NEEDHAM PLANNING BOARD
Tuesday, December 15, 2020
7:15 p.m.

Virtual Meeting using Zoom
Meeting ID: **826-5899-3198**
(Instructions for accessing below)

To view and participate in this virtual meeting on your phone, download the "Zoom Cloud Meetings" app in any app store or at www.zoom.us. At the above date and time, click on "Join a Meeting" and enter the following Meeting ID: 826-5899-3198

To view and participate in this virtual meeting on your computer, at the above date and time, go to www.zoom.us click "Join a Meeting" and enter the following ID: 826-5899-3198

1. De Minimus Change: Major Project Site Plan Special Permit No. 95-2: Zucchini Gold, LLC d/b/a The Rice Barn, 172 N. Main St. #9 Mansfield, MA 02048, Petitioner. (Property located at 1037 Great Plain Ave, Needham, MA, Needham, Massachusetts).

2. Public Hearing:

   7:20 p.m. Major Project Site Plan Special Permit No. 2020-03: Hunnewell Needham, LLC, 393 South Main Street, Cohasset, MA, 02025, Petitioner. (Property located at 400 Hunnewell Street, Needham, MA, Needham, Massachusetts). Regarding request to build new residential building with 8 units (see legal notice for more info).

   7:40 p.m. 390 Grove Street Definitive Subdivision: Elisabeth Schmidt-Scheuber, 390 Grove Street, Needham, MA, Petitioner, (Property located at 390 Grove Street, Needham, MA). *Please note this is a re-noticed hearing that began on February 4, 2020 and is continued from the July 21, 2020, August 11, 2020, September 8, 2020 and November 4, 2020 Planning Board meetings.*

   8:00 p.m. Amendment to Major Project Site Plan Special Permit No. 2012-07: The Children's Hospital Corporation c/o Boston Children's Hospital, 300 Longwood Avenue, Boston, MA, Petitioner. (Property located at 66 B Street, 360 First Avenue, 410 First Avenue, and 37 A Street, Needham, MA, Needham, Massachusetts). Regarding request of to build out development for Children's Hospital (see legal notice for more info). *Please note: this hearing is a continuation from November 17, 2020.*

3. Highway Commercial 1 Rezoning and Planning Study: Review of Work Program.

4. Minutes.

5. Correspondence.

6. Report from Planning Director and Board members.

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

TOWN OF NEEDHAM
MASSACHUSETTS

500 Dedham Avenue
Needham, MA 02492
781-455-7550

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2020 DEC 10 AM 11:20

PLANNING BOARD

APPLICATION FOR SITE PLAN REVIEW

De Minimus change

Project Determination: (circle one) Major Project Minor Project

This application must be completed, signed, and submitted with the filing fee by the applicant or his representative in accordance with the Planning Board's Rules as adopted under its jurisdiction as a Special Permit Granting Authority. Section 7.4 of the By-Laws.

Location of Property 1037 Great Plain Ave, Needham, MA 02492
Name of Applicant Zucchini Gold LLC
Applicant's Address 172 N. Main Street, Mansfield, MA 02048-2272
Phone Number 617-909-5753

Applicant is: Owner _____ Tenant _X____
Agent/Attorney _____ Purchaser _____

Property Owner's Name Triantos Thomas Triantos Thomas
Property Owner's Address 198 Curve Street, Dedham, MA 02026
Telephone Number 781-329-5894

Characteristics of Property: Lot Area 14,636 Present Use
Restaurant
Map # 51 Parcel # 11 Zoning District _____

Description of Project for Site Plan Review under Section 7.4 of the Zoning By-Law:

Request to extend hours to allow breakfast service starting at 7 am.

Signature of Applicant (or representative) Chalermpol Intha/Manager
Address if not applicant _____
Telephone #
Owner's permission if other than applicant _____

SUMMARY OF PLANNING BOARD ACTION

Received by Planning Board _____ Date 12/10/2020
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____
Denied _____ Fee Paid _____ Fee Waived _____
Withdrawn _____
NOTE: Reports on Minor Projects must be issues within 35 days of filing date.

Zucchini Gold LLC
172 N. Main Street #9
Mansfield, MA 02048-2272

December 9, 2020

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2020 DEC 10 AM 11:20

Planning Board
Town of Needham
500 Dedham Avenue
Needham, MA 02492

Dear Planning Board members:

I am requesting an Amendment to the existing special permit No. 95-2, dated March 7, 1995, amended on April 2, 1996 and transferred on September 5, 2006 and finally to Zucchini Gold, LLC d/b/a The Rice Barn on June 18, 2013. I would like to be permitted to open at 7:00 a.m.; we need to explore selling breakfast/coffee. Covid-19 took away more than half of The Rice Barn income. Since our location is one of the best in relation to a commuter rail station breakfast/coffee look like a good possibility of a way to increase the sales. I would also like to request a waiver of the $250 fee, as we are just trying to stay afloat during this difficult time. Your kind consideration is greatly appreciated.

Very truly yours,

Chalermpol Intha
(Manager, Zucchini Gold, LLC d/b/a The Rice Barn)

Trinity Thomas

Amendment to Decision
MAJOR PROJECT SITE PLAN SPECIAL PERMIT
Application No. 95-2

Zucchini Gold, LLC d/b/a The Rice Barn

December 15, 2020

(Original dated March 7, 1995;
amended April 2, 1996, transferred on September 5, 2006 and June 18, 2013)

(Filed during the Municipal Relief Legislation, Chapter 53 of the Acts of 2020)

DECISION of the Planning Board (hereinafter referred to as the Board) on the petition of Zucchini Gold, LLC d/b/a The Rice Barn (hereinafter referred to as the Petitioner) for property located at 1037 Great Plain Avenue, Needham, Massachusetts. Said property is shown on Assessors Plan No. 51 as Parcel 11 containing 14,363 square feet and is located in the Center Business District.

This Decision is in response to an Application submitted to the Board on December 10, 2020, by the Petitioner to amend Major Project Site Plan Special Permit No. 95-2 originally issued to Kenny Chan d/b/a Joy Luck Café, Inc. on March 7, 1995, filed with the Town Clerk on March 8, 1995, as amended by Site Plan Special Permit Amendment dated April 2, 1996, and filed with the Town Clerk on April 3, 1996, and subsequently amended and transferred to Banyan Tree, LLC on September 5, 2006 and filed with the Town Clerk on September 22, 2006 and finally transferred to Zucchini Gold, LLC d/b/a The Rice Barn on June 18, 2013, and filed with the Town Clerk on June 19, 2013. The requested Amendment would, if granted, permit the Petitioner to change the opening of business time to 7:00 a.m. from 11:00 a.m.

The changes requested are deemed minor in nature and extent and do not require public notice or public hearing. Testimony and documentary evidence were presented to the Board on December 15, 2020 via remote meeting using Zoom ID 826-5899-3198. Board members Martin Jacobs, Jeanne S. McKnight, Paul S. Alpert, Bruce Eisenhut and Ted Owens were present throughout the proceedings. After testimony and documentary evidence were presented, the Board took action on the matter.

EVIDENCE

Submitted for the Board's review were the following Exhibits:

Exhibit 1 — Completed Application for Further Site Plan Review dated December 10, 2020.

Exhibit 2 — Letter from Chalermpol Intha, Manager, Zucchini Gold, LLC d/b/a The Rice Barn dated December 10, 2020.

FINDINGS AND CONCLUSIONS

The findings and conclusions made in Major Project Site Plan Special Permit No. 95-2, dated March 7, 1995, amended April 2, 1996, transferred on September 5, 2006 and June 18, 2013, were ratified and confirmed except as follows:

1. The Board hereby approves the modifications as described in Exhibits 1 and 2 to allow the Petitioner to change the opening of business time to 7:00 a.m. from 11:00 a.m.

2. Section 3.3 of CONDITIONS accordingly shall be revised as follows:

   3.3 The restaurant on the subject Premises may be open and operated for dining room food service and take out food service seven days per week between the hours of 7:00 a.m. to 11:00 p.m.

