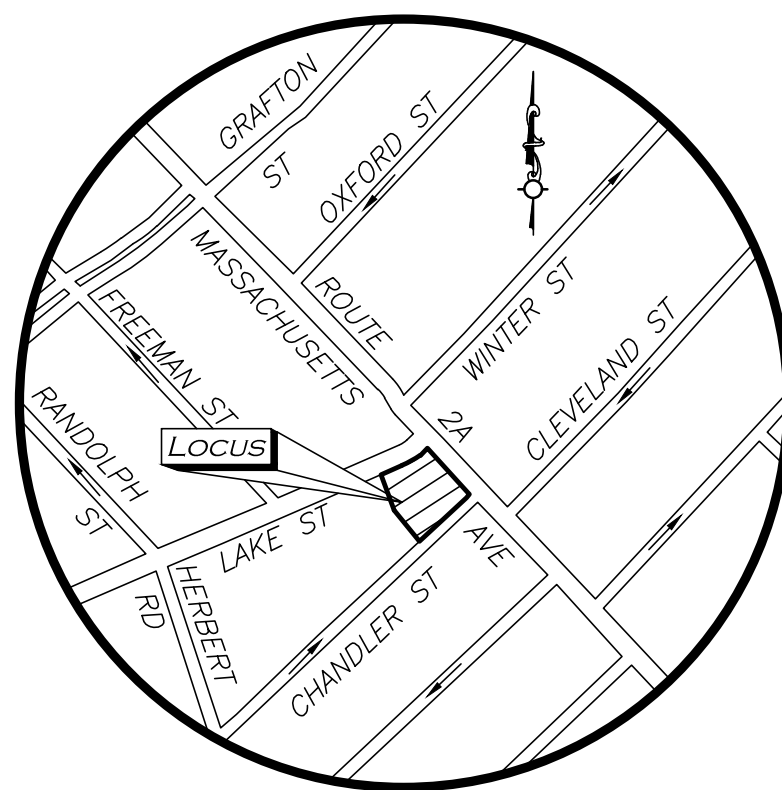
In summary, the proposed building is in harmony with other structures in the neighborhood of the property and will not have an adverse impact on nearby

properties with respect to shadow effects and massing and, on the other hand, will provide needed residential apartment units in the Town, while also providing for restaurant/retail space at the first level of the building which conforms to the intent of the mixed-use portion of the Zoning Bylaw.

The Applicant and its representatives understand that their proposal will represent a change to the neighborhood in which the property is located and, to that extent, creating a development plan for the site is challenging.

The plans submitted are a proposal to the Members of the Arlington Redevelopment Board and the Applicant fully expects comments from the Members with respect to the design aspects of the project and indeed invites those comments with a view toward coming up with a development that makes sense not only for the Town but also for the property owner who of course will be spending the money to develop the site.

The Applicant has also reached out to abutters and neighbors to the property for the purpose of alerting them to the development plans and invites comments from those individuals and entities as well.



**LOCUS MAP**  
NOT TO SCALE

# SITE DEVELOPMENT PLAN SET

## 190 & 192-200 MASSACHUSETTS AVE

### ARLINGTON, MA 02476

**APPLICANT:**

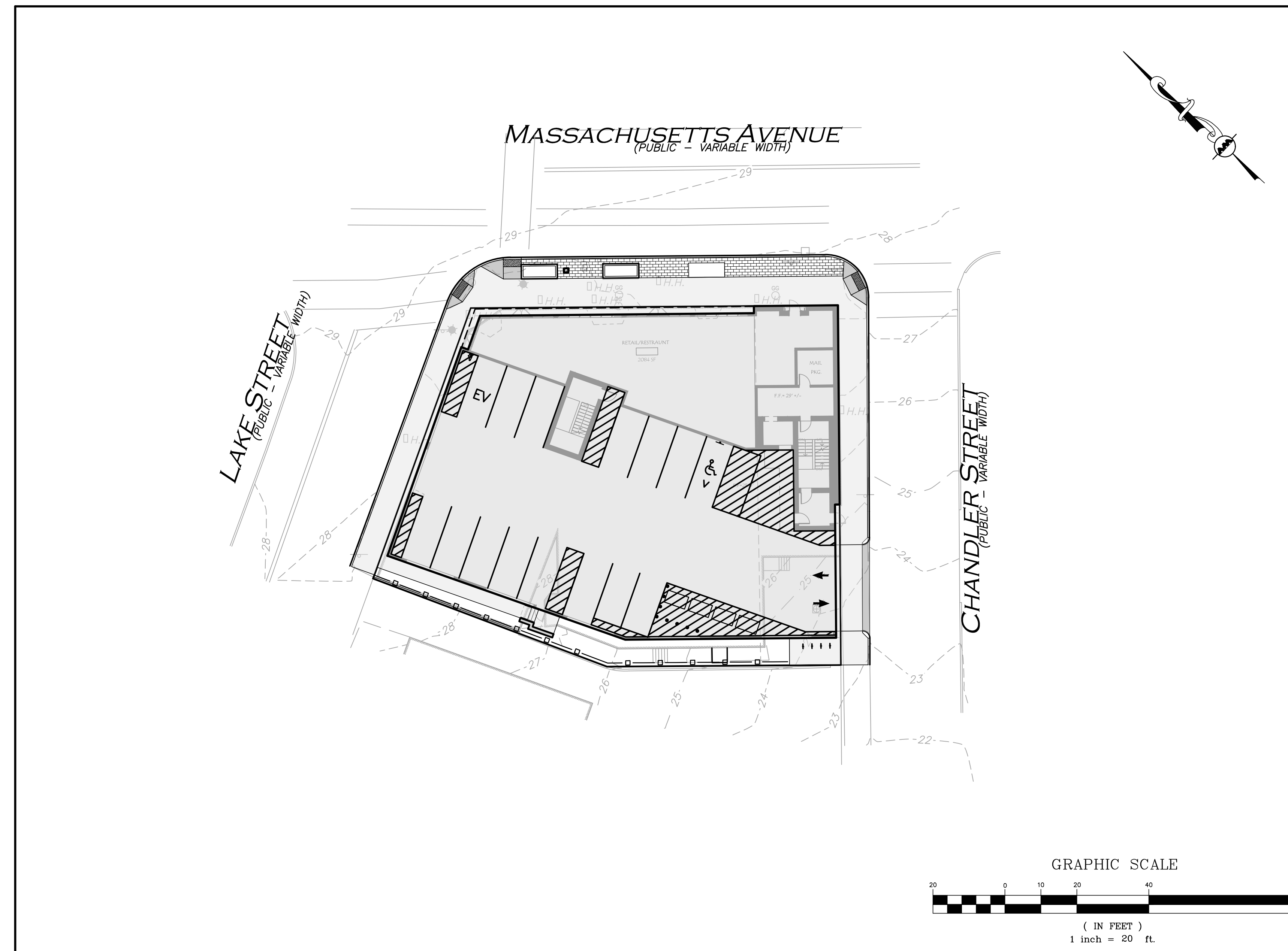
192-200 MASSACHUSETTS AVE, LLC  
452 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

**ARCHITECT:**

MARKET SQUARE ARCHITECTS  
104 CONGRESS STREET, STE 203  
PORTSMOUTH, NH 03801  
(603) 501-0202

**CIVIL ENGINEER, LANDSCAPE ARCHITECT &  
LAND SURVEYOR:**

ALLEN & MAJOR ASSOCIATES, INC.  
100 COMMERCE WAY, SUITE 5  
WOBURN, MA 01801  
(781) 985-6889



#### LIST OF DRAWINGS

DRAWING TITLE	SHEET	ISSUED	REVISED
EXISTING CONDITIONS	V-101	10/23/2020	-
SITE PREPARATION PLAN	C-101	03/10/2021	-
LAYOUT & MATERIALS PLAN	C-102	03/10/2021	-
GRADING & DRAINAGE PLAN	C-103	03/10/2021	-
UTILITIES PLAN	C-104	03/10/2021	-
DETAILS	C-501	03/10/2021	-
DETAILS	C-502	03/10/2021	-
DETAILS	C-503	03/10/2021	-
LANDSCAPE PLAN	L-101	03/10/2021	-
LANDSCAPE DETAILS	L-501	03/10/2021	-



*Brian D. Jones*  
03.10.21

PROFESSIONAL ENGINEER FOR  
ALLEN & MAJOR ASSOCIATES, INC.

PREPARED BY:



**ALLEN & MAJOR  
ASSOCIATES, INC.**

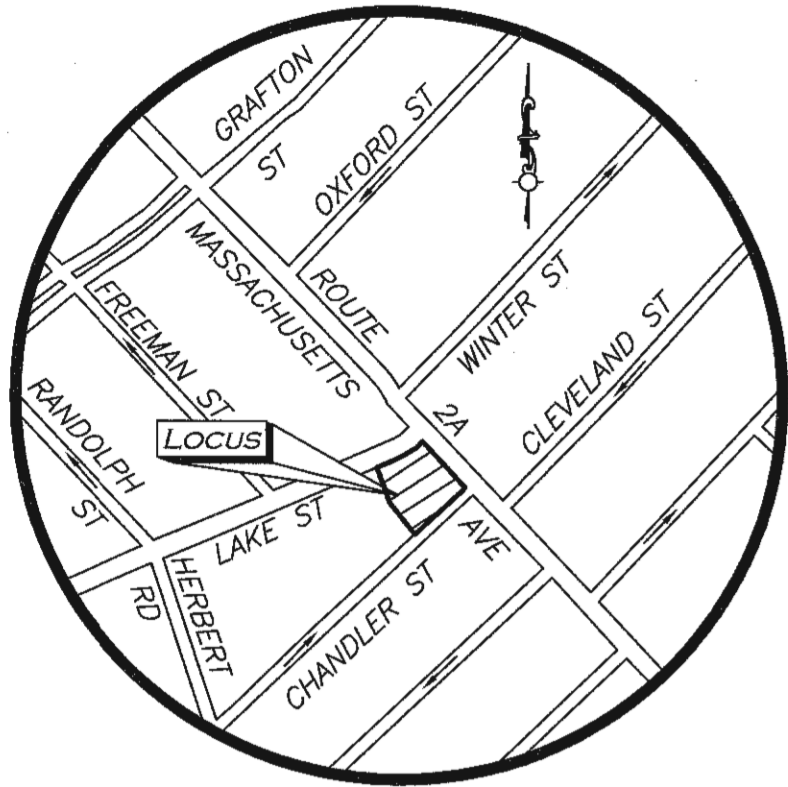
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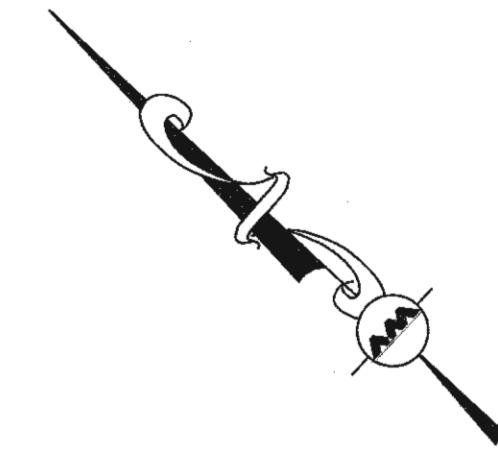
ISSUED FOR ARB REVIEW: MARCH 10, 2021

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LOCUS MAP  
(NOT TO SCALE)

BENCHMARK SUMMARY		
TBM #	DESCRIPTION	ELEV.
1	COTTON GIN SPINDLE SET IN UTILITY POLE	28.96
2	CHISEL SQUARE ON CONCRETE BASE	29.24



## LEGEND

STONE BOUND (SB)	□
DRAIN MANHOLE (DMH)	⊙
SEWER MANHOLE (SMH)	⊙
MISC. MANHOLE (MH)	⊙
TELEPHONE MANHOLE (TMH)	⊙
ROUND CATCH BASIN (RCB)	⊙
UTILITY POLE	⊙
UTILITY POLE W/LIGHT	⊙
UTILITY POLE W/RISE	⊙
WATER GATE	⊙
GAS GATE	⊙
HAND HOLE	⊙
TRAFFIC SIGNAL	⊙
LIGHT	⊙
TREE	⊙
SIGN	⊙
CONCRETE	⊙
BUILDING	⊙
BUILDING OVERHANG	⊙
PROPERTY LINE	⊙
CURB	⊙
CHAIN LINK FENCE	⊙
WATER LINE	⊙
SEWER LINE	⊙
DRAIN LINE	⊙
GAS LINE	⊙
ELECTRIC LINE	⊙
TELEPHONE LINE	⊙
OVERHEAD WIRES	⊙
FINISHED FLOOR ELEVATION	FFE
BITUMINOUS	BIT.
CONCRETE	CONC.
GRANITE	GRAN.
BOTTOM CENTER	(BC)
REINFORCED CONCRETE PIPE	RCP
POLYVINYL CHLORIDE PIPE	PVC
NOW OR FORMERLY	N/F
BOOK	BK.
PAGE	PG.
LAND COURT	L.C.
LAND COURT CASE	L.C.C.

## LOCUS REFERENCES

- TOWN OF ARLINGTON ASSESSORS MAP 6, LOT 3-1A
- L.C. BOOK 1362, PAGE 16
- L.C. BOOK 1376, PAGE 27
- L.C.C. NO. 3413N
- RECORD OWNER: FRAMINA LLC

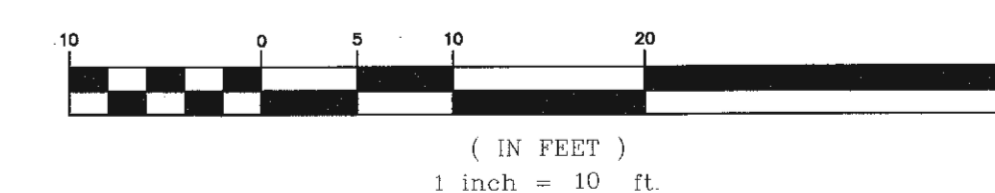
## PLAN REFERENCES

- PLAN 542 OF 1986
- PLAN 320 OF 2012
- L.C.C. NO. 3413

## NOTES

- NORTH ARROW IS BASED ON MASSACHUSETTS GRID COORDINATE SYSTEM (MAINLAND ZONE) (NAD 83).
- BOOK/PAGE AND PLAN REFERENCES ARE TAKEN FROM MIDDLESEX (SOUTH) REGISTRY OF DEEDS IN CAMBRIDGE, MA.
- VERTICAL DATUM IS NAVD 88 ESTABLISHED USING RTK GPS OBSERVATION.
- CONTOUR INTERVAL IS ONE FOOT (1').
- THERE ARE NO STRIPED PARKING STALLS ON THE SUBJECT PREMISES.

## GRAPHIC SCALE



N:\PROJECTS\2729-02\SURVEY\DRAWINGS\CURRENT\5-2729-02-EC.DWG

WE HEREBY CERTIFY THAT THIS PLAN IS THE  
RESULT OF AN ACTUAL ON THE GROUND  
SURVEY PERFORMED ON AUGUST 4, 2020.

PROFESSIONAL LAND SURVEYOR FOR  
ALLEN & MAJOR ASSOCIATES, INC.



REV	DATE	DESCRIPTION
-----	------	-------------

APPLICANT/OWNER:  
192-200 MASSACHUSETTS AVE LLC  
455 MASSACHUSETTS AVENUE  
SUITE 1  
ARLINGTON, MA 02474

PROJECT:  
190 & 192-200  
MASSACHUSETTS AVENUE  
ARLINGTON, MA

PROJECT NO. 2729-02 DATE: 10/22/20  
SCALE: 1" = 10' DWG. NAME: 5-2729-02-EC  
DRAFTED BY: AJR CHECKED BY: NIL

PREPARED BY:



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ASSOCIATES, INC.

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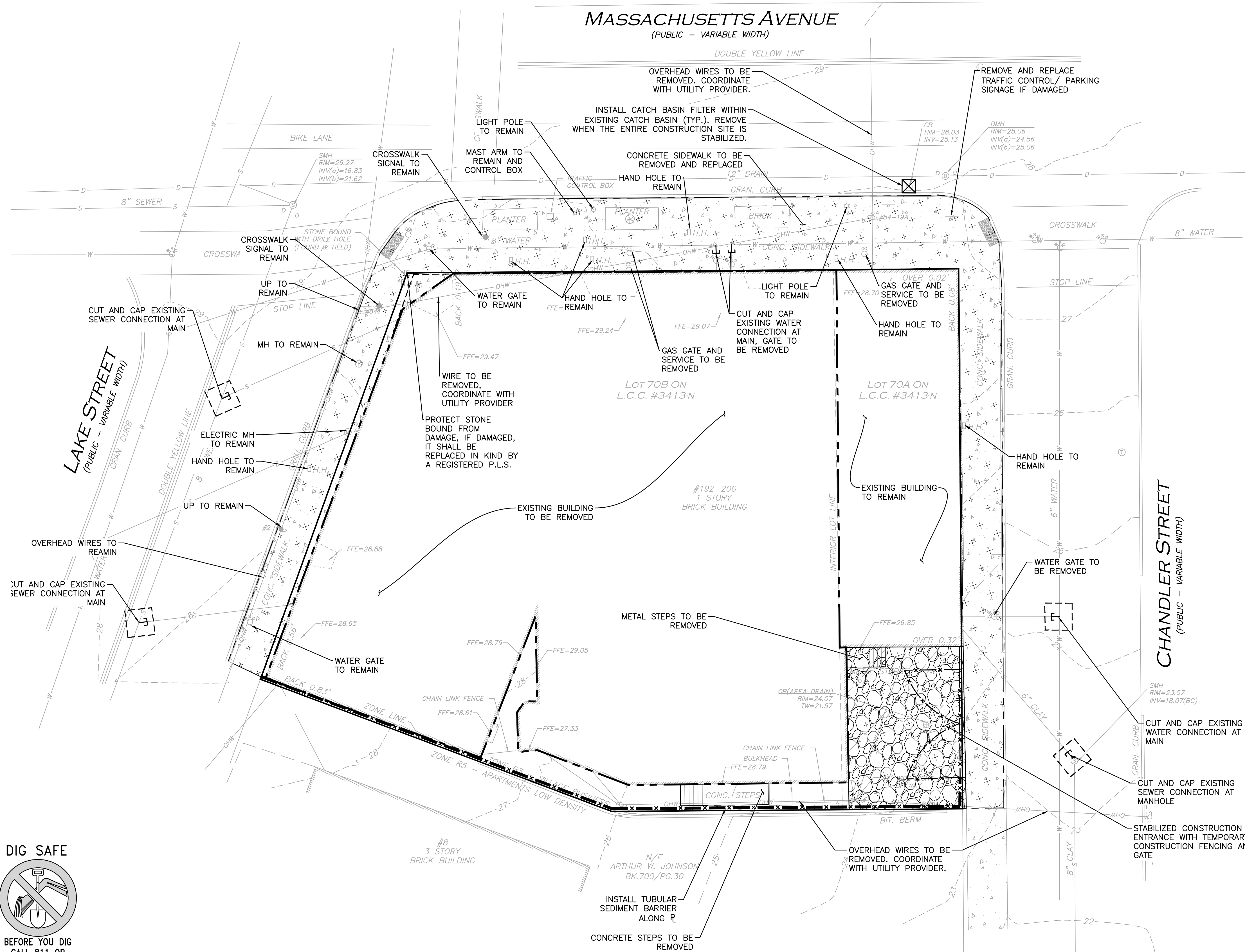
DRAWING TITLE: EXISTING CONDITIONS SHEET NO. V-101

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## 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.

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LEGEND

TUBULAR BARRIER

CATCH BASIN FILTER

STABILIZED ENTRANCE

STOCKPILE/STAGING AREA

LIMIT OF DISTURBANCE

LIMIT OF 'CLEAR AND GRUB'

BUILDING TO BE REMOVED

PAVEMENT TO BE REMOVED

UTILITY CUT AND CAP

TEMPORARY FENCE

X

X

X

X

X

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- SITE PREPARATION NOTES:
1.

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
2.

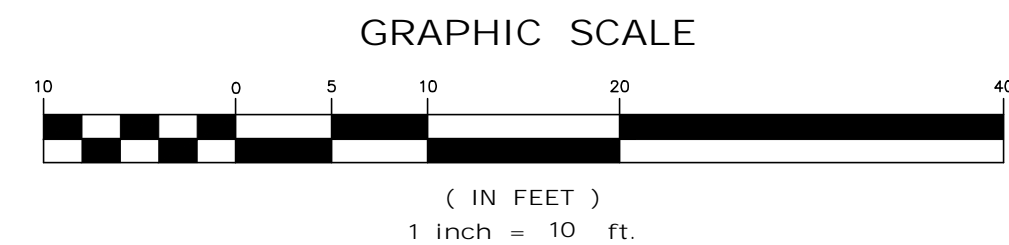
THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY, AND "DIGSAFE" AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST EXACT FIELD LOCATION OF UTILITIES AND THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION TAKEN BEFORE PROCEEDING WITH THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
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. 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.
4.

EXISTING WATER AND SEWER CONNECTIONS SHALL BE CUT AND CAPPED IN ACCORDANCE WITH THE TOWN OF ARLINGTON REQUIREMENTS.
5.

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.
6.

ALL INSTALLED CATCH BASINS AND AREA DRAINS SHALL HAVE A FILTER INSTALLED IMMEDIATELY, AND THE FILTER SHALL BE REMOVED WHEN THE ENTIRE SITE IS STABILIZED.



BRIAN D. JONES

CIVIL

No. 46212

REGISTERED

PROFESSIONAL ENGINEER

03.10.21

PROFESSIONAL ENGINEER FOR  
ALLEN & MAJOR ASSOCIATES, INC.

1	03/10/2021	ISSUED FOR ARB REVIEW
REV	DATE	DESCRIPTION

APPLICANT/OWNER:

192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:

190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO.	2729-02	DATE:	10/23/2020
SCALE:	1" = 10'	DWG. NAME:	C2729-02
DESIGNED BY:	ARM	CHECKED BY:	BDJ

PREPARED BY:

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civil engineering • land surveying  
environmental consulting • landscape architecture  
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DRAWING TITLE:	SHEET No.
SITE PREPARATION PLAN	C-101

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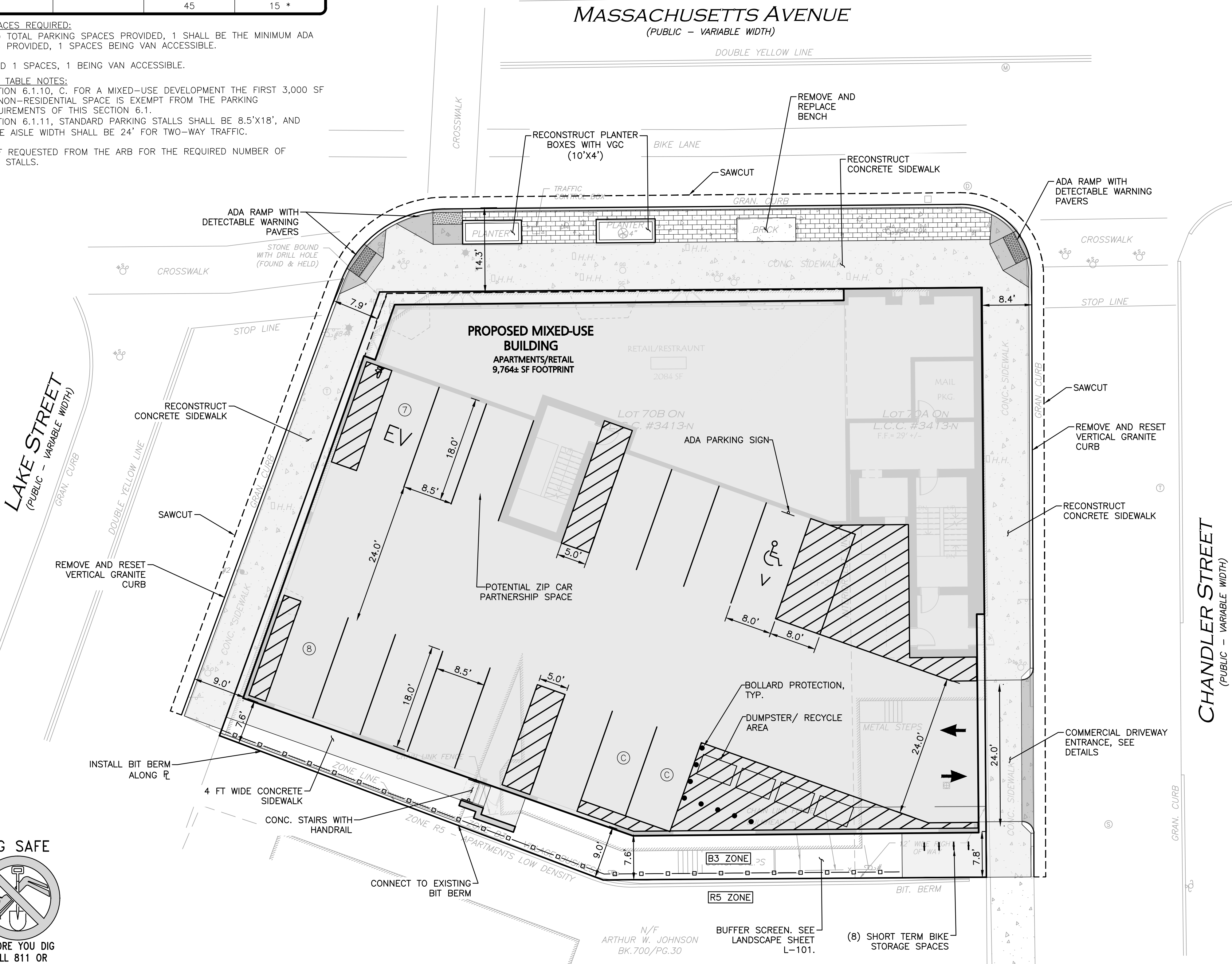
PARKING SUMMARY TABLE			
USE	CALCULATION	MIN. REQUIRED	TOTAL PROPOSED
APARTMENT BUILDING	1 SPACES PER EFFICIENCY UNIT 1 X 10 = 10 REQUIRED	10	5
	1.15 SPACES PER 1 BED UNIT 23 X 1.15 = 27 REQUIRED	27	7
	1.5 SPACES PER 2 BED UNIT 4 X 2 = 8 REQUIRED	8	3
	1 PER 300 SF 2,084 SF (UNDER 3,000 SF PARKING N/A)	N/A	N/A
GENERAL RETAIL		45	15 *

ADA SPACES REQUIRED:  
(15-25) TOTAL PARKING SPACES PROVIDED, 1 SHALL BE THE MINIMUM ADA PARKING PROVIDED, 1 SPACES BEING VAN ACCESSIBLE.  
PROVIDED 1 SPACES, 1 BEING VAN ACCESSIBLE.

PARKING TABLE NOTES:  
1. SECTION 6.1.10, C. FOR A MIXED-USE DEVELOPMENT THE FIRST 3,000 SF OF NON-RESIDENTIAL SPACE IS EXEMPT FROM THE PARKING REQUIREMENTS OF THIS SECTION 6.1.  
2. SECTION 6.1.11, STANDARD PARKING STALLS SHALL BE 8.5'X18', AND DRIVE AISLE WIDTH SHALL BE 24' FOR TWO-WAY TRAFFIC.  
\* RELIEF REQUESTED FROM THE ARB FOR THE REQUIRED NUMBER OF PARKING STALLS.

BICYCLE PARKING SUMMARY TABLE			
SHORT TERM BICYCLE PARKING (EXTERIOR)			
USE	CALCULATION	MIN. REQUIRED	TOTAL PROPOSED
APARTMENT BUILDING	0.1 PER UNIT 37 X 0.1 = 3.7 REQUIRED	4	5
	0.6 PER 1,000 SF 1.7 X 0.6 = 1.02 REQUIRED	1	3
TOTAL		5	8
LONG TERM BICYCLE PARKING (INTERIOR)			
USE	CALCULATION	MIN. REQUIRED	TOTAL PROPOSED
APARTMENT BUILDING	1.5 PER UNIT 37 X 1.5 = 55.5 REQUIRED	56	59
	0.1 PER 1,000 SF 2 X 0.1 = 0.2 REQUIRED	1	1
TOTAL		57	60

BICYCLE PARKING TABLE NOTES:  
1. REQUIRED NUMBER OF SPACES ARE FROM BICYCLE PARKING GUIDELINES, APPENDIX A BIKE PARKING BY-LAW.



ZONING SUMMARY TABLE			
B3-VILLAGE BUSINESS (MIXED-USE <=20,000SF)			
ITEM	REQUIRED/ALLOWED	EXISTING	PROPOSED

ITEM	REQUIRED/ALLOWED	EXISTING	PROPOSED
MINIMUM LOT AREA	N/A	11,134± SF	11,134± SF
MINIMUM LOT AREA PER UNIT	N/A	N/A	301± SF
MINIMUM FRONTAGE	50 FT	102.1± FT MASS AVE	102.1± FT MASS AVE
MINIMUM FRONT YARD SETBACK	0 FT	0 FT	0 FT
MINIMUM SIDE YARD SETBACK	0 FT	0.6 FT	7.5 FT
MINIMUM REAR YARD SETBACK	(H+L)/6	NO REAR	NO REAR
SCREENING BUFFER	7.5 FT <sup>(3)</sup>	0.6 FT	7.5 <sup>(3)</sup>
LANDSCAPED OPEN SPACE	10% <sup>(2)</sup>	0.9%	4.8%*
USABLE OPEN SPACE	20% <sup>(2)</sup>	0%	9.0%*
MAXIMUM HEIGHT	60 FT	20± FT	<60
MAXIMUM HEIGHT STORIES	5	1	5 <sup>(1)</sup>
FLOOR AREA RATIO	1.50	0.89	4.1*

ZONING TABLE NOTES:  
1. SECTION 5.3.17, FOR BUILDING MORE THAN 3 STORIES IN HEIGHT, AN ADDITIONAL 7.5 FT STEP-BACK SHALL BE PROVIDED BEGINNING AT THE THIRD STORY LEVEL OR 30 FT ABOVE GRADE, WHICHEVER IS LESS. THE UPPER STORY STEP-BACK SHALL BE PROVIDED ALONG ALL BUILDING ELEVATIONS WITH STREET FRONTAGE.  
2. SECTION 5.3.21, SUPPLEMENTAL REQUIREMENTS IN THE BUSINESS AND INDUSTRIAL DISTRICTS, D, FOR MIXED USES AND ANY PERMITTED RESIDENTIAL USE NOT SPECIFICALLY IDENTIFIED IN THE TABLES IN SECTION 5.5.2, THE MINIMUM OPEN SPACE REQUIREMENTS (COMPUTED FROM THE RESIDENTIAL FLOOR AREA ONLY) SHALL BE 10% LANDSCAPED AND 20% USABLE IN THE B1, B2, B2A, B3, AND B4 DISTRICTS, AND 15 PERCENT USABLE IN THE B5 DISTRICT.  
3. SECTION 5.3.21, SUPPLEMENTAL REQUIREMENTS IN THE BUSINESS AND INDUSTRIAL DISTRICTS, B3 ABUTTING R5 15 FT MINIMUM BUFFER. A SOLID WALL OR WOODEN FENCE MAY BE SUBSTITUTED FOR ON-HALF THE WIDTH OF THE LANDSCAPED BUFFER.  
4. SECTION 5.3.19, REDUCED HEIGHT BUFFER. RELIEF REQUESTED FROM THE ARB TO PERMIT THE HIGHER PERMITTED HEIGHT OF 60 FT AND 5 STORIES.



PROFESSIONAL ENGINEER FOR  
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	03/10/2021	ISSUED FOR ARB REVIEW

APPLICANT/OWNER:  
192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
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ARLINGTON, MA 02476

PROJECT NO.	2729-02	DATE:	10/23/2020
SCALE:	1" = 10'	DWG. NAME:	C2729-02
DESIGNED BY:	ARM	CHECKED BY:	BDJ

PREPARED BY:

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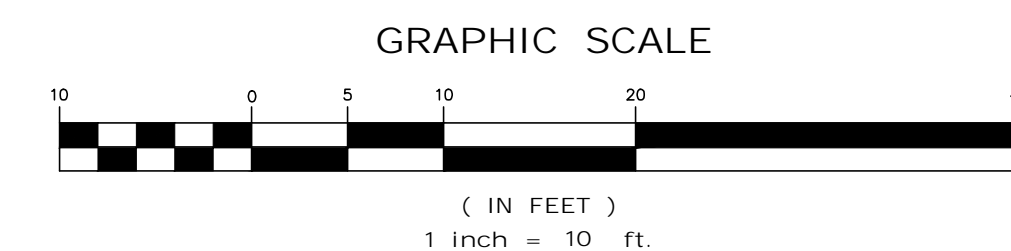
DRAWING TITLE:	SHEET No.
LAYOUT & MATERIALS PLAN	C-102

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## **PLAN 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. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF EXISTING STRUCTURES INCLUDING REMOVAL OF ANY EXISTING UTILITIES SERVING THE STRUCTURE. UTILITY CONNECTIONS SHOULD BE COORDINATED WITH THE MEP PRIOR TO CONSTRUCTION.
3. EXISTING DRAINAGE STRUCTURES TO REMAIN ARE TO BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.
4. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.
5. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ENSURE A SMOOTH FIT AND CONTINUOUS GRADE.
6. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
7. THE CONTRACTOR SHALL COORDINATE WITH THE ARCHITECT FOR THE FINAL LOCATIONS OF PROPOSED ROOF DRAINS. LOCATIONS ARE SHOWN HEREON FOR COORDINATION PURPOSES ONLY.
8. WRITTEN DIMENSIONS ON THIS PLAN TAKE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN THE EVENT OF A CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWINGS AND/OR SPECIFICATIONS OR CONDITIONS, THE ENGINEER SHALL BE NOTIFIED BY THE CONTRACTOR.
9. ANY DAMAGE TO PRIVATE OR PUBLIC PROPERTIES DUE TO THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AND RESTORED BY THE CONTRACTOR AT THEIR OWN EXPENSE.
10. ALL PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED DURING CONSTRUCTION, ANY DAMAGE TO THESE ITEMS SHALL BE REPAIRED AND RESTORED BY A LAND SURVEYOR LICENSED IN THE COMMONWEALTH OF MASSACHUSETTS AT THE CONTRACTOR'S EXPENSE.
11. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ADDITIONAL BENCHMARK INFORMATION IF REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING BENCHMARKS. IF IT IS NECESSARY TO RELOCATE A BENCHMARK, IT SHALL BE RELOCATED BY A MASSACHUSETTS LAND SURVEYOR AND DONE SO AT THE CONTRACTOR'S EXPENSE.
12. ALL PERMITS AND APPROVALS NECESSARY FROM AGENCIES GOVERNING THE WORK SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORK.
13. CONSTRUCTION DURING WET WEATHER OR WINTER CONDITIONS IS TO BE ANTICIPATED AND PROVISIONS TO ADEQUATELY ADDRESS THESE CONDITIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
14. ALL CONSTRUCTION SHALL CONFORM TO THE APPLICABLE REGULATIONS AND STANDARDS INCLUDING THE TOWN OF ARLINGTON, MADOT, MADEP, MWRA, MUTCD, AND AASHTO.
15. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND FOR CONDITIONS AT THE SITE. THESE PLANS, PREPARED BY ALLEN & MAJOR ASSOCIATES DO NOT EXTEND TO OR INCLUDE SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR THEIR EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK, OR THE OWNER'S EMPLOYEES, CUSTOMERS, OR THE GENERAL PUBLIC. THE SEAL OF THE ENGINEER AS INCLUDED IN THE PLAN SET DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED INTO THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PROVIDE THE APPROPRIATE SAFETY SYSTEMS WHICH MAY BE REQUIRED BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), STATE, AND LOCAL REGULATIONS.
16. 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.



PROFESSIONAL ENGINEER FOR  
ALLEN & MAJOR ASSOCIATES, INC

1	03/10/2021	ISSUED FOR ARB REVIEW
REV	DATE	DESCRIPTION

APPLICANT\OWNER:	
------------------	--

192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:

190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO.	2729-02	DATE:	10/23/2020
SCALE:	1" = 10'	DWG. NAME:	C2729-02
DESIGNED BY:	ARM	CHECKED BY:	BDJ

PREPARED BY:



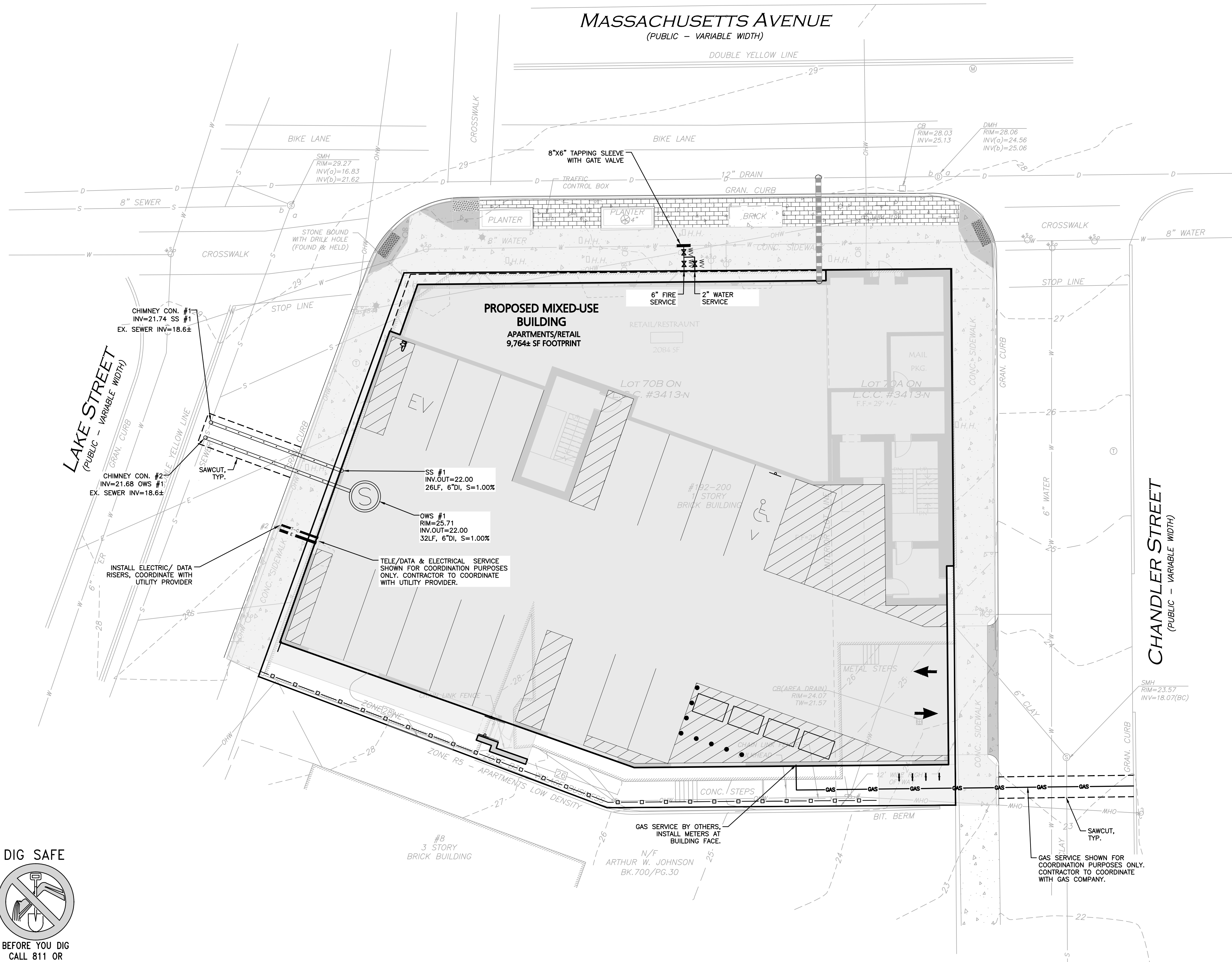
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TEL: (781) 935-6889  
FAX: (781) 935-2896

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

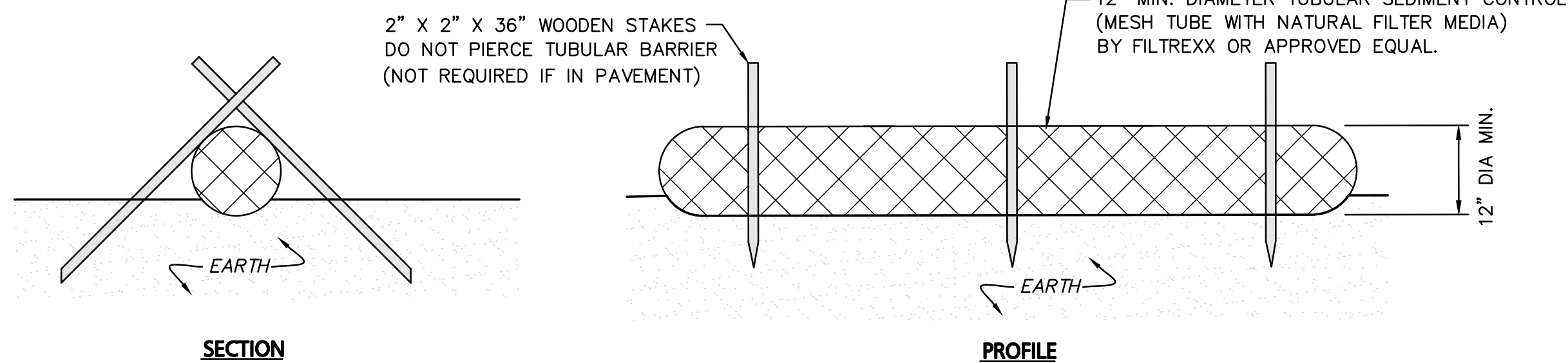
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DRAWING TITLE:	SHEET No.
GRADING & DRAINAGE PLAN	C-103