3. The proposed changes are deemed minor in nature and do not require public notice or hearing.

4. The Planning Board further approves the Applicant's request to waive the filing fee for this de minimus change.

CONDITIONS AND LIMITATIONS

The Plan modifications, conditions and limitations contained in Major Project Site Plan Special Permit No. 95-2, dated March 7, 1995, amended April 2, 1996, transferred on September 5, 2006 and June 18, 2013, are ratified and confirmed except as modified herein.

DECISION

NOW THEREFORE, by unanimous vote of the Planning Board, the Board votes that:

1. The proposed changes are minor in nature and do not require a public notice or a public hearing. No 20-day appeal period from this Amendment of Decision is required.

2. That the requested modifications are granted.

This approval shall be recorded in the Norfolk County Registry of Deeds. This Major Site Plan Special Permit amendment shall not take effect until the Petitioner has delivered written evidence of recording to the Board.

Witness our hands this 15th day of December, 2020.

NEEDHAM PLANNING BOARD

_____
Jeanne McKnight, Chairperson

_____
Paul S. Alpert, Vice-Chairperson

_____
Ted Owens

_____
Martin Jacobs

_____
Adam Block

COMMONWEALTH OF MASSACHUSETTS

Norfolk, ss _____2020

On this _____day of _____, 2020, before me, the undersigned notary public, personally appeared _____, one of the members of the Planning Board of the Town of Needham, Massachusetts, proved to me through satisfactory evidence of identification, which was _____, to be the person whose name is signed on the proceeding or attached document, and acknowledged the foregoing to be the free act and deed of said Board before me.

_____
Notary Public

My Commission Expires: _____

No 20 day appeal period for this De Minimus Change Decision.

Copy sent to:
Petitioner
Town Clerk
Building Inspector
Director, PWD
Board of Health
Conservation Commission
Board of Selectmen
Engineering
Fire Department
Police Department
Chalermpol Intha, Manager

LEGAL NOTICE
Planning Board
TOWN OF NEEDHAM
NOTICE OF HEARING

In accordance with the provisions of M.G.L., Chapter 40A, S.11; the Needham Zoning By-Laws, Section 7.4, 1.4.6, 3.2.2, 4.4.2, 5.1.1.5 and 5.1.3, the Needham Planning Board will hold a public hearing on Tuesday, December 15, 2020 at 7:20 p.m. by Zoom Web ID Number 826-5899-3198 (further instructions for accessing are below), regarding the application of Hunnewell Needham, LLC, 393 South Main Street, Cohasset, MA, 02025, for a Special Permit under Site Plan Review, Section 7.4 of the Needham Zoning By-Law.

The subject property is located at 400 Hunnewell Street, Needham, MA, located in the Hillside Avenue Business District. The property is shown on Assessors Plan No. 99 as Parcel 3 containing a total of 20,123 square feet. The requested Major Project Site Plan Special Permit, would, if granted, permit the Petitioner to demolish the existing commercial building and replace it with a new residential building containing a total of eight units. The new building would be two stories high, plus a basement level, to be used for underground parking. The first and second floor together would contain a total of 12,915 square feet of floor area. The area to the left of the building, looking from the front, is proposed to be completely landscaped, as will the area in front of the building. Additional landscaping would be provided in the rear corner of the Premises as well. The rest of the Premises is proposed to be occupied by an access driveway and 7 surface parking spaces.

In accordance with the Zoning By-Law, Section 7.4, a Site Plan Special Permit is required. In accordance with the Zoning By-Law, Section 1.4.6, a Special Permit is required, if applicable, for the change and extension of a lawful, pre-existing, non-conforming use, and the alteration, enlargement or reconstruction of a lawful, pre-existing, non-conforming structure. In accordance with the Zoning By-Law, Section 3.2.2, a Special Permit is required for apartment or multi-family dwelling in the Hillside Avenue Business District. In accordance with the Zoning By-Law, Section 4.4.2, a Special Permit is to exempt the basement level underground parking from inclusion in the Floor Area Ratio calculation. In accordance with the Zoning By-Law, Section 5.1.1.5, a Special Permit is required to waive strict adherence to the requirements of Section 5.1.3.

To view and participate in this virtual hearing on your phone, download the "Zoom Cloud Meetings" app in any app store or at www.zoom.us. At the above date and time, click on "Join a Meeting" and enter the following Meeting ID: 826-5899-3198

To view and participate in this virtual hearing on your computer, at the above date and time, go to www.zoom.us click "Join a Meeting" and enter the following ID: 826-5899-3198

The application may be viewed at this link: https://www.needhamma.gov/Archive.aspx?AMID=146&Type=&ADID= . Interested persons are encouraged to attend the public hearing and make their views known to the Planning Board. This legal notice is also posted on the Massachusetts Newspaper Publishers Association's (MNPA) website at (http://masspublicnotices.org/).

NEEDHAM PLANNING BOARD

Needham Times, November 19, 2020 and November 26, 2020.

TOWN OF NEEDHAM
MASSACHUSETTS

Room 20, Town Hall
Needham, MA 02492
781-455-7526

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2018 NOV 24 PM 12:34

PLANNING BOARD

APPLICATION FOR SITE PLAN REVIEW

Project Determination: (circle one) Major Project Minor Project

This application must be completed, signed, and submitted with the filing fee by the applicant or his representative in accordance with the Planning Board's Rules as adopted under its jurisdiction as a Special Permit Granting Authority. Section 7.4 of the By-Laws.

Location of Property 400 Hunnewell Street, Needham, MA 02494,
Name of Applicant Hunnewell Needham, LLC
Applicant's Address 393 South Main Street, Cohasset, MA 02025
Phone Number 617-460-0099 - Elisha Long, Manager

Applicant is: Owner X Tenant _____
Agent/Attorney _____ Purchaser _____

Property Owner's Name Same as above
Property Owner's Address Same as Above
Telephone Number Same as above

Characteristics of Property: Lot Area 20,123 SF Present Use Office
Map # 99 Parcel # 3 Zoning District Hillside Avnue Business (HAB)

Description of Project for Site Plan Review under Section 7.4 of the Zoning By-Law:

Demolition of existing two story commercial building and construction of a new multifamily, residential dwelling, containing a total of eight units, with an underground parking garage and associated surface parking and driveway; as described at Addendum A attached hereto and the plans sbumitted herewith, all of which are hereby incorporated herein.

Signature of Applicant (or representative) _____
Address if not applicant George Giunta, Jr., Esq., 281 Chestnut Street, Needam, MA 02492
Telephone # 781-449-4520
Owner's permission if other than applicant See Authorization Provided Herewith

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SUMMARY OF PLANNING BOARD ACTION

Received by Planning Board _____ Date _____
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____
Denied _____ Fee Paid _____ Fee Waived _____
Withdrawn _____
NOTE: Reports on Minor Projects must be issues within 35 days of filing date.

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NEEDHAM, MA 02492
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ADDENDUM A
TO
APPLICATION FOR SITE PLAN REVIEW
OF
Hunnewell Needham, LLC
400 Hunnewell Street
Needham, Massachusetts

The following relief is or may be required, and is hereby requested:

1. Pursuant to the criteria of Section 7.4.2 of the By-Law, the proposed redevelopment of the Premises constitutes a "major project" and therefore requires Major Project Site Plan Review and the issuance of a special permit pursuant thereto.

2. In addition, the following relief is, or may be required:

a. Issuance of a Special Permit pursuant to Section 1.4.6 for the change and extension of a lawful, pre-existing, non-conforming use, and the alteration, enlargement and reconstruction of a lawful, pre-existing, non-conforming structure;

b. Issuance of a Special Permit pursuant to Section 3.2.2 for apartment or multi-family dwelling in the Hillside Avenue Business District;

c. Issuance of a Special Permit pursuant to Section 4.4.2 exempting the basement level underground parking from inclusion in the floor area calculation;

d. Issuance of a Special Permit pursuant to Section 5.1.1.5 waving strict adherence with the parking design requirements of Section 5.1.3 of the Zoning By-law;

e. Waiver of strict compliance with the following requirements of Section 7.4.4, to the extent necessary and applicable:

1. Requirement of subparagraph (b) concerning location of structures within 100 feet of property line;
2. Requirements of subparagraph (d) concerning building elevation as related to the existing portions of the building not effected by the proposed addition;
3. Requirements of subparagraph (l) concerning lighting;
4. Requirements of subparagraph (m) concerning loading and unloading facilities;
5. Requirements of subparagraph (n) concerning provisions for refuse removal; and
3. Requirements of subparagraph (o) concerning projected traffic volume.

f. Any and all additional relief required or appropriate for the redevelopment of the Premises for residential use and the construction of the proposed new multifamily building with underground parking.

3. The Applicant requests that any and all relief granted by the Board in connection with the within application shall run with the land and that the movement, change and alteration of interior layout, including, without limitation, walls and interior fixtures, not require any further review, provided the total useable square footage of the building and the total number of residential units remains fixed.

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Hunnewell Needham, LLC
393 South Main Street
Cohasset, MA 02025

November 5, 2020

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2020 NOV 24 PM 12:34

Lee Newman
Planning Director
Town of Needham
Planning Board
Town Hall
Needham, Massachusetts 02492

Re: Site Plan Application
Hunnewell Needham, LLC
400 Hunnewell Street, Needham, MA

Dear Mrs. Newman,

Please accept this letter as confirmation that George Giunta, Jr., Esquire, is authorized to make application for Site Plan Approval and any and all other zoning, planning, general by-law and other relief that may be required or appropriate in connection with the redevelopment of the property known and numbered 400 Hunnewell Street. In connection therewith, Attorney Giunta is hereby authorized, to execute, sign, deliver and receive all necessary documentation related thereto, including, without limitation, Application for Site Plan Review.

Hunnewell Needham, LLC

By Elisha Long
Manager, duly authorized

GEORGE GIUNTA, JR.
ATTORNEY AT LAW*
281 Chestnut Street
Needham, MASSACHUSETTS 02492
*Also admitted in Maryland
TELEPHONE (781) 449-4520 FAX (781) 465-6059

November 5, 2020

Planning Department
Town of Needham
Public Services Administration Building
500 Dedham Avenue
Needham, MA 02492

Re: Application for Zoning Relief
Hunnewell Needham, LLC
400 Hunnewell Street, Needham, MA

Dear Lee,

Please be advised that I represent Hunnewell Needham, LLC (hereinafter, the "Applicant") relative to the property known and numbered 400 Hunnewell Street (the "Premises"). In connection therewith, submitted herewith, in electronic format pursuant to Covid-19 filing procedures, please find the following (with the exception of item 5, which is submitted in hard copy only):

1. Complete Site Plan Review Application with Addendum;

2. Authorization letter;

3. Architectural Plans titled "400 Hunnewell, Needham, MA, Permit Set – Nov 05, 2020", prepared by Duckham Architecture & Interiors, consisting of 7 sheets, as follows: Sheet 1, cover sheet 2, A.B.1, "Lower Level Garage Plan"; Sheet 3, A.1.1 "1st Floor Plan"; Sheet 4, A.1.2, "2nd Floor Plan"; Sheet 5, A.1.3 "Roof Plan"; Sheet 6, A201 "Proposed South Elevation"; and Sheet 7, A202 "Proposed South Elevation".

4. Site Plan for 400 Hunnewell Street, Needham, Massachusetts 02494", consisting of 8 sheets, as follows: Sheet 1, "Cover Sheet", dated November 2, 2020; Sheet 2, "Existing Conditions Plan of Land", dated March 5, 2020, revised April 6, 2020 and November 5, 2020, prepared by Field Resources, Inc.; Sheet 3 "Layout Plan Showing Proposed Structure", dated March 5, 2020, revised April 6, 2020 and November 5, 2020, prepared by Field Resources, Inc.; Sheet 4 "Grading and Drainage Plan", dated November 2, 2020, prepared by J.M. Grenier Associates, Inc.; Sheet 5 "Utility Plan", dated November 2, 2020, prepared by J.M. Grenier Associates, Inc.; Sheet 6, "Erosion & Sedimentation Control Plan", dated November 2, 2020, prepared by J.M. Grenier Associates, Inc.; Sheet 7, "Detail Plan 1/2", dated November 2, 2020, prepared by J.M.

Grenier Assocaites, Inc.; and Sheet 8, “Detail Plan 2/2”, dated November 2, 2020, prepared by J.M. Grenier Assocaites, Inc.;

5. Scanned copy of Check no. 2919 in the amount of $1,000 for the applicable filing fee; and

6. Word format version of this letter.

In addition, in accordance with current Covid-19 filing requirements, three full size copies of the above items 1 through 4, together with three copies of “Stormwater Management Report, 400 Hunnewell Street, Needham, Massachusetts”, dated November 2, 2020, prepared by J.M. Grenier Associates, Inc. and the original check, are being simultaneously mailed to you at the above address.

The Premises is identified as Parcel 3 on Town of Needham Assessor’s Map No. 99. It is located within the Hillside Avenue Business District (the “HAB”) and contains 20,123 square feet of area, with 104.31 feet of frontage on Hunnewell Street. The Premises is currently fully developed, being occupied by a two-story commercial building, associated parking areas and limited landscaping. Based on the records of the Assessor’s Department, the building, which is made of concrete block, was constructed in or around 1975. It contains approximately 8,520 square feet of area divided over two floors, both of which are used for office purposes.

As indicated in the Application, the Applicant desires to demolish the existing commercial building and replace it with a new residential building containing a total of eight units. The new building would be two stories high, plus a basement level, to be used for underground parking. The first and second floor together would contain a total of 12,915 square feet of floor area.

The area to the left of the building, looking from the front, will be completely landscaped, as will the area in front of the building. Additional landscaping will be provided in the rear corner of the Premises as well. The rest of the Premises will be occupied by an access driveway and 7 surface parking spaces.

Analysis

I. Use

Whereas the existing building is proposed to be demolished, no comment or analysis is made relative to the use thereof. With respect to the proposed new building, same is to be used entirely for residential purposes. Pursuant to Section 3.2.2 of the Zoning By-Law, use of property in the HAB for “apartment or multifamily dwelling” is allowed by special permit. Therefore, provided the Board approves the requested special permit, the proposed use of the Premises will comply with the By-Law.

II. Dimensional and Density Requirements

A. Lot Area and Frontage

As indicated above, the Premises contains 20,123 square feet of area, with 104.31 feet of frontage on Hunnewell Street. Pursuant to Section 4.4.1 of the By-Law, lots in the HAB are currently required to contain a minimum of 10,000 square feet of area and to have a minimum of 80 feet of frontage. Therefore, the Premises meets or exceeds both minimum frontage and minimum area requirements.

B. Building Related Dimensional and Density Requirements

Pursuant to Section 4.4.2(e) of the By-Law, the maximum floor area ratio ("FAR") applicable to the Premises is 0.7, or 14,086.1 square feet. As mentioned above, the proposed new building consists of two occupied floors plus a basement level containing underground parking. Pursuant to Section 4.4.2, the Planning Board may issue a special permit exempting underground parking from inclusion in the FAR calculation, and such permit has been requested. Provided the permit is granted, the proposed new building will contain a total of 14,076 square feet on the first and second floor; 10 square feet less than the maximum required and in compliance with the applicable FAR requirement.

Pursuant to Section 4.4.3 of the By-Law, the maximum height allowed as of right in the HAB is two and one-half (2 ½) stories, not to exceed thirty-five feet; with all use except storage prohibited above the second floor. Whereas the proposed new building is only two stories and not more than 35' tall, the proposed new building will comply with the height limitations of the By-Law.

As applied to the Premises, Section 4.4.4 of the By-Law requires a front yard setback of 20 feet. Whereas the proposed new building is set back 20 feet from Hunnewell at its closest point, it complies with such requirement.

Pursuant to Section 4.4.5 of the By-Law, no more than two driveways are allowed for every 150 feet of frontage, and two-way driveways of the kind proposed for the Premises must be no less than 18 feet wide and no more than 25 feet wide. Whereas only one driveway is proposed, and whereas the driveway is 25 feet wide, same complies with the applicable driveway opening conditions of Section 4.4.5.[1]

[1] Technically only 12.5 feet of the driveway opening is on the Premises, as the proposed driveway utilizes a common right of way, shared with the adjacent Premises, as set forth in Deed recorded with Norfolk County Registry of Deeds in Book 5115, Page 175, and shown on "Plan of Land in Needham, Mass.", dated January 28, 1975, prepared by Apex Associates, endorsed by the Needham Planning Board and recorded therewith.