R:\PROJECTS\2729-02\CIVIL\DRAWINGS\CURRENT\C-2729-02\_UTILITIES.DWG



R:\PROJECTS\2729-02\CIVIL\DRAWINGS\CURRENT\C-2729-02\_DETAILS.DWG



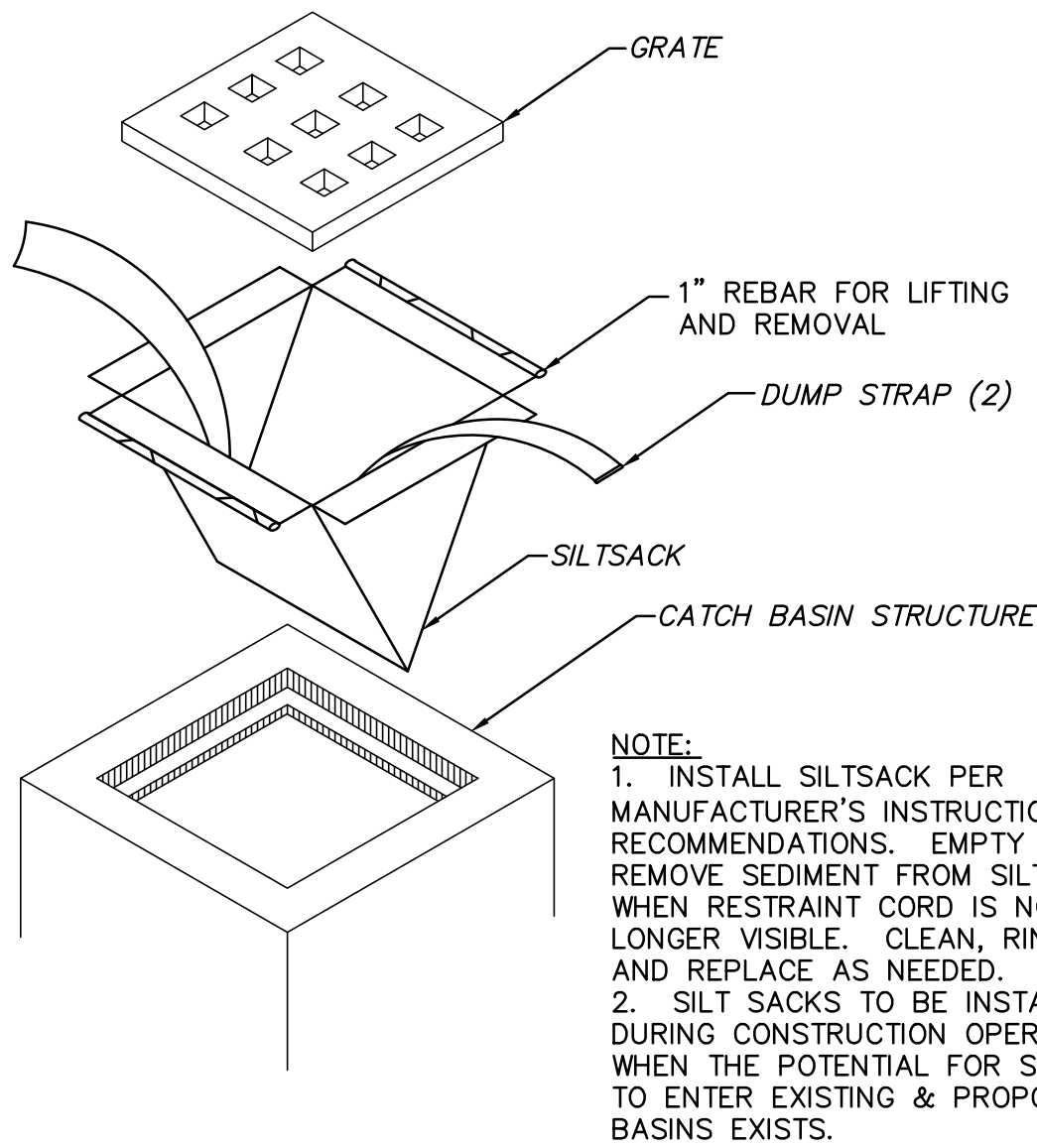
SECTION

PROFILE

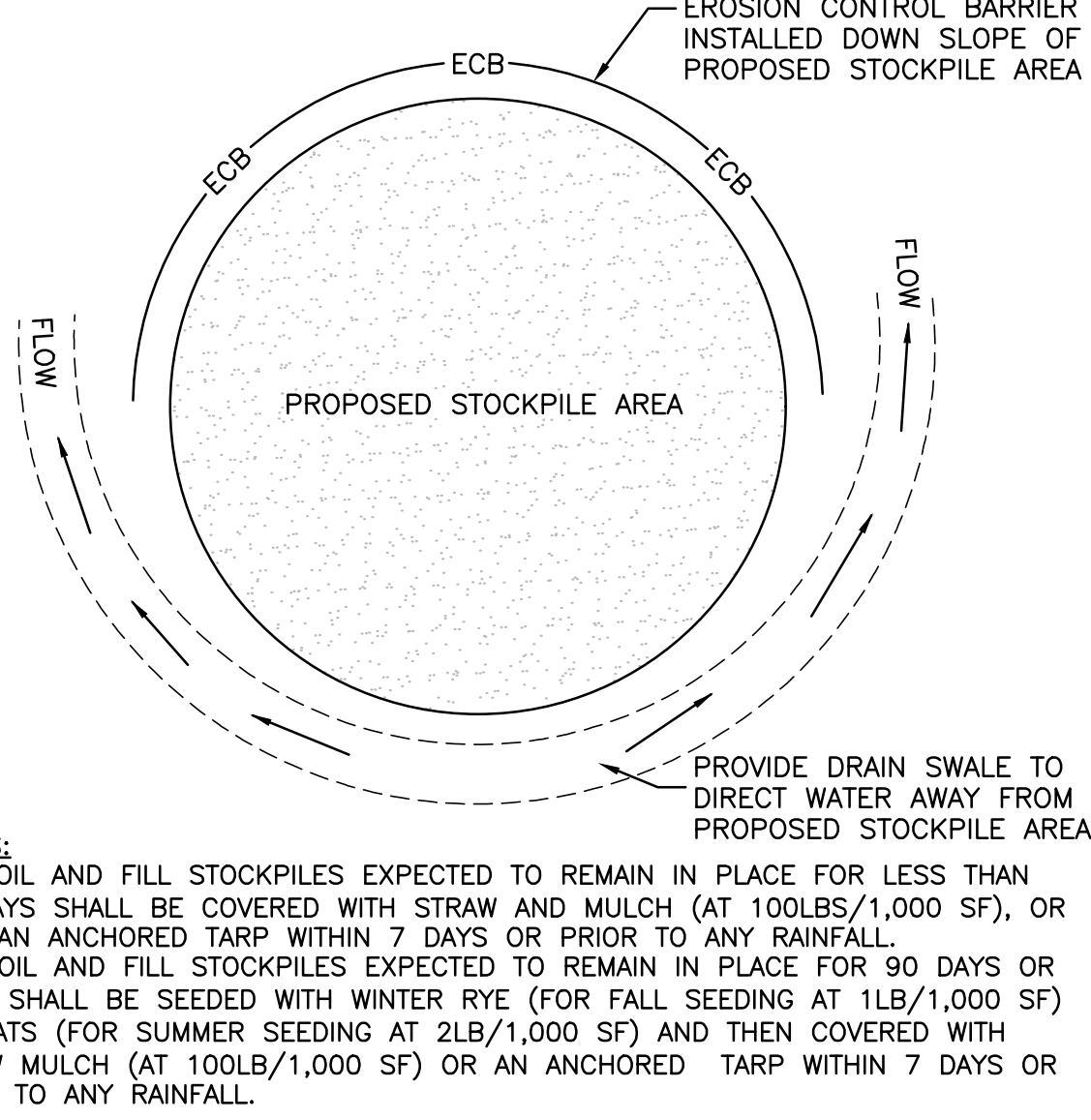
NOTES:

1. ALL MATERIALS TO MEET MANUFACTURERS SPECIFICATIONS.
2. INSTALL WOODEN STAKES IN A CRISS-CROSS PATTERN EVERY 8' ON CENTER.
3. OVERLAP TUBULAR BARRIER SEGMENTS A MINIMUM OF 12".
4. THE CONTRACTOR SHALL MAINTAIN THE TUBULAR BARRIERS IN A FUNCTIONAL CONDITION AT ALL TIMES. THE CONTROLS SHALL BE ROUTINELY INSPECTED BY THE CONTRACTOR.
5. WHERE THE TUBULAR BARRIERS REQUIRE REPAIR OR SEDIMENT REMOVAL, IT WILL BE COMPLETED BY THE CONTRACTOR AT NO ADDITIONAL COST.
6. AT A MINIMUM, THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE WHEN THEY REACH 1/3 THE EXPOSED HEIGHT OF THE BARRIER.

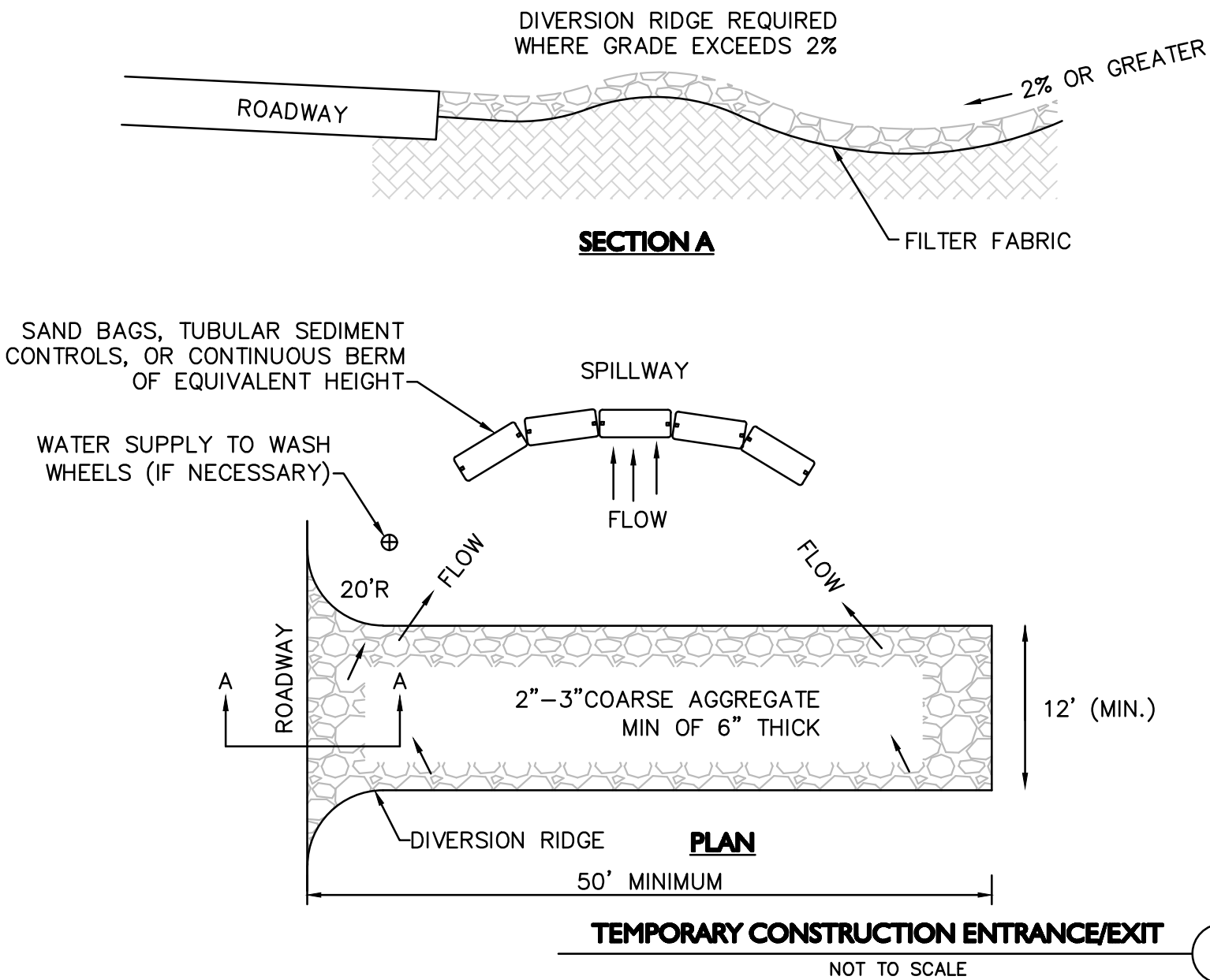
TUBULAR SEDIMENT BARRIER  
NOT TO SCALE



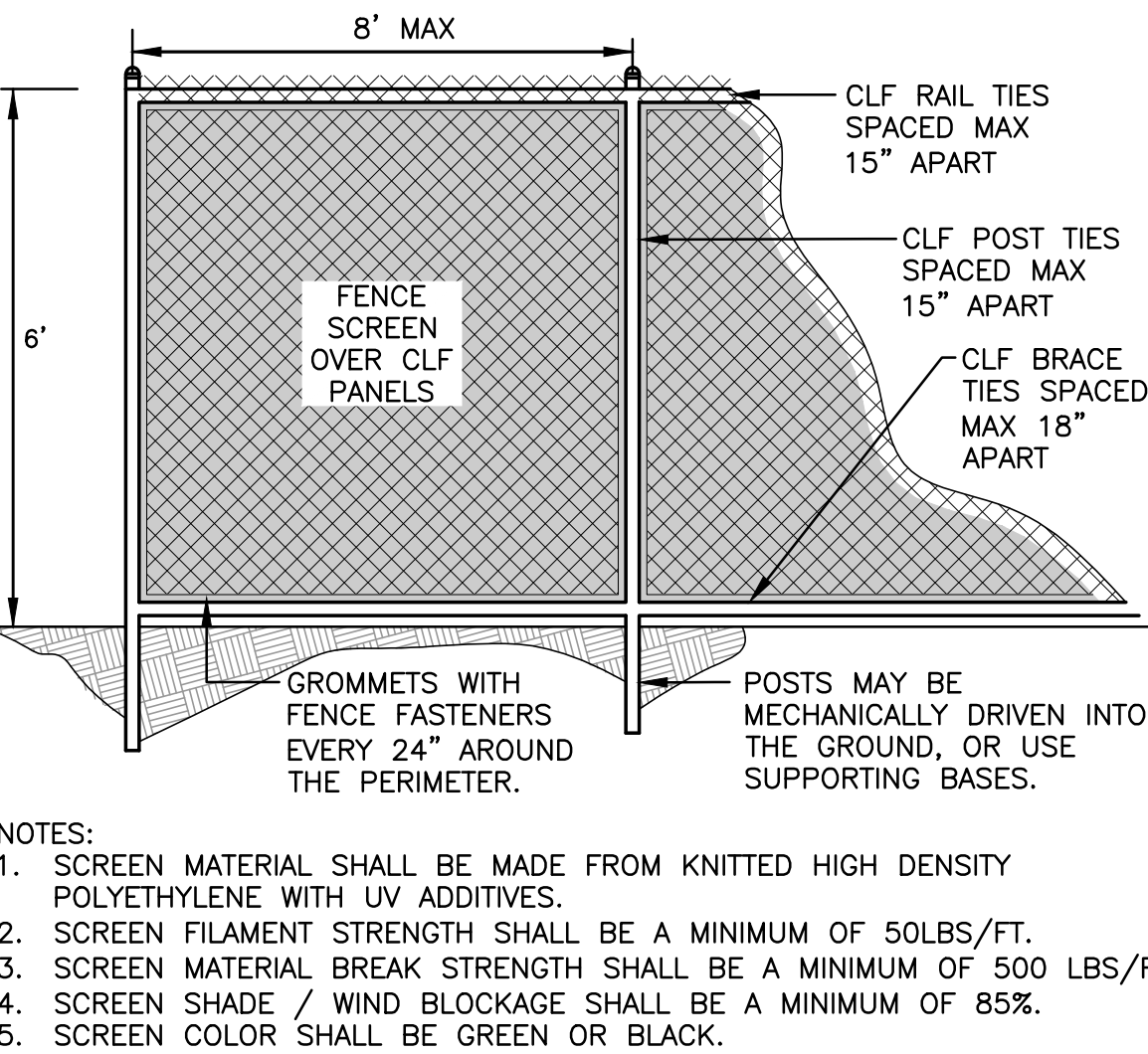
SILTSACK INLET DETAIL  
NOT TO SCALE



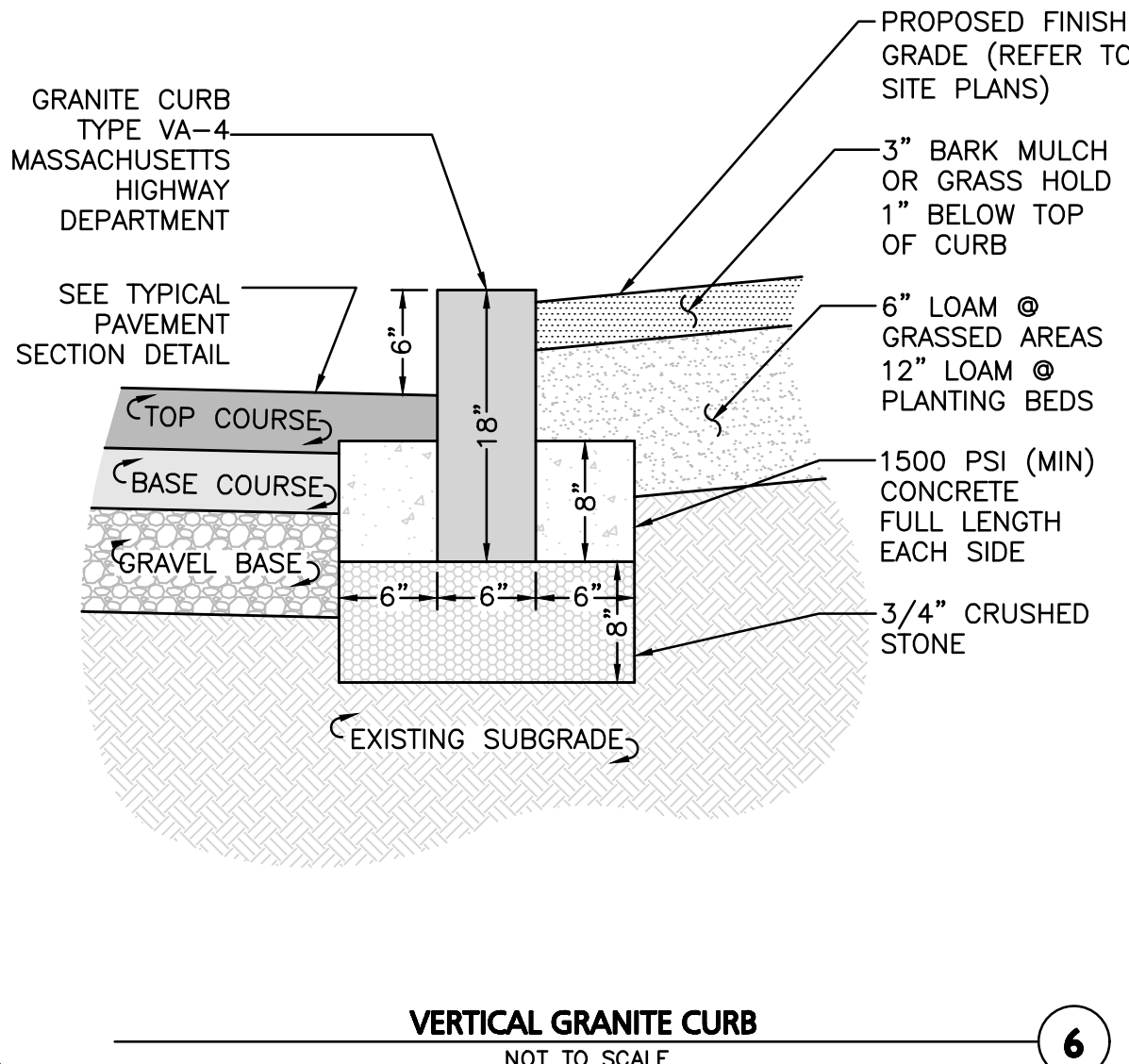
STOCKPILE PROTECTION DETAIL  
NOT TO SCALE



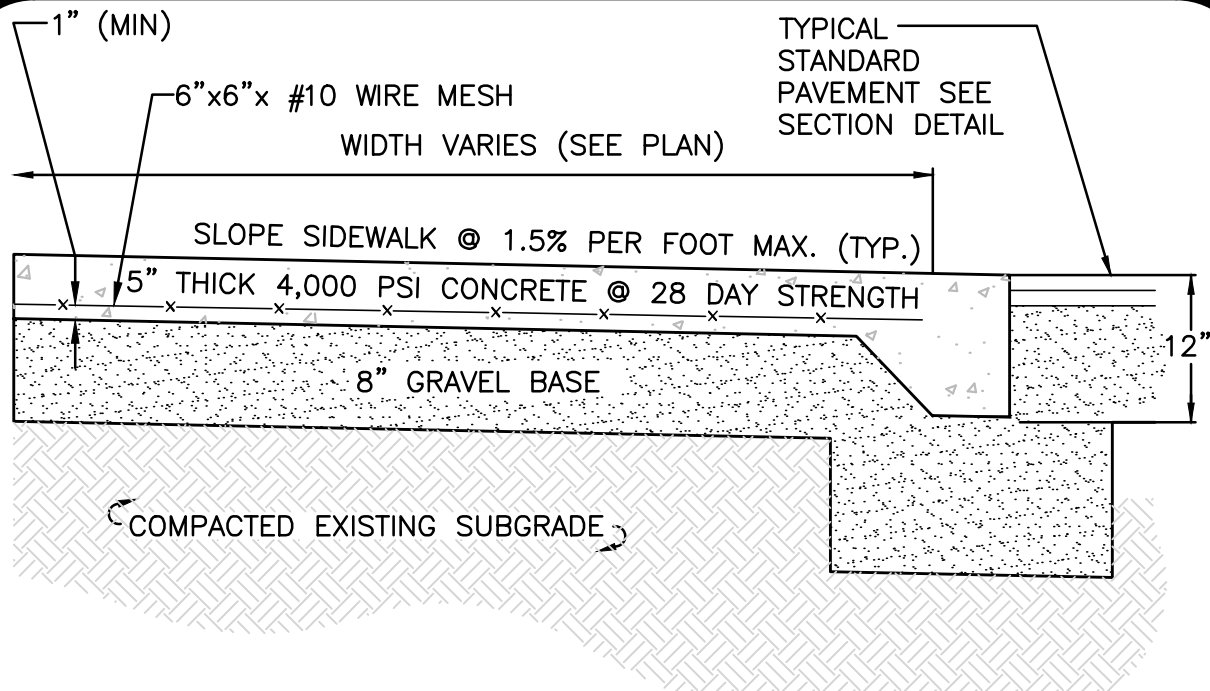
TEMPORARY CONSTRUCTION ENTRANCE/EXIT  
NOT TO SCALE



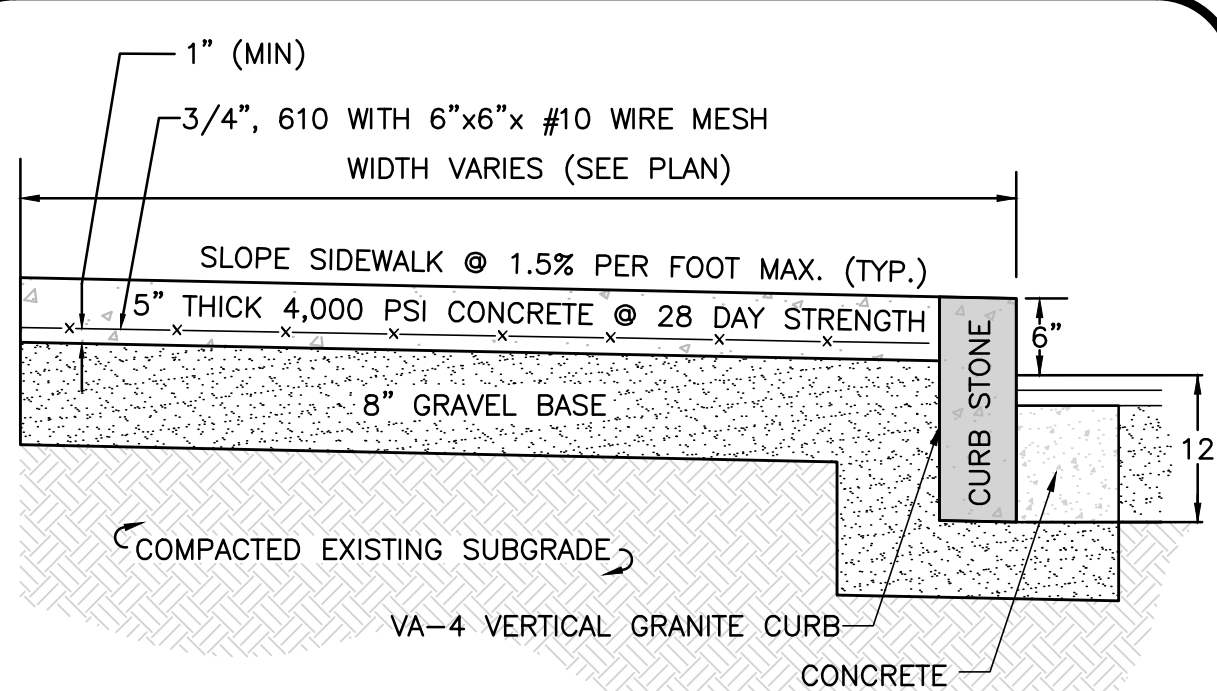
TEMPORARY CONSTRUCTION FENCE w/ SCREEN  
NOT TO SCALE



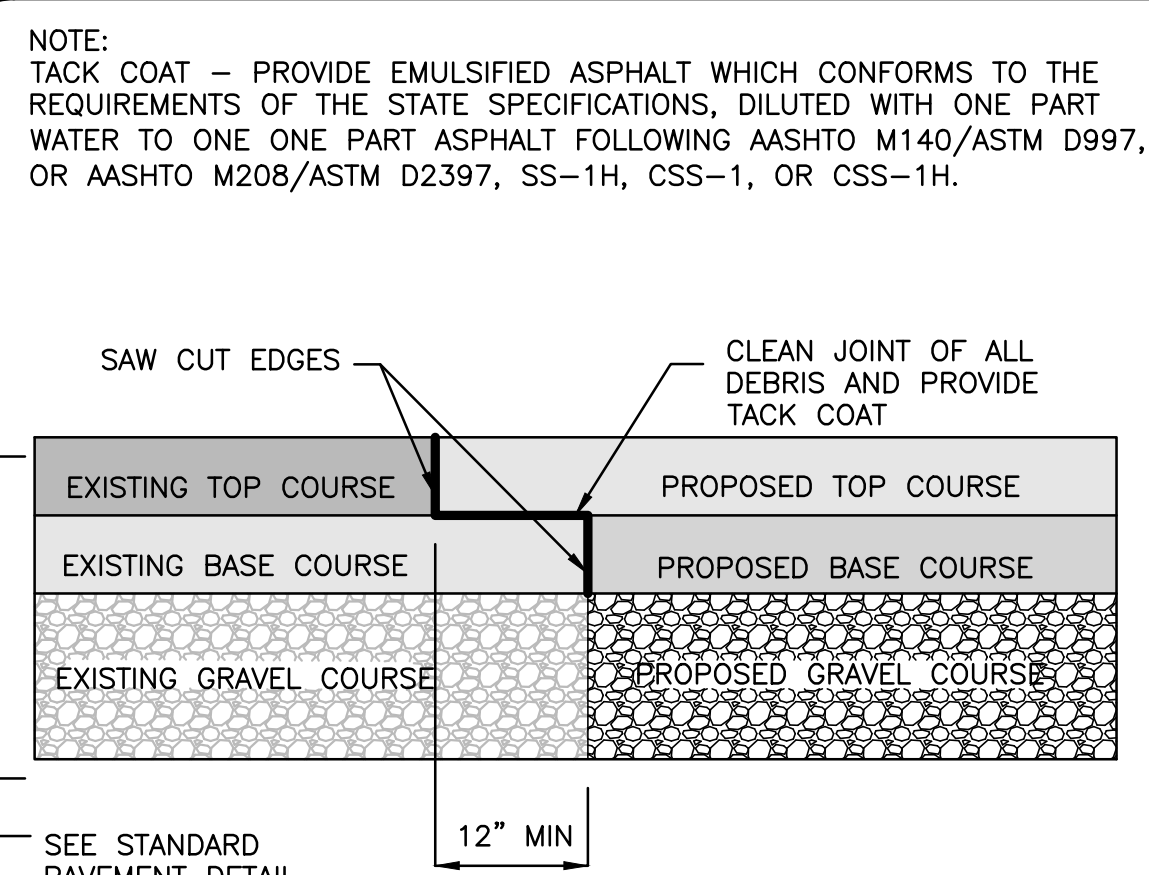
VERTICAL GRANITE CURB  
NOT TO SCALE



CONCRETE SIDEWALK  
NOT TO SCALE



CONCRETE SIDEWALK WITH VGC CURBSTONE  
NOT TO SCALE



PAVEMENT KEY CUT DETAIL  
NOT TO SCALE



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455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:  
190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO. 2729-02 DATE: 10/23/2020

SCALE: AS SHOWN DWG. NAME: C2729-02

DESIGNED BY: ARM CHECKED BY: BDJ

PREPARED BY:

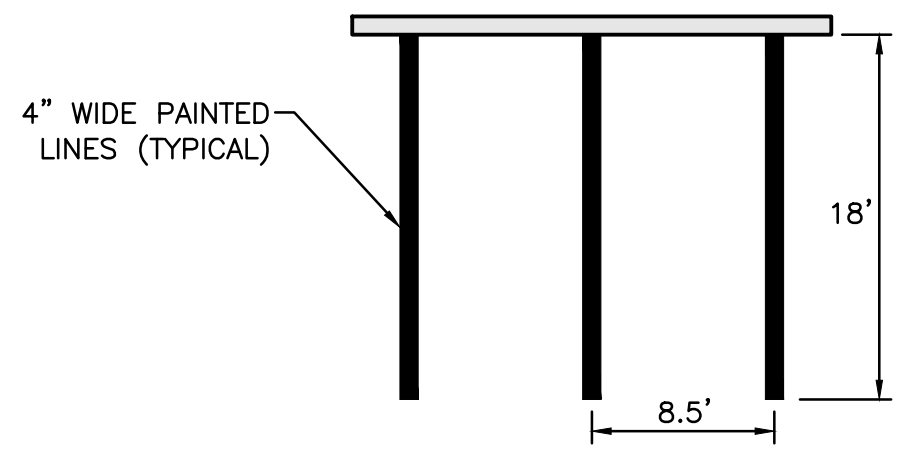
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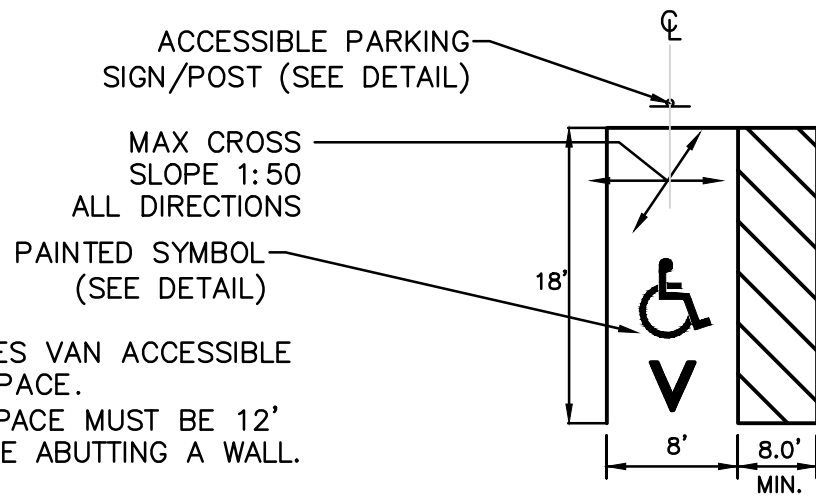
DRAWING TITLE: DETAILS SHEET No. C-501

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R:\PROJECTS\2729-02\CIVIL\DRAWINGS\CURRENT\C-2729-02\_DETAILS.DWG

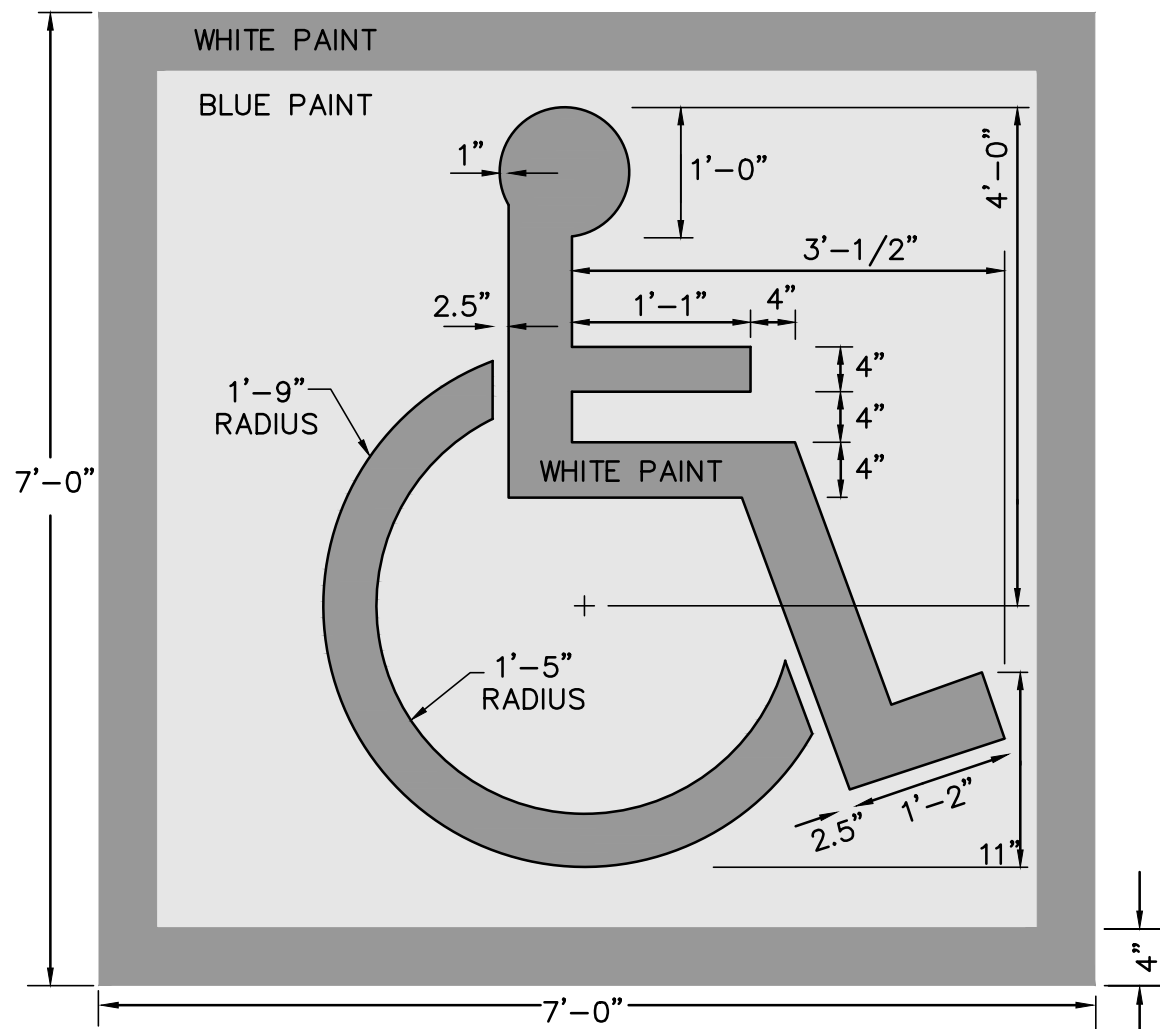


STANDARD STALL



ADA AND STANDARD PARKING STRIPING

1



SYMBOL TO BE CENTERED ON WIDTH OF PARKING STALL. SYMBOL IS REQUIRED TO CONTRAST WITH BACKGROUND. USE WHITE ON BLUE (COLOR #105090 IN FEDERAL STANDARD 5952) DOUBLE COAT.

ACCESSIBLE PARKING STALL PAVEMENT MARKING

2

NOT USED

NOT TO SCALE

3

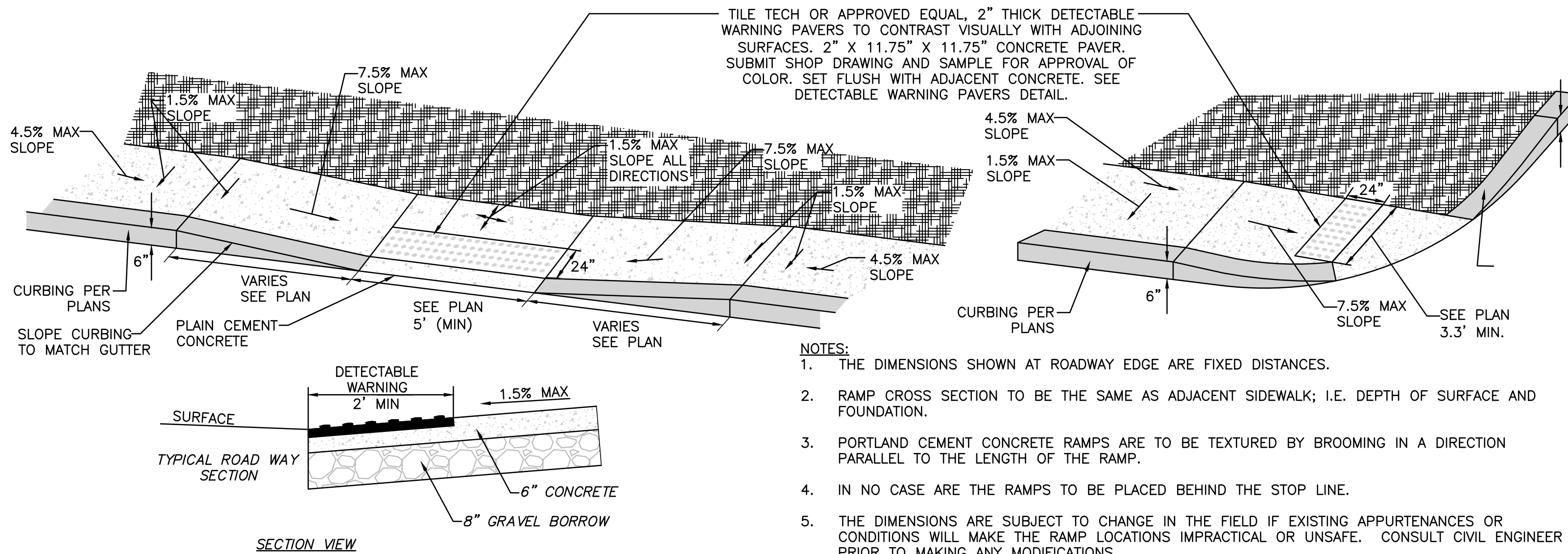
DESC.	SIGN	SIZE	MOUNTING HEIGHT	DESCRIPTION	REFLEC-TORIZED
R7-BM (MODIFIED)		12" x 26"	7' - 0"	WHITE TEXT ON BLUE FIELD WITH WHITE BORDER	YES

- TRAFFIC AND SAFETY SIGNAGE SHALL COMPLY WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) STANDARDS.
- MOUNTING HEIGHT IS DEFINED AS THE DISTANCE FROM THE BOTTOM OF THE SIGN TO THE NEAR EDGE OF THE PAVEMENT.