Pursuant to Section 4.4.8.4 of the By-Law,

> no building or structure for a use not allowed in a residential district shall be placed within fifty (50) feet of a residential district boundary, and the ten feet closest to such boundary shall be suitable landscaped as specified at Section 4.4.8.5. The remainder of the setback may be used for an accessory use not including a building or structure.

A small portion of the Premises directly abuts the Single Residence B Zoning District, at the rear corner, with a larger portion located adjacent to the MBTA railroad right-of-way. Because the HAB district boundary ends at the edge of the railroad right-of-way, and whereas the opposite side of the right-of-way is located in the SRB District, the property line likely constitutes a residential district boundary, as contemplated by Section 4.4.8.4.

However, whereas the proposed new building is an apartment or multi-family dwelling, used for residential purposes, and whereas apartments and multifamily structures and residential use are allowed in a residential district, the provisions of Section 4.4.8.4 do not apply by their own terms. Moreover, even if they did apply, the proposed new building is located more than 50 feet from the applicable boundaries. In addition, virtually the entire 50 foot boundary area is currently occupied by commercial parking, and therefore qualifies as pre-existing, non-conforming. As a result, even if 4.4.8.4 does apply and there is an issue with compliance, provided a special permit is issued pursuant to Section 1.4.6 to alter, extend and enlarge a pre-existing non-conformity, same can be made to comply with the By-Law.

Finally, whereas Section 4.4.9 of the By-Law, pertains only to business use, same is inapplicable to the proposed redevelopment.

II. Parking

Total parking demand for the Premises, as redeveloped and used for residential purposes in eight total units, is 12 spaces, calculated as follows:

Multi-family Structures (Section 5.1.4): 8 Units @ 1.5 space Unit = 12 spaces

As indicated on the plans, there are 23 total parking spaces proposed: 16 underground parking spaces and an additional 7 surface spaces; two to the right of the new building and 5 to the rear. As a result, more than sufficient parking is provided, and the redevelopment complies with the off-street parking requirements of the By-Law relative to the number of spaces.

Notwithstanding the foregoing, parking waivers are still required, relative to the design requirements of the By-Law concerning the following:

> A. Parking Lot Illumination – The By-Law requires that all parking areas shall provide an illumination level of an average of one foot candle. The illumination proposed for the Premises is limited to modest lights mounted on the building, which are expected to produce an illumination level of less than one foot candle in portions of the parking area.

B. Landscaped Areas – The By-Law requires that ten (10) percent or more of the parking area shall be maintained as landscaped area. Whereas the majority of the parking provided is in an underground structure, and due to the configuration of the site, a waiver from such provision has been requested.

C. Trees – As applied to the Premises, the By-Law requires two trees, located within or around the parking area, with not less than 40 square feet of unpaved soil or other permeable surface area per tree, in planting beds at least 4 feet wide. While the Applicant is proposing landscaping at the front and rear corner of the Premises, same does not meet the tree requirement and a waiver has been requested.

III. Site Plan Analysis

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

The Applicant asserts that the use of the Premises for residential purposes, as proposed, does not constitute a "seriously detrimental use" within the terms of the By-Law. Furthermore, considering that the Premises is bounded to the rear by the MBTA railroad right of way, to one side by a commercial use and to the other side by a multifamily / apartment development, the Applicant asserts that no additional sound and sight buffers are required, and that views, light and air are not materially affected.

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

The Applicant is of the opinion that it has provided for safe and convenient vehicular and pedestrian movement within the site and on adjacent streets. The driveway serving the parking area is of adequate width and in an appropriate location, and the building is accessed by a walkway.

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

Parking is arranged both around and below the building and is readily accessible. The proposed residential use of the building is not expected to require any special or dedicated loading spaces. Therefore, based on the proposed use, the Applicant is of the opinion that the arrangement of parking and loading spaces is adequate.

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

The proposed residential use of the Premises is not anticipated to generate any significant wastes or trash. Nevertheless, it will be a requirement for the occupants of the building that all trash, waste and debris be removed on a regular basis, as necessary and appropriate, consistent with customary residential use. Therefore, the Applicant asserts that the methods of waste disposal are adequate for the Premises and its proposed use.

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

There is no real natural landscape to speak of, in the vicinity of the Premises. The property is bounded on one side by an existing commercial activity on another by a multifamily development, and on the third side by the MBTA railroad right of way. As a result, the proposed redevelopment of the Premises for residential purposes is not anticipated to have any significant negative effect on any community assets or any adjacent landscape, buildings and structures.

(f) Mitigation of adverse impacts on the Town's resources including the effect on the Town's water supply and distribution system, sewer collection and treatment, fire protection, and streets.

No significant impact to the Town's resources is proposed or anticipated. The use of the Premises for residential purposes is consistent with both other current uses in the HAB and the uses allowed pursuant to the By-Law. As a result, the proposed redevelopment of the Premises and use thereof for residential purposes is not anticipated to substantially or materially increase or alter the need for any Town resources

Conclusion

Based on all of the foregoing, the Applicant asserts that the proposed redevelopment of the Premises, and use thereof for residential purposes, as set forth above and in the materials submitted herewith, is both proper and appropriate. The proposed use of the Premises is allowable by special permit. The proposed new building complies with applicable density and dimensional requirements, and, while parking waivers are required relative to the design standards, and a waiver for the underground parking, same are appropriate considering the fully developed character of the Premises at present, the proposed redevelopment and use of the Premises, and the surrounding area and abutting properties.

Please schedule this matter for the next available hearing of the Board. In the meantime, if you have any questions, comments or concerns relative to the foregoing, please do not hesitate to contact me so that I may be of assistance.

Your courtesy and attention are appreciated.

Sincerely,



George Giunta, Jr.

TOWN OF NEEDHAM
MASSACHUSETTS

Room 20, Town Hall
Needham, MA 02492
781-455-7526

PLANNING BOARD

APPLICATION FOR SITE PLAN REVIEW

Project Determination: (circle one) Major Project Minor Project

This application must be completed, signed, and submitted with the filing fee by the applicant or his representative in accordance with the Planning Board's Rules as adopted under its jurisdiction as a Special Permit Granting Authority. Section 7.4 of the By-Laws.

Location of Property 400 Hunnewell Street, Needham, MA 02494,
Name of Applicant Hunnewell Needham, LLC
Applicant's Address 393 South Main Street, Cohasset, MA 02025
Phone Number 617-460-0099 - Elisha Long, Manager

Applicant is: Owner X Tenant _____
Agent/Attorney _____ Purchaser _____

Property Owner's Name Same as above
Property Owner's Address Same as Above
Telephone Number Same as above

Characteristics of Property: Lot Area 20,123 SF Present Use Office
Map # 99 Parcel # 3 Zoning District Hillside Avnue Business (HAB)

Description of Project for Site Plan Review under Section 7.4 of the Zoning By-Law:

Demolition of existing two story commercial building and construction of a new multifamily, residential dwelling, containing a total of eight units, with an underground parking garage and associated surface parking and driveway; as described at Addendum A attached hereto and the plans sbumitted herewith, all of which are hereby incorporated herein.

Signature of Applicant (or representative) _____
Address if not applicant George Giunta, Jr., Esq., 281 Chestnut Street, Needam, MA 02492
Telephone # 781-449-4520
Owner's permission if other than applicant See Authorization Provided Herewith

---

SUMMARY OF PLANNING BOARD ACTION

Received by Planning Board _____ Date _____
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____
Denied _____ Fee Paid _____ Fee Waived_____
Withdrawn _____
NOTE: Reports on Minor Projects must be issues within 35 days of filing date.

ADDENDUM A
TO
APPLICATION FOR SITE PLAN REVIEW
OF
Hunnewell Needham, LLC
400 Hunnewell Street
Needham, Massachusetts

The following relief is or may be required, and is hereby requested:

1. Pursuant to the criteria of Section 7.4.2 of the By-Law, the proposed redevelopment of the Premises constitutes a "major project" and therefore requires Major Project Site Plan Review and the issuance of a special permit pursuant thereto.