SIGN TABLE

NOT TO SCALE

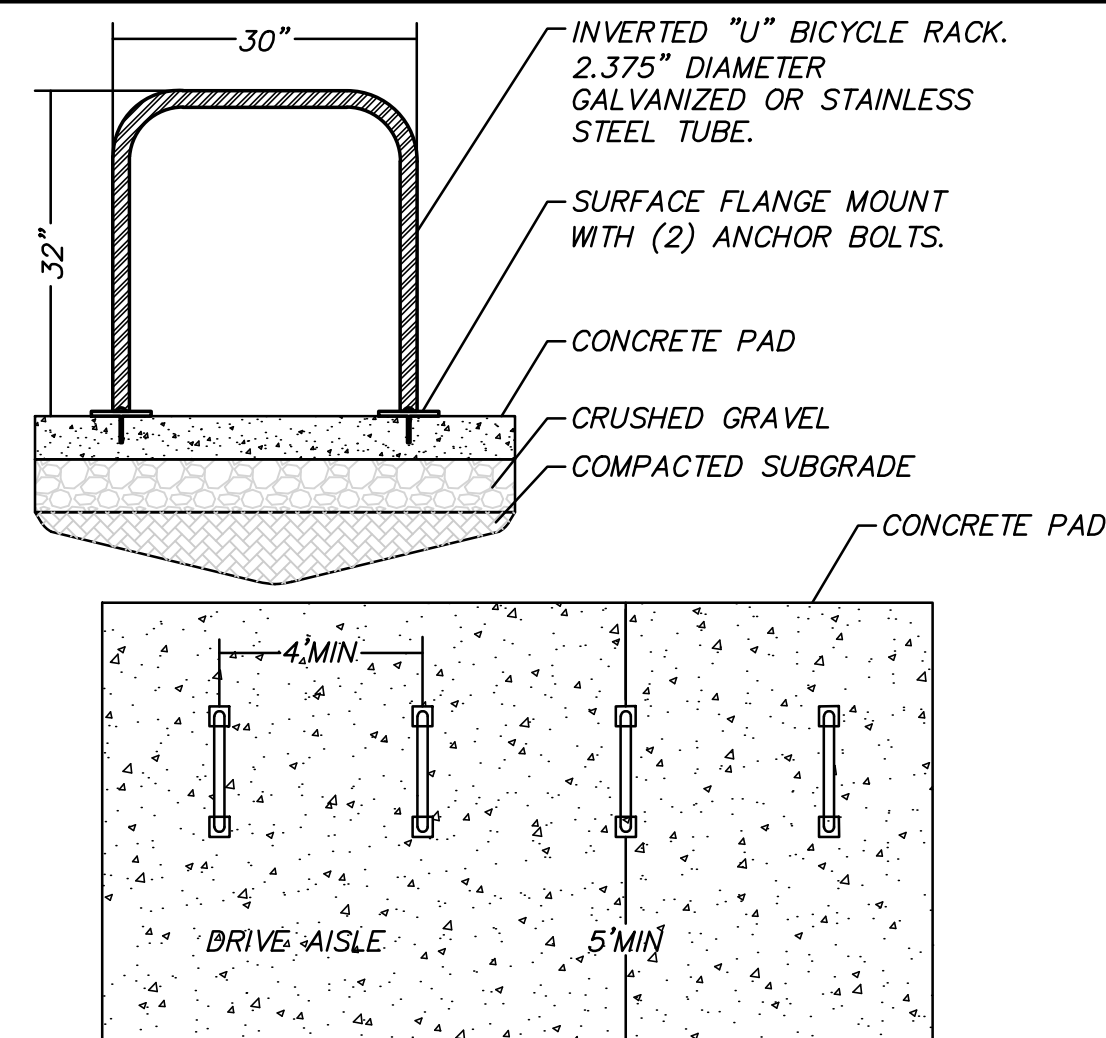
4



HANDICAP CURB CUT & CURB TRANSITION

NOT TO SCALE

5

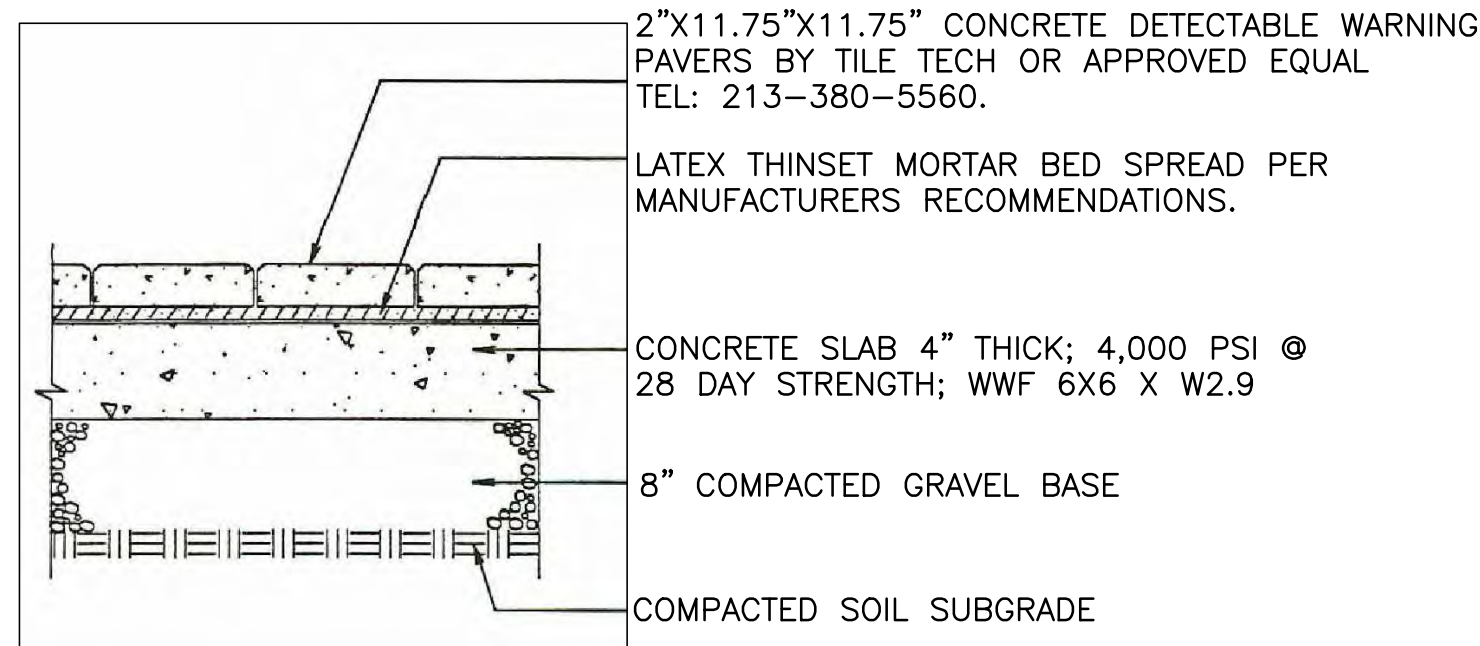


NOTE: BIKE RACKS TO BE FROM PARK A BIKE: MODEL 200 SERIES-INVERTED U BIKE RACKS HR202 30\"/>

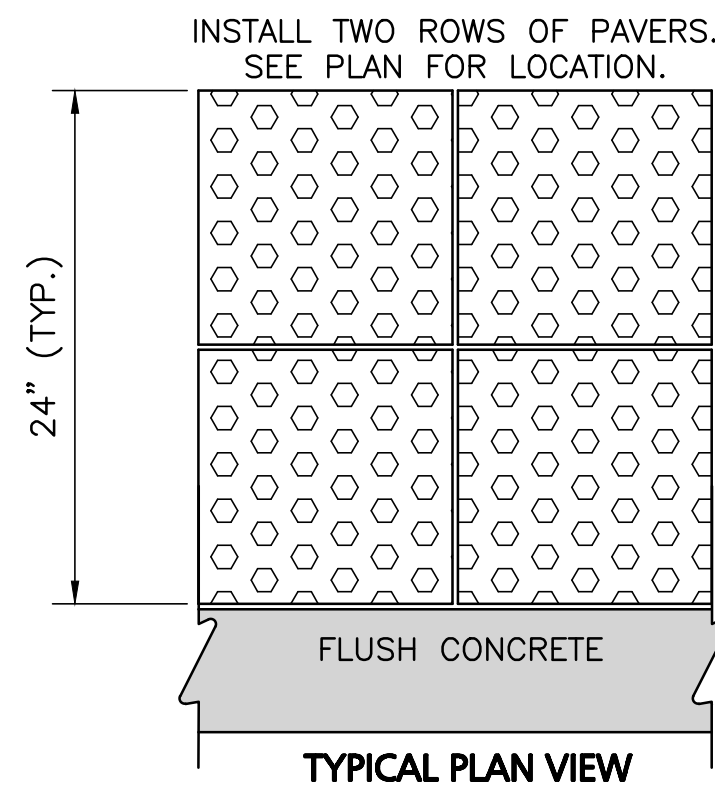
BICYCLE RACK DETAIL

NOT TO SCALE

6



TYPICAL SECTION VIEW

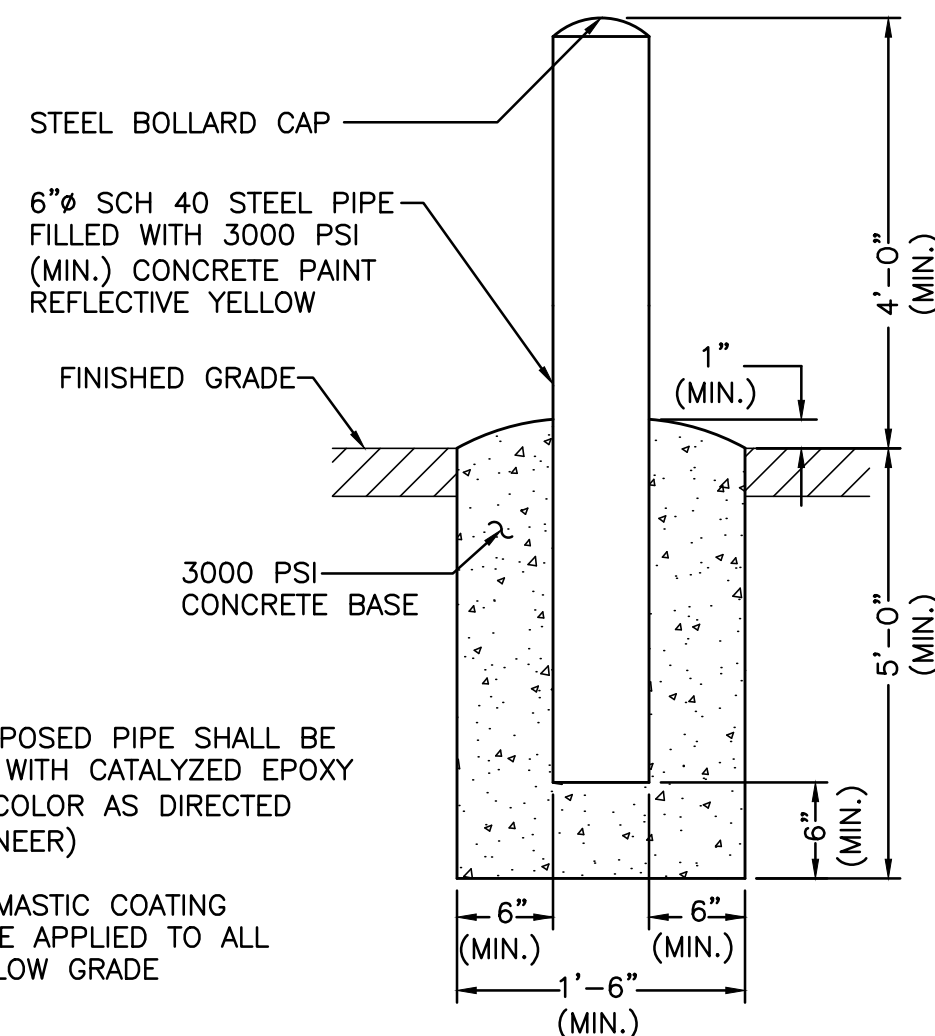


TYPICAL PLAN VIEW

TACTILE WARNING PAVERS

NOT TO SCALE

7



FIXED PIPE BOLLARD DETAIL

NOT TO SCALE

8

NOT USED

NOT TO SCALE

9



PROFESSIONAL ENGINEER FOR  
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455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:

190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO. 2729-02 DATE: 10/23/2020

SCALE: AS SHOWN DWG. NAME: C2729-02

DESIGNED BY: ARM CHECKED BY: BDJ

PREPARED BY:



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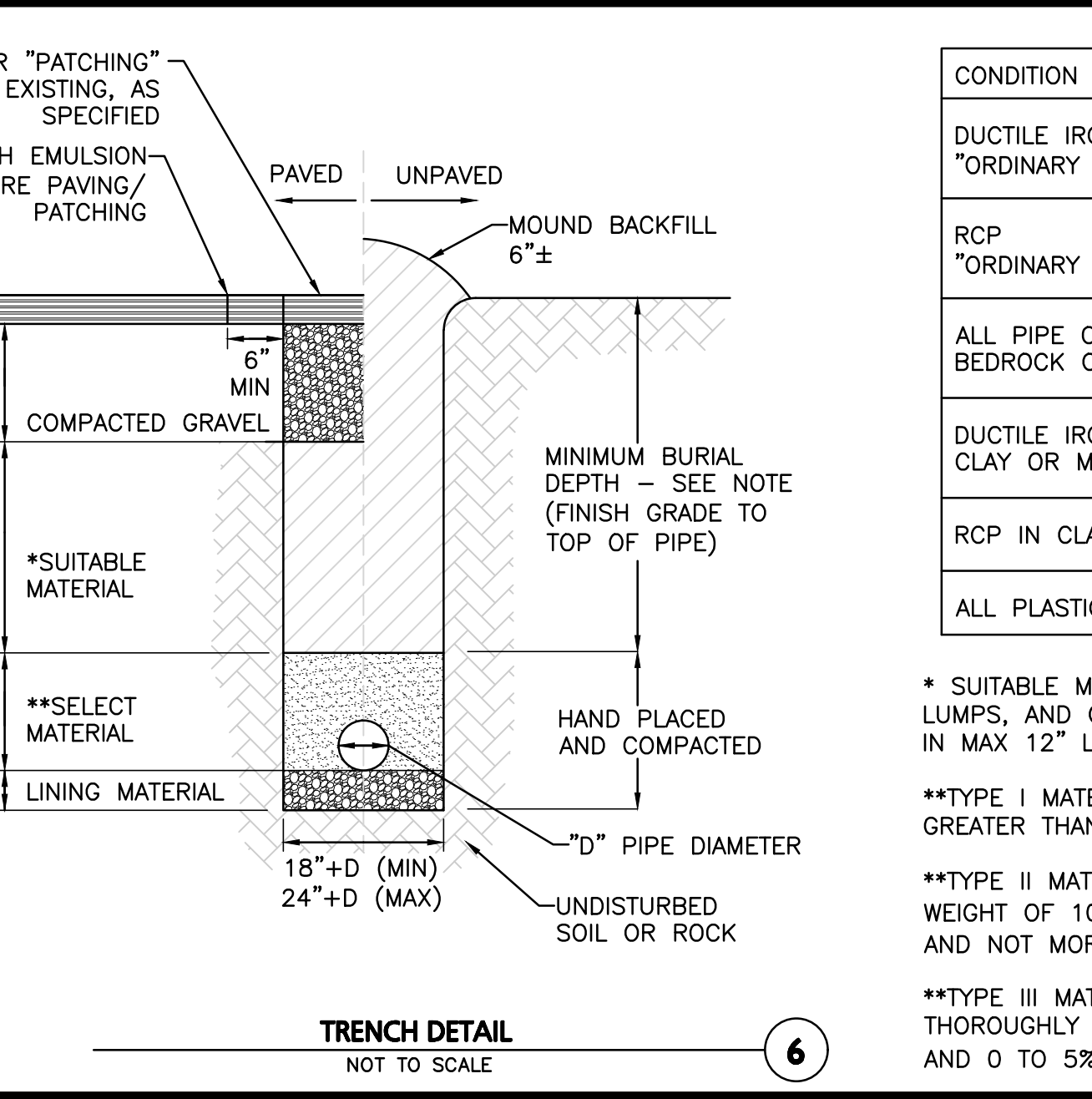
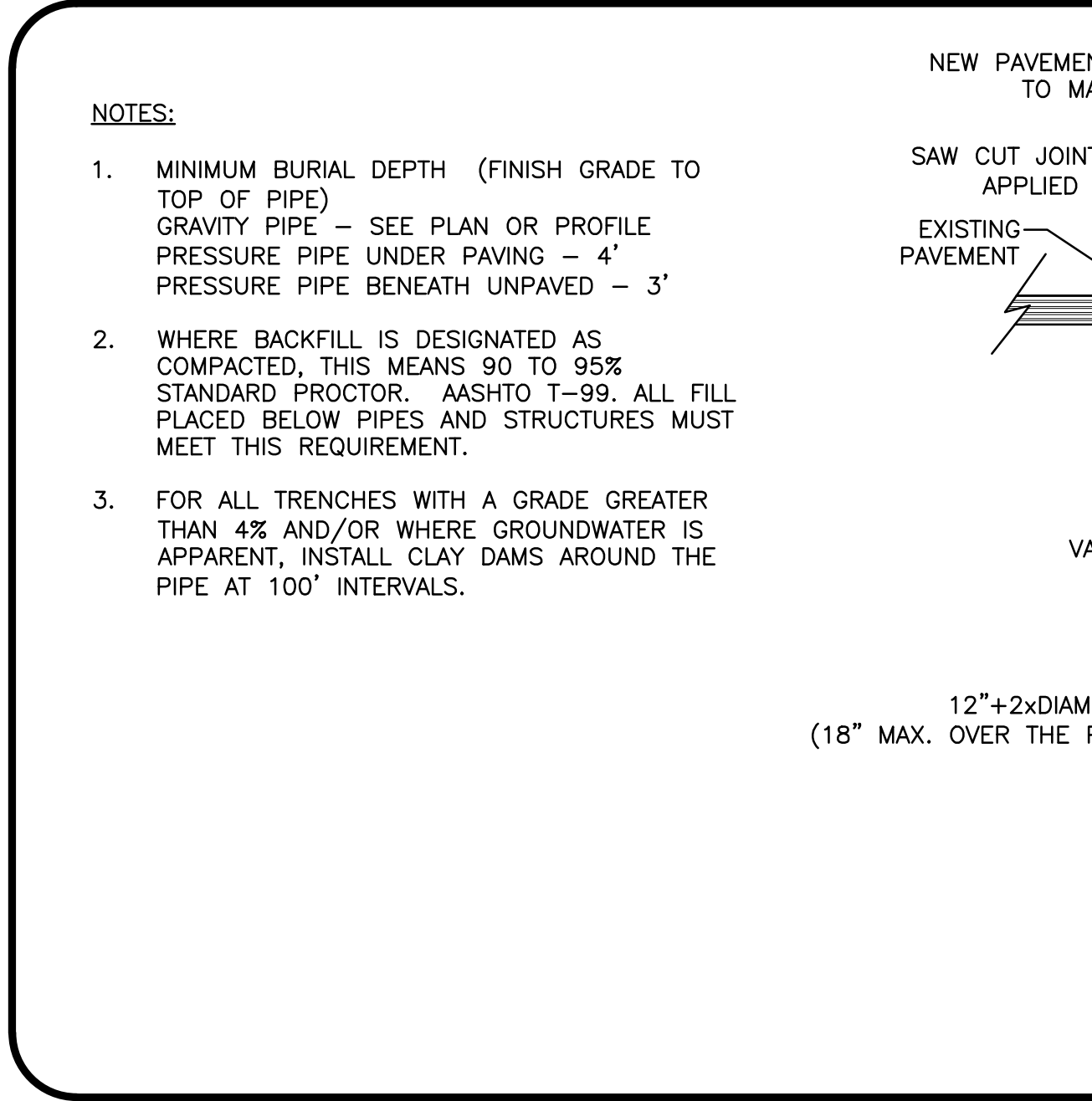
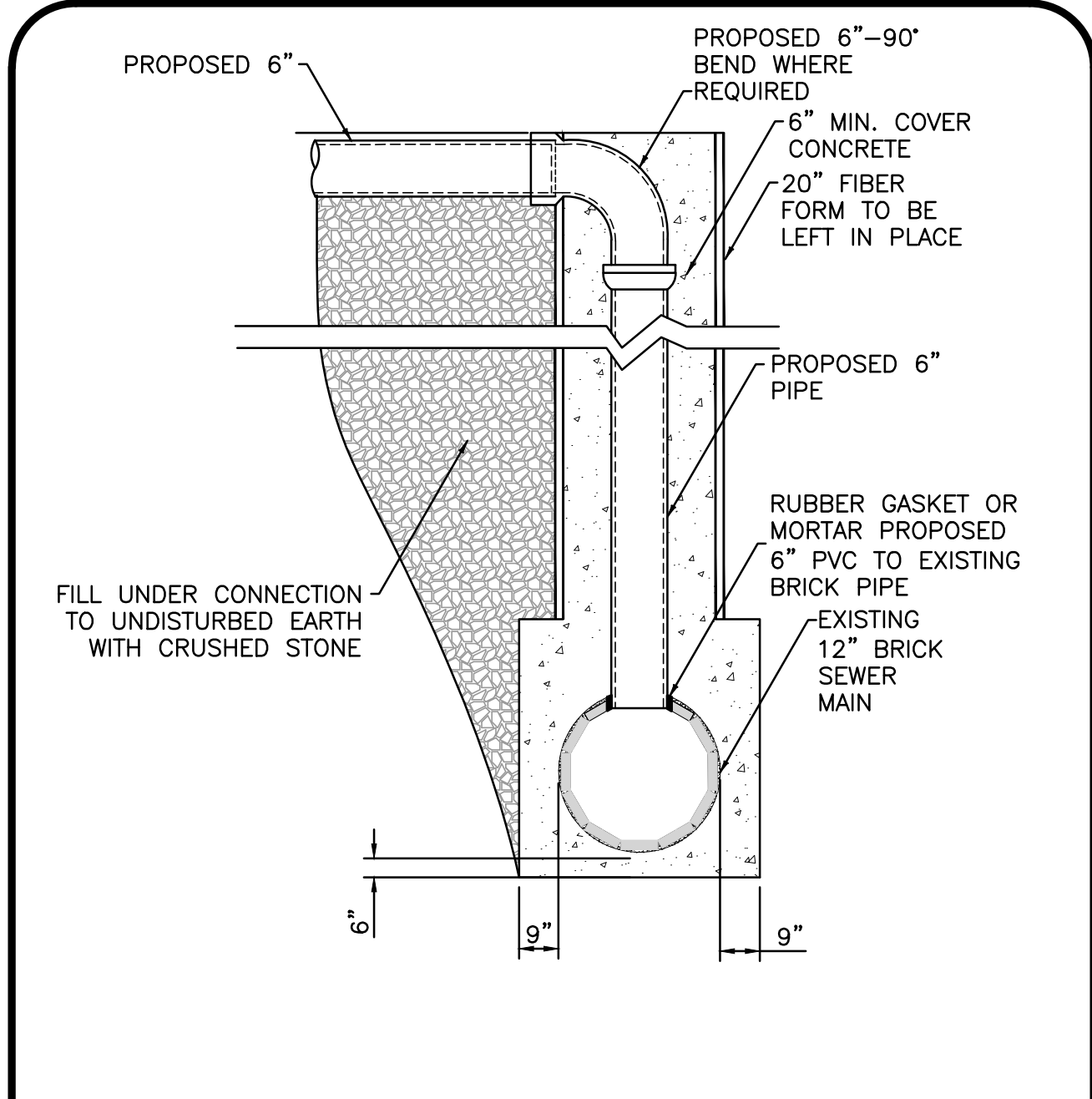
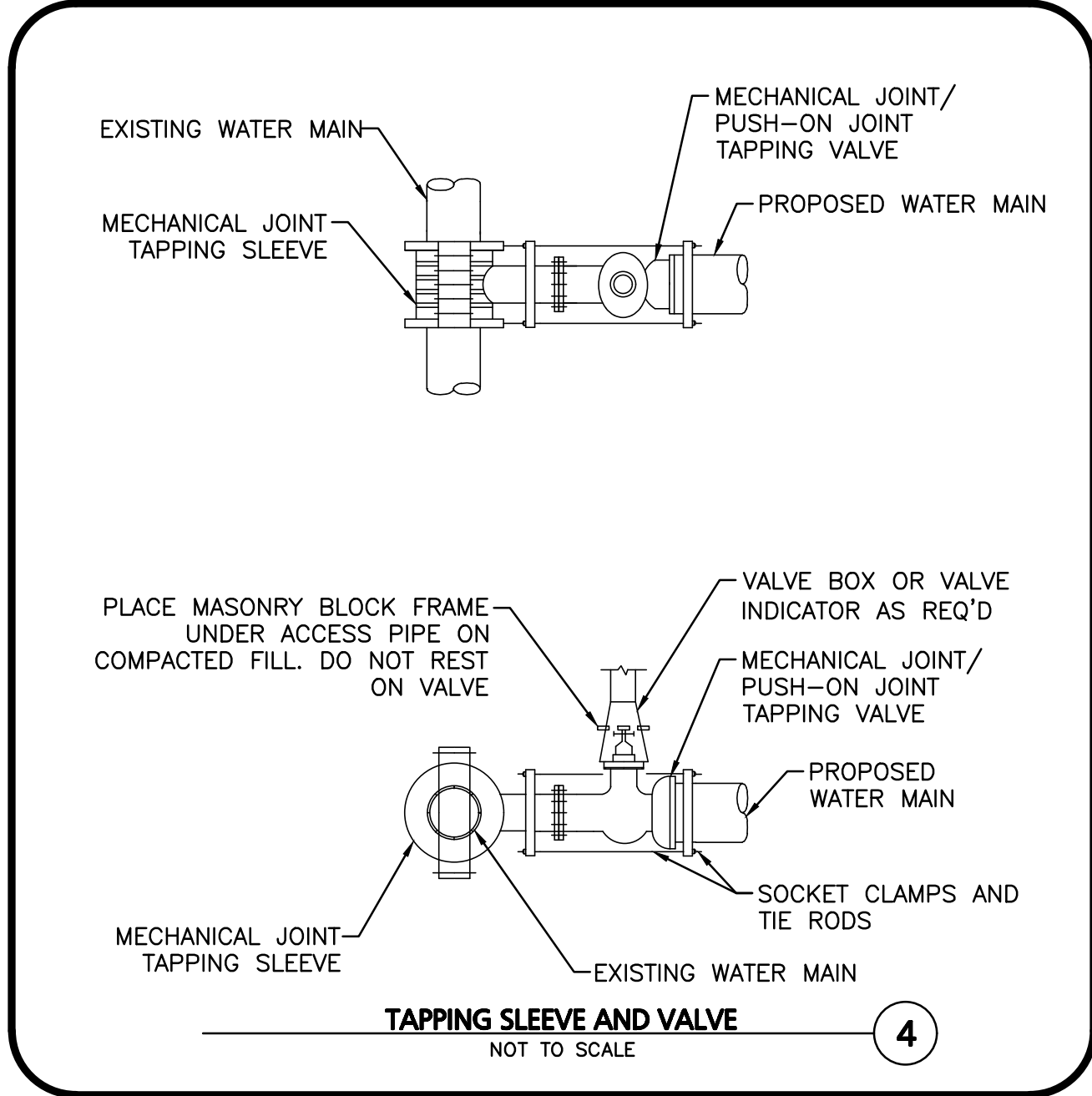
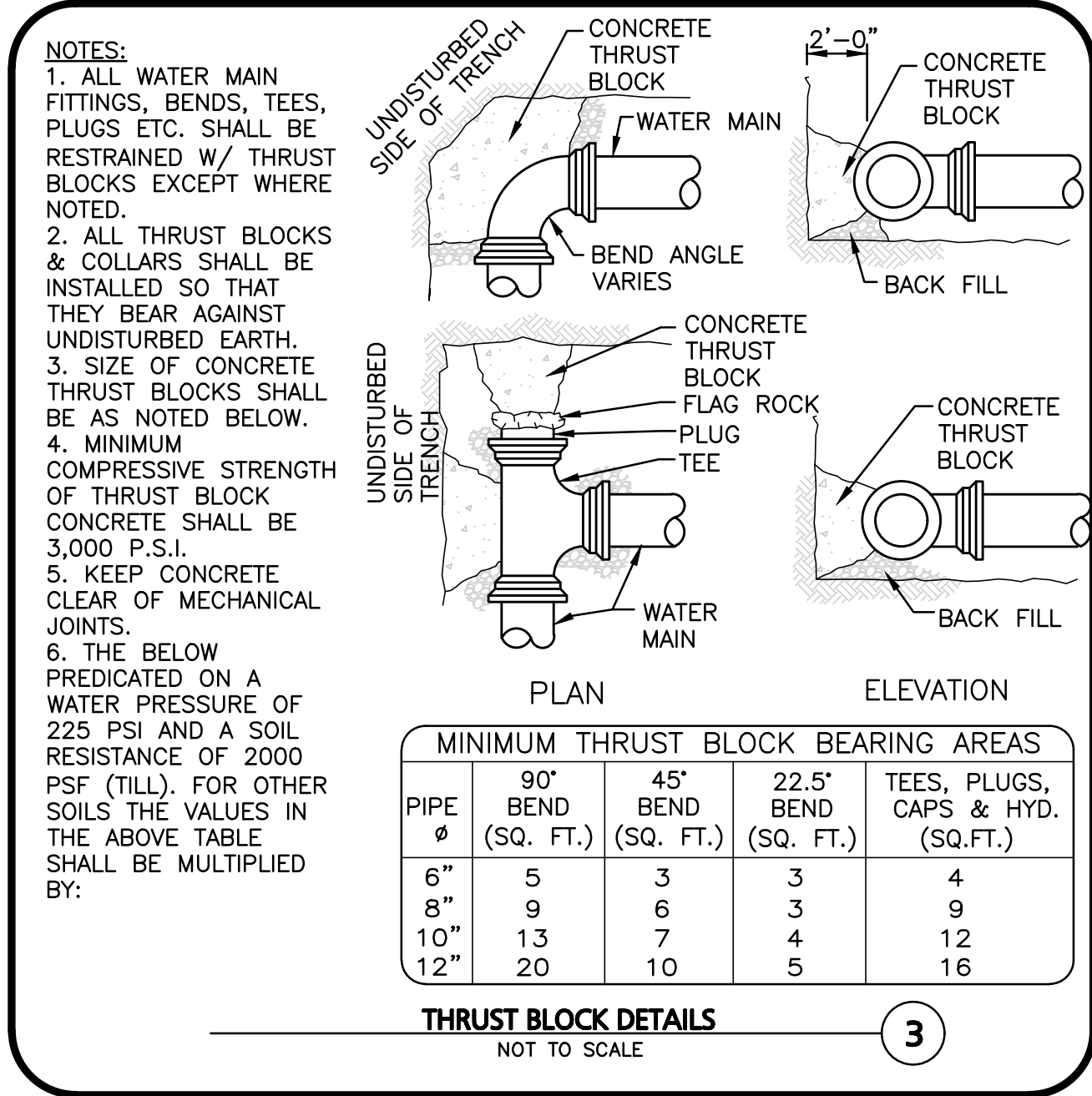
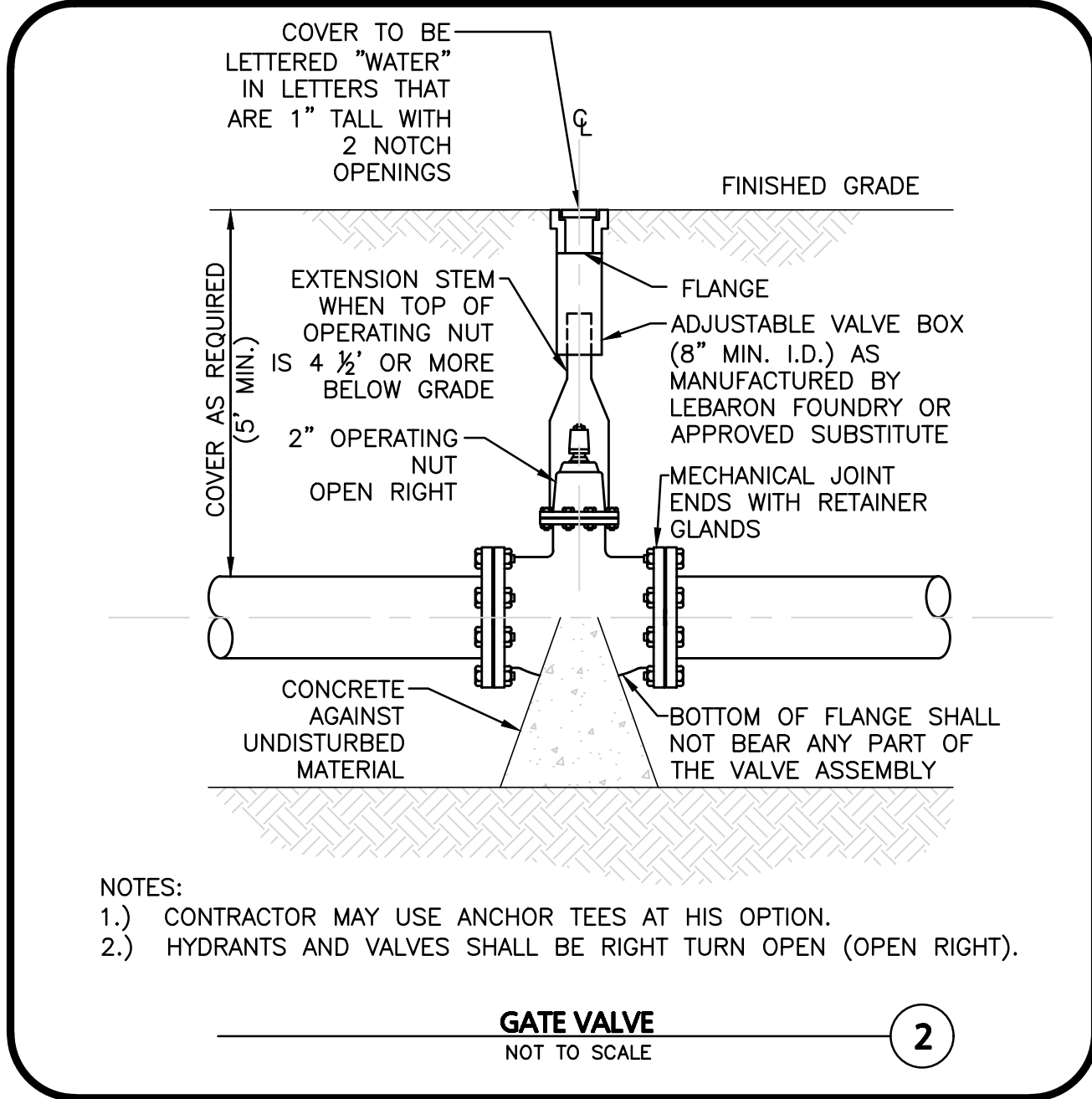
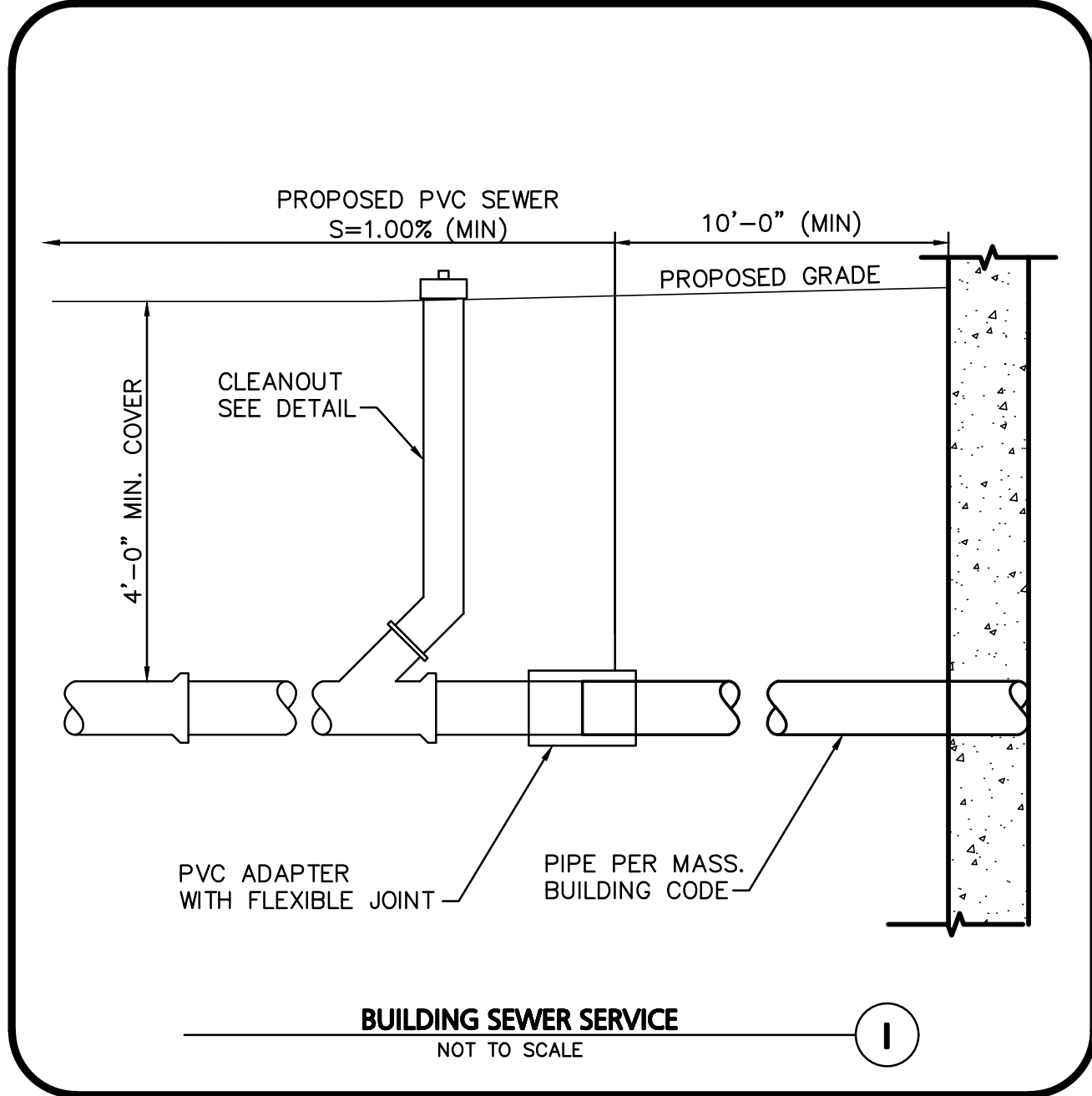
DRAWING TITLE:

DETAILS

SHEET No.

C-502

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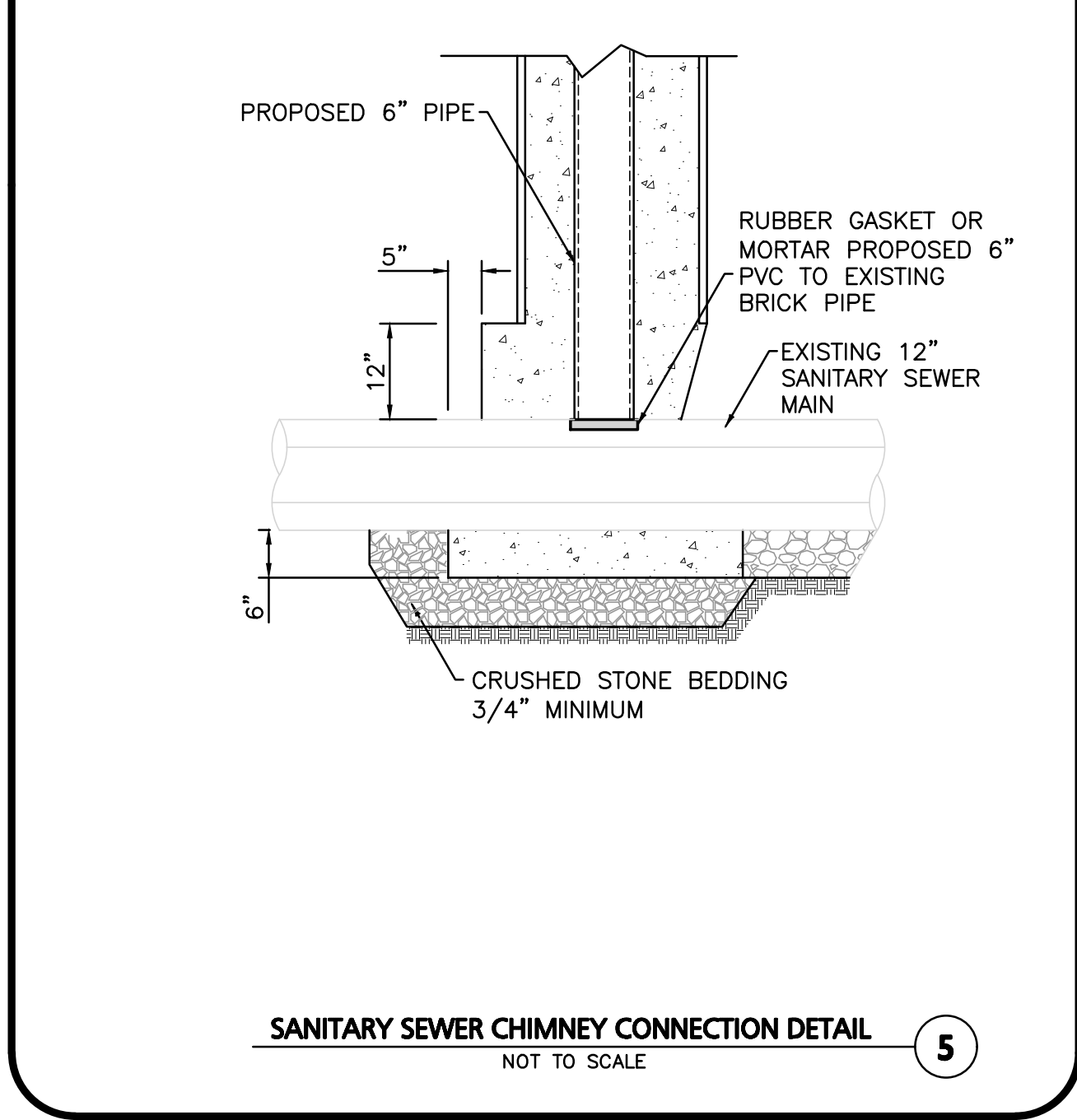
CONDITION & PIPE	**SELECT MATERIAL	LINING MATERIAL	Y-DIMENSION
DUCTILE IRON "ORDINARY SOIL"	TYPE I, II, OR III	SAND OR TYPE III	3"
RCP "ORDINARY SOIL"	TYPE II OR III	SAND OR TYPE III	3"
ALL PIPE OVER BEDROCK OR LEDGE	TYPE II OR III	SAND OR TYPE III	8"
DUCTILE IRON IN CLAY OR MUCK	TYPE II OR III	SAND	4"
RCP IN CLAY	TYPE II OR III	SAND	8"
ALL PLASTICS	TYPE III	SAND OR TYPE III	6"

\* SUITABLE MATERIAL SHALL CONTAIN NO STONE GREATER THAN 4" IN DIAMETER, NO FROZEN LUMPS, AND ONLY MINOR AMOUNTS OF CLAY OR ORGANIC MATERIAL. ALL MATERIAL TO BE PLACED IN MAX 12" LIFTS AND COMPACTED BEFORE PLACING NEXT LIFT.

\*\*TYPE I MATERIAL SHALL BE EITHER GRAVEL OR EXCAVATED MATERIAL CONTAINING NO STONES GREATER THAN 1.5" DIAMETER, NO FROZEN LUMPS, CLAY OR ORGANIC MATERIAL.

\*\*TYPE II MATERIAL SHALL BE CLEAN, HARD, CRUSHED OR NATURAL STONE WITH A GRADATION BY WEIGHT OF 100% PASSING A 1.5" SQUARE OPENING, NOT MORE THAN 25% PASSING A 3/4" OPENING, AND NOT MORE THAN 5% PASSING A 1/2" SQUARE OPENING.

\*\*TYPE III MATERIAL SHALL BE CLEAN, HARD, CRUSHED STONE FREE FROM COATINGS AND THOROUGHLY WASHED WITH A GRADATION BY WEIGHT OF 100% PASSING A 1" SQUARE OPENING, AND 0 TO 5% PASSING A 1/4" SQUARE OPENING.



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ARLINGTON, MA 02474

PROJECT:

190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO.	2729-02	DATE:	10/23/2020
SCALE:	AS SHOWN	DWG. NAME:	C2729-02
DESIGNED BY:	ARM	CHECKED BY:	BDJ
PREPARED BY:			

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DETAILS	C-503

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PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

1 03/10/2021 ISSUED FOR ARB REVIEW

REV DATE DESCRIPTION

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PREPARED BY:			

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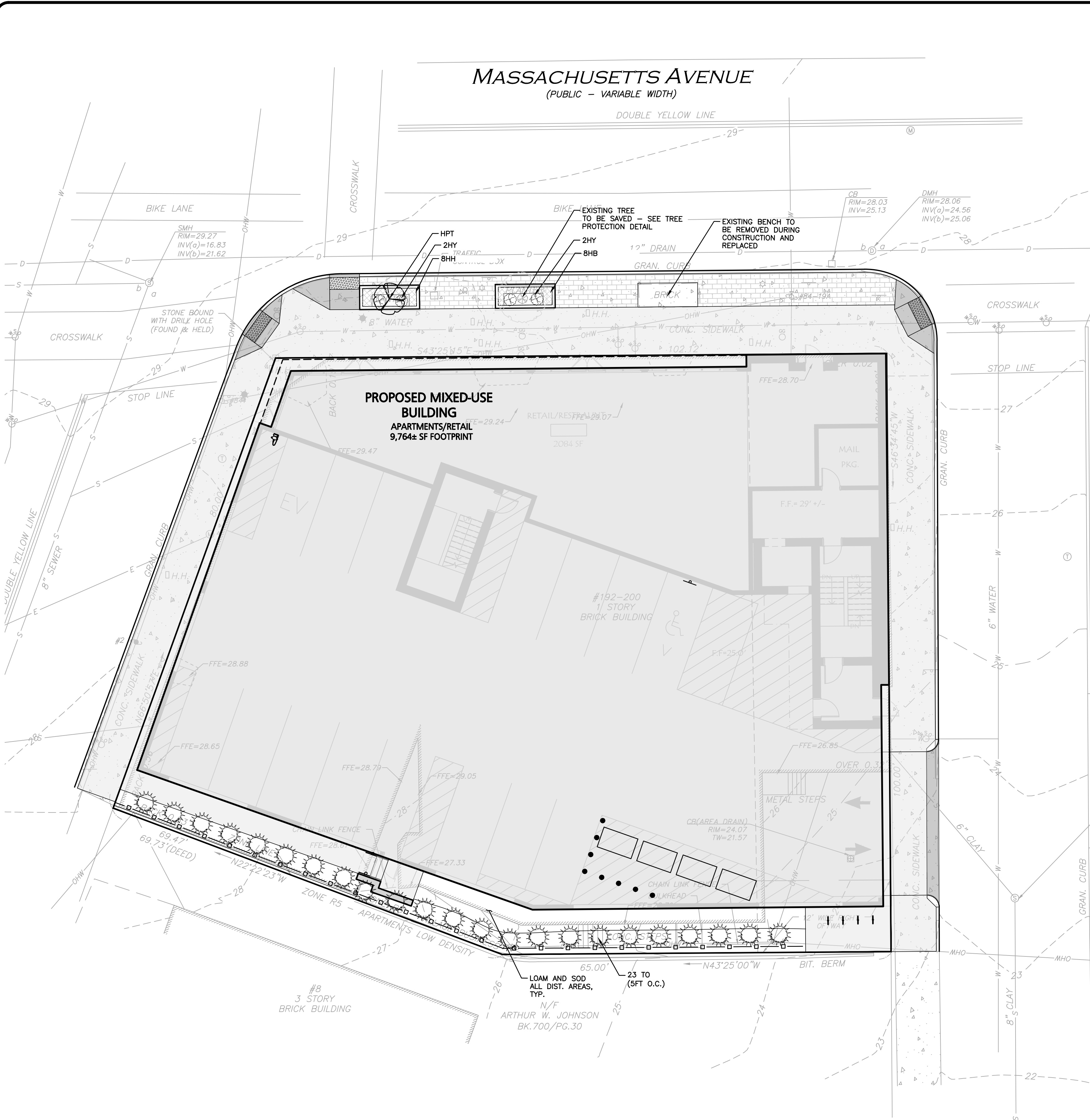
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DRAWING TITLE:	SHEET No.
DETAILS	C-503

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LEGEND

DECIDUOUS TREE

EVERGREEN TREE

FLOWERING TREE

SHRUBS

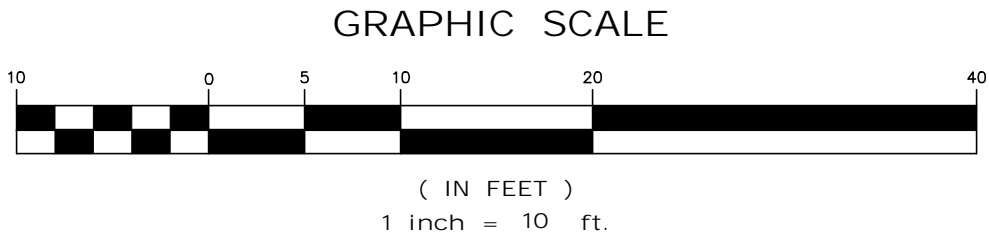
MULCH BED

PERENNIALS/GROUNDCOVER

PLANTING SCHEDULE-TREES, SHRUBS, GROUNDCOVERS & PERENNIALS

KEY	QUANTITY	BOTANICAL NAME	COMMON NAME	MIN. SIZE	SPACING	COMMENTS
EVERGREEN TREES						
TO	26	THUJA O. 'WINTERGREEN'	WINTERGREEN ARBORVITAE	6-7' HT	AS SHOWN	B&B
TREES/SHRUBS						
HPT	1	HYDRANGEA PANICULATA 'LIMELIGHT'	TREE FORM LIMELIGHT HYDRANGEA	5-6' HT. TREEFORM	AS SHOWN	B&B
HY	4	HYDRANGEA ARBORESCENS 'INVINCIBELLE WEE WHITE'	INVINCIBELLE WEE WHITE HYDRANGEA	#3	AS SHOWN	POT
PERENNIALS						
HH	8	HEMEROCALLIS 'HAPPY RETURNS'	HAPPY RETURNS DAYLILLY	#1	24" O.C	STAGGERED
HB	8	HOSTA 'HADSPEN BLUE'	HADSPEN BLUE HOSTA	#1	24" O.C	STAGGERED

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  - ALL LANDSCAPED AREAS WITH SHRUBS, TREES, AND PERENNIALS TO HAVE 18" MINIMUM DEPTH OF TOPSOIL. EIGHTEEN INCHES OF TOPSOIL AROUND TREES AND SHRUBS DOES NOT INCLUDE AMENDED PLANTING SOIL WITHIN TREE / SHRUB PIT FOR FULL DEPTH OF ROOTBALLS. SEE PLANTING DETAILS FOR PLANTING DEPTH AT SHRUBS AND TREES. ALL AREAS OF LOAM AND SEED OR LOAM & SOD TO HAVE 6" MINIMUM DEPTH OF TOPSOIL. TOPSOIL TO BE TESTED BY CONTRACTOR, AND APPROVED BY A&M PRIOR TO PURCHASE AND OR PLACEMENT. GENERAL CONTRACTOR, DEMOLITION CONTRACTOR, AND LANDSCAPE CONTRACTOR TO COORDINATE PROPER DEPTH OF EXISTING MATERIAL REMOVAL ACROSS SITE SO THAT 18" MINIMUM AND 6" MINIMUM DEPTHS OF PROPOSED TOPSOIL NOTED ABOVE ARE MET AT NO ADDITIONAL COST TO OWNER. SEE TOPSOIL DETAIL.



DIG SAFE

BEFORE YOU DIG  
CALL 811 OR  
1-888-DIG-SAFE  
1-888-344-7233



REGISTERED LANDSCAPE ARCHITECT FOR  
ALLEN & MAJOR ASSOCIATES, INC.

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DRAWING TITLE:

LANDSCAPE PLAN

SHEET No.

L-101

LOAM AND SODDING NOTES

CONTRACTOR SHALL SOD AREAS NOTED ON THE PLANS.

SOD IS TO BE A BLEND OF FOUR TO FIVE CURRENT AND IMPROVED HYBRID BLUEGRASS AND FESCUE MIXES APPROPRIATE FOR BOTH SEMI-SHADED AND AREAS OF SUN.

HYBRIDS MAY INCLUDE: BLACKSTONE KENTUCKY BLUEGRASS, AWARD KENTUCKY BLUEGRASS, CHALLENGER KENTUCKY BLUEGRASS, BLACKBURG II KENTUCKY BLUEGRASS OR COMPARABLE AND EQUAL BLUEGRASS HYBRIDS.

1. SOD SHALL BE HIGH QUALITY, NURSERY GROWN ON CULTIVATED MINERAL AGRICULTURAL SOILS. SOD SHALL BE MOIST, AND MACHINE CUT AT A UNIFORM SOIL THICKNESS OF AT LEAST ¾" AT TIME OF CUTTING. MEASUREMENT FOR THICKNESS SHALL INCLUDE TOP GROWTH AND THATCH. SOD SHALL BE FREE OF DISEASES, WEEDS, BARE SPOTS, OR INSECTS.
2. SODDING TO BE COMPLETED "IN SEASON" BETWEEN APRIL 1 TO JUNE 15 OR AUGUST 15 TO OCTOBER 1, EXCEPT FOR RE-SODDING OF BARE SPOTS. IF UNABLE TO SOD WITHIN THESE TIMEFRAMES, CONTRACTOR TO INSTALL EROSION CONTROL MATS ON ALL SLOPES 3:1 AND OVER, HYDROSEED ALL EXPOSED AREAS, ADD SOIL STABILIZER "FLUX TERRA HP-FGM SOIL STABILIZER" AS MANUFACTURED BY "PROFILE" TO HYDROSEED (AT RATE OF 3,000 LBS PER ACRE), AT NO ADDITIONAL COST TO THE OWNER. CONTRACTOR TO COMPLETE ALL ABOVE "OUT OF SEASON" REQUIREMENTS AND THEN ALSO BE RESPONSIBLE FOR RE-GRADING AND RE-SODDING ALL DISTURBED, ERODED, OR BARE SPOTS WITHIN NEXT CLOSEST PLANTING SEASON IN FALL OR SPRING AT NO ADDITIONAL COST TO OWNER. CONTRACTOR RESPONSIBLE FOR ALL MAINTENANCE UNTIL FINAL ACCEPTANCE OF LAWN AREAS INCLUDING: WATERING, ADDING FERTILIZERS AND LIME AND MOWING AT NO ADDITIONAL COST TO OWNER.
3. COMMERCIAL FERTILIZER SHALL BE APPLIED AT THE RATE OF 25 POUNDS PER 1000 SQ. FT. OR AS RECOMMENDED BY THE TESTING AGENCY. LIME TO BE SPREAD AT THE RATE OF 100 POUNDS PER 1000 SQ. FT. OR AS RECOMMENDED BY THE TESTING AGENCY. COMMERCIAL FERTILIZER SHALL BE A COMPLETE FERTILIZER CONTAINING AT LEAST 50% OF THE NITROGEN OF WHICH IS DERIVED FROM NATURAL ORGANIC SOURCES OF UREAFORM. IT SHALL CONTAIN THE FOLLOWING PERCENTAGES BY WEIGHT: NITROGEN (N) 10%, PHOSPHORUS (P) 6%, POTASH (K) 4%. LIME SHALL BE AN APPROVED AGRICULTURAL LIMESTONE CONTAINING NOT LESS THAN 85% OF TOTAL CARBONATES. LIMESTONE SHALL BE GROUND TO SUCH FINENESS THAT 50% WILL PASS A 100 MESH SIEVE AND 90% WILL PASS THROUGH A 20 MESH SIEVE.
4. CONTRACTOR RESPONSIBLE FOR WATERING, MOWING, AND RE-SODDING OF LAWN BARE SPOTS UNTIL A UNIFORM, HEALTHY STAND OF GRASS IS ESTABLISHED AND ACCEPTED.

LANDSCAPE NOTES

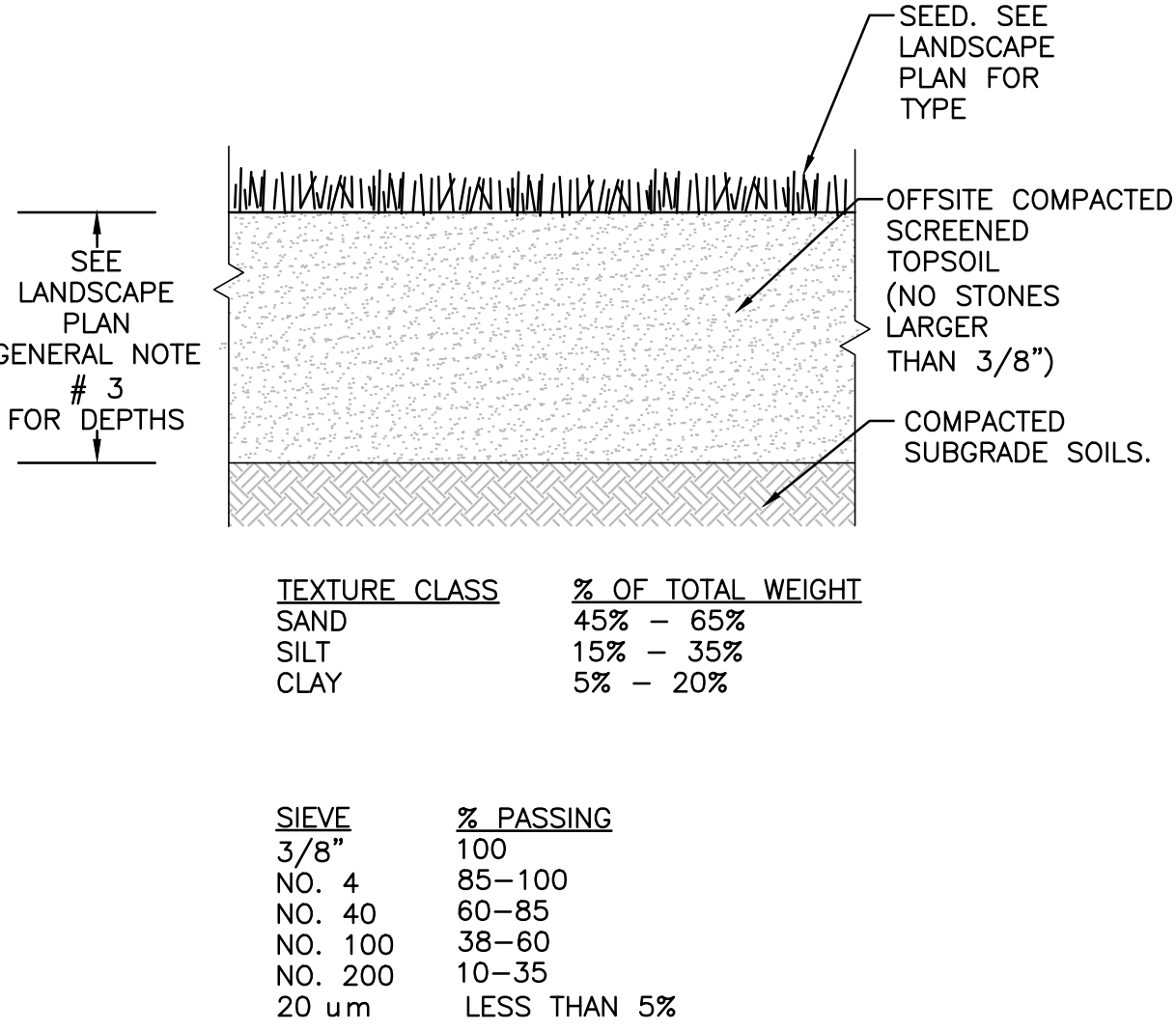
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF ARLINGTON, MA.
2. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT OF PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES, ANY PERMITTING 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 ANY CONFLICTS IN WRITING.
4. NO PLANT MATERIAL SHALL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA, ANY TREES NOTED AS "SEAL OR SELECTED SPECIMEN" SHALL BE TAGGED AND SEALED BY THE LANDSCAPE ARCHITECT.
5. ALL TREES SHALL BE BALLED AND BURLAPPED (B&B) UNLESS OTHERWISE NOTED OR APPROVED BY THE OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL VERIFY QUANTITIES SHOWN ON PLANT LIST. QUANTITIES SHOWN ON PLANS SHALL GOVERN OVER PLANT LIST.
7. ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
8. ALL PLANT MATERIALS INSTALLED SHALL MEET THE GUIDELINES ESTABLISHED BY THE STANDARDS FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN.
9. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF ACCEPTANCE.

DIG SAFE

BEFORE YOU DIG  
CALL 811 OR  
1-888-DIG-SAFE  
1-888-344-7233

LANDSCAPE NOTES CONT.

10. 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.
11. ANY FALL TRANSPLANTING HAZARD PLANTS SHALL BE DUG IN THE SPRING AND STORED FOR FALL PLANTING.
12. TREES SHALL HAVE A MINIMUM CALIPER AS INDICATED ON THE PLANTING SCHEDULE TAKEN ONE FOOT ABOVE THE ROOT CROWN.
13. ALL PLANT BEDS AND TREE SAUCERS TO RECEIVE 3" OF PINE BARK MULCH. GROUND COVER AREAS SHALL RECEIVE 1" OF PINE BARK MULCH
14. 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.
15. ALL TREE STAKES SHALL BE STAINED DARK BROWN.
16. CONTRACTOR RESPONSIBLE FOR WATERING, AND RESEEDING OF BARE SPOTS UNTIL A UNIFORM STAND OF VEGETATION IS ESTABLISHED AND ACCEPTED.
17. ALL PARKING ISLANDS PLANTED WITH SHRUBS SHALL HAVE 24" OF TOP SOIL. FINISH GRADE SHALL BE EQUAL TO THE TOP OF CURB.
18. SOIL SAMPLES, TESTS, AND SHOP DRAWINGS SHALL BE PROVIDED TO THE LANDSCAPE ARCHITECT OR THE OWNER FOR APPROVAL PRIOR TO CONSTRUCTION.
19. AN MINIMUM 18" WIDE BARRIER OF 1" GRAY OR TAN PEASTONE SHALL BE INSTALLED IN ALL PLANT BEDS WHICH ABUT THE BUILDINGS. 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). INSTALL 6" DEEP OF PEASTONE WITH MIRAFI WEED FABRIC BENEATH AND STEEL EDGING BETWEEN THE PEASTONE AND ADJACENT MULCH BED.
20. ALL PROPOSED LANDSCAPE AREAS INCLUDING MOWED LAWNS, TREES, SHRUB BEDS, AND PERENNIALS SHALL BE PROVIDED WITH WATER EFFICIENT UNDERGROUND IRRIGATION. DESIGN AND INSTALLATION OF IRRIGATION SYSTEM TO BE PERFORMED BY AN APPROVED IRRIGATION DESIGN BUILD CONTRACTOR OR BY AN APPROVED EQUAL, TO BE DETERMINED BY THE OWNERS REPRESENTATIVE AND LANDSCAPE ARCHITECT. IRRIGATION SYSTEM IS TO BE DESIGNED FOR EFFICIENT WATER USAGE INCLUDING: USE OF DRIP IRRIGATION FOR SHRUBS AND PERENNIALS, IRRIGATION SYSTEM WITH HEAD-TO-HEAD COVERAGE, A CENTRAL SHUT-OFF VALVE, AND A RAIN SENSOR TO SHUT OFF IRRIGATION DURING RAIN EVENTS.

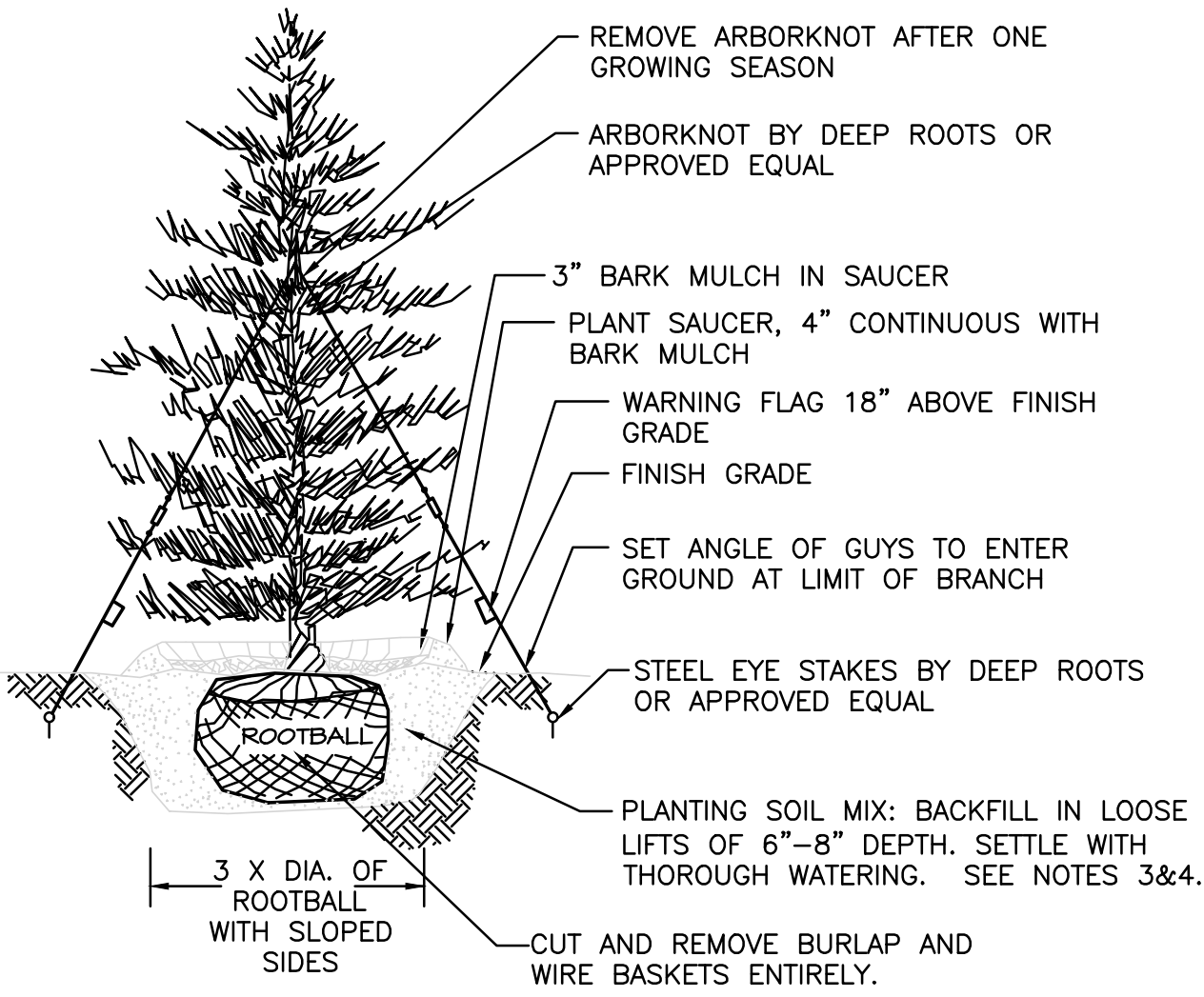


- NOTES:
1. TOP OF LOAM (TOPSOIL) IS FINISH GRADE.
2. ALL TOPSOIL (BOTH ONSITE AND OFFSITE SOURCES) SHALL BE COMPOSED OF A NATURAL, FERTILE, FRIABLE SOIL TYPICAL OF CULTIVATED TOPSOILS OF THE LOCALITY. OFFSITE SOIL SHALL BE SUITABLE FOR THE GERMINATION OF SEEDS AND SUPPORT OF VEGETATIVE GROWTH, WITH 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 CLOUDS, STICKS, STUMPS, CLAY LUMPS, ROOTS, OTHER OBJECTIONABLE, EXTRANEIOUS 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 ANY TOPSOIL IS PURCHASED OR PLACED PRIOR TO APPROVAL BY OWNER / LANDSCAPE ARCHITECT, IT IS AT CONTRACTORS RISK, AND IT CAN BE REMOVED AT NO ADDITIONAL COST TO THE OWNER. 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 LAWN, TREES, SHRUBS, & PERENNIALS

NOT TO SCALE

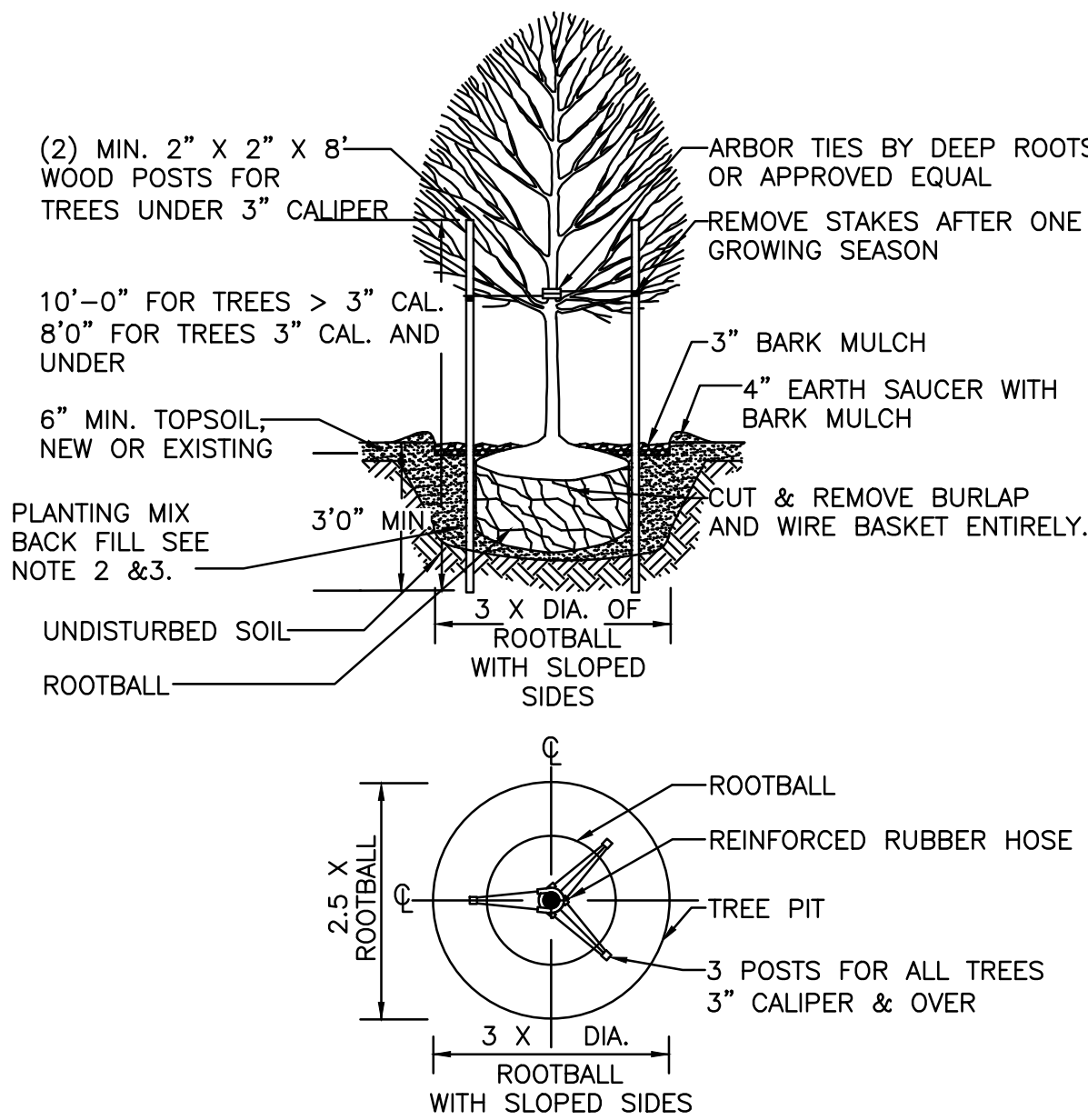
2



EVERGREEN TREE DETAIL

NOT TO SCALE

1



DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

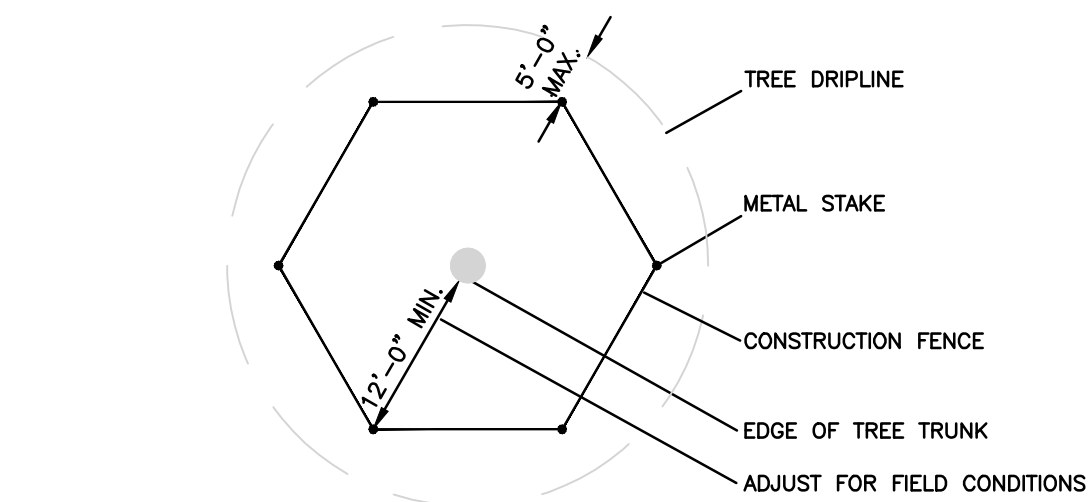
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NOTES

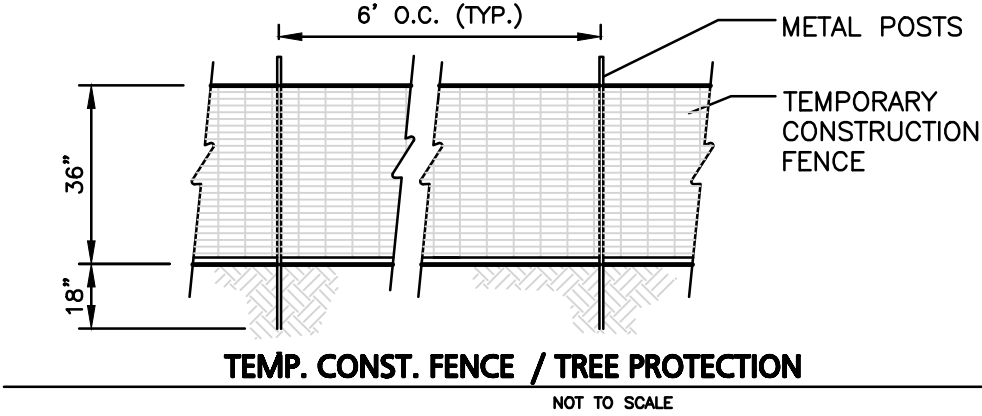
1. TREES SHALL BEAR SAME RELATIONSHIP TO FINISH GRADE AS IT BORE TO NURSERY OR FIELD GRADE. ROOT FLARE SHALL BE 2" ABOVE FINISH GRADE. REMOVE SOIL FROM TRUNK FLARE OF TREE TO DETERMINE ACTUAL TOP OF ROOTBALL AREA.
2. INSTALL THREE GUYS PER TREE; EQUALLY SPACED AROUND BALL.
3. ATTACH GUYS AT 2/3 HEIGHT OF TREE.
4. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH) 20% PEAT MOSS, 10% SAND.
5. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED AND WATER THOROUGHLY AT COMPLETION.

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% 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 AND WATER THOROUGHLY AT COMPLETION.



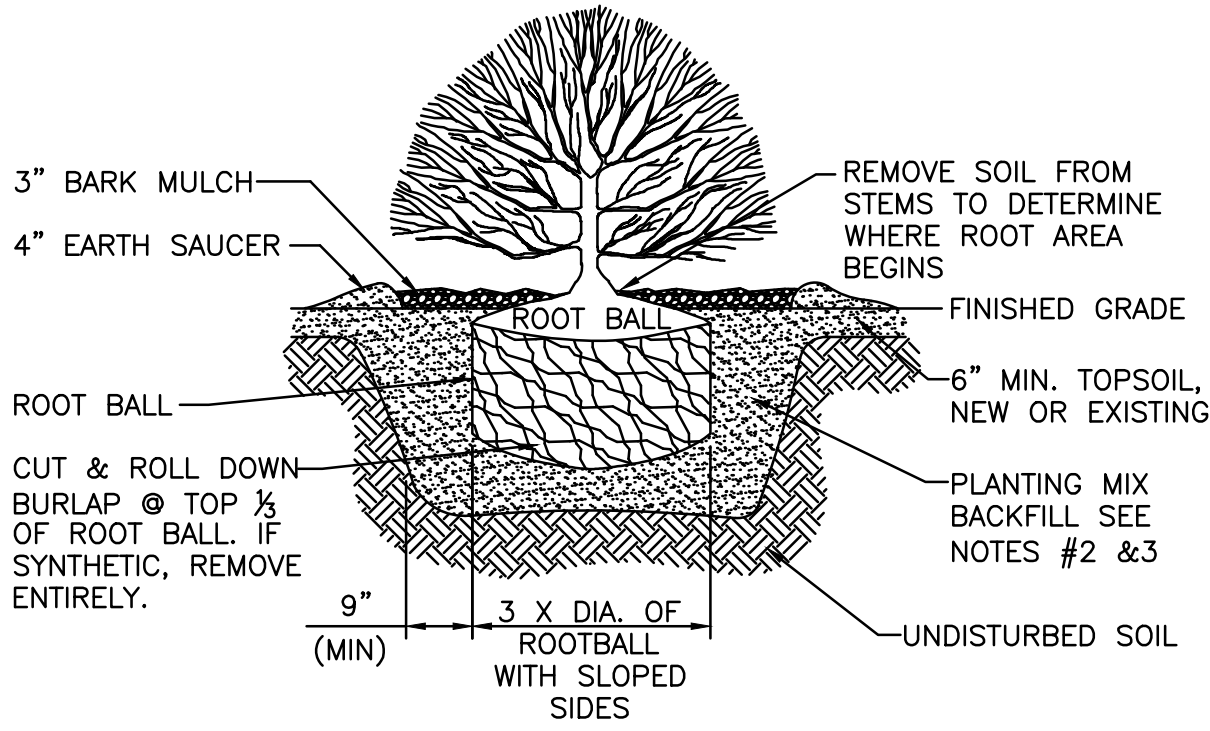
- NOTE:
1. CONSTRUCTION FENCE TO BE "VISUAL BARRIER FENCE" AS MANUFACTURED BY EXXON CHEMICAL COMPANY ATLANTA, GA; "KONTROL SAFETY FENCE" AS MANUFACTURED BY MIRAFI, CHARLOTTE, N.C. OR APPROVED EQUAL.
2. IF GROUPS OF TREES ARE TO BE PROTECTED, EXTEND FENCE AROUND PERIMETER TO CONFORM TO MINIMUM DIMENSIONS FOR TREE TRUNKS AND DRIPLINE.



4

NOTES:

1. ALL SHRUBS SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING. SET SHRUB 1"-2" ABOVE FINISH GRADE.
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 AND WATER THOROUGHLY AT COMPLETION.
4. SHRUB BEDS TO HAVE 24" MIN. OF CONTINUOUS PLANTING SOIL.



SHRUB PLANTING DETAIL

NOT TO SCALE

5



REGISTERED LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

1	03/10/2021	ISSUED FOR ARB REVIEW
REV	DATE	DESCRIPTION

APPLICANT/OWNER:

192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:

190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO.	2729-02	DATE:	10/23/2020
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SCALE:	NTS	DWG. NAME:	C2729-02
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DESIGNED BY:	BCD	CHECKED BY:	BDJ
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PREPARED BY:

ALLEN & MAJOR  
ASSOCIATES, INC.

civil engineering • land surveying  
environmental consulting • landscape architecture  
www.allenmajor.com

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FAX: (781) 935-2896

WOBURN, MA • LAKEVILLE, MA • MANCHESTER, NH

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DRAWING TITLE:	SHEET No.
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LANDSCAPE DETAILS

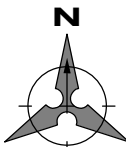
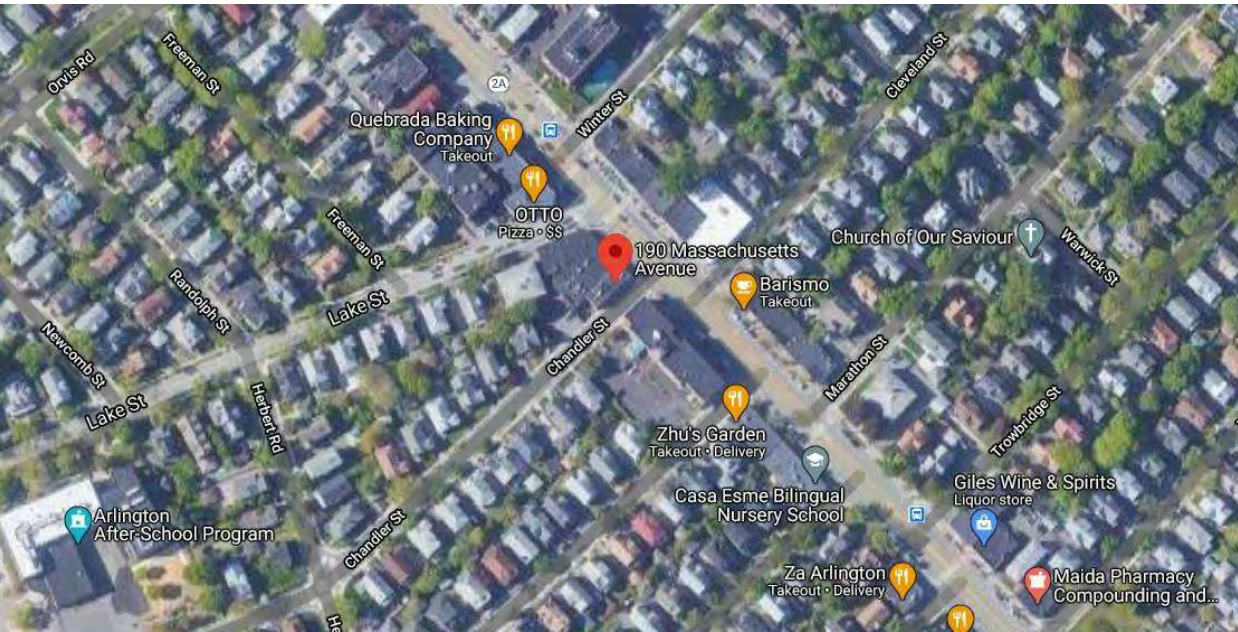
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PERSPECTIVE VIEW:



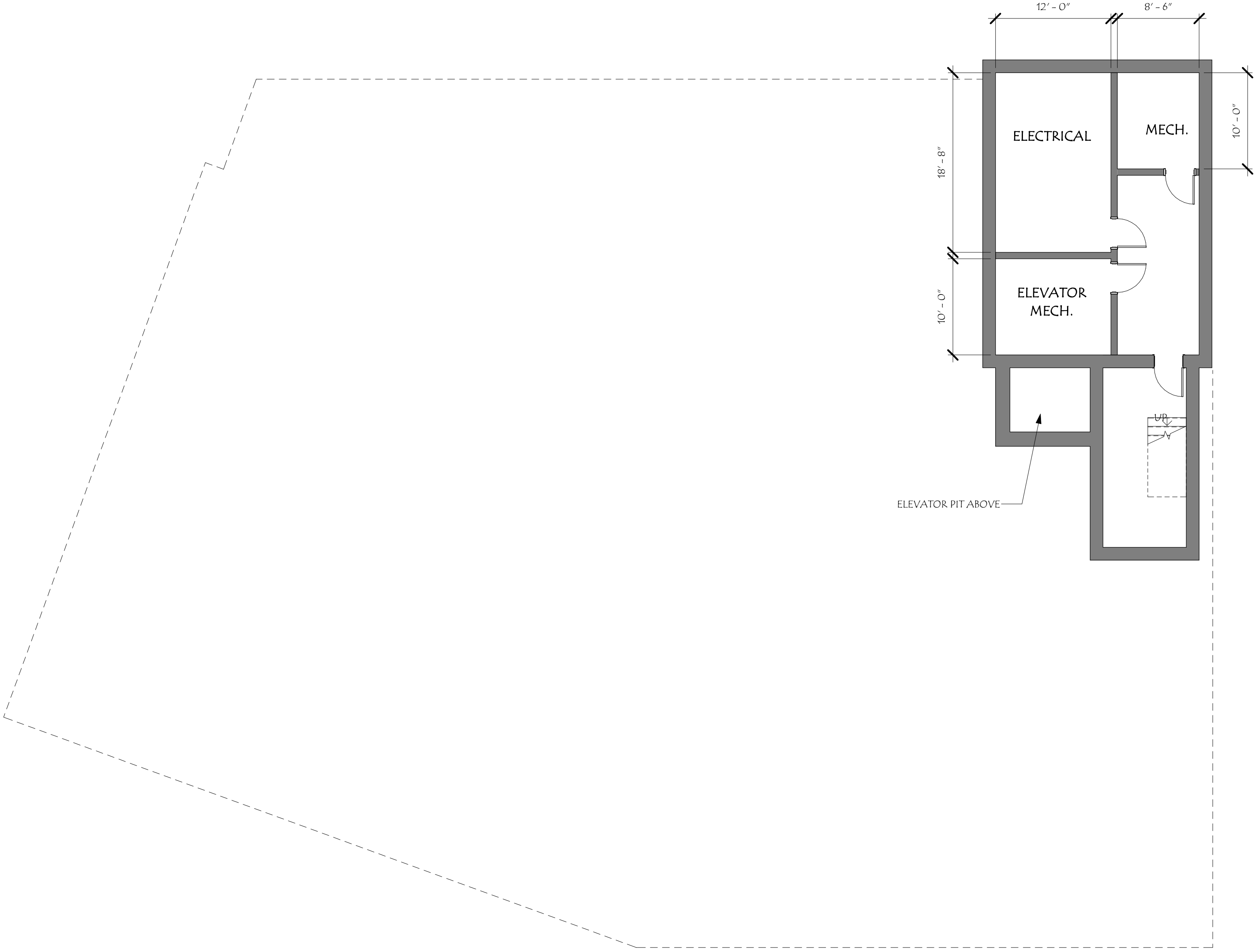
AERIAL SITE PLAN:



DRAWING LIST

ARCHITECTURAL	
A1.00	OVERALL PLAN - BASEMENT
A1.01	OVERALL PLAN - FIRST FLOOR
A1.02	OVERALL PLAN - SECOND FLOOR
A1.03	OVERALL PLAN - THIRD FLOOR
A1.04	OVERALL PLAN - FOURTH FLOOR
A1.05	OVERALL PLAN - FIFTH FLOOR
A1.06	OVERALL PLAN - ROOF
A2.01	BUILDING ELEVATIONS
A9.01	STREET ELEVATIONS
A9.02	BANK CORNER RENDER
A9.03	COMMERCIAL CORNER RENDER
A9.04	ROOF DECK RENDER
A9.05	SOLAR STUDIES

REVISION
DATE



Title:  
OVERALL PLAN -  
BASEMENT

A1.00

Scale:  
Drawn By:  
Checked By:  
Project No.:  
Date:

1/8" = 1'-0"  
PPS  
ALW  
2020051  
03/01/21

Revisions:		
#	Description	Date

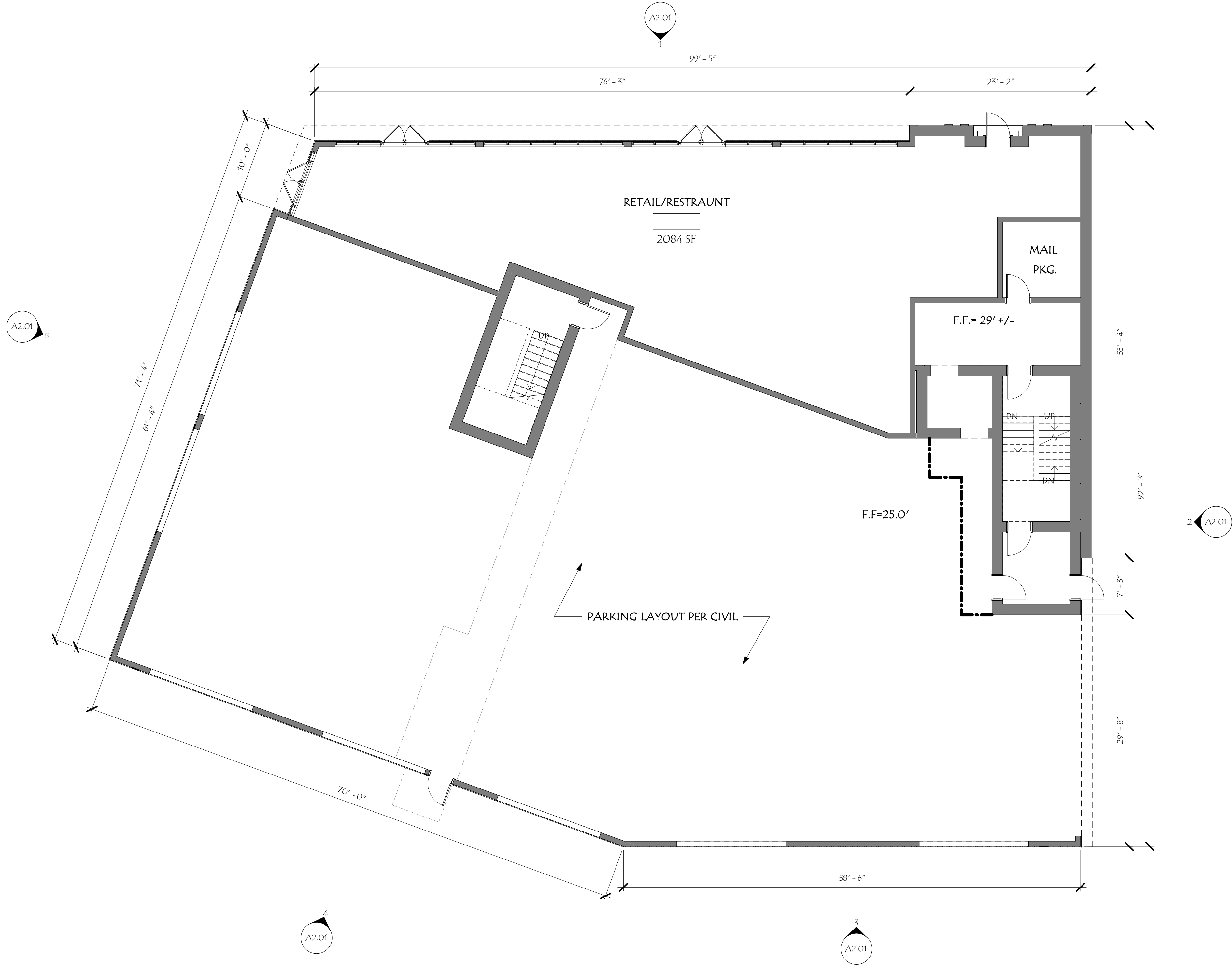
200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION



1 OVERALL PLAN - 1ST FLOOR  
1/8" = 1'-0"



Title:  
OVERALL PLAN -  
FIRST FLOOR

A1.01

Revisions:		
#	Description	Date

Scale:	1/8" = 1'-0"
Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	03/01/21