2. In addition, the following relief is, or may be required:

a. Issuance of a Special Permit pursuant to Section 1.4.6 for the change and extension of a lawful, pre-existing, non-conforming use, and the alteration, enlargement and reconstruction of a lawful, pre-existing, non-conforming structure;

b. Issuance of a Special Permit pursuant to Section 3.2.2 for apartment or multi-family dwelling in the Hillside Avenue Business District;

c. Issuance of a Special Permit pursuant to Section 4.4.2 exempting the basement level underground parking from inclusion in the floor area calculation;

d. Issuance of a Special Permit pursuant to Section 5.1.1.5 waving strict adherence with the parking design requirements of Section 5.1.3 of the Zoning By-law;

e. Waiver of strict compliance with the following requirements of Section 7.4.4, to the extent necessary and applicable:

1. Requirement of subparagraph (b) concerning location of structures within 100 feet of property line;
2. Requirements of subparagraph (d) concerning building elevation as related to the existing portions of the building not effected by the proposed addition;
3. Requirements of subparagraph (l) concerning lighting;
4. Requirements of subparagraph (m) concerning loading and unloading facilities;
5. Requirements of subparagraph (n) concerning provisions for refuse removal; and
3. Requirements of subparagraph (o) concerning projected traffic volume.

f. Any and all additional relief required or appropriate for the redevelopment of the Premises for residential use and the construction of the proposed new multifamily building with underground parking.

3. The Applicant requests that any and all relief granted by the Board in connection with the within application shall run with the land and that the movement, change and alteration of interior layout, including, without limitation, walls and interior fixtures, not require any further review, provided the total useable square footage of the building and the total number of residential units remains fixed.

Hunnewell Needham, LLC
393 South Main Street
Cohasset, MA 02025

November 5, 2020

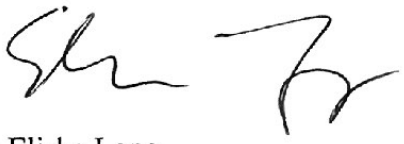
Lee Newman
Planning Director
Town of Needham
Planning Board
Town Hall
Needham, Massachusetts 02492

Re: Site Plan Application
Hunnewell Needham, LLC
400 Hunnewell Street, Needham, MA

Dear Mrs. Newman,

Please accept this letter as confirmation that George Giunta, Jr., Esquire, is authorized to make application for Site Plan Approval and any and all other zoning, planning, general by-law and other relief that may be required or appropriate in connection with the redevelopment of the property known and numbered 400 Hunnewell Street. In connection therewith, Attorney Giunta is hereby authorized, to execute, sign, deliver and receive all necessary documentation related thereto, including, without limitation, Application for Site Plan Review.

Hunnewell Needham, LLC



By Elisha Long
Manager, duly authorized

DUCKHAM
ARCHITECTURE & INTERIORS

400 HUNNEWELL

Needham, MA

PERMIT SET - Nov, 05 2020



PROJECT DIRECTORY

OWNER:	400 Hunnewell Street, llc 14A Brooks Street Wellesley, MA 02482
ARCHITECT:	Duckham Architecture & Interiors 53 Central Avenue Needham, MA 02494 T. (781) 449-4109 Contact: Kent Duckham
LANDSCAPE ARCHITECT:	Verdant Lanscape Architecture 318 Harvard St #25 Brookline, MA 02446 T. (6171) 735-1180 Contact:
CIVIL/SITE SURVEY:	Field Resources Land Surveyor 281 Chestnut St #1 Needham, MA 02492 T. (781) 444-5936 Contact:
STRUCTURAL ENGINEER:	Dov Kirstajn, P.E. Structural Consultant 103 Beaumont Ave Newton, Ma 02460 (617) 969-3539 dkirstajnx@gmail.com
MECHANICAL ELECATRICAL FIRE PROTECTION	LVR Corporation 88 Foundry Street Wakefield, MA 01880 P 781-245-9888 C 617-719-2119 Contact: Larry Roy
GENERAL CONTRACTOR:	

DRAWING INDEX

1/8	SITE PLAN COVER SHEET
2/8	EXISTING CONDITIONS PLAN
3/8	LAYOUT PLAN
4/8	GRADING & DRAINAGE PLAN
5/8	UTILITY PLAN
6/8	EROSION & SEDIMENTATION CONTROL PLAN
7/8	DETAIL PLAN 1/2
8/8	DETAIL PLAN 2/2
A.1.0	PROPOSED BASEMENT FLOOR PLAN
A.1.1	PROPOSED FIRST FLOOR PLAN
A.1.2	PROPOSED SECOND FLOOR PLAN
A.1.4	PROPOSED ROOF PLAN
A.2.1	EXTERIOR ELEVATIONS
A.2.2	EXTERIOR ELEVATIONS

400 HUNNEWELL STREET ZONING LEGEND:

DUCKHAM
ARCHITECTURE & INTERIORS

REV: 06-24-2016

ZONING DISTRICT: HILLSIDE AVENUE BUSINESS DISTRICTS

CATEGORY	REQUIRED	EXISTING	PROPOSED
USE	N/A	OFFICE BUILDING	RESIDENTIAL (8-UNITS)
MINIMUM LOT SIZE	10,000	20,123 SQ. FT.	20,123 SQ. FT.
MINIMUM LOT FRONTAGE	80'	104.31'	104.31'
MAX GROSS AREA	14,086	8,520	14,076
MAX FLOOR AREA RATIO	0.7	0.4	0.7
MINIMUM FRONT YARD SETBACK	20'	21'	21'
MINIMUM SIDE YARD SETBACK	N/A	8.3'	8.3'
MINIMUM REAR YARD SETBACK	N/A	99.5'	80'
MAX BUILDING HEIGHT	35'	8,534 +/-	29'
MAX BUILDING HEIGHT	2 ½ STORIES	2 STORIES	2 ½ STORIES
PARKING			
a. EXISTING OFFICE	a. 28.45 (1/300)	30 SPACES	
b. PROPOSED RESIDENTIAL	b. 12 (1.5 Units)		23 SPACES