## 200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION



NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI  
190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Revisions:	#	Description	Date

Scale:	1/8" = 1'-0"
Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	03/01/21

Title:  
OVERALL PLAN -  
SECOND FLOOR

A1.02

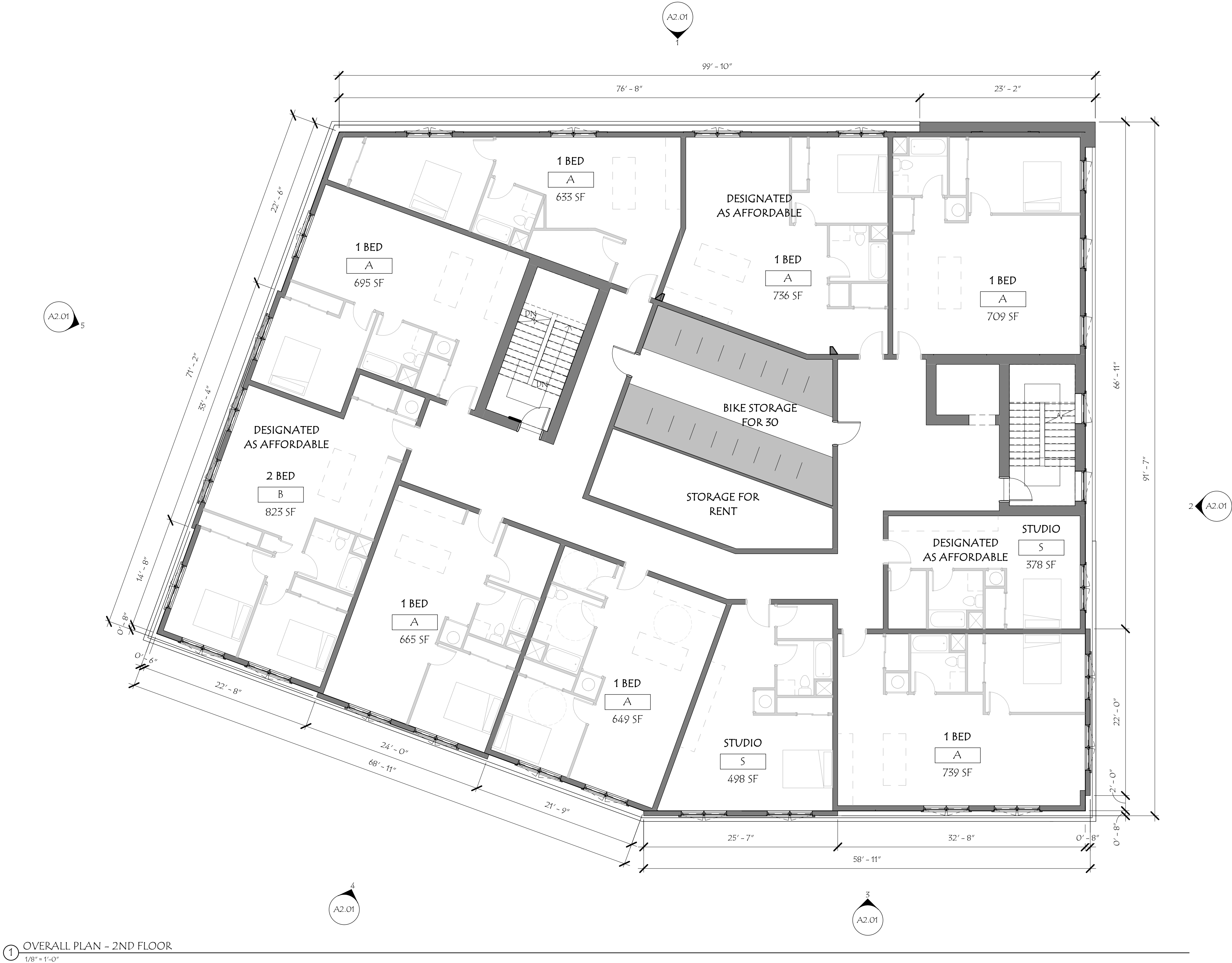
UNIT MATRIX:

	#	%
SECOND FLOOR:		
STUDIO	2 UNIT	20%
1 BED	7 UNITS	70%
2 BED	1 UNIT	10%

TOTAL:		
STUDIO	10 UNITS	27%
1 BED	23 UNITS	62%
2 BED	4 UNITS	11%

TOTAL 37 UNITS

NOTE:  
PRELIMINARY UNIT INTERNAL LAYOUT SHOWN, FINAL LAYOUT MAY VARY



1 OVERALL PLAN - 2ND FLOOR  
1/8" = 1'-0"

NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI  
190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Revisions:	#	Description	Date

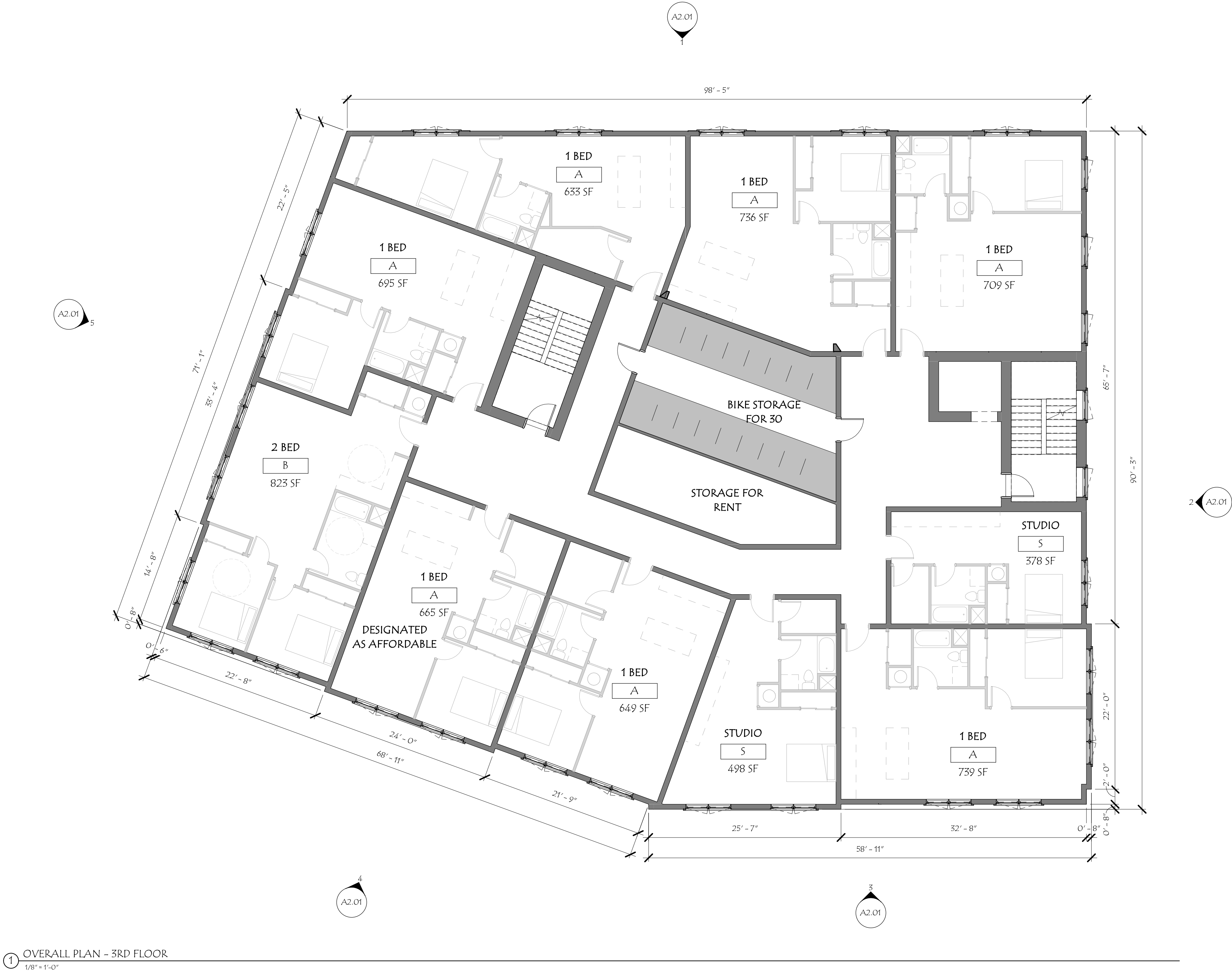
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Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	03/01/21

Title:  
OVERALL PLAN -  
THIRD FLOOR

A1.03

UNIT MATRIX:		
	#	%
THIRD FLOOR:		
STUDIO	2 UNIT	20%
1 BED	7 UNITS	70%
2 BED	1 UNIT	10%
TOTAL:		
STUDIO	10 UNITS	27%
1 BED	23 UNITS	62%
2 BED	4 UNITS	11%
TOTAL	37 UNITS	

NOTE:  
PRELIMINARY UNIT INTERNAL LAYOUT SHOWN, FINAL LAYOUT MAY VARY



1 OVERALL PLAN - 3RD FLOOR  
1/8" = 1'-0"

NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Revisions:	#	Description	Date

Scale:	1/8" = 1'-0"
Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	03/01/21

Title:  
OVERALL PLAN -  
FOURTH FLOOR

A1.04

UNIT MATRIX:

	#	%
FOURTH FLOOR:		
STUDIO	2 UNIT	25%
1 BED	5 UNITS	63%
2 BED	1 UNIT	12%
TOTAL:		
STUDIO	10 UNITS	27%
1 BED	23 UNITS	62%
2 BED	4 UNITS	11%
TOTAL	37 UNITS	

NOTE:  
PRELIMINARY UNIT INTERNAL LAYOUT SHOWN, FINAL LAYOUT MAY VARY

1 OVERALL PLAN - 4TH FLOOR  
1/8" = 1'-0"



1 OVERALL PLAN - 5TH FLOOR  
1/8" = 1'-0"



UNIT MATRIX:

	#	%
FIFTH FLOOR:		
STUDIO	4 UNIT	44%
1 BED	4 UNITS	44%
2 BED	1 UNIT	11%
TOTAL:		
STUDIO	10 UNITS	27%
1 BED	23 UNITS	62%
2 BED	4 UNITS	11%
TOTAL	37 UNITS	

NOTE:  
PRELIMINARY UNIT INTERNAL LAYOUT SHOWN, FINAL LAYOUT MAY VARY



NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI  
190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

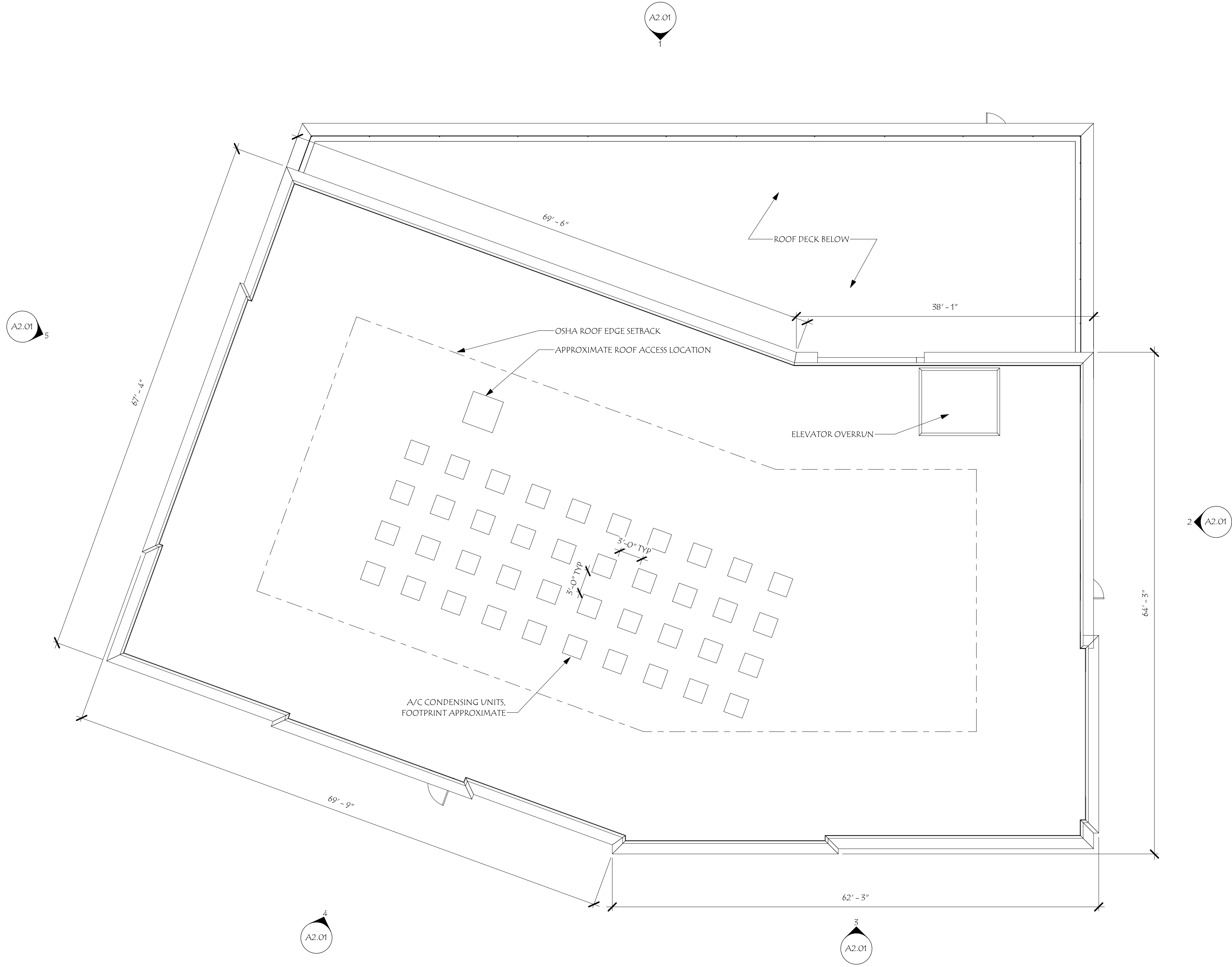
Revisions:	#	Description	Date

1/8" = 1'-0"	PPS	ALW	2020051	03/01/21
Scale:	Drawn By:	Checked By:	Project No.:	Date:

Title:  
OVERALL PLAN -  
FIFTH FLOOR

A1.05

1 OVERALL PLAN - ROOF  
1/8" = 1'-0"



Title:  
OVERALL PLAN -  
ROOF

A1.06

Scale:  
Drawn By:  
Checked By:  
Project No.:  
Date:

1/8" = 1'-0"  
PPS  
ALW  
2020051  
03/01/21

Revisions: #	Description	Date

200 MASS AVE MULTI  
190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION

NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Revisions:			Date
#	Description		

Scale:	3/32" = 1'-0"
Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	03/01/21

Title: BUILDING ELEVATIONS	A2.01

- MATERIAL NOTES:
- BRICK BASE TO MATCH EXISTING BRICK BANK.
  - PAINTED FIBER CEMENT PANEL, TYP. UPPER STORIES.
  - CORNICE/TRIM TO BE FIBER CEMENT OR AZEK WITH METAL FLASHING PAINTED TO MATCH.



2 ELEVATION - 2  
3/32" = 1'-0"



5 ELEVATION - 5  
3/32" = 1'-0"



4 ELEVATION - 4  
3/32" = 1'-0"



3 ELEVATION - 3  
3/32" = 1'-0"



1 ELEVATION - 1  
3/32" = 1'-0"

NOTE:  
CONTEXT BUILDING HEIGHTS AND ELEVATIONS APPROXIMATED.

NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Title: STREET ELEVATIONS	Scale:	1" = 20'-0"	Revisions:	Date
	Drawn By:	PPS	#	Description
	Checked By:	ALW		
	Project No.:	2020051		
	Date:	03/01/21		
A9.01				



③ CHANDLER STREET ELEVATION

1" = 20'-0"



② LAKE STREET ELEVATION

1" = 20'-0"



① MASS AVE STREET ELEVATION

1" = 20'-0"



Title:  
BANK CORNER  
RENDER

A9.02

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Scale:  
Drawn By:  
Checked By:  
Project No.:  
Date:

PPS  
ALW  
2020051  
03/01/21

Revisions: #	Description	Date

200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION



NOT FOR  
CONSTRUCTION

200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

Revisions:		Date
#	Description	

Scale:	PPS
Drawn By:	ALW
Checked By:	2020051
Project No.:	03/01/21
Date:	

Title: COMMERCIAL CORNER RENDER	
	A9.03



Title:  
ROOF DECK RENDER

A9.04

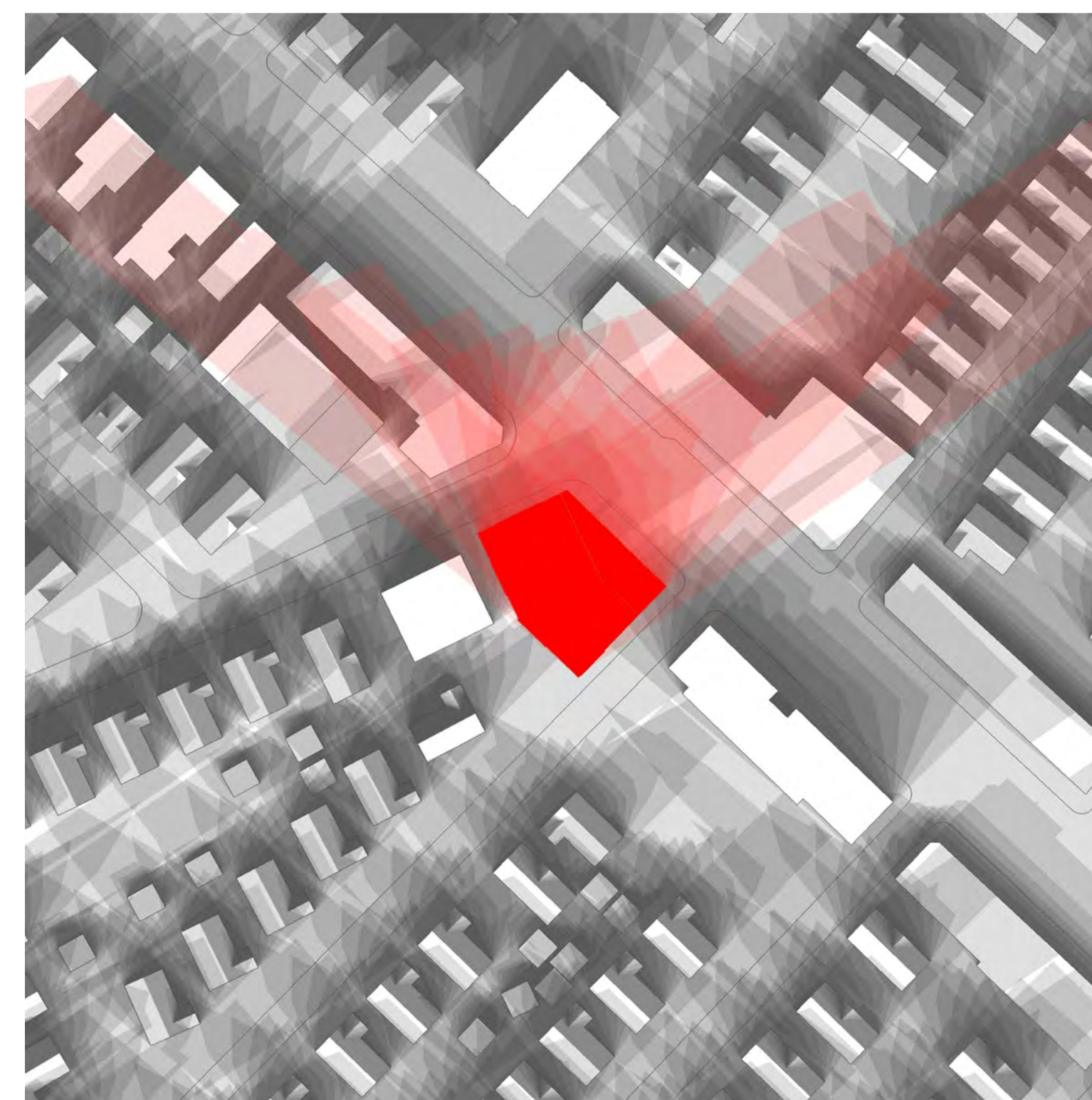
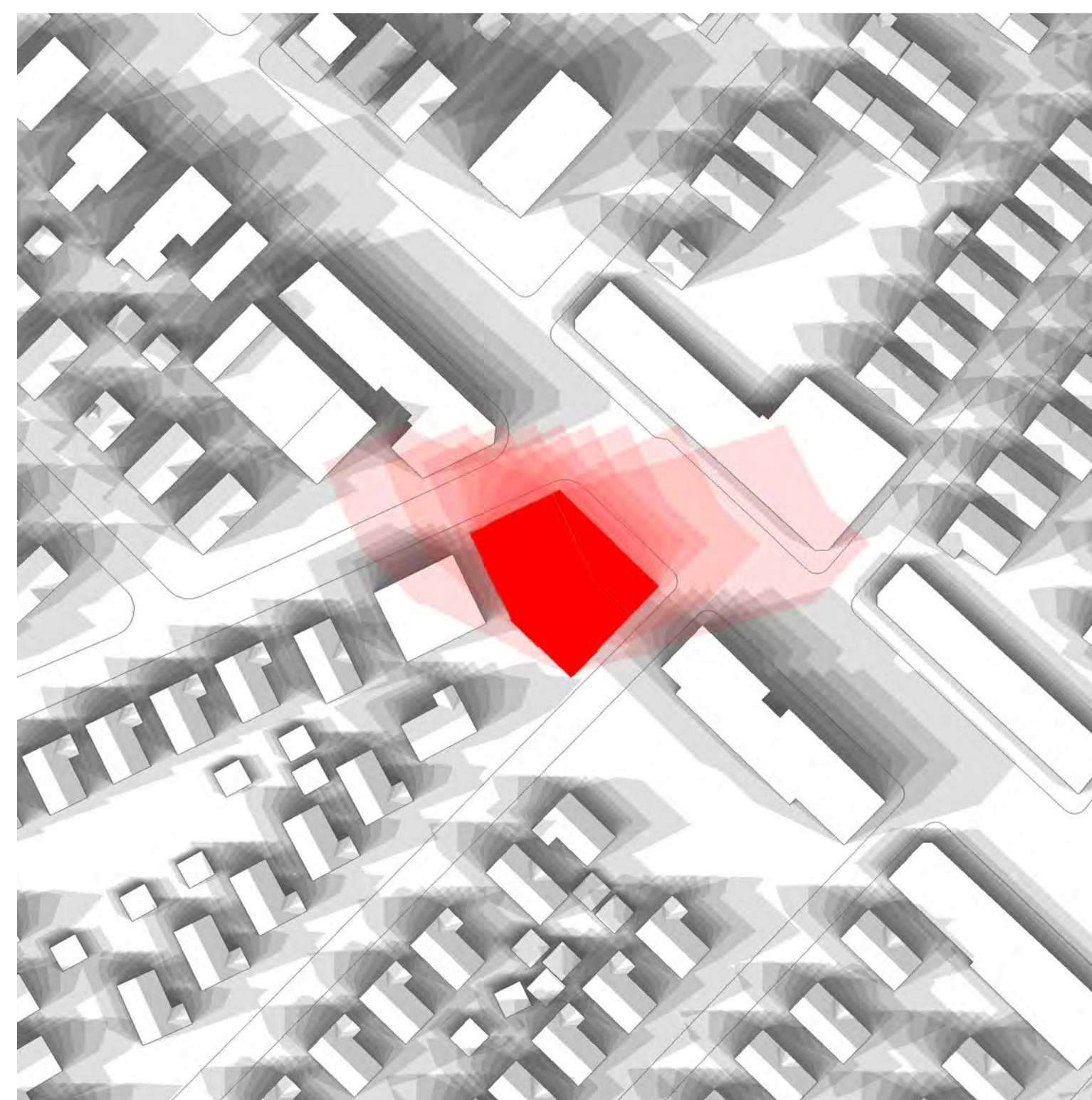
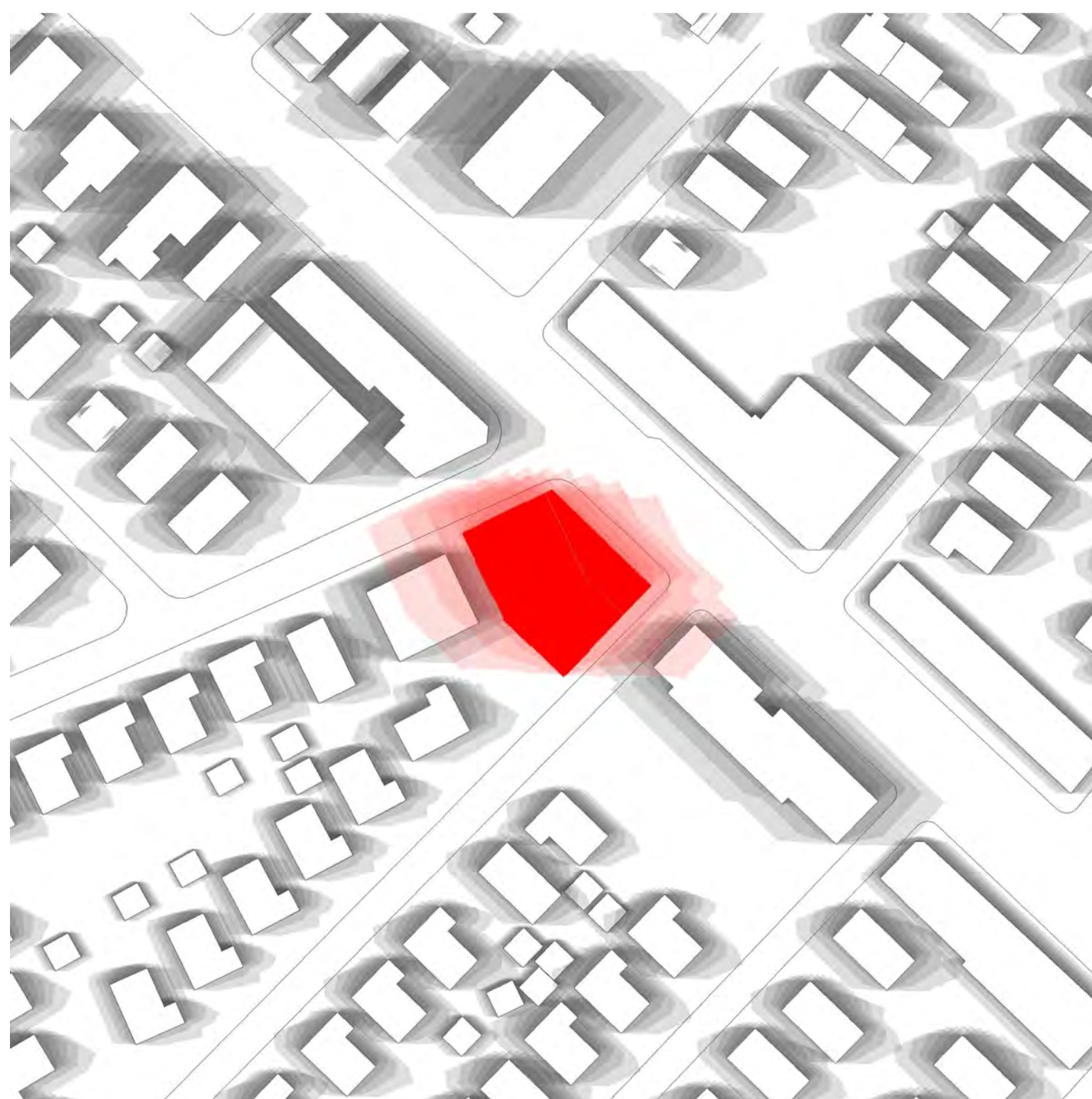
Scale:  
Drawn By: PPS  
Checked By: ALW  
Project No.: 2020051  
Date: 03/01/21

Revisions:		
#	Description	Date

200 MASS AVE MULTI

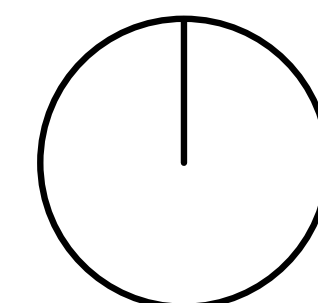
190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION



NOTE:

THE BUILDING AND LANDSCAPE SHADOWS ILLUSTRATED IN THE RENDERINGS BELOW ARE DIGITALLY GENERATED AND THEORETICAL REPRESENTATIONS OF THOSE SHADOWS CAST AT A SPECIFIC MOMENT IN TIME ON A SPECIFIC DAY. WHILE ACCURATE TO THE INPUT CALENDAR AND SUN LOCATION DATA, THE ACTUAL PERCEPTION OF SHADOWS INCLUDING THEIR SIZE, SHAPE AND INTENSITY OR DARKNESS, MAY BE SUBJECTIVE AND VARIABLE TO THE SPECIFIC OBSERVER. AS SUCH, THIS INFORMATION SHOULD BE UTILIZED AS GENERAL COMMENTARY, AND CAUSE FOR FURTHER DISCUSSION OR STUDY AS NEEDED.



Title: SOLAR STUDIES

A9.05

\* 2020 Market Square Architects 3/10/2021 1:20:08 PM

Revisions: #	Description	Date

Scale:	
Drawn By:	PPS
Checked By:	ALW
Project No.:	2020051
Date:	05/01/21

## 200 MASS AVE MULTI

190-200 MASSACHUSETTS AVE  
ARLINGTON, MA

NOT FOR  
CONSTRUCTION

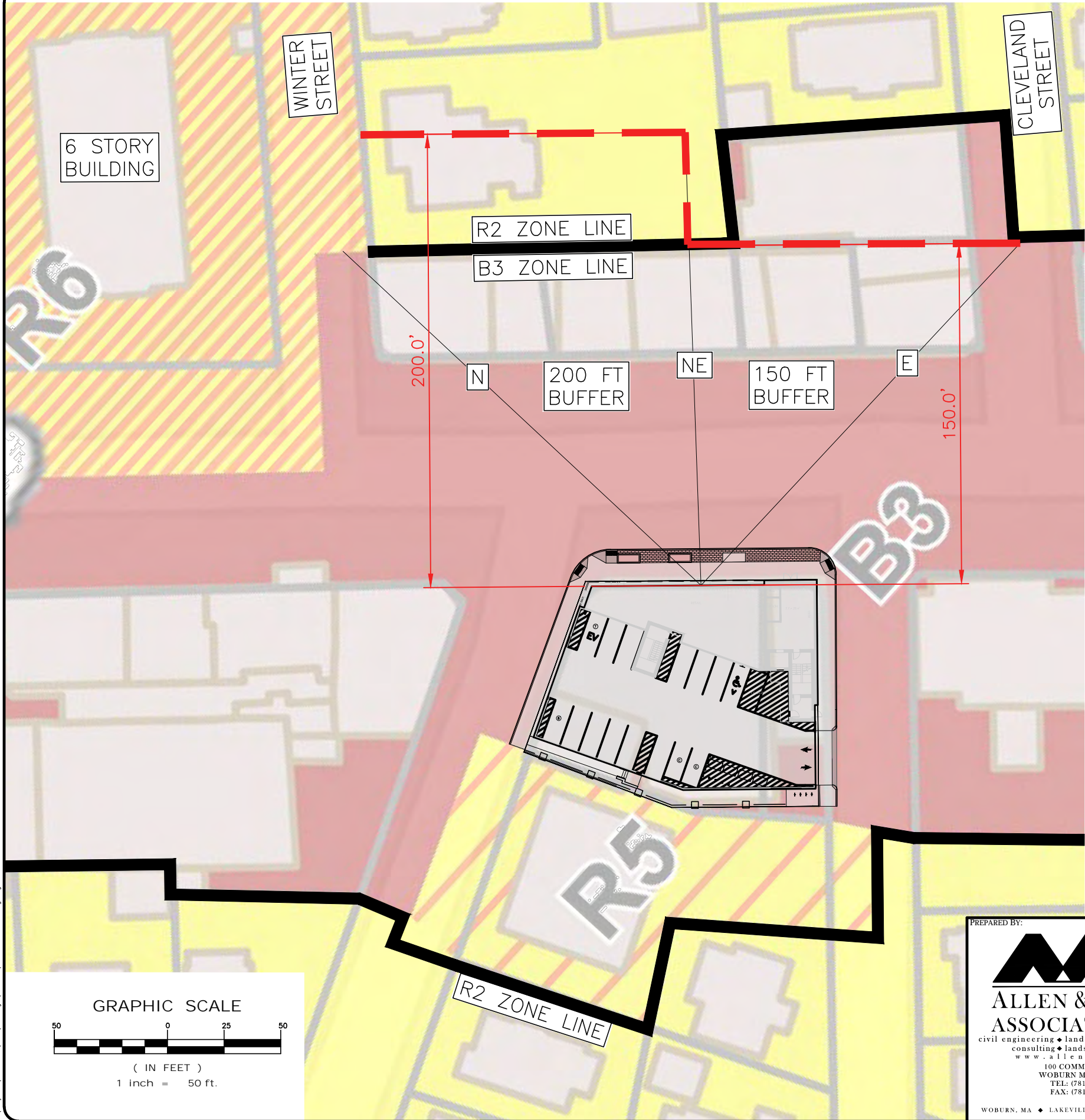


Market Square Architects investigated the impact of the greater maximum height limit as proposed through two methods.

Solar studies were conducted on the Solstices and the Equinoxes, from 8:00AM to 4:00 PM UTC-5; topography and existing structures were included in the model, and conclusions were drawn by extrapolating this data. These studies demonstrate that the proposed structure will only cast shadows on existing structures in a R2 zone during the evenings of winter months, when long shadows are already cast by existing structures and foliage. Furthermore, the specific properties of these existing structures (Cleveland St.) are farther than the boundary which triggers the height buffer (see FIG-01, Allen & Major Associates), such that no existing structure in an R2 zone close enough to trigger the height buffer is anticipated to be impacted by a shadow.

Massing studies were conducted to understand the context of the neighborhood. While the existing use of this specific site is shorter than proposed, the existing use of the surrounding context and neighborhood precedents a building of this proposed massing. An existing 5 story structure (215 Massachusetts Ave) stands on a lot roughly two hundred feet diagonally from the proposed construction. Observing the surrounding context, the proposed building exaggerates the required upper story setback, minimizing the impact of the taller structure and creating a pedestrian friendly streetscape along Mass Ave which harmonizes with the massing of the adjacent existing structures (Capitol Theater, 204 Massachusetts Ave, and Leader Bank Corporate Offices, 180 Massachusetts Ave). The building does not immediately abut a R2 zoned property, therefor we believe an adequate buffer remains between the proposed construction and existing R2 lots.

Conclusively, we believe that utilizing the taller maximum height allowed would have minimal impact on the nearby R2 lots.

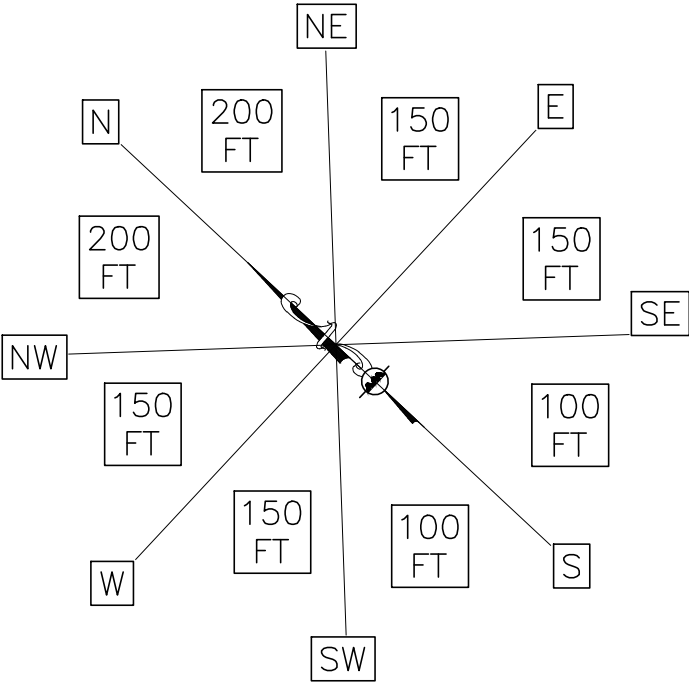


5.3.19. Reduced Height Buffer Area

- A. When two different maximum height limits are specified for the same zoning district in any Table of Dimensional and Density Regulations in this Section 5, the lower limit shall apply to any lot or part of a lot located in a height buffer area unless it is determined as a specific finding of a special permit that the properties in the adjacent R0, R1, R2, or OS district would not be adversely affected due to existing use or topographic condition. A height buffer area is defined as a lot or part of a lot which is located at a lesser distance from any land, not within a public way, in an R0, R1, R2 or OS district than the following:

5-10 / DISTRICTS & USES

Land in R0, R1, R2, OS is located	Lower height shall apply
Between northwest and northeast	Within 200 feet
Easterly, between northeast and southeast, or westerly between northwest and southwest	Within 150 feet
Southerly, between southeast and southwest	Within 100 feet



R:\Projects\2729-02\Civil\Drawings\Current\C-2729-02\_Zoning.dwg

PREPARED BY:

**ALLEN & MAJOR ASSOCIATES, INC.**  
civil engineering • land surveying environmental consulting • landscape architecture  
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WOBURN, MA • LAKEVILLE, MA • MANCHESTER, NH

<b>PROJECT:</b>  190 & 192-200 MASSACHUSETTS AVE	<b>NORTHERN REDUCED HEIGHT BUFFER</b>	
	<b>PROJECT NO.</b> 2729-02	<b>DATE:</b> 10/28/2020
	<b>SCALE:</b> 1"=50'	<b>SHEET REF:</b> -
	<b>DESIGNED BY:</b> ARM	<b>CHECKED BY:</b> -
<b>APPLICANT/OWNER: 192-200 MASSACHUSETTS AVE, LLC</b>		
THIS DRAWING HAS BEEN PREPARED IN ELECTRONIC FORMAT. CLIENT/CLIENT'S REPRESENTATIVE OR CONSULTANT MAY BE PROVIDED COPIES OF DRAWINGS AND SPECIFICATIONS ON MAGNETIC MEDIA FOR HIS/HER INFORMATION AND USE FOR SPECIFIC APPLICATION TO THIS PROJECT. DUE TO THE POTENTIAL THAT THE MAGNETIC INFORMATION MAY BE MODIFIED UNINTENTIONALLY OR OTHERWISE, ALLEN & MAJOR ASSOCIATES, INC. MAY REMOVE ALL INDICATION OF THE DOCUMENT'S AUTHSHIP ON THE MAGNETIC MEDIA. PRINTED REPRESENTATIONS OF THE DRAWINGS AND SPECIFICATIONS ISSUED SHALL BE THE ONLY RECORD COPIES OF ALLEN & MAJOR ASSOCIATES, INC.'S WORK PRODUCT.		
		<b>FIGURE No.</b>  <b>FIG-01</b>



# LEED v4 for Building Design and Construction: Homes and Multifamily Lowrise

Project Checklist

Project Name: 190-200 Massachusetts Ave, Arlington, MA 02476

Date: 12/18/2020

Y ? N

Y			Credit	Integrative Process	2
9	6	0	<b>Location and Transportation</b>		<b>15</b>
Y			Prereq	Floodplain Avoidance	Required
<b>PERFORMANCE PATH</b>					
			Credit	LEED for Neighborhood Development Location	15
<b>PRESCRIPTIVE PATH</b>					
4	4		Credit	Site Selection	8
3			Credit	Compact Development	3
	2		Credit	Community Resources	2
2			Credit	Access to Transit	2
2	2	3	<b>Sustainable Sites</b>		<b>7</b>
Y			Prereq	Construction Activity Pollution Prevention	Required
Y			Prereq	No Invasive Plants	Required
	1	1	Credit	Heat Island Reduction	2
	1	2	Credit	Rainwater Management	3
2			Credit	Non-Toxic Pest Control	2
4	4	2	<b>Water Efficiency</b>		<b>12</b>
Y			Prereq	Water Metering	Required
<b>PERFORMANCE PATH</b>					
			Credit	Total Water Use	12
<b>PRESCRIPTIVE PATH</b>					
4		2	Credit	Indoor Water Use	6
	4		Credit	Outdoor Water Use	4
10	21	6	<b>Energy and Atmosphere</b>		<b>38</b>
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Energy Metering	Required
Y			Prereq	Education of the Homeowner, Tenant or Building Manager	Required
<b>PERFORMANCE PATH</b>					
			Credit	Annual Energy Use	29
<b>BOTH PATHS</b>					
2	3		Credit	Efficient Hot Water Distribution System	5
	1	1	Credit	Advanced Utility Tracking	2
1			Credit	Active Solar Ready Design	1
	1		Credit	HVAC Start-Up Credentialing	1
<b>PRESCRIPTIVE PATH</b>					
Y			Prereq	Home Size	Required
	1	2	Credit	Building Orientation for Passive Solar	3
	2		Credit	Air Infiltration	2
	2		Credit	Envelope Insulation	2
3			Credit	Windows	3
	2	2	Credit	Space Heating & Cooling Equipment	4


<b>EA PRESCRIPTIVE PATH (continued)</b>					
	3		Credit	Heating & Cooling Distribution Systems	3
	2	1	Credit	Efficient Domestic Hot Water Equipment	3
2			Credit	Lighting	2
2			Credit	High Efficiency Appliances	2
	4		Credit	Renewable Energy	4
5	4	1	<b>Materials and Resources</b>		<b>10</b>
Y			Prereq	Certified Tropical Wood	Required
Y			Prereq	Durability Management	Required
	1		Credit	Durability Management Verification	1
2	2		Credit	Environmentally Preferable Products	4
3			Credit	Construction Waste Management	3
	1	1	Credit	Material Efficient Framing	2
9	5	2	<b>Indoor Environmental Quality</b>		<b>16</b>
Y			Prereq	Ventilation	Required
Y			Prereq	Combustion Venting	Required
Y			Prereq	Garage Pollutant Protection	Required
Y			Prereq	Radon-Resistant Construction	Required
Y			Prereq	Air Filtering	Required
Y			Prereq	Environmental Tobacco Smoke	Required
Y			Prereq	Compartmentalization	Required
2	1		Credit	Enhanced Ventilation	3
2			Credit	Contaminant Control	2
	3		Credit	Balancing of Heating and Cooling Distribution Systems	3
	1		Credit	Enhanced Compartmentalization	1
2			Credit	Enhanced Combustion Venting	2
		2	Credit	Enhanced Garage Pollutant Protection	2
3			Credit	Low Emitting Products	3
1	0	5	<b>Innovation</b>		<b>6</b>
Y			Prereq	Preliminary Rating	Required
		5	Credit	Innovation	5
1			Credit	LEED AP Homes	1
0	0	4	<b>Regional Priority</b>		<b>4</b>
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
		1	Credit	Regional Priority: Specific Credit	1
40	42	23	<b>TOTALS</b>		<b>Possible Points: 110</b>

Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

## MEMORANDUM

**DATE:** December 21, 2020

**TO:** Frank Pasciuto  
Member Manager  
192 Massachusetts Ave LLC  
Framina LLC  
455 Massachusetts Avenue, Ste 1  
Arlington, MA 02474

**FROM:** Robert J. Michaud, P.E. – Managing Principal   
Daniel A. Dumais, P.E. – Senior Project Manager

**RE: Proposed Mixed-Use Development**  
190-200 Massachusetts Avenue, Arlington, Massachusetts

---

MDM Transportation Consultants, Inc. (MDM) has conducted this traffic impact statement (TIS) for a proposed mixed-use development to be located at 190-200 Massachusetts Avenue in Arlington, Massachusetts. The location of the site relative to the adjacent roadway network is shown in **Figure 1**. This TIS provides a summary of the baseline traffic characteristics of the Site and adjacent roadways/ intersections, evaluates existing and projected site trip generation, quantifies incremental traffic impacts of the Site development on area roadways, and evaluates safety-related conditions at key study locations that provide access to the Site.

Key findings of the assessment are as follows:

- *Safety Characteristics.* A review of the crash data indicated that no immediate safety countermeasures are warranted based on the crash history at the study intersections. Likewise, available sight lines at the site driveway intersection with Chandler Street will exceed the sight line requirements published by AASHTO.
- *Public Transportation.* The project is in close proximity to an extensive sidewalk system, three nearby multi-use paths (Minuteman Bikeway, Alewife Greenway Bike Path, and Alewife Linear Path), adjacent MBTA bus routes, and the nearby redline subway connections. A review of Census data for Arlington indicates alternative transportation (transit, walk, and bike) use of 50% for residents of the immediate study area (Census tract 3561).

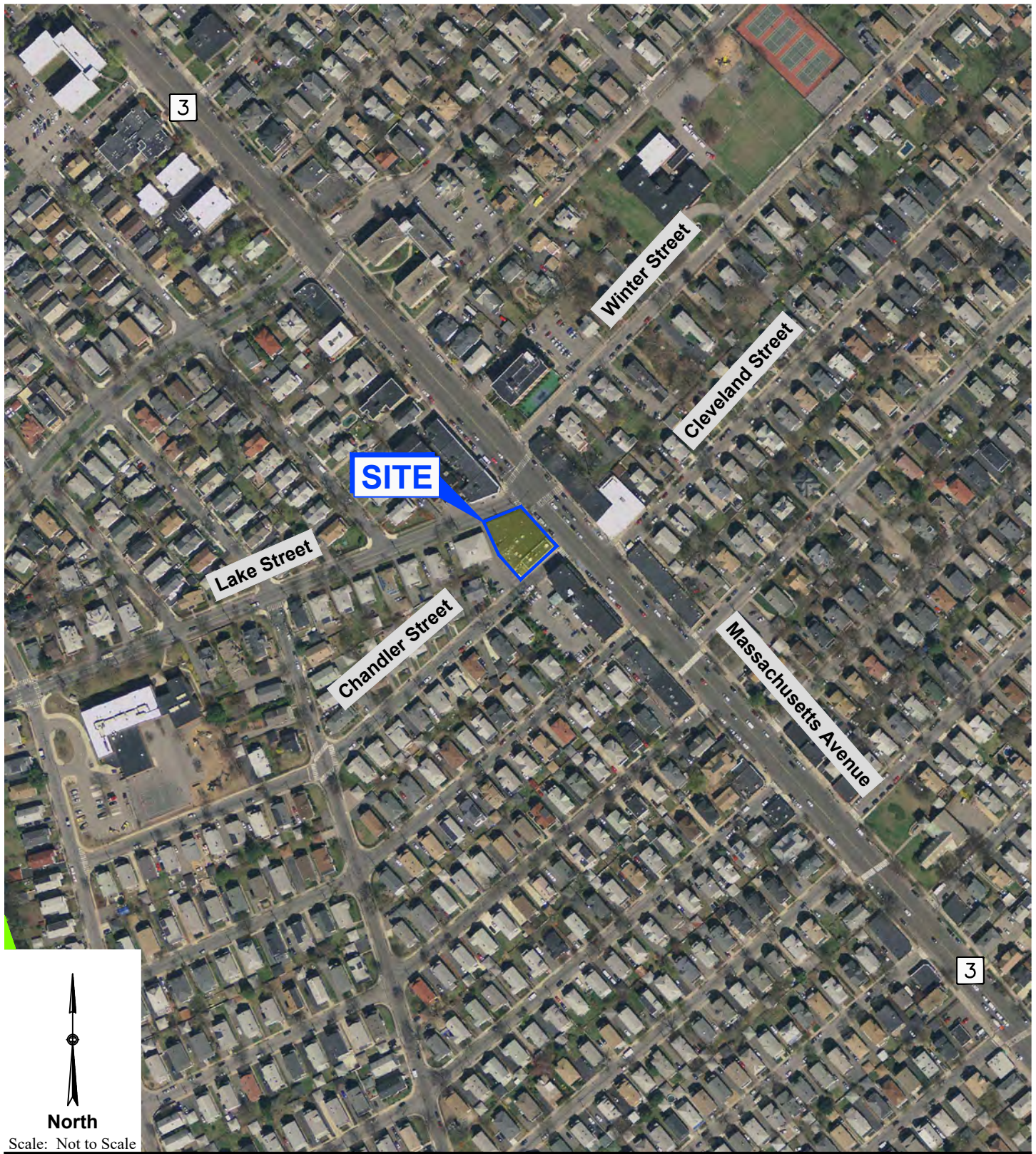


Figure 1

Site Location

- *Reduced Trip Generation.* Based on ITE methodology the proposed mixed-use development is estimated to reduce peak hour trips by up to 25 vehicle trips and approximately 228 fewer vehicle trips on a weekday relative to existing/historic site uses.
- *Qualitative Impact Assessment.* the incremental traffic associated with the proposed development will result in a reduction in vehicular activity compared to the existing/historic uses; consequently, no material impact in operating conditions at the study intersections and area roadways is projected as a result of the redevelopment.

In summary, access improvements, pedestrian/bicycle improvements, and TDM program are outlined under *Recommendations and Conclusions*. These improvements will establish a framework of minimizing Site traffic impacts and encourage non-motorized travel modes and pedestrian accommodation that is compatible with other projects in the area.

## PROJECT DESCRIPTION

The Site consists of approximately 0.26± acres of land located along the western side of Massachusetts Avenue between Lake Street and Chandler Street. The existing Site includes 10,500± sf of commercial/retail buildings with a curb cut along Chandler Street providing 2 off-street parking spaces. The development program envisions retaining approximately 1,735 sf of commercial space and constructing 37 residential apartments. Accordingly, net new trip activity for the site will be limited to the proposed 37 residential units after further offset by the reduction in commercial tenants in the current buildings. Access to the Site will be via a full access/egress driveway along Chandler Street with off-street parking for 15 vehicles. The preliminary site layout prepared by Allen & Major Associates; Inc. is presented in **Figure 2**.

## STUDY AREA

The following intersections will comprise the proposed study area:

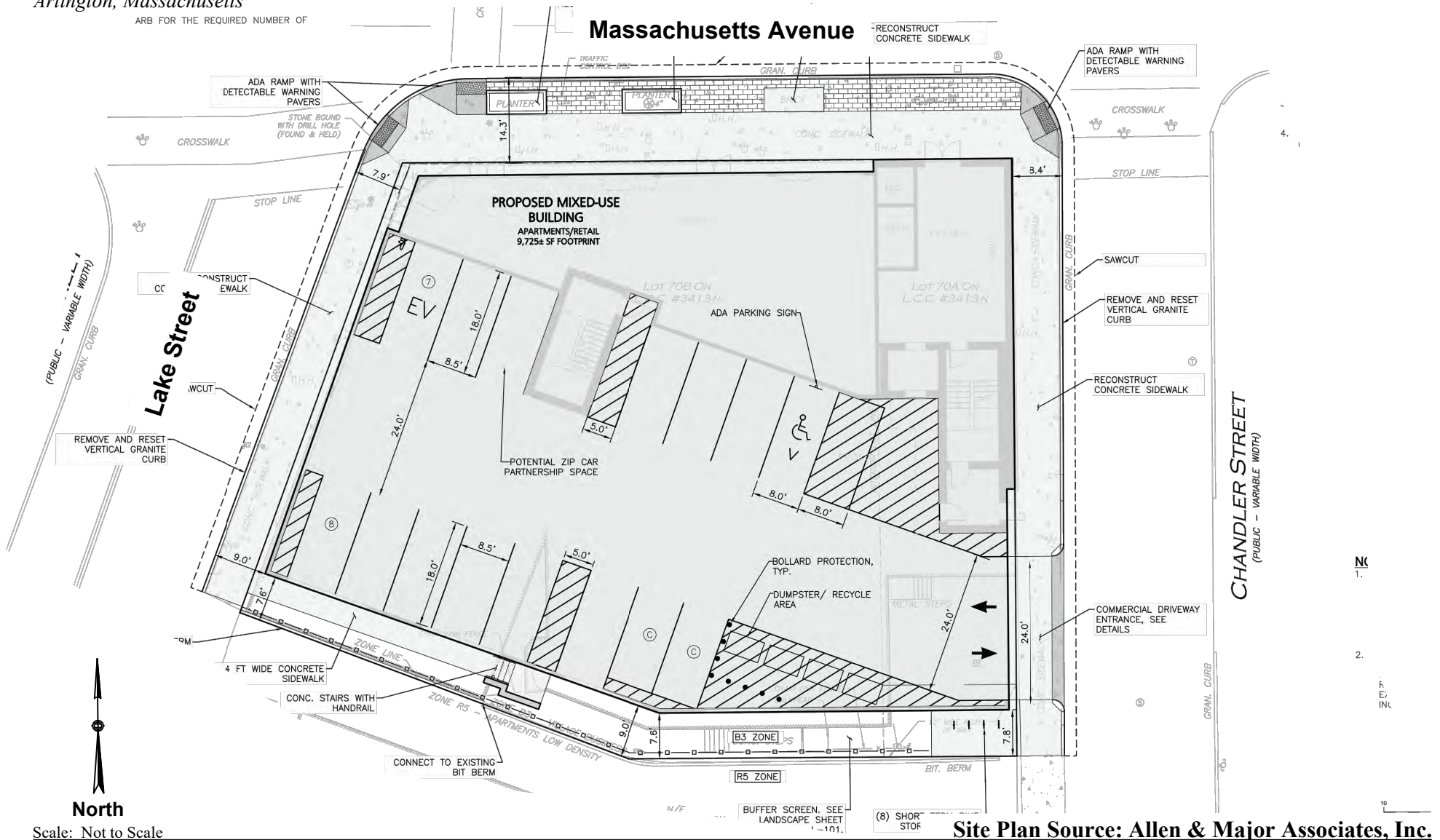
- Massachusetts Avenue at Lake Street/Winter Street (Signal)
- Massachusetts Avenue at Chandler Street
- Chandler Street at Site Driveway

## BASELINE TRAFFIC & SAFETY CHARACTERISTICS

An overview of roadway classification and geometric characteristics is provided below for the adjacent study roadway.

*Traffic Impact Memorandum*  
*Arlington, Massachusetts*

ARB FOR THE REQUIRED NUMBER OF



**MDM** TRANSPORTATION CONSULTANTS, INC.  
 Planners & Engineers

**Figure 2**

**Preliminary Site Plan**

## **Roadways**

### *Massachusetts Avenue (Route 3)*

Adjacent to the Site, Massachusetts Avenue is a southeast-northwest roadway under local (town) jurisdiction and is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Principal Arterial roadway. The roadway provides a connection to Arlington Center in the west and connects to Alewife Brook Parkway and Cambridge to the east. Massachusetts Avenue provides three travel lanes in the site area, one westbound and two eastbound, separated by a double yellow centerline. Additional turn lanes are provided at its major intersections. Sidewalks and on-street parking are provided along both the northern and southern side of the roadway, and bike lanes are provided in both directions. Land use along Massachusetts Avenue in the immediate study area includes a mix of commercial and residential uses.

### *Lake Street*

Lake Street is a two-lane, east-west roadway under local (town) jurisdiction and is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Minor Arterial roadway. The roadway provides a connection to Route 2 in the west and connects to Massachusetts Avenue to the east. Lake Street provides two travel lanes, one in each direction, separated by a double yellow centerline. Sidewalks are provided along both the northern and southern side of the roadway, and no on-street parking is allowed. Land use along Lake Street in the immediate study area includes a mix of uses including the commercial and residential uses, Hardy Elementary School, and access to the Minuteman Commuter Bikeway.

### *Chandler Street*

Adjacent to the Site, Chandler Street is a one-lane, northbound roadway under local (town) jurisdiction and is classified by the Massachusetts Department of Transportation (MassDOT) as a local roadway. Chandler Street is approximately 24 feet wide and allows on-street parking along the eastern side of the roadway. Sidewalks are provided along both the eastern and western side of the roadway. Land use along Chandler Street in the immediate study area includes a mix of commercial and residential uses.

## **Intersection Crash History**

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the Town of Arlington for the five-year period covering 2015 – 2019 (the most recent full year of data available from MassDOT). A summary of the crash data with crash rates for the study intersections with reported crashes is provided in **Table 1** with detailed data provided in the **Attachments**. A review of Highway Safety Improvement Project (HSIP) locations was also conducted.

**TABLE 1**  
**INTERSECTION CRASH SUMMARY**  
**2015 THROUGH 2019<sup>1</sup>**

Data Category	STUDY LOCATION		
	Massachusetts Ave at Lake Street/ Winter Street	Massachusetts Ave at Chandler Street	Chandler Street at Site Driveway/ 180 Mass Ave
Traffic Control	Signalized	Unsignalized	Unsignalized
<i>Year:</i>			
2015	9	2	0
2016	2	0	1
2017	5	1	0
2018	2	1	0
<u>2019</u>	<u>3</u>	<u>0</u>	<u>0</u>
<b>Total</b>	<b>21</b>	<b>4</b>	<b>1</b>
<i>Type:</i>			
Angle	3	3	1
Rear-End	6	1	0
Head-On	0	0	0
Sideswipe	10	0	0
Single Vehicle	1	0	0
Other/Unknown	1	0	0
<i>Severity:</i>			
P. Damage Only	20	4	1
Personal Injury	1	0	0
Fatality	0	0	0
Not Reported	0	0	0
<i>Conditions:</i>			
Dry	19	1	1
Wet	2	2	0
Snow	0	0	0
Not Reported/Other	0	1	0
<i>Time:</i>			
7:00 to 9:00 AM	2	0	0
4:00 to 6:00 PM	3	1	0
Rest of Day	16	3	1

<sup>1</sup>Source: MassDOT Crash Database

<sup>2</sup>Crashes per million entering vehicles

As summarized in **Table 1**:

- *Massachusetts Avenue at Lake Street*: A total of twenty-one (21) crashes were reported near the signalized intersection of Lake Street with Massachusetts Avenue resulting in approximately 4 crashes per year. The reported crashes included three (3) angle type collisions, six (6) rear-end type collisions, and ten (10) sideswipe-type collisions. Seventy-six percent (76%) of the crashes resulted in property-damage only, generally indicative of low-speed crashes. No fatalities or pedestrian-related incidents were reported during the study period. There was one collision that involved a bicycle and an eastbound vehicle in 2018 during the weekday evening peak hour that resulted in property damage only with the driver listed as disregarding the signal and roadway markings.
- *Massachusetts Avenue at Chandler Street*: A total of four (4) crashes were reported near the unsignalized intersection of Chandler Street with Massachusetts Avenue resulting in approximately 1 crash per year. The reported crashes included three (3) angle type collisions and one (1) rear-end type collisions. No fatalities or pedestrian-related incidents were reported during the study period.
- *Chandler Street at Site Driveway*: One (1) crash was reported at the unsignalized intersection of 180 Massachusetts Avenue (Bank) rear parking lot with Chandler Street. The reported crash was an angle-type collision that resulted in property damage only. No fatalities or pedestrian-related incidents were reported during the study period.

MDM notes that the safety review indicates that Massachusetts Avenue is listed as a HSIP bicycle cluster between Tufts Street in Arlington and Magoun Street in Cambridge. However, after an extensive review of crash records at the study intersections and with the limited number of pedestrian/bicycle related crashes as described above, no additional safety countermeasures are warranted.

## Sight Line Evaluation

An evaluation of sight lines was conducted at the proposed site driveway location to ensure that minimum recommended sight lines are available to safely exit onto Chandler Street. The evaluation documents existing sight lines for vehicles as they relate to Chandler Street with comparison to recommended guidelines for the regulatory speed limit.

The American Association of State Highway and Transportation Officials' (AASHTO) standards<sup>1</sup> reference two types of sight distance which are relevant at the site driveway intersection on Chandler Street: stopping sight distance (SSD) and intersection sight distance (ISD). Sight lines for critical vehicle movements at the proposed site driveway intersection with Chandler Street were compared to minimum SSD and ISD for the regulatory speed limit in the Site vicinity.

### *Stopping Sight Distance*

Sight distance is the length of roadway visible to the motorist to a fixed object. The minimum sight distance available on a roadway should be sufficiently long enough to enable a below-average operator, traveling at or near a regulatory speed limit, to stop safely before reaching a stationary object in its path, in this case, a vehicle exiting the site driveway onto Chandler Street. The SSD criteria are defined by AASHTO based on design and operating speeds, anticipated driver behavior and vehicle performance, as well as physical roadway conditions. SSD includes the length of roadway traveled during the perception and reaction time of a driver to an object, and the distance traveled during brake application on wet level pavement. Adjustment factors are applied to account for roadway grades where applicable.

SSD was estimated in the field using AASHTO standards for driver's eye (3.5 feet) and object height equivalent to the taillight height of a passenger car (2.0 feet) for the eastbound Chandler Street approaches to the proposed site driveway. **Table 2** presents a summary of the available SSD for the Chandler Street approach to the site driveway and AASHTO's recommended SSD for the regulatory travel speed.

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<sup>1</sup> A policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 2018.

**TABLE 2**  
**STOPPING SIGHT DISTANCE SUMMARY**  
**CHANDLER STREET APPROACH TO SITE DRIVEWAY**

Approach/ Travel Direction	Available SSD	AASHTO Recommended <sup>1</sup>	
		Regulatory Speed Limit <sup>2</sup>	Criteria Satisfied
Northbound	>400 Feet	155 Feet	Yes

<sup>1</sup>Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet to object height of 2.0 feet and adjustments for roadway grade.

<sup>2</sup>Prima-Facie Speed Limit is 25 mph.

As summarized in **Table 2** analysis results indicate that the available sight lines will exceed AASHTO's recommended SSD criteria for the proposed site driveway based on the regulatory speeds along Chandler Street.

#### *Intersection Sight Distance*

Clear sight lines provide sufficient sight distance for a stopped driver on a minor-road approach to depart from the intersection and enter or cross the major road. As stated under AASHTO's Intersection Sight Distance (ISD) considerations, "...If the available sight distance for an entering ...vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient sight distance to avoid collisions...To enhance traffic operations, intersection sight distances that exceed stopping sight distances are desirable along the major road." AASHTO's ISD criteria are defined into several "cases". For the proposed unsignalized site driveway location, which is proposed to be under "STOP" control with left egress movements, the ISD in question relates to the ability to turn left from the proposed driveway at its intersection with Chandler Street.

Available ISD was estimated in the field using AASHTO standards for driver's eye (3.5 feet), object height (3.5 feet) and decision point (between 8 from the edge of the travel way) for the eastbound direction along Chandler Street. **Table 3** presents a summary of the available ISD for the departure from the proposed site driveway and AASHTO's minimum and ideal ISD recommendations.

**TABLE 3**  
**INTERSECTION SIGHT DISTANCE SUMMARY**  
**SITE DRIVEWAY DEPARTURE TO CHANDLER STREET**

View Direction	Available ISD	AASHTO Minimum <sup>1</sup>	AASHTO Ideal <sup>2</sup>
		Regulatory Speed Limit <sup>2</sup>	Regulatory Speed Limit <sup>2</sup>
<i>Looking South</i>	>400 Feet	155 Feet	280 Feet

<sup>1</sup>Recommended sight distance based on AASHTO, A Policy on Geometric Design of Highways and Streets. Based on driver height of eye of 3.5 feet and an object height of 3.5 feet. Minimum value as noted represents SSD per AASHTO guidance. Adjustments for driveway grade have been made as needed.

<sup>2</sup> Prima-Facie Speed Limit is 25 mph.

The results of the ISD analysis presented in **Table 3** indicate that the available sight lines looking west from the site driveway onto Chandler Street will exceed the recommended sight line criteria from AASHTO. MDM recommends that any new plantings (shrubs, bushes) or physical landscape features to be located within driveway sight lines should also be maintained at a height of 2 feet or less above the adjacent existing roadway grade to ensure unobstructed lines of sight.

As a further safety feature, it is recommended that the Proponent install an audible and visual warning device at the garage exit to alert pedestrians of pending motorists exiting the driveway.

### **Alternative Transportation Facilities**

The existing pedestrian and transit facilities within the study area are shown graphically in **Figure 3**. The project is in close proximity to an extensive sidewalk system, nearby multi-use paths, adjacent MBTA bus routes, and nearby redline subway stations. The Massachusetts Bay Transit Authority (MBTA) operates the following bus routes in the study area and could be used as an alternative mode of travel to/from the site. A review of census data for Arlington indicates alternative transportation (transit, walk, and bike) use of 50% for residents of the immediate study area (Census tract 3561). Specific route and schedule information and Census data is provided in the **Attachments**.

- *MBTA Subway Service:* The redline subway runs from Alewife Station to South Station with another stop at Harvard Square. Both Alewife and Harvard stops are accessible from the Site via nearby MBTA Bus Routes. Service generally runs 5:00 am to 1:00 am on both weekdays and weekends with headways of approximately 9 minutes on peak times and 15-25 minutes during off-peak times.



Figure 3

- *Route 77:* This route provides service between Arlington Heights and Harvard Square via Massachusetts Avenue (Route 3). Service is provided along Massachusetts Avenue with a bus stop located less than ¼ mile from Site near the intersection of Massachusetts Avenue and Lake Street. Several connections to other bus routes in the service area are available as is a direct connection to the Redline T service. Service is generally provided seven (7) days a week and operates between 5:00 am and 1:30 am on weekdays, between 5:00 am and 1:30 am on Saturdays and between 6:00 am and 1:30 am on Sundays.
  
- *Route 79:* This route provides service between Arlington Heights and Alewife Station via Massachusetts Avenue (Route 3) and Alewife Brook Parkway. Service is provided along Massachusetts Avenue with a bus stop located less than ¼ mile from Site near the intersection of Massachusetts Avenue and Lake Street. Several connections to other bus routes in the service area are available as is a direct connection to the Redline T service. Service is generally provided five (5) days a week and operates between 7:00 am and 7:30 pm on weekdays with no service on weekends.
  
- *Route 350:* This route provides service between North Burlington and Alewife Station via Cambridge Street (Route 3A), Massachusetts Avenue (Route 3), and Alewife Brook Parkway. Service is provided along Massachusetts Avenue with a bus stop located less than ¼ mile from Site near the intersection of Massachusetts Avenue and Lake Street. Several connections to other bus routes in the service area are available as is a direct connection to the Redline T service. Service is generally provided seven (7) days a week and operates between 6:00 am and 11:00 pm on weekdays, between 6:30 am and 10:00 pm on Saturdays and between 7:00 am and 7:30 pm on Sundays.
  
- *Minuteman Bikeway:* This bikeway is a 10-mile trail connecting Bedford, Lexington, Arlington, and Cambridge. Access to the Bikeway from the Site can be made at its crossing of Lake Street located approximately ¼ mile away. The Bikeway provides a direct connection to the Alewife MBTA Station as well as other bike/pedestrian trails in the area including the nearby Alewife Greenway Bike Path and Alewife Linear Path.
  
- *Alewife Greenway Bike Path:* This bikeway is approximately a 2-mile trail connecting Cambridge and eastern Arlington. Access to the Bikeway from the Site can be made via a connection to the Minuteman Bikeway near Magnolia Park. The Bike Path follows along Alewife Brook Parkway and provides a direct connection from the Alewife MBTA Station to Mystic Valley Parkway in Arlington as well as local commercial and recreational spaces such as Dilboy Fields, Pool and Tennis Courts.
  
- *Alewife Linear Path:* This bikeway is a 2-mile trail connecting Cambridge and Somerville. Access to the Bikeway from the Site can be made via a connection to the Minuteman Bikeway near Alewife Station. The Bikeway provides a direct connection from the Alewife MBTA Station to Davis Square in Somerville.

## TRIP GENERATION

The trip generation estimates for the proposed redevelopment of the Site are provided for the weekday morning and weekday evening periods, which correspond to the critical analysis periods for the proposed use and adjacent street traffic flow. The methodology utilized to estimate the future trip-generation characteristics of the proposed development are summarized below. In accordance with EEA/MassDOT guidelines, the traffic generated by the proposed mixed-use development was estimated using trip rates published in ITE's *Trip Generation* for the Land Use Code (LUC) based on trip rates for Multifamily Housing (Mid-Rise) (LUC 221) and Shopping Center (LUC 820) for the commercial space. Census data for the immediate area indicates a transit use mode share of approximately 50% for residential uses. Therefore, trips associated with the residential use have been adjusted to reflect the census tract data. Projected site trip generation for the proposed development is summarized in **Table 2**. Trip generation calculations are provided in the **Attachments**.

**TABLE 2**  
**TRIP-GENERATION SUMMARY**

Period	Residential <sup>1</sup>	Retail Use <sup>2</sup>	Total Trips
<i>Weekday Morning Peak-Hour:</i>			
Enter	2	1	3
<u>Exit</u>	<u>5</u>	<u>1</u>	<u>6</u>
Total	7	2	9
<i>Weekday Evening Peak-Hour:</i>			
Enter	5	3	8
<u>Exit</u>	<u>3</u>	<u>4</u>	<u>7</u>
Total	8	7	15
<i>Daily</i>	102	66	168

<sup>1</sup>Based on ITE LUC 221 (Multifamily Housing (Mid-Rise)) applied to 37 Units adjusted to reflect 50% non-auto mode share per US Census tract data.

<sup>2</sup>Based on ITE LUC 820 (Shopping Center) applied to 1,735 sf.

As summarized in **Table 2**, the proposed mixed-use development is estimated to generate approximately 9 vehicle trips during the weekday morning peak hour (3 entering and 6 exiting) and 15 vehicle trips during the weekday evening peak hour (8 entering and 7 exiting). On a daily basis, the development is estimated to generate approximately 168 vehicle trips on a weekday.

**Table 3** summarizes the trip generation comparison for the project with respect to total new trips when adjusted for credit of existing/historic Site uses.

**TABLE 3**  
**TRIP-GENERATION COMPARISON**

Period	Existing Uses <sup>1</sup>	Proposed Use <sup>2</sup>	Net New Trips
<i>Weekday Morning Peak-Hour:</i>			
Enter	6	3	-3
Exit	<u>4</u>	<u>6</u>	<u>+2</u>
Total	10	9	-1
<i>Weekday Evening Peak-Hour:</i>			
Enter	19	8	-11
Exit	<u>21</u>	<u>7</u>	<u>-14</u>
Total	40	15	-25
<i>Daily</i>	396	168	-228

<sup>1</sup>Based on ITE LUC 820 (Shopping Center) applied to 10,500 sf.

<sup>2</sup>Based on ITE LUC 221 (Multifamily Housing (Mid-Rise)) applied to 37 Units adjusted to reflect 50% non-auto mode share per US Census tract data and ITE LUC 820 (Shopping Center) applied to 1,735 sf.

As summarized in **Table 3**, the proposed mixed-use development is estimated to generate a net reduction in vehicle trips relative to existing/historic uses at the site. Specifically, the project will generate approximately 1 *fewer* vehicle trip (3 fewer entering and 2 more exiting) during the weekday morning peak hour and 25 *fewer* vehicle trips (11 fewer entering and 14 fewer exiting) during the weekday evening peak hour. On a daily basis, the development is estimated to generate approximately 228 *fewer* vehicle trips on a weekday. Trip generation calculations are provided in the **Attachments**.

## QUALITATIVE IMACT ASSESSMENT

This section provides a quantitative statement of impact and describes the changes in trip generation associated with the development relative to Baseline conditions. Based on ITE trip generation methodology, the project will result in a no material change in traffic during the weekday morning peak hour and a modest decrease of approximately 25 vehicular trips (60% decrease) during the weekday evening peak hour. Relative traffic increases for the proposed project represents an inconsequential change in area roadway volumes - a level of change that falls well within normal day-to-day fluctuations in traffic traveling along Massachusetts Avenue and entering and exiting the study intersections. Consequently, no material impact in operating conditions at the study intersections and area roadways is projected as a result of the project.

## RECOMMENDATIONS AND CONCLUSIONS

In summary, the proposed mixed-use development is estimated to result in a net reduction in trips compared to the existing commercial use of the property. However, several mitigation actions are identified to support the project to ensure that site access meets applicable safety criteria, to enhance neighborhood walking/bicycling and to reduce dependency on single-occupant auto use. These include (a) access-related improvements, (b) pedestrian and bicycle accommodations, and (c) Transportation Demand Management (TDM) elements as summarized below.

### **Access/Egress Improvements**

- *Signs and Pavement Markings.* A STOP sign (R1-1) and STOP line pavement marking should be installed on the driveway approach to Chandler Street. “Left Turn Only” arrow and pavement marking should also be installed on the driveway approach to enhance the one-way restriction along Chandler Street. The sign and pavement markings shall conform to Manual on Uniform Traffic Control Devices (MUTCD) standards.
- *Audible Warning Device.* As a further safety feature, the Proponent should install an audible and visual warning device at the garage exit to alert pedestrians of pending motorists exiting the driveway.
- *Maintain Clear Driveway Sight Lines.* New plantings (shrubs, bushes) and structures (walls, fences, etc.) should be designed and maintained at a height of 2 feet or less above the finished driveway elevation within the sight triangle areas to provide unobstructed visibility to oncoming vehicles.

### **Pedestrian and Bicycle Accommodations**

- *Pedestrian Accommodation.* The design incorporates sidewalks that connect the proposed building entrances with the parking areas and to the existing sidewalk along Massachusetts Avenue, Chandler Street, and Lake Street. The sidewalk along the property frontage will also be reconstructed to enhance the pedestrian environment along the property.
- *Bicycle Amenities.* The Proponent will incorporate secure and weather-protected indoor bicycle racks within the site (60 total spaces) to encourage and facilitate this mode of transportation to/from the Site by residents and building tenants. Additional short-term bike racks (8 exterior spaces) will also be provided near the building.

## **Transportation Demand Management (TDM)**

A preliminary list of potential TDM program elements may include the following, subject to refinement of the development program and further evaluation by the Proponent:

- *Unbundled Parking.* The Proponent will consider unbundling residential parking to provide an option for residents to rent fewer or no parking spaces with their unit.
- *Bicycle Facilities and Promotion.* The Proponent will provide bicycle parking in excess of the zoning ordinance requirements to including weather protected racks for residents and supplemental racks for visitors and employees proximate to the building entrance. Specifically, this includes weather-protected bicycle storage within the site (60 spaces total within the property) plus 8 supplemental short-term exterior bike spaces.
- *Improve Walking Conditions.* The sidewalk along the property frontage will be reconstructed to enhance pedestrian accommodation to and along the property. The Proponent proposed to replace the bench within the sidewalk area fronting the property to accommodate pedestrians that are waiting for public transportation along Massachusetts Avenue. The Proponent will reconstruct the sidewalk and ramp system adjacent to the Site and provide enhanced planter boxes.
- *Electric Vehicle Parking Space.* Proponent will provide one (1) charging station for electric vehicles in the parking garage.
- *Car-Sharing Service Parking Space.* Proponent will consider the inclusion of one (1) parking space dedicated to a car-sharing service, such as ZipCar or other equivalent service.

## **CONCLUSIONS**

In summary, MDM finds that the incremental traffic associated with the proposed development will result in a net reduction in vehicular activity compared to the existing/historic uses. Consequently, no material impact in operating conditions at the study intersections and area roadways is projected as a result of the redevelopment. Implementation of access improvements, proposed pedestrian improvements, and a TDM program will establish a framework of minimizing Site traffic impacts and will encourage non-motorized travel modes and pedestrian accommodation that is compatible with other projects in the area.

# ATTACHMENTS

- Crash Data
- Sight Line Calculations
- Public Transportation Information
- Trip Generation
- Census Information

□ Crash Data

Mass Ave at Lake Street

Crash Num	City Town Name	Crash Date	Crash Severity	Crash Time	Number of Vehicles	First Harmful Event	Manner of Collision	Non-Motorist Type (/	Road Surface	C X	Y
3993282	ARLINGTON	01/11/2015	Property damage o	2:29 PM	2	Collision with motor vehicle in traffic	Angle	Dry		229447.7	906201.7
4034761	ARLINGTON	04/15/2015	Property damage o	3:44 PM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229448.7	906200.6
4036637	ARLINGTON	04/29/2015	Not Reported	8:29 AM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229439.6	906210.5
4039082	ARLINGTON	05/01/2015	Property damage o	5:54 AM	2	Collision with motor vehicle in traffic	Rear-end	Dry		229448.7	906200.6
4045800	ARLINGTON	05/24/2015	Property damage o	10:02 PM	2	Collision with motor vehicle in traffic	Rear-end	Dry		229448.7	906200.6
4050184	ARLINGTON	06/05/2015	Not Reported	2:28 PM	2	Collision with motor vehicle in traffic	Rear-end	Dry		229448.7	906200.6
4071582	ARLINGTON	08/07/2015	Non-fatal injury	4:56 PM	2	Collision with motor vehicle in traffic	Sideswipe, opposite direction	Dry		229448.7	906200.6
4115437	ARLINGTON	11/19/2015	Not Reported	3:35 PM	2	Collision with motor vehicle in traffic	Angle	Dry		229448.7	906200.6
4122759	ARLINGTON	12/10/2015	Not Reported	6:27 AM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229448.7	906200.6
4137503	ARLINGTON	01/17/2016	Property damage o	2:51 PM	2	Collision with motor vehicle in traffic	Rear-end	Dry		229448.7	906200.6
4247681	ARLINGTON	09/13/2016	Property damage o	12:09 PM	1	Collision with utility pole	Single vehicle crash	Dry		229448.7	906200.6
4372115	ARLINGTON	06/03/2017	Property damage o	1:12 PM	1	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229456.9	906192.4
4388089	ARLINGTON	07/08/2017	Property damage o	12:11 PM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229439.6	906210.5
4447110	ARLINGTON	10/26/2017	Property damage o	9:42 AM	2	Collision with parked motor vehicle	Sideswipe, same direction	Wet		229439.6	906210.5
4492857	ARLINGTON	11/27/2017	Property damage o	12:07 PM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229448.7	906200.6
4517088	ARLINGTON	03/20/2018	Property damage o	5:01 PM	1	Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Unknown	P3: Cyclist	Dry	229448.7	906200.6
4596395	ARLINGTON	06/03/2017	Property damage o	1:12 PM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229448.3	906201.1
4618623	ARLINGTON	11/06/2018	Property damage o	7:03 PM	2	Collision with motor vehicle in traffic	Rear-to-rear	Wet		229441.5	906208.5
4774799	ARLINGTON	11/14/2019	Property damage o	8:07 AM	3	Collision with motor vehicle in traffic	Rear-end	Dry		229441.5	906208.5
4776600	ARLINGTON	11/15/2019	Property damage o	5:33 PM	2	Collision with motor vehicle in traffic	Angle	Dry		229448.7	906200.6
4783683	ARLINGTON	11/25/2019	Property damage o	1:13 PM	2	Collision with motor vehicle in traffic	Sideswipe, same direction	Dry		229448.7	906200.6

Mass Ave at Chandler Street

Crash Num	City Town Name	Crash Date	Crash Severity	Crash Time	Number of Vehicles	First Harmful Event	Manner of Collision	Non-Motorist Type (/	Road Surface	C X	Y
4070001	ARLINGTON	07/31/2015	Not Reported	12:28 PM	2	Collision with parked motor vehicle	Rear-end	Dry		229479.5	906169.7
4088269	ARLINGTON	09/17/2015	Not Reported	10:55 PM	1	Collision with motor vehicle in traffic	Angle	Not reported		229479.5	906169.7
4355229	ARLINGTON	04/21/2017	Property damage o	4:43 PM	2	Collision with motor vehicle in traffic	Angle	Wet		229479.5	906169.7
4593671	ARLINGTON	09/12/2018	Property damage o	1:02 PM	3	Collision with motor vehicle in traffic	Angle	Wet		229479.5	906169.7

Chandler Street at Site Driveway

Crash Num	City Town Name	Crash Date	Crash Severity	Crash Time	Number of Vehicles	First Harmful Event	Manner of Collision	Non-Motorist Type (/	Road Surface	C X	Y
4157362	ARLINGTON	02/26/2016	Property damage o	3:15 PM	2	Collision with motor vehicle in traffic	Angle	Dry		229449.8	906143.2

## □ Sight Line Calculations

## Stopping Sight Distance - Regulatory Speed

Chandler Street approaches to Site Driveway

		SPEED (MPH)	BRAKE REACTION DISTANCE (FT)	BRAKING DISTANCE (FT)	CALCULATED STOPPING SIGHT DISTANCE (FT)
Direction 1	NB	25	91.875	59.9	151.8

### INPUTS

### Direction 1

Travel Direction	NB
Speed	25
Grade	0
t	2.5
a	11.2

### Stopping Sight Distance (SSD) - Source: AASHTO

SSD = Reaction Distance + Brake Distance

Reaction Distance =  $1.47 \times t \times V$

Brake Distance =  $V^2 / (30 \times ((a/32.2) + G))$

Where:

t = reaction time (sec)

V = travel speed (mph)

G= roadway grade

a - deceleration rate (ft/sec<sup>2</sup>)

## Intersection Sight Distance Calculations

Source: *A Policy on Geometric Design of Highways and Street, 7th Edition*; AASHTO; 2018.

$$ISD = 1.47 * V * t$$

V = speed

t = time gap

t = 7.5 s for a passenger car for Left Turn from a Stop

t = 6.5 s for a passenger car for Right Turn from a Stop

### **Chandler Street**

$$ISD = 1.47 * 25 * 7.5 = 276 \text{ ft } \mathbf{SAY \ 280 \ ft}$$

(left-turn from a stop)

□ Public Transportation Information

T Fares				
PRICE PER TRIP	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40
CharlieTicket	\$2.00	\$2.00	\$2.90	\$4.90**
Cash-on-Board	\$2.00	\$4.00	\$2.90	\$4.90**
Student/Youth*	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10
UNLIMITED TRIP PASSES				
1-Day	\$12.75	\$12.75	\$12.75	\$12.75
7-Day	\$22.50	\$22.50	\$22.50	\$22.50
Monthly	\$55.00	\$55.00	\$90.00	\$90.00
Senior/TAP Monthly \$30.00/month for unlimited travel on Local Bus and Rapid Transit				

**VALID PASSES:** LinkPass (\$84.50/mo.); Student/Youth LinkPass\* (\$30/mo.); Senior/TAP LinkPass\* (\$30/mo.); and express bus, commuter rail, and boat passes.

**FREE FARES:** Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free; if using a guide, the guide rides free.

\* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbtta.com/youthpass](http://www.mbtta.com/youthpass) for details.

\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

\*\*\* For Silver Line SL4 or SL5 pay \$2.75. Also see "transfers."

#### TRANSFERS

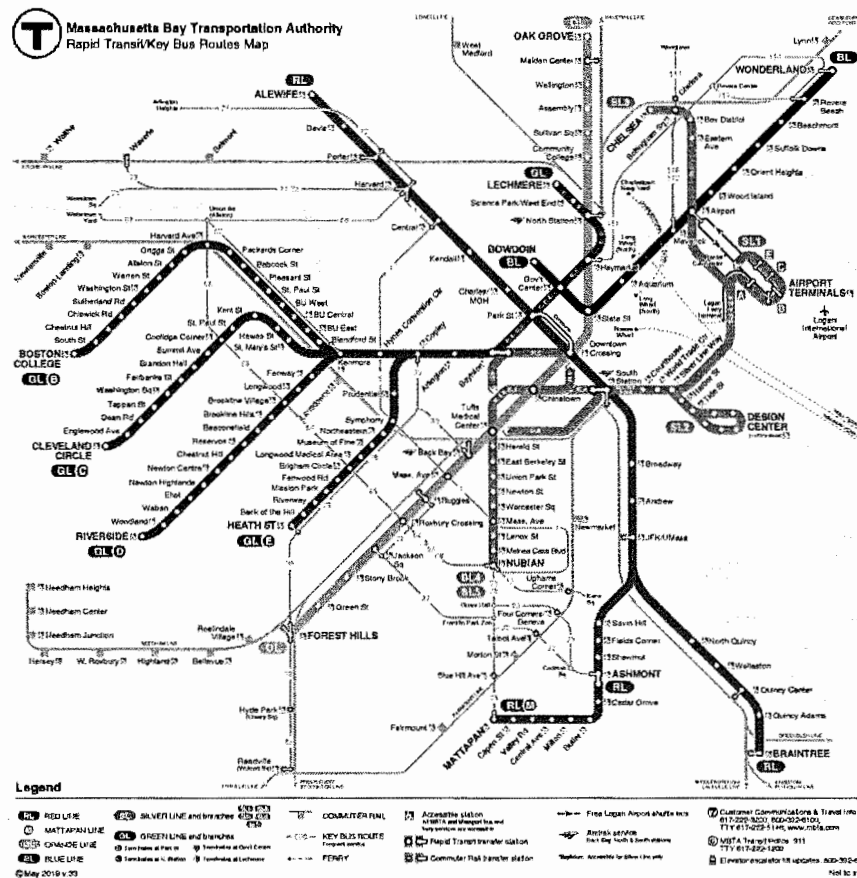
If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations.

#### SCHEDULES

Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay and Downtown Crossing (Orange Line Level) or see station personnel. Schedules also available at the Transportation Building (10 Park Plaza), 45 High St., and online at [mbta.com](http://mbta.com).

For real-time subway and bus tracking, download the Transit app on any smartphone.