GENERAL NOTES

1. ALL WORK PERFORMED, INCLUDING MATERIALS FURNISHED, WORKMANSHIP, AND MEANS AND METHODS OF CONSTRUCTION SHALL CONFORM TO THE APPLICABLE AND THE LATEST REQUIREMENTS OF THE MASSACHUSETTS STATE BUILDING CODE AND THE APPLICABLE CITY OR TOWNSHIP, ALL LOCAL AND STATE HANDICAP AND FEDERAL REQUIREMENTS, AND GENERAL CONDITIONS PER AIA DOCUMENT #A205 AND OWNER/CONTRACTOR AGREEMENT DOCUMENT #A105.
2. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FILE ALL REQUIRED CERTIFICATES OF INSURANCE WITH THE OWNER AND THE DEPARTMENT OF BUILDINGS, OBTAIN ALL REQUIRED PERMITS, AND PAY ALL FEES REQUIRED BY THE GOVERNING AGENCIES.
3. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THAT ALL EXISTING CONDITIONS AGREE WITH THE INFORMATION SHOWN ON THE DRAWINGS. ANY CONFLICTS, OMISSIONS OR DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT FOR RESOLUTION PRIOR TO COMMENCEMENT OF ANY WORK. NO ALLOWANCES WILL SUBSEQUENTLY BE MADE ON BEHALF OF THE ARCHITECT FOR ANY ADDITIONAL EXPENSES WHICH ARE INCURRED DUE TO NEGLECT OR WHICH COULD HAVE BEEN REASONABLY FORESEEN BY PRIOR INSPECTION OF EXISTING CONDITIONS.
4. PRIOR TO COMMENCING WORK, ORDERING OF MATERIALS AND SHOP FABRICATION OF ANY MATERIALS, THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AS INDICATED ON THE DRAWINGS AND SHALL REPORT ANY DISCREPANCIES TO THE ARCHITECT FOR RESOLUTION.
5. DRAWINGS INDICATE LOCATION, DIMENSIONS, REFERENCE AND TYPICAL DETAIL FOR CONSTRUCTION. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER CONSTRUCTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS IF THEY WERE INDICATED IN THE DRAWINGS, FOR CONDITIONS NOT ILLUSTRATED, NOTIFY ARCHITECTS FOR CLARIFICATION AND/OR SIMILAR DETAIL.
6. THE SCOPE OF WORK INCLUDES ALTERATION TO EXISTING FACILITIES. WORK WHICH IS OBVIOUSLY REQUIRED TO BE PERFORMED OR PROVIDE A COMPLETE AND FINISHED PRODUCT WITHIN THE SCOPE OF WORK, BUT WHICH IS NOT SPECIFICALLY INCLUDED ON THE CONTRACT DOCUMENTS, SHALL BE PERFORMED BY THE CONTRACTOR AND BE INCLUDED IN THE BID. CONTRACTOR TO INSPECT AT TIME OF DELIVERY ALL FIXTURES PROVIDED BY OWNER TO INSURE PROPER QUANTITY, THAT ITEMS ARE DEFECT FREE, AND MATCH INVOICE. CONTRACTOR TO BE RESPONSIBLE FOR INSTALLATION, WHICH MAY INCLUDE BLOCKING, SHIMMING, ETC. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE ALL ITEMS SUPPLIED BY OWNER'S VENDORS AND TO VERIFY THAT ALL MATERIALS RECEIVED ARE IN ACCORDANCE WITH THE SPECIFICATIONS, HEREIN. ANY DAMAGED ITEMS OR DISCREPANCIES BETWEEN MATERIALS SPECIFIED AND MATERIALS SHIPPED, SHALL BE REPORTED TO THE ARCHITECT PROMPTLY.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL INSTALLATIONS, CONDITIONS MATERIALS AND FINISHES WITH THE PROPOSED CONSTRUCTION AREA AND ALL ADJOINING PROPERTY AFFECTED BY CONTRACTOR'S OPERATIONS. THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND BRACING FOR STRUCTURAL OR REMOVAL TASKS. THE CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ANY DAMAGE OR INJURIES CAUSED BY OR DURING THE EXECUTION OF THE WORK. ANY EXISTING MATERIALS AND FINISHES WHICH ARE DAMAGED, SHALL BE REPLACED AS NECESSARY WITH NEW MATCHING MATERIALS AT THE CONTRACTOR'S OWN COST AND EXPENSE.
8. THE CONTRACTOR SHALL DO ALL CUTTING, CHASING, CORE DRILLING, PATCHING AND REPAIRING AS REQUIRED TO PERFORM ALL THE WORK THAT MAY BE INDICATED ON THE DRAWINGS, AND ALL OTHER WORK THAT MAY BE REQUIRED TO COMPLETE THE JOB. PATCHING SHALL MATCH ADJACENT SYSTEMS, MATERIALS AND FINISHES UNLESS OTHERWISE NOTED.
9. CONTRACTOR SHALL EMPLOY ADEQUATE NUMBER OF SKILLED WORKMEN WHO ARE THOROUGHLY TRAINED AND EXPERIENCED IN THE NECESSARY CRAFTS AND WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND THE METHODS NEEDED FOR PROPER PERFORMANCE OF THE WORK. ALL WORK SHALL BE PERFORMED BY DULY LICENSED PROFESSIONALS AND AS REQUIRED BY STATE AND LOCAL GOVERNMENTS FOR EACH APPLICABLE TRADE, (PLUMBING, ELECTRICAL, ETC.), WHO SHALL ARRANGE FOR AND OBTAIN REQUIRED INSPECTIONS AND SIGN-OFFS.
10. THESE DRAWINGS ARE DIVIDED INTO SECTIONS FOR CONVENIENCE ONLY. CONTRACTOR, SUBCONTRACTORS, VENDORS AND MATERIAL SUPPLIERS SHALL REFER TO ALL RELEVANT SECTIONS IN BIDDING AND PERFORMING THEIR WORK AND SHALL BE RESPONSIBLE FOR ALL ASPECTS OF THEIR WORK REGARDLESS OF WHERE THE INFORMATION OCCURS ON THE DRAWINGS.
11. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WORK OF ALL TRADES AND SHALL PROVIDE ALL DIMENSIONS REQUIRED FOR OTHER TRADES, SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COORDINATION OF THEIR WORK WITH THE WORK OF OTHERS, AND SHALL VERIFY THAT ANY WORK RELATING TO THEM WHICH MUST BE PROVIDED BY OTHERS, HAS BEEN COMPLETED AND IS ADEQUATE PRIOR TO COMMENCING WORK.
12. CONTRACTOR SHALL PROVIDE STRUCTURAL BACKING/BLOCKING FOR ALL WALL MOUNTED FIXTURES, FINISHES AND EQUIPMENT, AND FOR ALL HANGING FIXTURES, BLINDS, ETC.
13. CONTRACTOR SHALL INSTALL ALL MATERIALS AND EQUIPMENT AS PER MANUFACTURER'S WRITTEN INSTRUCTIONS AND/OR RECOMMENDATIONS.
14. CONTRACTOR SHALL AT ALL TIMES DURING THE COURSE OF THE CONTRACT KEEP ADJOINING PREMISES, INCLUDING STREETS AND OTHER AREAS ASSIGNED TO OR USED BY THE CONTRACTOR, FREE FROM ACCUMULATIONS OF WASTE MATERIALS AND RUBBISH CAUSED BY CONTRACTOR'S EMPLOYEES, SUBCONTRACTOR OR THEIR WORK.
15. CONTRACTOR SHALL ASSIST DELIVERY AND STORAGE OF OWNER SUPPLIED ITEMS, AND DISPOSE OF ANY RESULTING TRASH.
16. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL TRADES PRIOR TO INSTALLATION, AND SAMPLES OF ALL MATERIAL AND COLOR/FINISHES FOR ARCHITECT'S APPROVAL ON ANY DEVIATION/SUBSTITUTION FROM CONTRACT DOCUMENTS.
17. CONTRACTOR TO VERIFY ALL FIXTURE COUNTS, AS APPLICABLE TO THEIR CONTRACT, WITH OWNER.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR CLOSEOUT, PRIOR TO FINAL PAYMENT, INCORPORATING ALL STANDARD GUARANTIES AND WARRANTIES AND ORIGINALS OF ALL APPLICABLE CERTIFICATES OF TESTING, INSPECTION, TEMPORARY FINAL CERTIFICATE OF OCCUPANCY, COORDINATE WITH OWNER.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR A THOROUGH, PROFESSIONAL CLEANING OF THE ENTIRE FACILITY PRIOR TO OWNER TAKEOVER DATE. ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES INCLUDING, BUT NOT LIMITED TO THE FOLLOWING MUST BE WIPED CLEAN AND FREE OF DUST; WALLS, EXPOSED STRUCTURAL MEMBERS, STAIRS AND RAILINGS, CABINETRY. ALL FLOORS MUST BE MOPPED CLEAN.
20. CONTRACTOR TO PROVIDE 3 COPIES OF AS BUILT INFORMATION, OPERATION AND MAINTENANCE MANUALS, INCLUDING ALL PRODUCT GUARANTIES AND WARRANTIES.
21. CONTRACTOR TO KEEP A SET OF THE MOST CURRENT DRAWINGS ON SITE AT ALL TIMES.