## Massachusetts Bay Transportation Authority Rapid Transit/Key Bus Routes Map



## Rapid Transit

Effective August 30, 2020



Massachusetts Bay Transportation Authority **massDOT**

Information 617-222-3200 • 1-800-392-6100  
(TTY) 617-222-5146 • [www.mbtta.com](http://www.mbtta.com)

Rapid Transit Line	Weekday				Saturday			Sunday		
	First Trip	Peak	Off Peak	Last Trip	First Trip	Arriving Every	Last Trip	First Trip	Arriving Every	Last Trip
<b>Red Line</b>										
Alewife Braintree	5:24 AM 5:08 AM	9 mins	12-16 mins	12:20 AM 12:17 AM	5:24 AM 5:09 AM	12-16 mins	12:20 AM 12:17 AM	6:06AM 6:00AM	12-16 mins	12:20 AM 12:17 AM
Alewife Ashmont	5:16 AM 5:16 AM	9 mins	12-16 mins	w 12:27 AM w 12:30 AM	5:16 AM 5:16 AM	12-16 mins	w 12:27 AM w 12:30 AM	6:00AM 6:00AM	12-16 mins	w 12:27 AM w 12:30 AM
"M" Ashmont Mattapan	5:17 AM 5:05 AM	5 mins	8-12 Day 26 Late	w 1:05 AM 12:53 AM	5:15 AM 5:05 AM	8-12 Day 26 Early/Late	w 1:05 AM 12:53 AM	6:03AM 5:51AM	8-12 Day 26 Early/Late	w 1:05 AM 12:53 AM
<b>Blue Line</b>										
Wonderland Orient Heights Bowdoin	5:13 AM 5:14 AM 5:30 AM	5 mins	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:25 AM 5:13 AM 5:29 AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:58AM 6:03AM 6:21AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM
<b>Orange Line</b>										
Oak Grove Forest Hills	5:16 AM 5:16 AM	6 mins	9-11 mins	w 12:30 AM w 12:28 AM	5:16 AM 5:16 AM	9-11 mins	w 12:30 AM w 12:28 AM	6:00AM 6:00AM	9-11 mins	w 12:30 AM w 12:28 AM
<b>Green Line*</b>										
B Boston College Park Street	5:01 AM 5:45 AM	5-6 mins	7-9 mins	12:10 AM w 12:52 AM	4:45 AM <sup>2</sup> 5:40 AM	7-8 mins	12:09 AM w 12:52 AM	5:20AM <sup>2</sup> 6:12AM	9 mins	12:10 AM w 12:52 AM
C Cleveland Circle North Station	4:57 AM <sup>1</sup> 5:48 AM	6-8 mins	9-11 mins	12:07 AM w 12:46 AM	4:50 AM <sup>2</sup> 5:30 AM	9-10 mins	12:10 AM w 12:46 AM	5:30AM <sup>2</sup> 6:06AM	10 mins	12:10 AM w 12:46 AM
D Riverside Government Ctr.	4:56 AM 5:45 AM	6 mins	8-11 mins	12:05 AM w 12:49 AM	4:55 AM 5:38 AM	8-9 mins	12:02 AM w 12:49 AM	5:25AM 6:10AM	11-12 mins	12:05 AM w 12:49 AM
E Lechmere* Heath Street	5:00 AM <sup>4</sup> 5:45 AM	6-7 mins	8-10 mins	12:30 AM 12:47 AM <sup>3</sup>	5:01 AM 5:39 AM	10 mins	12:30 AM 12:47 AM <sup>3</sup>	5:35AM 6:15AM	12 mins	12:30 AM 12:47 AM <sup>3</sup>
<b>Silver Line</b>										
SL1 Logan Airport South Station	5:38 AM 5:40 AM	7-12 mins	10-12 mins	f 1:03 AM w 1:02 AM	5:48 AM 5:45 AM	10-12 mins	1:15 AM w 12:59 AM	5:50AM 6:12AM	10-12 mins	f 1:12 AM w 1:00 AM
SL2 Design Center South Station	6:07 AM 5:44 AM	6 mins	14-16 mins	12:37 AM 12:50 AM	6:03 AM 5:47 AM	14-16 mins	12:35 AM 12:45 AM	6:51AM 6:35AM	14-16 mins	12:51 AM 12:36 AM
SL3 Chelsea Station South Station	4:55 AM 4:20 AM	6-11 mins	8-13 mins	f 1:05 AM w 12:35 AM	5:30 AM 4:56 AM	8-13 mins	1:22 AM w 12:55 AM	6:26AM 5:53AM	8-13 mins	f 1:25 AM w 12:55 AM
SL4 Nubian Station South Station	5:20 AM 5:38 AM	6-11 mins	6-11 mins	12:20 AM 12:37 AM	5:23 AM 5:40 AM	13-20 mins	12:20 AM 12:40 AM	6:02AM 6:20AM	13-20 mins	12:20 AM 12:40 AM
SL5 Nubian Station Downtown Xing	5:15 AM 5:32 AM	11-14 mins	13-20 mins	12:51 AM w 1:07 AM	5:19 AM 5:34 AM	6-11 mins	12:43 AM w 1:00 AM	6:00AM 6:16AM	6-11 mins	12:25 AM w 12:47 AM

**Peak Service:**  
Weekdays 7 AM - 9 AM, 4 PM - 6:30 PM

**Green Line Notes:**

New and ongoing infrastructure projects may result in diversions on some branches at various times.

See GL service changes at [mbta.com/GLwork](http://mbta.com/GLwork)

View service alerts at [mbta.com/alerts](http://mbta.com/alerts)

\* E trains start/end at North Station for Green Line Extension work – shuttles provided between North Station and Lechmere.

More: [mbta.com/GLEwork](http://mbta.com/GLEwork)

1 - The first two C train AM northbound trips run through to Lechmere Station on weekdays.

2 - The first B and second C train AM northbound trips run through to Lechmere Station on weekends.

3 - On weekdays the 12:27 AM trip (weekends the 12:32 AM trip) from Heath St is the last connecting train to other lines downtown. The 12:37AM and 12:47AM trips (weekends the 12:47AM trip) from Heath St. runs in service to Lechmere with no guaranteed connections.

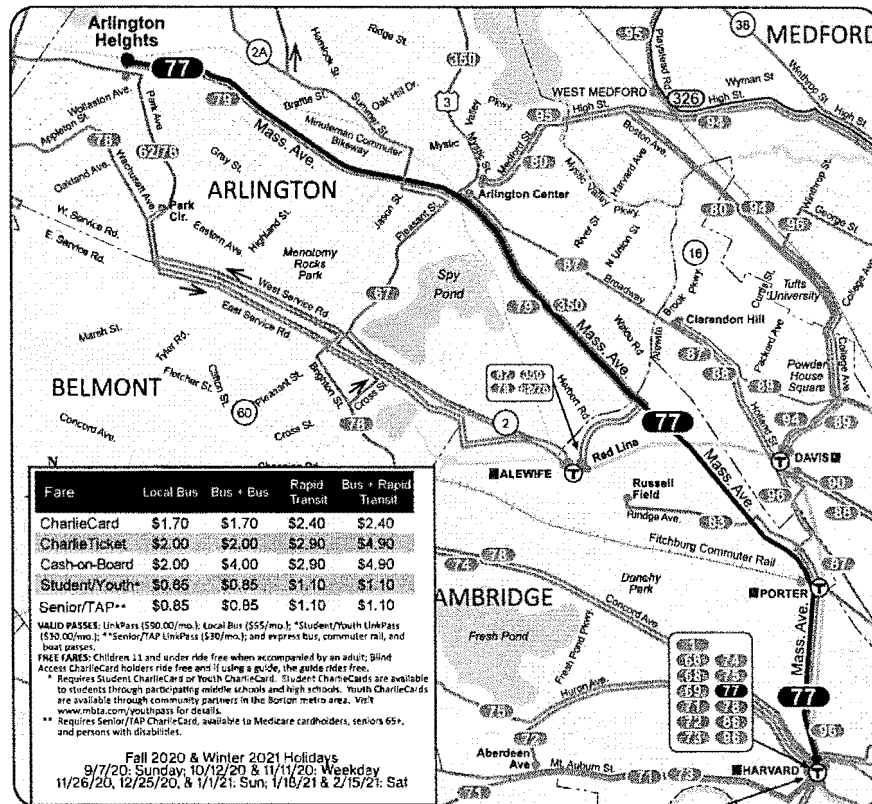
4 - Early morning service from Lechmere to Riverside departs Lechmere at 5:00 AM.

f - After exiting Ted Williams Tunnel bus will only service World Trade Center and South Station stops.

w - Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.

Fall 2020 & Winter 2021 Holidays  
9/7/20: Sunday, 10/12/20 & 11/11/20: Weekday  
11/26/20, 12/25/20, & 1/1/21: Sun, 1/18/21 & 2/15/21: Sat

## Route 77 Arlington Heights - Harvard Station



# 77

Effective August 30, 2020

## Arlington Heights- Harvard Station

**Serving**

- Porter Station
- Arlington High School
- Arlington Center
- Harvard University
- Elm Street
- Red Line
- Fitchburg Commuter Rail



**Massachusetts Bay Transportation Authority**

**Information 617-222-3310 • 1-800-392-4000**  
 (TTY) 617-222-5396 • [www.mbta.com](http://www.mbta.com)

77 Weekday									
Inbound					Outbound				
Leave Arlington Heights	Arrive Arlington Center	Lv/Arrive North Camb.	Arrive Harvard Square		Leave Harvard Station	Arrive North Camb.	Arrive Arlington Center	Arrive Arlington Heights	
4:48A	4:54A	5:01A	5:12A		5:11A	5:19A	5:24A	5:29A	
5:00	5:06	5:13	5:24		5:21	5:29	5:34	5:39	
5:12	5:18	5:25	5:36		5:32	5:40	5:45	5:50	
5:23	5:29	5:36	5:47		5:43	5:51	5:56	6:01	
5:34	5:40	5:47	5:58		5:54	6:02	6:08	6:13	
Every 10 Mins. or Less					6:05	6:15	6:21	6:26	
10:15	10:23	10:34	10:51		6:18	6:28	6:34	6:39	
10:25	10:33	10:44	11:01		6:31	6:41	6:47	6:52	
10:34	10:42	10:53	11:10		6:42	6:52	6:58	7:08	
10:43	10:51	11:02	11:19		6:51	7:02	7:12	7:23	
10:52	11:00	11:11	11:28		7:00	7:12	7:22	7:33	
11:01	11:09	11:20	11:37		7:09	7:21	7:31	7:42	
11:11	11:19	11:30	11:47		Every 10 Mins. or Less				
11:20	11:28	11:39	11:56		11:19	11:30	11:38	11:47	
11:29	11:37	11:48	12:06P		11:28	11:39	11:47	11:56	
11:38	11:46	11:57	12:15		11:37	11:48	11:56	12:06P	
11:47	11:56	12:07P	12:25		11:46	11:57	12:05P	12:15	
11:56	12:05P	12:16	12:34		11:55	12:08P	12:17	12:27	
12:05P	12:14	12:25	12:43		12:05P	12:17	12:26	12:36	
12:14	12:23	12:34	12:52		Every 10 Mins. or Less				
Every 11 Mins. or Less					4:14	4:30	4:46	4:58	
4:01	4:10	4:22	4:38		4:24	4:43	4:59	5:11	
4:11	4:20	4:32	4:49		4:34	4:53	5:09	5:21	
4:21	4:30	4:42	5:01		4:44	5:03	5:19	5:31	
4:31	4:40	4:53	5:12		4:54	5:13	5:29	5:41	
4:41	4:50	5:04	5:23		5:04	5:23	5:39	5:51	
4:51	5:00	5:14	5:33		5:14	5:33	5:49	6:01	
5:01	5:10	5:24	5:43		5:24	5:43	5:59	6:11	
5:11	5:20	5:34	5:53		5:34	5:53	6:09	6:21	
5:21	5:30	5:44	6:03		5:44	6:03	6:19	6:30	
5:31	5:40	5:54	6:13		5:54	6:13	6:29	6:36	
5:41	5:50	6:04	6:23		6:04	6:23	6:37	6:44	
5:50	5:59	6:13	6:32		6:14	6:31	6:42	6:49	
6:00	6:08	6:23	6:42		6:23	6:36	6:47	6:54	
6:10	6:19	6:33	6:52		6:32	6:44	6:55	7:02	
Every 10 Minutes Until					6:41	6:53	7:04	7:11	
8:50	8:56	9:05	9:20		6:50	7:02	7:13	7:20	
9:00	9:06	9:15	9:30		6:59	7:11	7:22	7:29	
9:10	9:16	9:25	9:40		7:08	7:20	7:31	7:38	
9:21	9:27	9:36	9:51		7:17	7:29	7:40	7:47	
9:32	9:38	9:47	10:02		7:26	7:38	7:49	7:56	
9:43	9:49	9:58	10:13		7:35	7:47	7:58	8:05	
9:54	10:00	10:09	10:24		Every 11 Mins. or Less				
10:05	10:11	10:20	10:34		10:38	10:49	10:56	11:03	
10:16	10:22	10:30	10:43		10:50	11:01	11:08	11:15	
10:27	10:33	10:40	10:53		11:02	11:13	11:18	11:23	
10:38	10:43	10:50	11:03		11:13	11:23	11:28	11:33	
10:50	10:55	11:02	11:15		11:24	11:34	11:39	11:44	
11:02	11:07	11:14	11:27		11:35	11:45	11:50	11:55	
11:14	11:19	11:26	11:39		11:46	11:56	12:01A	12:06A	
11:26	11:31	11:38	11:51		11:57	12:07A	12:12	12:17	
11:38	11:43	11:50	12:03A		12:08A	12:18	12:23	12:28	
11:50	11:55	12:02A	12:15		12:19	12:29	12:34	12:39	
12:02A	12:07A	12:14	12:27		12:30	12:40	12:45	12:50	
12:17	12:22	12:29	12:42		12:45	12:55	1:00	1:05	
12:32	12:37	12:44	12:57		w 1:05	1:15	1:20	1:25	

77 Saturday									
Inbound					Outbound				
Leave Arlington Heights	Arrive Arlington Center	Lv/Arrive North Camb.	Arrive Harvard Square		Leave Harvard Station	Arrive North Camb.	Arrive Arlington Center	Arrive Arlington Heights	
4:48A	4:52A	4:59A	5:09A		5:18A	5:27A	5:32A	5:38A	
5:03	5:07	5:14	5:24		5:33	5:42	5:47	5:53	
5:18	5:22	5:29	5:39		5:48	5:57	6:02	6:08	
5:33	5:37	5:44	5:54		6:03	6:12	6:17	6:23	
5:48	5:52	5:59	6:10		Every 15 Minutes Until				
6:03	6:09	6:16	6:27		7:33	7:43	7:50	7:58	
6:18	6:24	6:31	6:42		7:48	7:58	8:05	8:13	
Every 14 Mins. Until					8:01	8:11	8:18	8:26	
7:15	7:22	7:31	7:45		8:14	8:24	8:31	8:39	
7:31	7:38	7:47	8:01		8:28	8:38	8:45	8:53	
7:47	7:54	8:03	8:17		Every 14 Mins. Until				
8:02	8:09	8:18	8:32		9:37	9:48	9:56	10:04	
8:17	8:24	8:33	8:47		9:50	10:01	10:09	10:17	
8:32	8:39	8:48	9:02		10:03	10:14	10:22	10:30	
8:45	8:52	9:01	9:15		10:15	10:26	10:34	10:42	
8:57	9:04	9:13	9:27		10:26	10:38	10:46	10:54	
9:09	9:16	9:25	9:39		10:37	10:49	10:57	11:05	
9:21	9:28	9:37	9:51		10:49	11:01	11:09	11:17	
9:33	9:40	9:49	10:03		11:00	11:12	11:20	11:28	
9:45	9:52	10:01	10:15		11:12	11:24	11:33	11:42	
9:56	10:03	10:12	10:26		11:24	11:36	11:45	11:54	
10:07	10:14	10:23	10:38		11:35	11:47	11:56	12:05P	
10:18	10:25	10:35	10:52		11:47	11:59	12:08P	12:17	
10:29	10:37	10:48	11:05		11:58	12:10P	12:19	12:28	
10:40	10:48	10:59	11:16		12:09P	12:21	12:30	12:39	
10:51	10:59	11:10	11:27		Every 12 Mins. or Less				
11:02	11:10	11:21	11:38		6:55	7:07	7:15	7:23	
Every 11 Mins. Until					7:07	7:19	7:27	7:35	
11:56	12:04P	12:15P	12:32P		7:19	7:31	7:39	7:47	
12:06P	12:14	12:25	12:42		7:31	7:43	7:51	7:59	
Every 12 Mins. or Less					7:44	7:56	8:04	8:12	
6:34	6:41	6:51	7:09		7:57	8:09	8:17	8:25	
6:47	6:54	7:04	7:21		8:10	8:22	8:30	8:37	
7:00	7:06	7:16	7:33		8:25	8:36	8:43	8:50	
7:15	7:21	7:31	7:48		8:40	8:51	8:58	9:05	
7:30	7:36	7:46	8:03		8:55	9:06	9:13	9:20	
7:45	7:51	8:01	8:17		9:10	9:21	9:28	9:35	
8:00	8:05	8:14	8:30		9:25	9:36	9:43	9:50	
8:15	8:20	8:29	8:45		9:40	9:51	9:58	10:05	
8:30	8:35	8:44	9:00		9:55	10:06	10:13	10:20	
8:45	8:50	8:59	9:15		10:10	10:21	10:28	10:35	
9:00	9:05	9:14	9:30		10:26	10:37	10:44	10:51	
9:15	9:20	9:29	9:45		10:42	10:53	11:00	11:07	
9:31	9:36	9:45	10:01		10:58	11:09	11:16	11:23	
9:48	9:53	10:02	10:18		11:14	11:25	11:32	11:38	
10:05	10:10	10:19	10:35		11:30	11:40	11:47	11:53	
10:22	10:27	10:35	10:51		11:46	11:56	12:03A	12:09A	
10:39	10:44	10:52	11:08		12:02A	12:12A	12:19	12:25	
Every 17 Mins. or Less					12:18	12:28	12:35	12:41	
12:00M	12:04A	12:11A	12:25A		12:35	12:45	12:52	12:58	
12:15	12:19	12:26	12:40		12:50	1:00	1:05	1:11	
12:30	12:34	12:41	12:55		w 1:05	1:15	1:20	1:26	

w - Waits for last train to arrive at Harvard Station.

All buses are accessible to persons with disabilities

77

Sunday

Inbound

Outbound

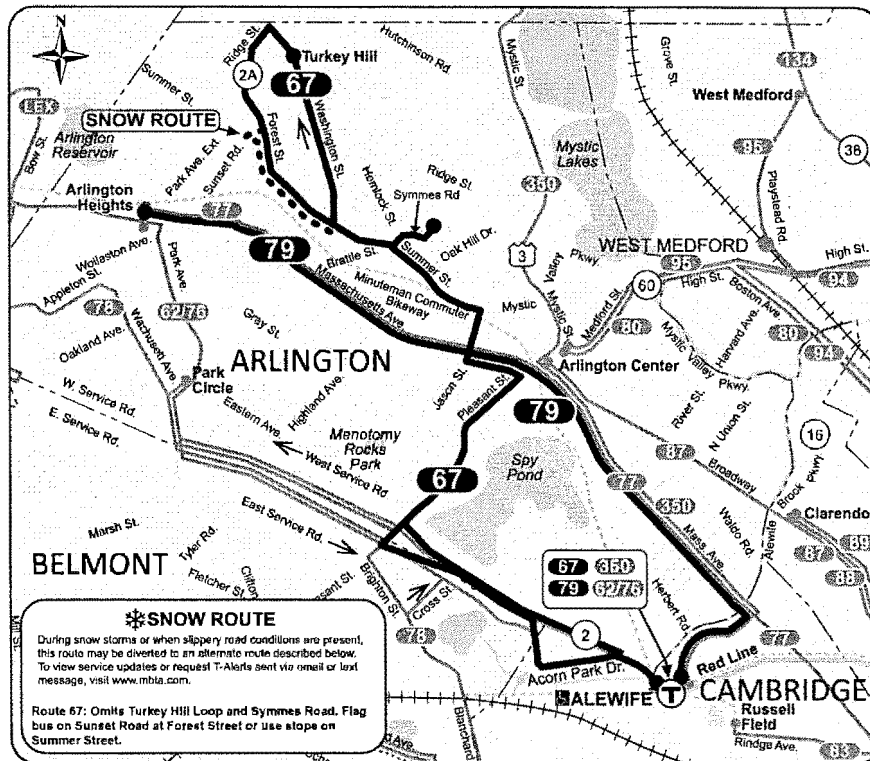
Leave Arlington Heights	Arrive Arlington Center	Arrive Harvard Square	Leave Harvard Station	Arrive Arlington Center	Arrive Arlington Heights
6:00A	6:04A	6:22A	6:25A	6:39A	6:45A
6:20	6:24	6:42	6:44	6:58	7:04
6:40	6:44	7:03	7:04	7:18	7:24
7:00	7:04	7:23	7:24	7:38	7:44
7:20	7:24	7:43	7:44	7:58	8:05
7:40	7:44	8:03	8:04	8:23	8:30
7:55	7:59	8:20	8:24	8:43	8:50
8:10	8:14	8:38	8:44	9:03	9:11
8:25	8:29	8:54	9:04	9:24	9:32
8:40	8:45	9:10	9:24	9:44	9:52
8:57	9:02	9:27	9:44	10:04	10:12
9:14	9:19	9:44	10:04	10:24	10:32
9:30	9:35	10:00	Every 15 Mins. or Less	12:08P	12:17P
Every 17 Mins. or Less					
11:49	11:55	12:25P	12:01P	12:23P	12:32P
12:05P	12:11P	12:41	Every 15 Mins. or Less	12:08P	12:17P
Every 17 Mins. or Less					
6:20	6:25	6:49	7:08	7:28	7:36
6:34	6:38	7:02	7:21	7:41	7:49
6:47	6:51	7:15	7:36	7:56	8:04
7:01	7:05	7:29	7:51	8:11	8:19
7:16	7:20	7:44	8:07	8:27	8:35
7:32	7:36	8:00	8:23	8:43	8:51
7:48	7:52	8:16	8:38	8:58	9:06
8:05	8:09	8:32	8:54	9:14	9:22
8:22	8:26	8:50	9:10	9:30	9:37
8:39	8:43	9:06	9:25	9:42	9:49
8:55	8:59	9:22	9:40	9:57	10:04
9:12	9:16	9:39	9:54	10:11	10:18
9:28	9:32	9:55	10:09	10:26	10:33
9:44	9:48	10:11	10:22	10:39	10:46
10:00	10:04	10:11	10:36	10:53	11:00
10:15	10:19	10:27	10:49	11:06	11:13
10:32	10:35	10:41	11:02	11:19	11:26
10:48	10:51	10:55	11:11	11:32	11:37
11:04	11:07	11:11	11:30	11:45	11:50
11:17	11:20	11:27	11:45	12:00M	12:05A
11:35	11:38	11:40	12:00M	12:15A	12:20
11:55	11:58	12:18A	12:10A	12:25	12:30
12:15A	12:18A	12:38	12:25	12:40	12:45
12:35	12:38	12:58	12:45	1:00	1:05
			w 1:05	1:20	1:25

Harvard Busway construction note:

Route 77 won't serve Harvard Busway during this time.

Inbound service will not serve Harvard Station Busway during this time. Passengers wishing to access Harvard Station are advised to disembark at the temporary bus stop located on Brattle St @ Palmer St. Outbound service is unaffected, and will continue to board passengers in the Harvard Station Busway.

**Route 67 Turkey Hill - Alewife Station**  
**Route 79 Arlington Heights - Alewife Station**



Schedule Change

# 67•79

Effective August 30, 2020

**67 Turkey Hill-Alewife Station**  
**79 Arlington Heights-Alewife Station**

Serving

- Arlington High School
- Arlington Town Hall
- Arlington Center
- Red Line

**MBTA**  
 Massachusetts Bay Transportation Authority

Information 617-222-3300 • 1-800-388-6200  
 (TTY) 617-222-3306 • [www.mbta.com](http://www.mbta.com)

67 Weekday					
Inbound			Outbound		
Leave Turkey Hill	Arrive Arlington Center	Arrive Alewife Station	Leave Alewife Station	Arrive Arlington Center	Arrive Turkey Hill
6:18A	6:23A	6:32A	5:53A	6:00A	6:15A
6:52	6:57	7:07	6:26	6:33	6:48
7:22	7:29	7:43	6:59	7:06	7:21
7:49	7:56	8:10	7:24	7:31	7:47
8:17	8:24	8:39	7:53	8:00	8:16
8:45	8:50	9:03	8:23	8:30	8:44
9:12	9:17	9:27	8:49	8:56	9:10
10:02	10:07	10:17	9:39	9:46	10:00
10:52	10:57	11:07	10:29	10:36	10:50
11:42	11:47	11:56	11:19	11:26	11:40
12:32P	12:37P	12:46P	12:09P	12:16P	12:30P
1:22	1:27	1:36	12:59	1:06	1:20
2:12	2:17	2:26	1:48	1:55	2:10
3:02	3:07	3:16	2:38	2:47	3:02
3:52	3:57	4:06	3:27	3:36	3:51
4:42	4:47	4:56	4:17	4:26	4:41
5:10	5:16	5:26	4:44	4:55	5:10
5:37	5:43	5:53	5:11	5:22	5:37
6:05	6:11	6:21	5:38	5:49	6:04
6:32	6:36	6:45	6:05	6:16	6:31
6:57	7:01	7:10	6:33	6:41	6:56
7:37	7:41	7:49	7:15	7:23	7:37
8:20	8:24	8:32	7:58	8:05	8:18

**Service Note:** Route 67  
Serves Symmes Road OUTBOUND ONLY.


**Route 67**  
**Turkey Hill-Alewife Station**





79 Weekday					
Inbound			Outbound		
Leave Arlington Heights	Arrive Arlington Center	Arrive Alewife Station	Leave Alewife Station	Arrive Arlington Center	Arrive Arlington Heights
6:35A	6:41A	6:55A	7:02A	7:09A	7:19A
7:00	7:06	7:20	7:30	7:38	7:52
7:30	7:39	7:59	8:10	8:16	8:26
8:00	8:06	8:24	8:35	8:41	8:51
8:30	8:36	8:54	9:30	9:36	9:46
9:00	9:05	9:20			
9:50	9:55	10:06			
2:20P	2:26P	2:39P	2:00P	2:06P	2:16P
s 3:05	3:11	3:25	2:45	2:52	3:05
s 3:15	3:21	3:34	3:10	3:17	3:28
3:20	3:26	3:39	3:30	3:37	3:48
s 3:25	3:30	3:41	3:50	3:57	4:09
3:40	3:46	3:59	4:10	4:22	4:34
4:00	4:06	4:19	4:30	4:42	4:54
4:20	4:26	4:39	4:50	5:02	5:14
4:40	4:46	4:59	5:10	5:24	5:36
5:00	5:06	5:20	5:30	5:44	5:56
5:20	5:26	5:40	5:50	6:03	6:14
5:45	5:51	6:05	6:15	6:27	6:38
6:05	6:11	6:25	6:35	6:47	6:58
6:45	6:51	7:02	7:05	7:13	7:24

s - Leaves from Massachusetts Avenue at Appleton Street and does NOT run during school vacation

**Route 79**  
**Arlington Heights-Alewife Station**

**No service on weekends.**

 All buses are accessible to persons with disabilities

Fare	   			
	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40
CharlieTicket	\$2.00	\$2.00	\$2.90	\$4.90
Cash-on-Board	\$2.00	\$4.00	\$2.90	\$4.90
Student/Youth*	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10

VALID PASSES: LinkPass (\$90.00/mo.); Local Bus (\$55/mo.); \*Student/Youth LinkPass (\$30.00/mo.); \*\*Senior/TAP LinkPass (\$30/mo.); and express bus, commuter rail, and boat passes.

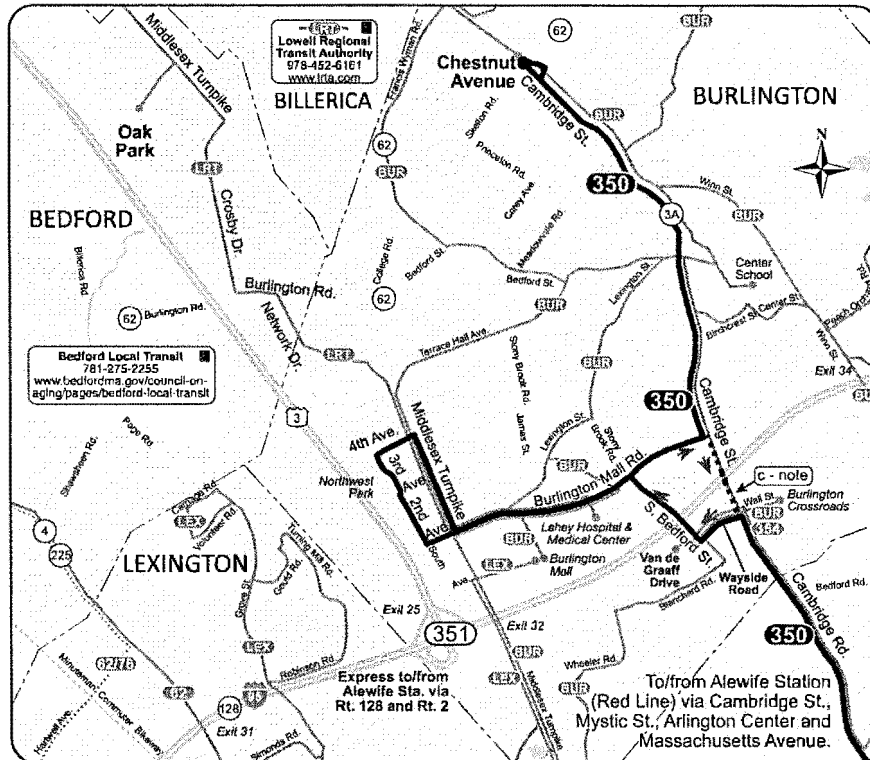
FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

\* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthpass](http://www.mbta.com/youthpass) for details.

\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Fall 2020 & Winter 2021 Holidays  
9/7/20: Sunday, 10/12/20 & 11/11/20: Weekday  
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

**Route 350 North Burlington - Alewife Station**  
**Route 351 Bedford Woods Dr - Alewife Station**



Service/Schedule Change

# 350•351

Effective August 30, 2020

350 North Burlington-Alewife Station

351 Bedford Woods Dr - Alewife Station

Serving

- Burlington Mall
- Oak Park
- Northwest Park
- Red Line
- Lehey Hospital & Medical Center
- Four Corners
- Arlington Center



Massachusetts Bay Transportation Authority

Information 617-222-3300 • 1-800-392-4000

(TTY) 617-222-5506 • [www.mbta.com](http://www.mbta.com)

# 350 & 351

# Weekday

Inbound					Outbound				
Leave Chestnut & Cambridge	Arrive Burlington Mail Road	Arrive Woburn/ Burl. Line	Arrive Arlington Center	Arrive Alewife Station	Leave Alewife Station	Arrive Arlington Center	Arrive Woburn/ Burl. Line	Arrive Burlington Mail Road	Arrive Chestnut & Cambridge
6:00A	.....	6:05A	6:19A	6:31A	b 6:53	6:00	.....	.....	.....
6:20	.....	6:25	6:42	6:52	b 6:16	6:22	6:39	6:50	7:08
6:38	.....	6:45	7:04	7:24	b 6:36	6:42	6:59	7:09	7:25
6:53	.....	7:00	7:19	7:41	b 6:56	7:02	7:17	7:27	7:43
7:15	.....	7:22	7:41	8:03	7:16	7:22	7:37	7:47	8:03
7:35	.....	7:44	8:03	8:25	7:36	7:43	8:02	8:11	8:31
7:55	.....	8:04	8:23	8:45	7:56	8:03	8:22	8:31	8:51
8:20	8:35A	8:42	9:03	9:13	8:16	8:23	8:42	8:51	9:11
8:40	8:55	9:02	9:19	9:29	8:56	9:03	9:22	9:31	9:49
9:00	9:14	9:21	9:38	9:48	9:36	9:42	9:59	10:08	10:26
9:20	9:34	9:41	9:58	10:09	10:16	10:22	10:39	10:48	11:06
10:00	10:14	10:21	10:38	10:49	10:56	11:02	11:19	11:28	11:46
10:40	10:54	11:01	11:18	11:29	11:36	11:42	11:59	12:08P	12:26P
11:20	11:34	11:41	11:58	12:09P	12:16P	12:22P	12:39P	12:48	1:06
12:00N	12:14P	12:21P	12:38P	12:49	12:56	1:02	1:19	1:28	1:46
12:40	12:54	1:02	1:19	1:30	1:36	1:42	1:59	2:07	2:24
1:20	1:34	1:42	1:59	2:10	2:16	2:26	2:45	2:53	3:12
2:00	2:14	2:22	2:39	2:50	2:41	2:51	3:09	3:18	3:37
2:40	2:54	3:03	3:21	3:32	3:05	3:13	3:31	3:40	3:59
3:25	3:40	3:50	4:08	4:19	3:30	3:38	3:56	4:05	4:27
3:45	4:00	4:10	4:28	4:39	4:25	4:35	4:54	4:31	4:53
4:10	4:25	4:35	4:53	5:07	4:55	5:08	5:28	5:03	5:25
4:30	4:45	4:55	5:16	5:32	5:20	5:33	5:53	5:28	5:43
4:45	5:00	5:10	5:32	5:48	5:40	5:53	6:13	5:33	5:48
5:10	5:25	5:35	5:57	6:10	6:00	6:13	6:33	6:08	6:28
5:35	5:50	6:00	6:21	6:34	6:20	6:33	6:53	6:28	6:48
5:55	6:10	6:18	6:37	6:50	6:42	6:51	7:06	7:15	7:37
6:15	6:30	6:37	6:52	7:05	7:05	7:14	7:29	7:38	8:00
6:35	6:49	6:56	7:11	7:24	7:35	7:44	7:59	8:07	8:23
6:55	7:09	7:16	7:31	7:41	8:31	8:39	8:54	9:02	9:17
7:45	7:59	8:05	8:18	8:28	9:25	9:33	9:48	9:56	10:11
8:35	8:49	8:55	9:08	9:18	10:20	10:32	10:50	.....	11:05
9:30	9:44	9:50	10:03	10:13	Route 351 indicated by shaded areas				
10:25	10:39	10:45	10:58	11:08	Route 351 FARES				

Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40
CharlieTicket	\$2.00	\$2.00	\$2.90	\$4.90
Cash-on-Board	\$2.00	\$4.00	\$2.90	\$4.90
Student/Youth*	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10

VALID PASSES: LinkPass (\$90.00/mo.); Local Bus (\$55/mo.); \*Student/Youth LinkPass (\$30.00/mo.); \*\*Senior/TAP LinkPass (\$10/mo.); and express bus, commuter rail, and boat passes.  
 FREE FARES: Children 11 and under ride free when accompanied by an adult. Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.  
 \* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthpass](http://www.mbta.com/youthpass) for details.  
 \*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

# ROUTE 351 FARES

Fare	Local Bus	Inner Express	Outer Express	Commuter Rail
CharlieCard	\$1.70	\$4.25	\$4.25	\$4.25
CharlieTicket	\$2.00	\$5.25	\$7.25	\$8.15
Cash-on-Board	\$2.00	\$5.25	\$7.25	\$8.15
Student/Youth*	\$0.85	\$2.10	\$2.10	\$2.10
Senior/TAP**	\$0.85	\$2.10	\$2.10	\$2.10

VALID PASSES on 442/442: LinkPass (\$90.00/mo.); Local Bus (\$55/mo.); \*Student/Youth LinkPass (\$30.00/mo.); \*\*Senior/TAP LinkPass (\$10/mo.); and express bus, commuter rail, and boat passes.  
 VALID PASSES on 442/449: Inner Express Bus (\$136.00/mo.); Outer Express Bus (\$166/mo.); commuter rail zone 1 or higher; and boat passes.  
 FREE FARES: Children 11 and under ride free when accompanied by an adult. Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.  
 \* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthpass](http://www.mbta.com/youthpass) for details.  
 \*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

# 350

# Saturday

Inbound			Outbound		
Leave Chestnut & Cambridge	Arrive Burlington Mail Road	Arrive Alewife Station	Leave Alewife Station	Arrive Burlington Mail Road	Arrive Chestnut & Cambridge
7:10A	.....	7:38A	6:25A	6:51A	7:05A
7:50	.....	8:18	7:05	7:31	7:45
8:30	8:45A	9:14	7:45	8:11	8:25
9:30	9:45	10:17	8:30	8:59	9:18
10:30	10:46	11:19	9:30	10:01	10:22
11:30	11:46	12:21P	10:30	11:01	11:22
12:30P	12:46P	1:25	11:30	12:01P	12:21P
1:30	1:46	2:25	12:30P	1:02	1:22
2:30	2:46	3:21	1:30	2:02	2:22
3:30	3:46	4:21	2:30	3:02	3:22
4:30	4:46	5:20	3:30	4:01	4:19
5:30	5:46	6:17	4:30	4:58	5:16
6:25	6:41	7:10	5:30	5:55	6:13
7:20	7:35	8:04	6:25	6:50	7:08
8:10	8:25	8:54	7:15	7:40	7:58
9:00	9:15	9:44	8:10	8:33	8:52
9:50	10:05	10:34	9:00	9:23	9:42
			9:50	.....	10:20
			10:40	.....	11:10

# 350

# Sunday

Inbound			Outbound		
Leave Chestnut & Cambridge	Arrive Burlington Mail Road	Arrive Alewife Station	Leave Alewife Station	Arrive Burlington Mail Road	Arrive Chestnut & Cambridge
7:55A	.....	8:24A	7:05A	7:31A	7:49A
9:20	.....	9:52	8:30	8:57	9:16
10:50	.....	11:22	9:55	10:24	10:43
			11:25	11:54	12:13P
12:20P	12:34P	1:06P	12:20P	12:49P	1:08
1:15	1:29	2:00	1:15	1:45	2:04
2:10	2:24	2:56	2:10	2:38	2:57
3:05	3:19	3:53	3:05	3:33	3:52
4:00	4:14	4:50	4:00	4:28	4:47
4:55	5:09	5:42	4:55	5:23	5:42
5:50	6:04	6:37	5:50	6:18	6:37
6:50	7:04	7:35	6:50	.....	7:26

Fall 2020 & Winter 2021 Holidays  
 9/7/20, Sunday; 10/12/20 & 11/11/20: Weekday  
 11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

NOTE:  
Route 351 Alewife service  
operates via Berth 8

Route 351 may be  
limited or  
suspended. Visit  
[mbta.com](http://mbta.com) for latest  
updates.

All buses are accessible to  
persons with disabilities

b - Omits Northwest Park

Route 350  
North Burlington-  
Alewife Station

Route 351  
Bedford Woods Dr -  
Alewife Station

## □ Trip Generation

**Institute of Transportation Engineers (ITE) 10th Edition**  
**Land Use Code (LUC) 820 - Shopping Center**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area  
 Independent Variable (X): 1.735

**Summary**

**AVERAGE WEEKDAY DAILY**

$T = 37.75 * (X)$   
 $T = 37.75 * 1.74$   
 $T = 65.50$   
 $T = 66$  vehicle trips  
 with 50% ( 33 vpd) entering and 50% ( 33 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.94 * (X)$   
 $T = 0.94 * 1.74$   
 $T = 1.63$   
 $T = 2$  vehicle trips  
 with 62% ( 1 vph) entering and 38% ( 1 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 3.81 * (X)$   
 $T = 3.81 * 1.74$   
 $T = 6.61$   
 $T = 7$  vehicle trips  
 with 48% ( 3 vph) entering and 52% ( 4 vph) exiting.

**SATURDAY DAILY**

$T = 46.12 * (X)$   
 $T = 46.12 * 1.74$   
 $T = 80.02$   
 $T = 80$  vehicle trips  
 with 50% ( 40 vpd) entering and 50% ( 40 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 4.50 * (X)$   
 $T = 4.50 * 1.74$   
 $T = 7.81$   
 $T = 8$  vehicle trips  
 with 52% ( 4 vph) entering and 48% ( 4 vph) exiting.

Pass-By:	0.34 Weekday		
Pass-By:	0.26 Saturday		
	<u>Total</u>	<u>Pass-By</u>	<u>Net New</u>
<b>AM</b>			
In	1	0	<b>1</b>
Out	<u>1</u>	<u>0</u>	<u><b>1</b></u>
Total	2	0	<b>2</b>
<b>PM</b>			
In	3	1	<b>2</b>
Out	<u>4</u>	<u>1</u>	<u><b>3</b></u>
Total	7	2	<b>5</b>
<b>Sat</b>			
In	4	1	<b>3</b>
Out	<u>4</u>	<u>1</u>	<u><b>3</b></u>
Total	8	2	<b>6</b>
<b>Daily</b>			
In	33	11	<b>22</b>
Out	<u>33</u>	<u>11</u>	<u><b>22</b></u>
Total	66	22	<b>44</b>
<b>Sat Daily</b>			
In	40	10	<b>30</b>
Out	<u>40</u>	<u>10</u>	<u><b>30</b></u>
Total	80	20	<b>60</b>

**Institute of Transportation Engineers (ITE) 10th Edition**  
**Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise)**

Average Vehicle Trips Ends vs: Dwelling Units  
Independent Variable (X): 37

**AVERAGE WEEKDAY DAILY**

$T = 5.44 * X$   
 $T = 5.44 * 37$   
 $T = 201.28$   
 $T = 202$  vehicle trips  
with 50% ( 101 vpd) entering and 50% ( 101 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.36 * X$   
 $T = 0.36 * 37$   
 $T = 13.32$   
 $T = 13$  vehicle trips  
with 26% ( 3 vph) entering and 74% ( 10 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.44 * X$   
 $T = 0.44 * 37$   
 $T = 16.28$   
 $T = 16$  vehicle trips  
with 61% ( 10 vph) entering and 39% ( 6 vph) exiting.

**SATURDAY DAILY**

$T = 4.91 * X$   
 $T = 4.91 * 37$   
 $T = 181.67$   
 $T = 182$  vehicle trips  
with 50% ( 91 vpd) entering and 50% ( 91 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 0.44 * X$   
 $T = 0.44 * 37$   
 $T = 16.28$   
 $T = 16$  vehicle trips  
with 49% ( 8 vph) entering and 51% ( 8 vph) exiting.

**Institute of Transportation Engineers (ITE) 10th Edition**  
**Land Use Code (LUC) 820 - Shopping Center**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area  
 Independent Variable (X): 10.500

**AVERAGE WEEKDAY DAILY**

$T = 37.75 * (X)$   
 $T = 37.75 * 10.50$   
 $T = 396.38$   
 $T = 396$  vehicle trips  
 with 50% ( 198 vpd) entering and 50% ( 198 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.94 * (X)$   
 $T = 0.94 * 10.50$   
 $T = 9.87$   
 $T = 10$  vehicle trips  
 with 62% ( 6 vph) entering and 38% ( 4 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 3.81 * (X)$   
 $T = 3.81 * 10.50$   
 $T = 40.01$   
 $T = 40$  vehicle trips  
 with 48% ( 19 vph) entering and 52% ( 21 vph) exiting.

**SATURDAY DAILY**

$T = 46.12 * (X)$   
 $T = 46.12 * 10.50$   
 $T = 484.26$   
 $T = 484$  vehicle trips  
 with 50% ( 242 vpd) entering and 50% ( 242 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

$T = 4.50 * (X)$   
 $T = 4.50 * 10.50$   
 $T = 47.25$   
 $T = 47$  vehicle trips  
 with 52% ( 24 vph) entering and 48% ( 23 vph) exiting.

**Summary**

Pass-By:	0.34 Weekday		
Pass-By:	0.26 Saturday		
	<u>Total</u>	<u>Pass-By</u>	<u>Net New</u>
<b>AM</b>			
In	6	2	4
Out	<u>4</u>	<u>2</u>	<u>2</u>
Total	10	4	6
<b>PM</b>			
In	19	7	12
Out	<u>21</u>	<u>7</u>	<u>14</u>
Total	40	14	26
<b>Sat</b>			
In	24	6	18
Out	<u>23</u>	<u>6</u>	<u>17</u>
Total	47	12	35
<b>Daily</b>			
In	198	67	131
Out	<u>198</u>	<u>67</u>	<u>131</u>
Total	396	134	262
<b>Sat Daily</b>			
In	242	63	179
Out	<u>242</u>	<u>63</u>	<u>179</u>
Total	484	126	358

## □ Census Information

# MEANS OF TRANSPORTATION TO WORK BY VEHICLES AVAILABLE



**Note:** This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

Census Tract 3561, Middlesex County, Massachusetts		
Label	Estimate	Margin of Error
▼ Total:	2,051	±155
No vehicle available	153	±92
1 vehicle available	947	±183
2 vehicles available	760	±179
3 or more vehicles available	191	±130
▼ Car, truck, or van - drove alone:	880	±171
No vehicle available	0	±12
1 vehicle available	268	±84
2 vehicles available	478	±145
3 or more vehicles available	134	±88
▼ Car, truck, or van - carpooled:	237	±96
No vehicle available	30	±49
1 vehicle available	110	±57
2 vehicles available	53	±59
3 or more vehicles available	44	±50
▼ Public transportation (excluding taxicab):	649	±144
No vehicle available	89	±66
1 vehicle available	385	±130
2 vehicles available	175	±83
3 or more vehicles available	0	±12
▼ Walked:	0	±12
No vehicle available	0	±12
1 vehicle available	0	±12
2 vehicles available	0	±12
3 or more vehicles available	0	±12
▼ Taxicab, motorcycle, bicycle, or other means:	152	±65
No vehicle available	26	±31

# Table Notes

---

## MEANS OF TRANSPORTATION TO WORK BY VEHICLES AVAILABLE

**Survey/Program:**

American Community Survey

**Universe:**

Workers 16 years and over in households

**Year:**

2018

**Estimates:**

5-Year

**Table ID:**

B08141

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see ACS Technical Documentation ). The effect of nonsampling error is not represented in these tables.

Workers include members of the Armed Forces and civilians who were at work last week.

While the 2014-2018 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural populations, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

**Explanation of Symbols:**

- An "\*\*\*" entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
- An "-" entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution, or the margin of error associated with a median was larger than the median itself.
- An "-" following a median estimate means the median falls in the lowest interval of an open-ended distribution.
- An "+" following a median estimate means the median falls in the upper interval of an open-ended distribution.
- An "\*\*\*\*" entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
- An "\*\*\*\*\*" entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.

March 10, 2021

Jennifer Raitt  
Director of Planning & Community  
Development  
730 Massachusetts Ave  
Arlington, MA 02476

RE: Mixed-Use Redevelopment  
Drainage Summary Letter  
190 & 192-200 Massachusetts Ave  
Arlington, MA 02476

Dear Ms. Raitt,

On behalf of our Client, 192-200 Massachusetts Ave, LLC, Allen & Major Associates (A&M) is pleased to provide this letter in support of the Special Permit application for the Mixed-Use Redevelopment project at 190 & 192-200 Massachusetts Ave. This letter will summarize the changes to the stormwater management system which are proposed as part of the redevelopment efforts.

**Existing Conditions**

The site is located on the corner of Lake Street and Massachusetts Avenue and Chandler Street and Massachusetts Avenue. There is an existing curb cut to the parcel located off of Chandler Street. The project comprised of two property's, identified on the City tax Map 6, Block 3, Lots 1A and 1B. Both lots are predominantly covered by an existing brick building. Elevations onsite range from elevation 29 to elevation 24. Elevation 24 is the low point on-site located at the existing curb cut along Chandler Street, and elevation 29 runs through the sidewalk along Mass Ave. The majority of the stormwater from the site discharges through roof drain connections to the municipal system. A review of the NRCS soil report for Middlesex County indicates that the soil onsite is considered Merrimac-Urban Land which has a Hydrologic Soil Group rating of an "A". A copy of the Existing Watershed Plan is included herewith.

**Proposed Conditions**

The project, proposes to demolish a portion of the existing structure to construct a 5-story, 9,764 square foot Mixed-Use building with apartment and retail uses. There are 15 parking stalls proposed on the first level. The stormwater management system will be improved with a new drainage pipe connection. The quantity of stormwater runoff will be reduced with the installation of landscaped areas on-site. The proposed work will result in approximately 701 square feet of impervious material being replaced with landscaped areas.

Runoff flows were estimated for both pre and post development conditions using HydroCAD 10.00 software, at a specific "Study Point" (SP-1). Study Point 1 is the flows that will enter the municipal drainage system. The table below shows that the project causes a reduction in the peak rate of runoff and volume of stormwater leaving the site at the Study Point. Copies of the HydroCAD worksheets and Watershed Plans are included herewith.

<b>STUDY POINT #1</b> (flow to municipal system)			
	2-Year	10-Year	100-Year
Existing Flow (CFS)	0.83	1.27	2.31
Proposed Flow (CFS)	0.76	1.22	2.28
<b>Decrease (CFS)</b>	<b>0.07</b>	<b>0.05</b>	<b>0.03</b>
Existing Volume (CF)	2,781	4,327	8,025
Proposed Volume (CF)	2,387	3,906	7,578
<b>Decrease (CF)</b>	<b>394</b>	<b>421</b>	<b>447</b>

The surface water drainage requirements of the Town of Arlington Zoning Bylaw Environmental Design Review Standards have been reviewed and met with the proposed design. The proposed project will introduce landscaped areas to the site to reduce the impervious area. The Town of Arlington, Article 15 Stormwater Mitigation, shall not apply as the proposed development will introduce a reduction in impervious area. However, with the proposed landscaped areas the project will reduce the runoff rates for all design storms, and comply with this bylaw.

#### **Summary**

As shown in the table above, the proposed development will have a positive impact on the stormwater management system by reducing the rate and volume of stormwater runoff from the site.

Very truly yours,

ALLEN & MAJOR ASSOCIATES, INC.

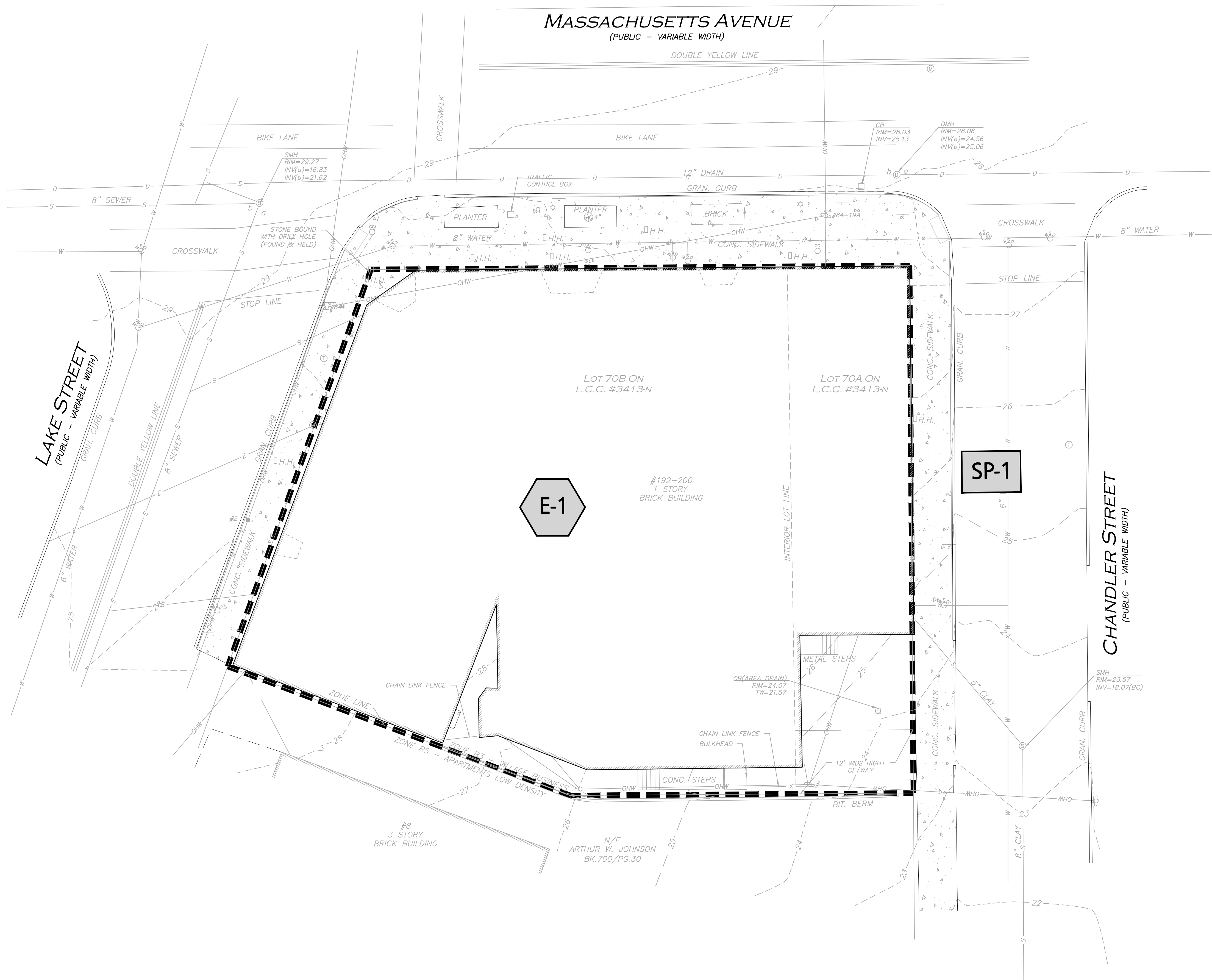
Aaron Mackey, PE  
Project Engineer



Attachments:

1. Existing Watershed Plan
2. Proposed Watershed Plan
3. Pre development HydroCAD Calculations
4. Post development HydroCAD Calculations
5. Extreme Precipitation Tables
6. NRCS Soil Report

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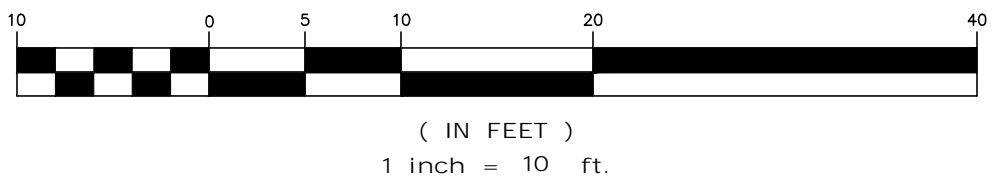
**LEGEND**

EXISTING WATERSHED

SUBCATCHMENT BOUNDARY

SUBCATCHMENT LABEL

GRAPHIC SCALE



1	03/10/2021	ISSUED FOR ARB REVIEW
REV	DATE	DESCRIPTION

APPLICANT/OWNER:  
192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:  
190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO. 2729-02 DATE: 10/23/2020

SCALE: 1" = 10' DWG. NAME: C2729-02

DESIGNED BY: ARM CHECKED BY: BDJ

PREPARED BY:

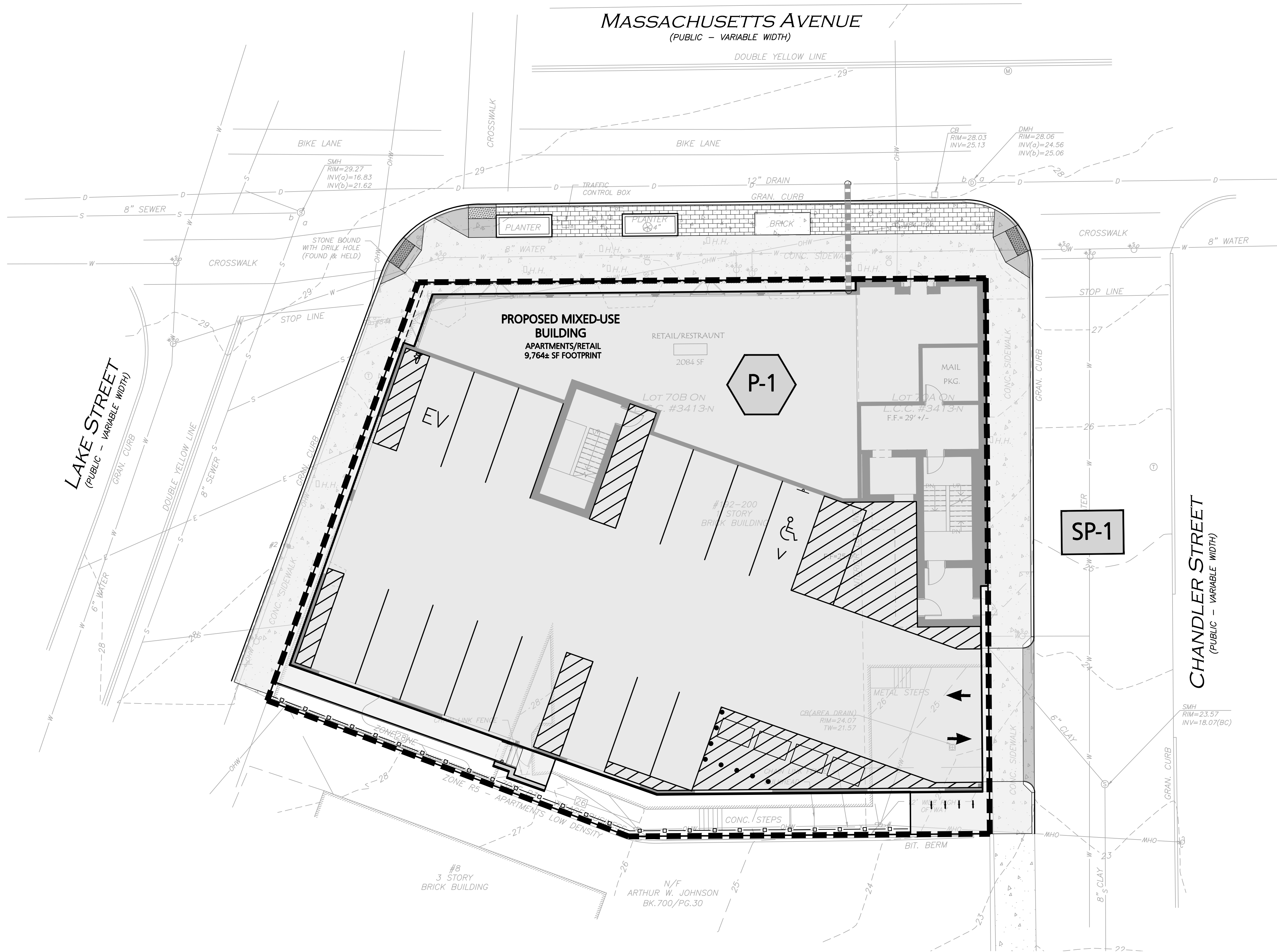
**ALLEN & MAJOR ASSOCIATES, INC.**  
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environmental consulting • landscape architecture  
www.allenmajor.com  
100 COMMERCE WAY, SUITE 5  
WOBURN MA 01801  
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DRAWING TITLE: EXISTING WATERSHED PLAN SHEET No. EWP

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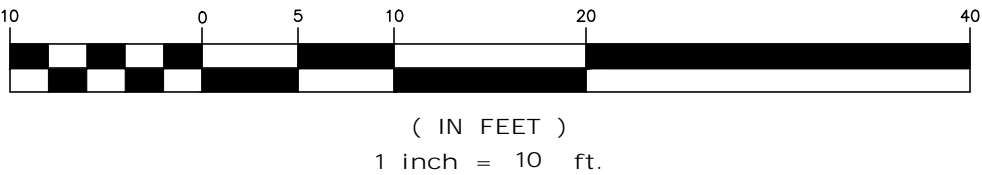


### LEGEND

EXISTING WATERSHED  
PROPOSED WATERSHED  
SUBCATCHMENT LABEL  
SUBCATCHMENT BOUNDARY

P-1

### GRAPHIC SCALE



REV	DATE	DESCRIPTION
1	03/10/2021	ISSUED FOR ARB REVIEW

APPLICANT/OWNER:  
192-200 MASSACHUSETTS AVE, LLC  
455 MASSACHUSETTS AVE, STE 1  
ARLINGTON, MA 02474

PROJECT:  
190 & 192-200  
MASSACHUSETTS AVE  
ARLINGTON, MA 02476

PROJECT NO. 2729-02 DATE: 10/23/2020

SCALE: 1" = 10' DWG. NAME: C2729-02

DESIGNED BY: ARM CHECKED BY: BDJ

PREPARED BY:

**ALLEN & MAJOR ASSOCIATES, INC.**  
civil engineering • land surveying  
environmental consulting • landscape architecture  
www.allenmajor.com  
100 COMMERCE WAY, SUITE 5  
WOBBURN MA 01801  
TEL: (781) 935-6889  
FAX: (781) 935-2896

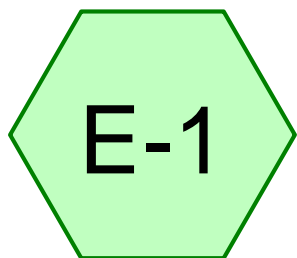
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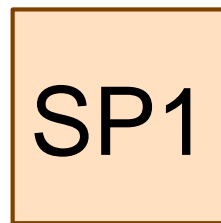
DRAWING TITLE: SHEET No.

PROPOSED WATERSHED PLAN PWP

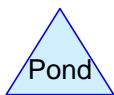
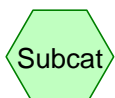
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Subcat E-1



Study Point 1



## 2729-02\_Existing-Conditions

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Page 2

### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,238	98	Paved parking, HSG A (E-1)
9,896	98	Roofs, HSG A (E-1)
<b>11,134</b>	<b>98</b>	<b>TOTAL AREA</b>

## 2729-02\_Existing-Conditions

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Page 3

### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
11,134	HSG A	E-1
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
<b>11,134</b>		<b>TOTAL AREA</b>

## 2729-02\_Existing-Conditions

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Page 4

### Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
1,238	0	0	0	0	1,238	Paved parking	E-1
9,896	0	0	0	0	9,896	Roofs	E-1
<b>11,134</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11,134</b>	<b>TOTAL AREA</b>	

## 2729-02\_Existing-Conditions

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Type III 24-hr 2-Year Rainfall=3.23"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment E-1: Subcat E-1

Runoff Area=11,134 sf 100.00% Impervious Runoff Depth=3.00"

Tc=5.0 min CN=98 Runoff=0.83 cfs 2,781 cf

### Reach SP1: Study Point 1

Inflow=0.83 cfs 2,781 cf

Outflow=0.83 cfs 2,781 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 2,781 cf Average Runoff Depth = 3.00"**  
**0.00% Pervious = 0 sf 100.00% Impervious = 11,134 sf**

**2729-02\_Existing-Conditions**

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Type III 24-hr 2-Year Rainfall=3.23"

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**Summary for Subcatchment E-1: Subcat E-1**

Runoff = 0.83 cfs @ 12.07 hrs, Volume= 2,781 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
1,238	98	Paved parking, HSG A
9,896	98	Roofs, HSG A
11,134	98	Weighted Average
11,134		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 100.00% Impervious, Inflow Depth = 3.00" for 2-Year event

Inflow = 0.83 cfs @ 12.07 hrs, Volume= 2,781 cf

Outflow = 0.83 cfs @ 12.07 hrs, Volume= 2,781 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

## 2729-02\_Existing-Conditions

Prepared by Allen & Major Associates Inc.

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Type III 24-hr 10-Year Rainfall=4.90"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment E-1: Subcat E-1

Runoff Area=11,134 sf 100.00% Impervious Runoff Depth=4.66"

Tc=5.0 min CN=98 Runoff=1.27 cfs 4,327 cf

### Reach SP1: Study Point 1

Inflow=1.27 cfs 4,327 cf

Outflow=1.27 cfs 4,327 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 4,327 cf Average Runoff Depth = 4.66"**  
**0.00% Pervious = 0 sf 100.00% Impervious = 11,134 sf**

**2729-02\_Existing-Conditions**

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Type III 24-hr 10-Year Rainfall=4.90"

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**Summary for Subcatchment E-1: Subcat E-1**

Runoff = 1.27 cfs @ 12.07 hrs, Volume= 4,327 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
1,238	98	Paved parking, HSG A
9,896	98	Roofs, HSG A
11,134	98	Weighted Average
11,134		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 100.00% Impervious, Inflow Depth = 4.66" for 10-Year event

Inflow = 1.27 cfs @ 12.07 hrs, Volume= 4,327 cf

Outflow = 1.27 cfs @ 12.07 hrs, Volume= 4,327 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

## 2729-02\_Existing-Conditions

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Type III 24-hr 100-Year Rainfall=8.89"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment E-1: Subcat E-1

Runoff Area=11,134 sf 100.00% Impervious Runoff Depth=8.65"

Tc=5.0 min CN=98 Runoff=2.31 cfs 8,025 cf

### Reach SP1: Study Point 1

Inflow=2.31 cfs 8,025 cf

Outflow=2.31 cfs 8,025 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 8,025 cf Average Runoff Depth = 8.65"**  
**0.00% Pervious = 0 sf 100.00% Impervious = 11,134 sf**

**2729-02\_Existing-Conditions**

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Type III 24-hr 100-Year Rainfall=8.89"

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**Summary for Subcatchment E-1: Subcat E-1**

Runoff = 2.31 cfs @ 12.07 hrs, Volume= 8,025 cf, Depth= 8.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
1,238	98	Paved parking, HSG A
9,896	98	Roofs, HSG A
11,134	98	Weighted Average
11,134		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

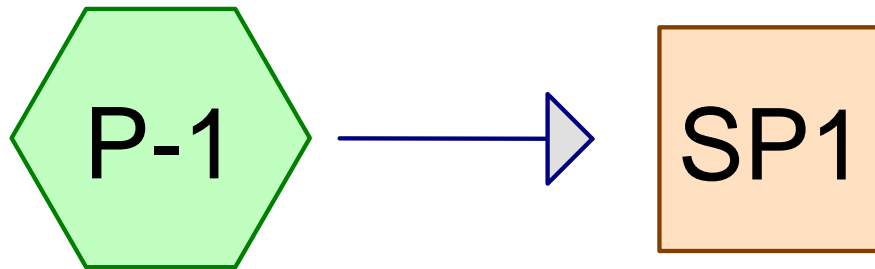
**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 100.00% Impervious, Inflow Depth = 8.65" for 100-Year event

Inflow = 2.31 cfs @ 12.07 hrs, Volume= 8,025 cf

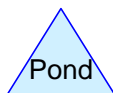
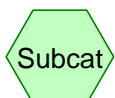
Outflow = 2.31 cfs @ 12.07 hrs, Volume= 8,025 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3



Subcat P-1

Study Point 1



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### Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
701	39	>75% Grass cover, Good, HSG A (P-1)
669	98	Paved parking, HSG A (P-1)
9,764	98	Roofs, HSG A (P-1)
<b>11,134</b>	<b>94</b>	<b>TOTAL AREA</b>

## 2729-02\_Proposed-Conditions

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### Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
11,134	HSG A	P-1
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
<b>11,134</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
701	0	0	0	0	701	>75% Grass cover, Good	P-1
669	0	0	0	0	669	Paved parking	P-1
9,764	0	0	0	0	9,764	Roofs	P-1
<b>11,134</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11,134</b>	<b>TOTAL AREA</b>	

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Type III 24-hr 2-Year Rainfall=3.23"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment P-1: Subcat P-1

Runoff Area=11,134 sf 93.71% Impervious Runoff Depth=2.57"

Tc=5.0 min CN=94 Runoff=0.76 cfs 2,387 cf

### Reach SP1: Study Point 1

Inflow=0.76 cfs 2,387 cf

Outflow=0.76 cfs 2,387 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 2,387 cf Average Runoff Depth = 2.57"**  
**6.29% Pervious = 701 sf 93.71% Impervious = 10,433 sf**

**2729-02\_Proposed-Conditions**

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Type III 24-hr 2-Year Rainfall=3.23"

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**Summary for Subcatchment P-1: Subcat P-1**

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 2,387 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Type III 24-hr 2-Year Rainfall=3.23"

Area (sf)	CN	Description
9,764	98	Roofs, HSG A
701	39	>75% Grass cover, Good, HSG A
669	98	Paved parking, HSG A
11,134	94	Weighted Average
701		6.29% Pervious Area
10,433		93.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**2729-02\_Proposed-Conditions**

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*Type III 24-hr 2-Year Rainfall=3.23"*

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Page 7**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 93.71% Impervious, Inflow Depth = 2.57" for 2-Year event  
Inflow = 0.76 cfs @ 12.07 hrs, Volume= 2,387 cf  
Outflow = 0.76 cfs @ 12.07 hrs, Volume= 2,387 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

## 2729-02\_Proposed-Conditions

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Type III 24-hr 10-Year Rainfall=4.90"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment P-1: Subcat P-1

Runoff Area=11,134 sf 93.71% Impervious Runoff Depth=4.21"

Tc=5.0 min CN=94 Runoff=1.22 cfs 3,906 cf

### Reach SP1: Study Point 1

Inflow=1.22 cfs 3,906 cf

Outflow=1.22 cfs 3,906 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 3,906 cf Average Runoff Depth = 4.21"**  
**6.29% Pervious = 701 sf 93.71% Impervious = 10,433 sf**

**2729-02\_Proposed-Conditions**

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Type III 24-hr 10-Year Rainfall=4.90"

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**Summary for Subcatchment P-1: Subcat P-1**

Runoff = 1.22 cfs @ 12.07 hrs, Volume= 3,906 cf, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
9,764	98	Roofs, HSG A
701	39	>75% Grass cover, Good, HSG A
669	98	Paved parking, HSG A
11,134	94	Weighted Average
701		6.29% Pervious Area
10,433		93.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**2729-02\_Proposed-Conditions**

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*Type III 24-hr 10-Year Rainfall=4.90"*

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**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 93.71% Impervious, Inflow Depth = 4.21" for 10-Year event  
Inflow = 1.22 cfs @ 12.07 hrs, Volume= 3,906 cf  
Outflow = 1.22 cfs @ 12.07 hrs, Volume= 3,906 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

## 2729-02\_Proposed-Conditions

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Type III 24-hr 100-Year Rainfall=8.89"

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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points x 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

### Subcatchment P-1: Subcat P-1

Runoff Area=11,134 sf 93.71% Impervious Runoff Depth=8.17"

Tc=5.0 min CN=94 Runoff=2.28 cfs 7,578 cf

### Reach SP1: Study Point 1

Inflow=2.28 cfs 7,578 cf

Outflow=2.28 cfs 7,578 cf

**Total Runoff Area = 11,134 sf Runoff Volume = 7,578 cf Average Runoff Depth = 8.17"**  
**6.29% Pervious = 701 sf 93.71% Impervious = 10,433 sf**

**2729-02\_Proposed-Conditions**

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Type III 24-hr 100-Year Rainfall=8.89"

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**Summary for Subcatchment P-1: Subcat P-1**

Runoff = 2.28 cfs @ 12.07 hrs, Volume= 7,578 cf, Depth= 8.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100-Year Rainfall=8.89"

Area (sf)	CN	Description
9,764	98	Roofs, HSG A
701	39	>75% Grass cover, Good, HSG A
669	98	Paved parking, HSG A
11,134	94	Weighted Average
701		6.29% Pervious Area
10,433		93.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Assumed

**2729-02\_Proposed-Conditions**

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*Type III 24-hr 100-Year Rainfall=8.89"*

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**Summary for Reach SP1: Study Point 1**

Inflow Area = 11,134 sf, 93.71% Impervious, Inflow Depth = 8.17" for 100-Year event

Inflow = 2.28 cfs @ 12.07 hrs, Volume= 7,578 cf

Outflow = 2.28 cfs @ 12.07 hrs, Volume= 7,578 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3

# Extreme Precipitation Tables

## Northeast Regional Climate Center

*Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.*

<b>Smoothing</b>	Yes
<b>State</b>	Massachusetts
<b>Location</b>	
<b>Longitude</b>	71.142 degrees West
<b>Latitude</b>	42.405 degrees North
<b>Elevation</b>	0 feet
<b>Date/Time</b>	Fri, 28 Aug 2020 14:10:00 -0400

## Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.28	0.43	0.53	0.70	0.87	1.10	<b>1yr</b>	0.75	1.04	1.28	1.63	2.09	2.69	2.94	<b>1yr</b>	2.38	2.83	3.29	3.98	4.65	<b>1yr</b>
<b>2yr</b>	0.35	0.54	0.67	0.88	1.11	1.40	<b>2yr</b>	0.96	1.28	1.62	2.04	2.57	3.23	3.59	<b>2yr</b>	2.86	3.45	3.95	4.70	5.35	<b>2yr</b>
<b>5yr</b>	0.42	0.65	0.81	1.09	1.39	1.77	<b>5yr</b>	1.20	1.61	2.06	2.60	3.26	4.09	4.56	<b>5yr</b>	3.62	4.38	5.00	5.97	6.69	<b>5yr</b>
<b>10yr</b>	0.47	0.74	0.93	1.27	1.65	2.12	<b>10yr</b>	1.42	1.91	2.47	3.12	3.92	4.90	5.47	<b>10yr</b>	4.33	5.26	5.99	7.15	7.92	<b>10yr</b>
<b>25yr</b>	0.56	0.89	1.13	1.56	2.06	2.67	<b>25yr</b>	1.78	2.40	3.13	3.96	4.98	6.20	6.96	<b>25yr</b>	5.49	6.69	7.59	9.10	9.91	<b>25yr</b>
<b>50yr</b>	0.63	1.01	1.30	1.82	2.45	3.21	<b>50yr</b>	2.12	2.86	3.77	4.78	5.98	7.43	8.36	<b>50yr</b>	6.57	8.03	9.08	10.92	11.75	<b>50yr</b>
<b>100yr</b>	0.73	1.18	1.52	2.14	2.92	3.84	<b>100yr</b>	2.52	3.40	4.52	5.73	7.17	8.89	10.04	<b>100yr</b>	7.87	9.65	10.88	13.10	13.94	<b>100yr</b>
<b>200yr</b>	0.83	1.36	1.76	2.52	3.47	4.60	<b>200yr</b>	2.99	4.05	5.43	6.89	8.61	10.65	12.07	<b>200yr</b>	9.43	11.60	13.03	15.73	16.54	<b>200yr</b>
<b>500yr</b>	1.01	1.65	2.16	3.13	4.37	5.83	<b>500yr</b>	3.77	5.11	6.90	8.77	10.97	13.54	15.40	<b>500yr</b>	11.98	14.81	16.55	20.05	20.75	<b>500yr</b>

## Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.25	0.38	0.46	0.62	0.76	0.85	<b>1yr</b>	0.66	0.83	1.15	1.44	1.78	2.44	2.50	<b>1yr</b>	2.16	2.41	2.93	3.53	4.05	<b>1yr</b>
<b>2yr</b>	0.33	0.51	0.63	0.85	1.05	1.26	<b>2yr</b>	0.91	1.23	1.45	1.91	2.48	3.13	3.47	<b>2yr</b>	2.77	3.33	3.82	4.53	5.18	<b>2yr</b>
<b>5yr</b>	0.39	0.60	0.75	1.02	1.30	1.51	<b>5yr</b>	1.12	1.47	1.73	2.24	2.89	3.77	4.18	<b>5yr</b>	3.34	4.02	4.59	5.47	6.17	<b>5yr</b>
<b>10yr</b>	0.44	0.67	0.83	1.16	1.50	1.73	<b>10yr</b>	1.29	1.69	1.95	2.53	3.24	4.35	4.83	<b>10yr</b>	3.85	4.65	5.27	6.29	7.01	<b>10yr</b>

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>25yr</b>	0.50	0.77	0.95	1.36	1.79	2.05	<b>25yr</b>	1.54	2.00	2.31	2.96	3.78	5.23	5.82	<b>25yr</b>	4.63	5.60	6.31	7.52	8.29	<b>25yr</b>
<b>50yr</b>	0.56	0.85	1.06	1.52	2.05	2.35	<b>50yr</b>	1.77	2.30	2.61	3.34	4.24	5.99	6.70	<b>50yr</b>	5.30	6.44	7.22	8.60	9.39	<b>50yr</b>
<b>100yr</b>	0.63	0.95	1.18	1.71	2.35	2.68	<b>100yr</b>	2.03	2.62	2.96	3.62	4.77	6.89	7.70	<b>100yr</b>	6.10	7.41	8.27	9.79	10.65	<b>100yr</b>
<b>200yr</b>	0.70	1.06	1.34	1.94	2.71	3.06	<b>200yr</b>	2.34	2.99	3.36	4.05	5.37	7.91	8.86	<b>200yr</b>	7.00	8.52	9.46	11.12	12.03	<b>200yr</b>
<b>500yr</b>	0.82	1.23	1.58	2.29	3.26	3.65	<b>500yr</b>	2.81	3.57	3.97	4.70	6.29	9.50	10.64	<b>500yr</b>	8.41	10.23	11.30	13.12	14.12	<b>500yr</b>

## Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
<b>1yr</b>	0.31	0.48	0.58	0.79	0.97	1.13	<b>1yr</b>	0.83	1.11	1.32	1.77	2.25	2.86	3.17	<b>1yr</b>	2.53	3.05	3.51	4.29	5.03	<b>1yr</b>
<b>2yr</b>	0.36	0.56	0.69	0.94	1.15	1.36	<b>2yr</b>	1.00	1.33	1.57	2.08	2.68	3.35	3.74	<b>2yr</b>	2.97	3.59	4.11	4.89	5.55	<b>2yr</b>
<b>5yr</b>	0.45	0.70	0.86	1.19	1.51	1.79	<b>5yr</b>	1.30	1.75	2.05	2.66	3.39	4.44	5.00	<b>5yr</b>	3.93	4.81	5.43	6.48	7.21	<b>5yr</b>
<b>10yr</b>	0.55	0.84	1.05	1.46	1.89	2.20	<b>10yr</b>	1.63	2.15	2.55	3.22	4.07	5.51	6.25	<b>10yr</b>	4.88	6.01	6.72	8.04	8.83	<b>10yr</b>
<b>25yr</b>	0.71	1.08	1.35	1.92	2.53	2.90	<b>25yr</b>	2.19	2.83	3.39	4.16	5.17	7.32	8.42	<b>25yr</b>	6.48	8.09	8.92	10.74	11.56	<b>25yr</b>
<b>50yr</b>	0.86	1.31	1.64	2.35	3.17	3.59	<b>50yr</b>	2.73	3.51	4.21	5.05	6.22	9.08	10.54	<b>50yr</b>	8.04	10.14	11.04	13.40	14.18	<b>50yr</b>
<b>100yr</b>	1.06	1.60	2.00	2.89	3.96	4.42	<b>100yr</b>	3.42	4.32	5.22	6.37	7.47	11.28	13.22	<b>100yr</b>	9.98	12.71	13.68	16.75	17.43	<b>100yr</b>
<b>200yr</b>	1.29	1.94	2.45	3.55	4.95	5.46	<b>200yr</b>	4.27	5.34	6.49	7.78	8.96	14.02	16.60	<b>200yr</b>	12.41	15.96	16.97	20.95	21.46	<b>200yr</b>
<b>500yr</b>	1.68	2.50	3.21	4.67	6.63	7.20	<b>500yr</b>	5.72	7.04	8.66	10.14	11.41	18.71	22.44	<b>500yr</b>	16.56	21.58	22.57	28.20	28.29	<b>500yr</b>





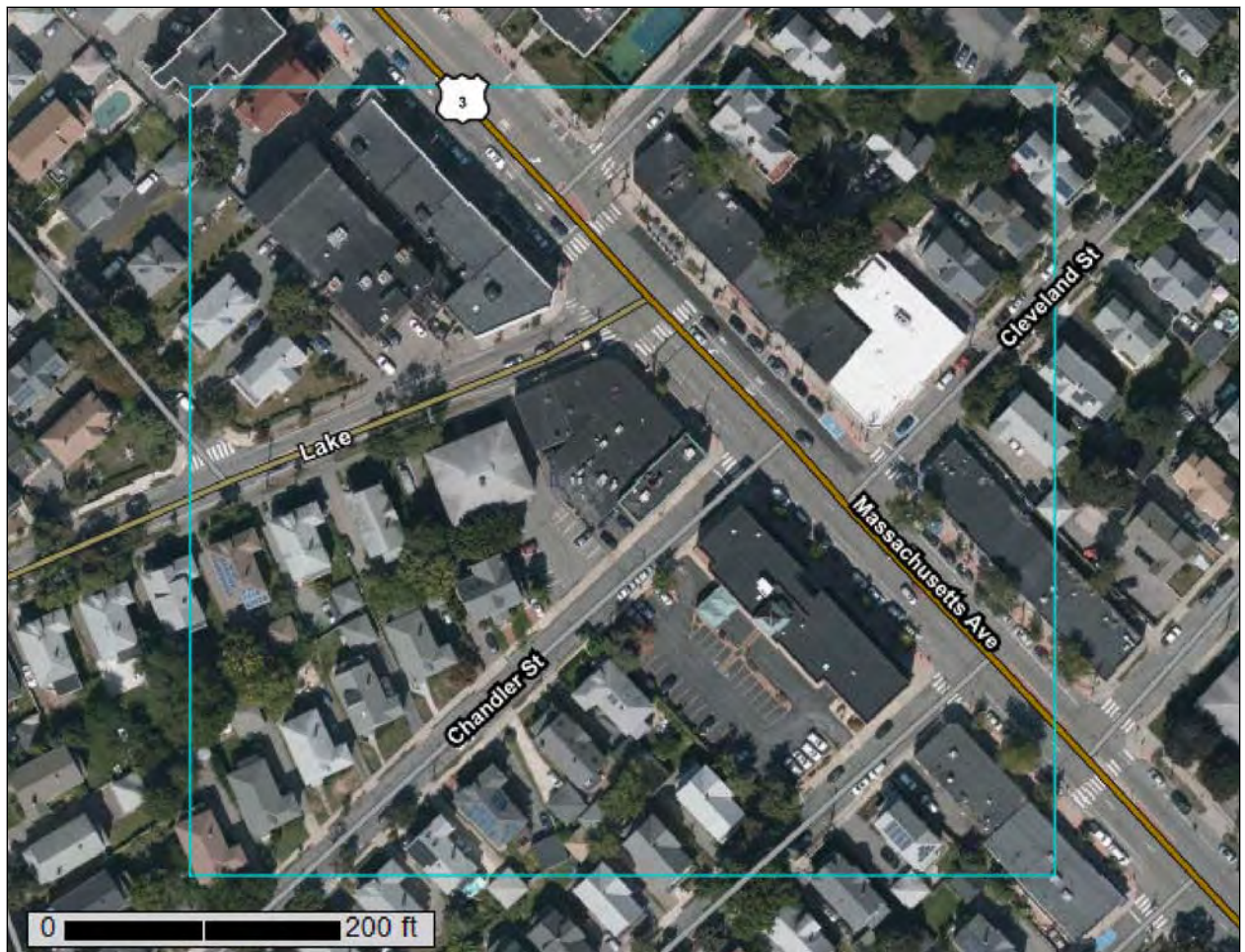
United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for **Middlesex County, Massachusetts**



August 28, 2020

# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

---

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report  
Soil Map



MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

**Special Point Features**

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

**Water Features**

Streams and Canals

**Transportation**

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

**Background**

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts  
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	6.6	79.8%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	1.7	20.2%
<b>Totals for Area of Interest</b>		<b>8.3</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Middlesex County, Massachusetts

### 602—Urban land

#### Map Unit Setting

*National map unit symbol:* 9950  
*Elevation:* 0 to 3,000 feet  
*Mean annual precipitation:* 32 to 50 inches  
*Mean annual air temperature:* 45 to 50 degrees F  
*Frost-free period:* 110 to 200 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Urban land:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Urban Land

##### Setting

*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Excavated and filled land

#### Minor Components

##### Rock outcrop

*Percent of map unit:* 5 percent  
*Landform:* Ledges  
*Landform position (two-dimensional):* Summit  
*Landform position (three-dimensional):* Head slope  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave

##### Udorthents, wet substratum

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

##### Udorthents, loamy

*Percent of map unit:* 5 percent  
*Hydric soil rating:* No

### 626B—Merrimac-Urban land complex, 0 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2tyr9  
*Elevation:* 0 to 820 feet  
*Mean annual precipitation:* 36 to 71 inches

## Custom Soil Resource Report

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 250 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Merrimac and similar soils:* 45 percent

*Urban land:* 40 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Merrimac

#### Setting

*Landform:* Eskers, moraines, outwash terraces, outwash plains, kames

*Landform position (two-dimensional):* Backslope, footslope, summit, shoulder

*Landform position (three-dimensional):* Side slope, crest, riser, tread

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

#### Typical profile

*Ap - 0 to 10 inches:* fine sandy loam

*Bw1 - 10 to 22 inches:* fine sandy loam

*Bw2 - 22 to 26 inches:* stratified gravel to gravelly loamy sand

*2C - 26 to 65 inches:* stratified gravel to very gravelly sand

#### Properties and qualities

*Slope:* 0 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (1.42 to 99.90 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 2 percent

*Maximum salinity:* Nonsaline (0.0 to 1.4 mmhos/cm)

*Sodium adsorption ratio, maximum:* 1.0

*Available water capacity:* Low (about 4.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2e

*Hydrologic Soil Group:* A

*Ecological site:* F144AY022MA - Dry Outwash

*Hydric soil rating:* No

### Description of Urban Land

#### Typical profile

*M - 0 to 10 inches:* cemented material

#### Properties and qualities

*Slope:* 0 to 8 percent

## Custom Soil Resource Report

*Depth to restrictive feature:* 0 inches to manufactured layer

*Runoff class:* Very high

*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)

*Available water capacity:* Very low (about 0.0 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 8

*Hydrologic Soil Group:* D

*Hydric soil rating:* Unranked

### Minor Components

#### Windsor

*Percent of map unit:* 5 percent

*Landform:* Dunes, outwash terraces, deltas, outwash plains

*Landform position (three-dimensional):* Tread, riser

*Down-slope shape:* Convex, linear

*Across-slope shape:* Convex, linear

*Hydric soil rating:* No

#### Sudbury

*Percent of map unit:* 5 percent

*Landform:* Outwash plains, terraces, deltas

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Tread, dip

*Down-slope shape:* Concave

*Across-slope shape:* Linear

*Hydric soil rating:* No

#### Hinckley

*Percent of map unit:* 5 percent

*Landform:* Eskers, kames, deltas, outwash plains

*Landform position (two-dimensional):* Summit, shoulder, backslope

*Landform position (three-dimensional):* Nose slope, side slope, crest, head slope, rise

*Down-slope shape:* Convex

*Across-slope shape:* Convex, linear

*Hydric soil rating:* No

# **Soil Information for All Uses**

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## **Soil Properties and Qualities**

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

## **Soil Physical Properties**

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

### **Saturated Hydraulic Conductivity (Ksat)**

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.


The numeric Ksat values have been grouped according to standard Ksat class limits.

# Custom Soil Resource Report Map—Saturated Hydraulic Conductivity (Ksat)




MAP LEGEND


**Area of Interest (AOI)**

 Area of Interest (AOI)


**Soils**


**Soil Rating Polygons**

 = 100.0000


 Not rated or not available


**Soil Rating Lines**

 = 100.0000


 Not rated or not available

**Soil Rating Points**


 = 100.0000


 Not rated or not available


**Water Features**


 Streams and Canals


**Transportation**

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

**Background**

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL: [Web Soil Survey](#)

Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Saturated Hydraulic Conductivity (Ksat)**

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
602	Urban land		6.6	79.8%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	100.0000	1.7	20.2%
<b>Totals for Area of Interest</b>			<b>8.3</b>	<b>100.0%</b>

**Rating Options—Saturated Hydraulic Conductivity (Ksat)**

*Units of Measure:* micrometers per second

*Aggregation Method:* Dominant Component

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Fastest

*Interpret Nulls as Zero:* No

*Layer Options (Horizon Aggregation Method):* Depth Range (Weighted Average)

*Top Depth:* 12

*Bottom Depth:* 120

*Units of Measure:* Inches

**Soil Qualities and Features**

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

**Hydrologic Soil Group**

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

# Custom Soil Resource Report Map—Hydrologic Soil Group



MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

**Water Features**

Streams and Canals

**Transportation**

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

**Background**

Aerial Photography

**Soil Rating Lines**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

**Soil Rating Points**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts  
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

**Table—Hydrologic Soil Group**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
602	Urban land		6.6	79.8%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	1.7	20.2%
<b>Totals for Area of Interest</b>			<b>8.3</b>	<b>100.0%</b>

**Rating Options—Hydrologic Soil Group**

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

# References

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- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_054262](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262)
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053577](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577)
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053580](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580)
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\\_053624](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624)

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)