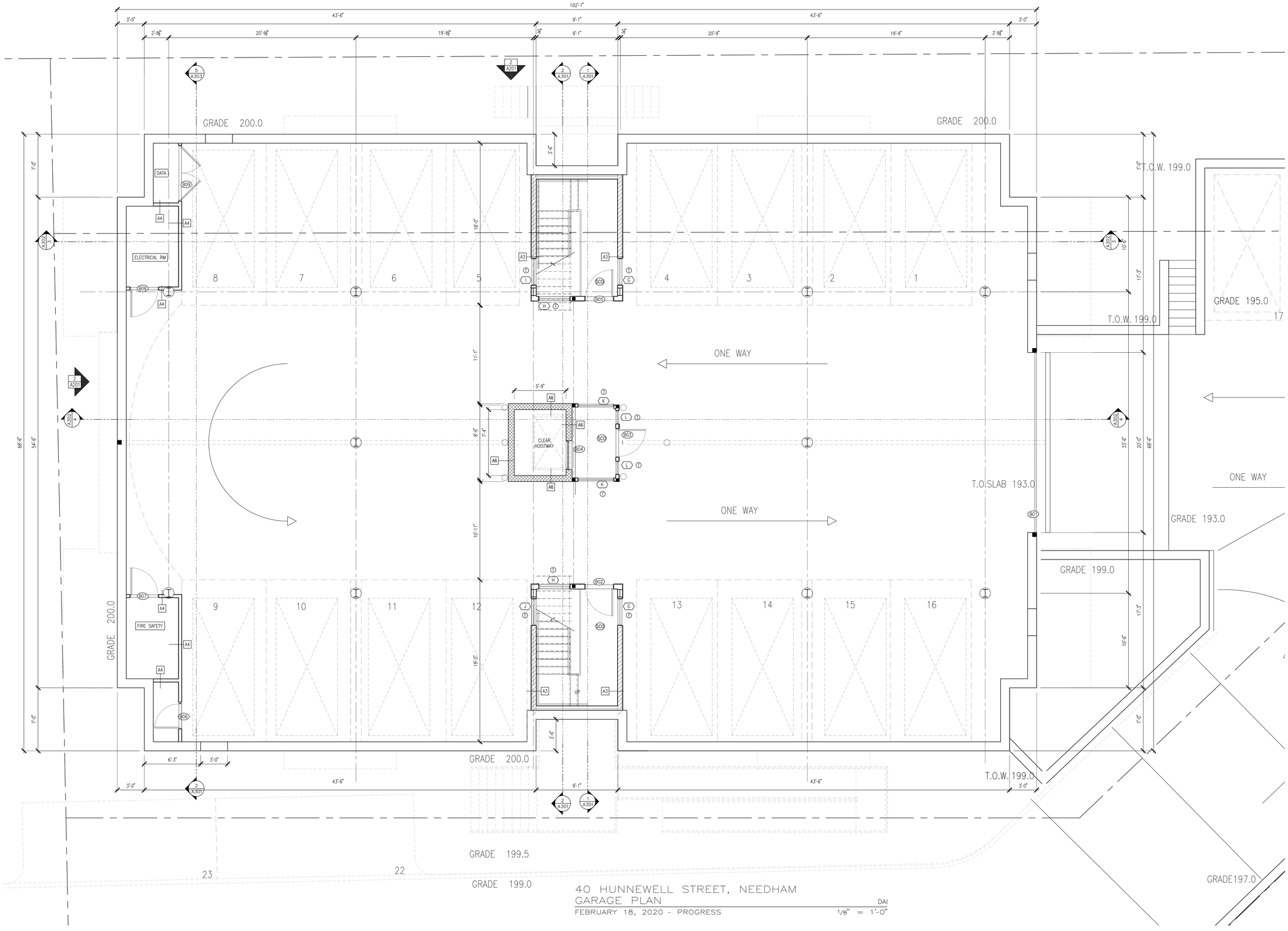
201919

400 HUNNEWELL ST

DUCKHAM

09.10.2020

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40 HUNNEWELL STREET, NEEDHAM
GARAGE PLAN
FEBRUARY 18, 2020 - PROGRESS
DAI
1/8" = 1'-0"

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KENT L. DUCKHAM REGISTERED ARCHITECT No. 9858 COMMONWEALTH OF MASSACHUSETTS

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400 Hunnewell Street
Needham, MA

LOWER LEVEL
GARAGE PLAN

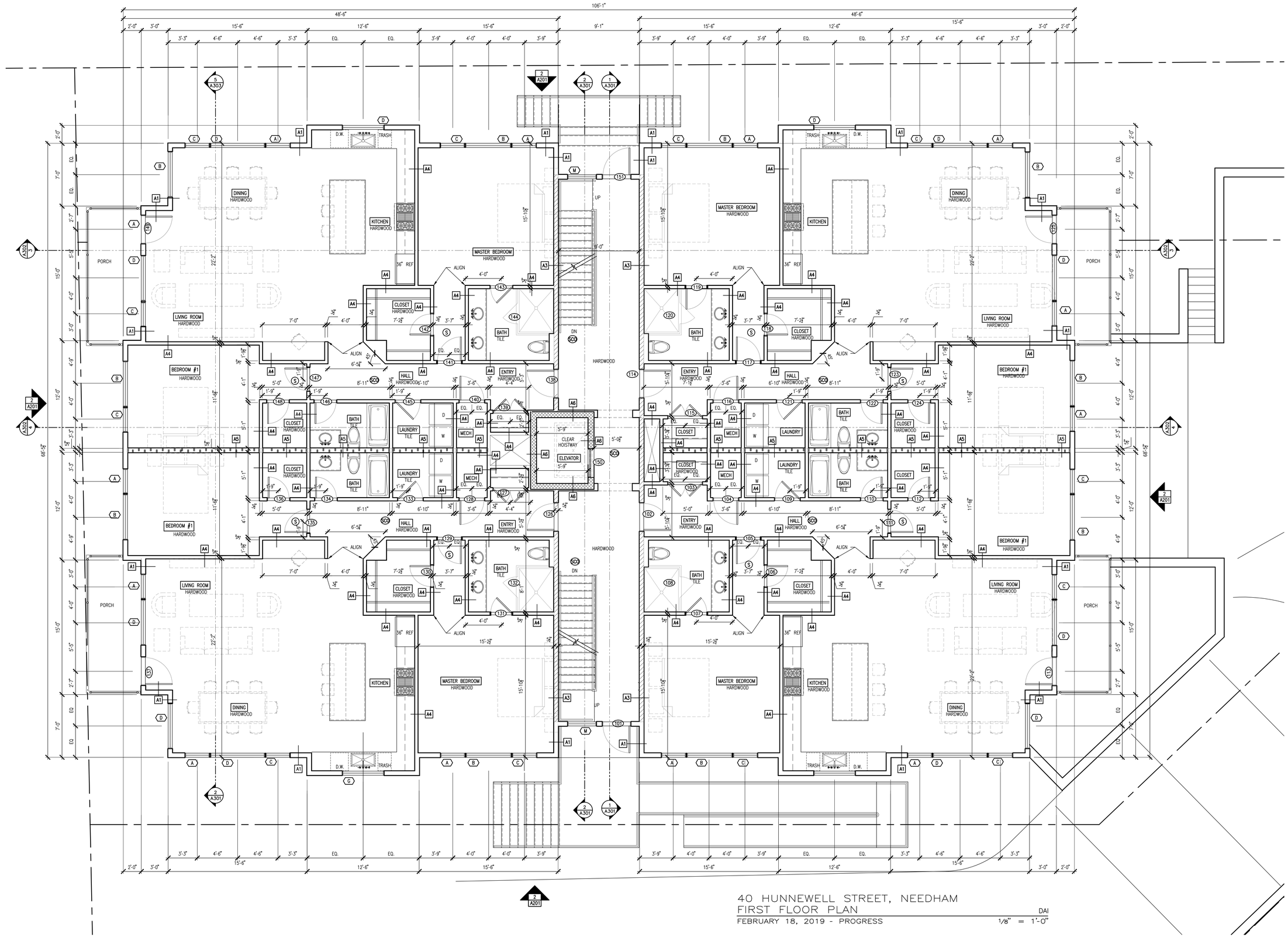
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A.B.1

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Number Date Description

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400 Hunnewell Street
Needham, MA

1st FLOOR PLAN

Drawing Scale:
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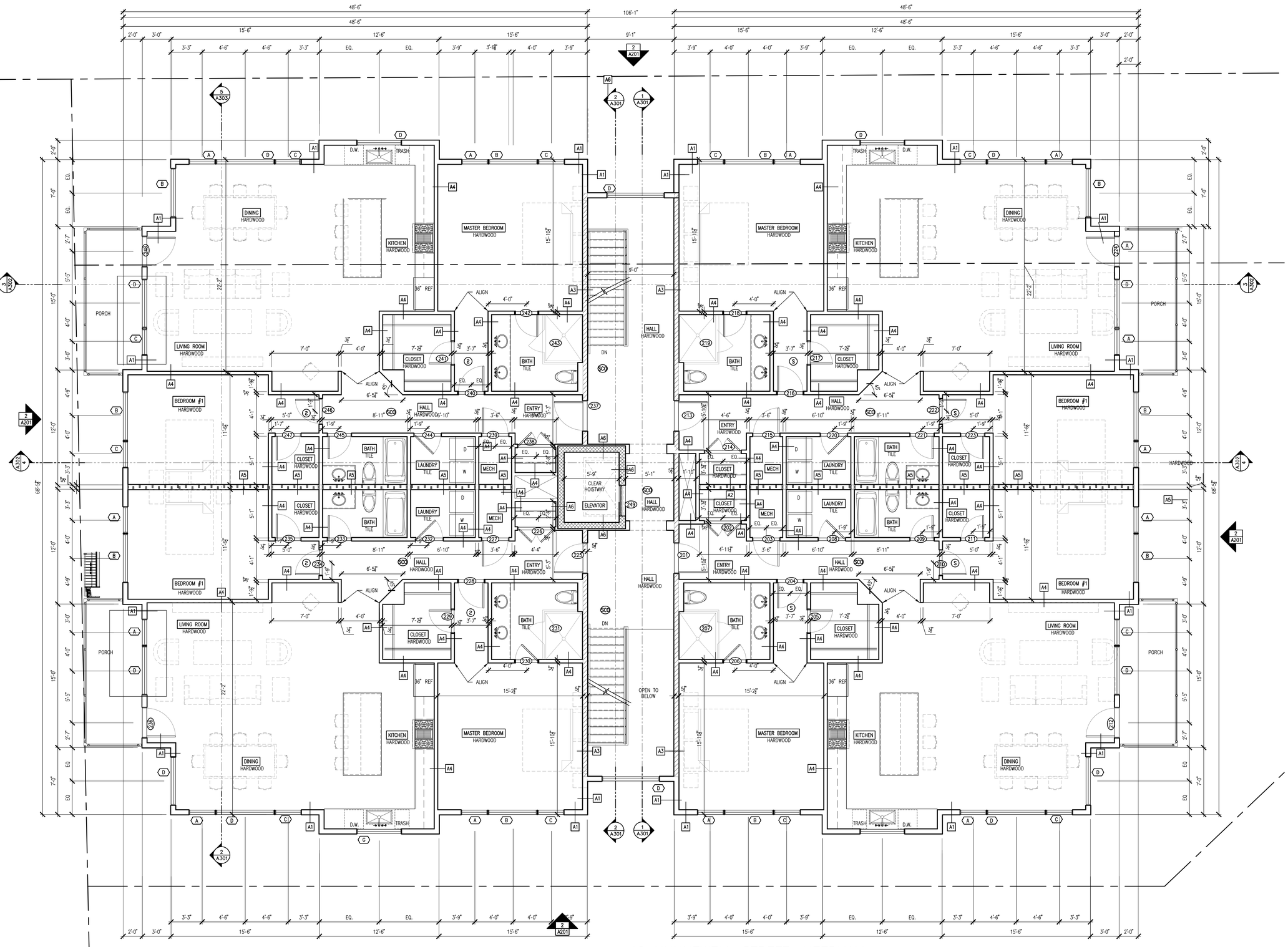
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201919.00

Date Issued:
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40 HUNNEWELL STREET, NEEDHAM
SECOND FLOOR PLAN
FEBRUARY 18, 2020 - PROGRESS
1/8" = 1'-0"

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Needham, MA 02494

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Number	Date	Description

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400 Hunnewell Street Needham, MA

2nd FLOOR PLAN

Drawing Scale: 1/4"=1'-0"

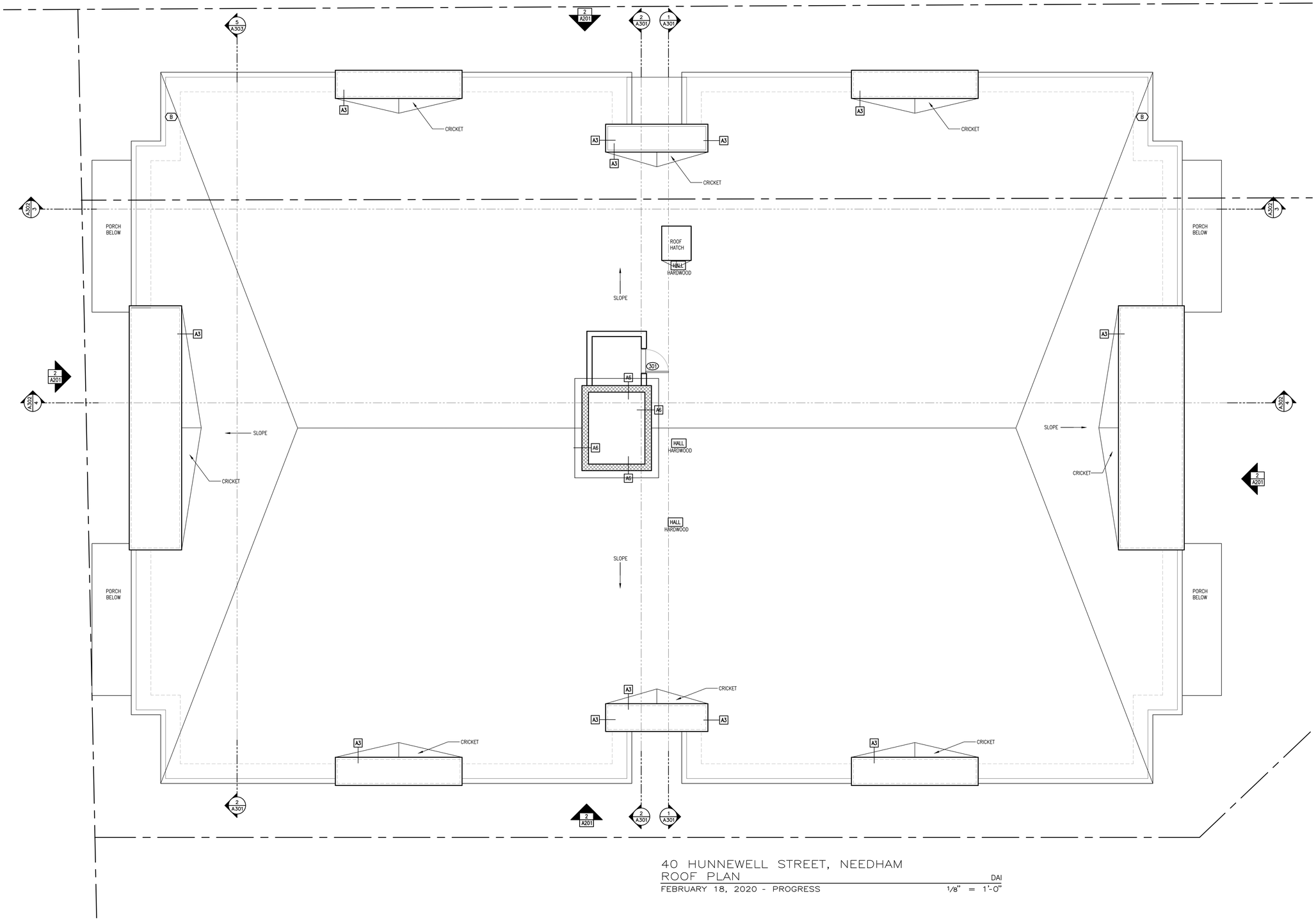
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40 HUNNEWELL STREET, NEEDHAM
ROOF PLAN DAI
FEBRUARY 18, 2020 - PROGRESS 1/8" = 1'-0"

DUCKHAM
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53 Central Avenue
Needham, MA 02494

Telephone: 781-449-4109

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Architecture & Interior Design

PERMIT SET
DRAWING NOT FOR CONSTRUCTION
SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street
Needham, MA

ROOF PLAN

Drawing Scale:
1/4"=1'-0"

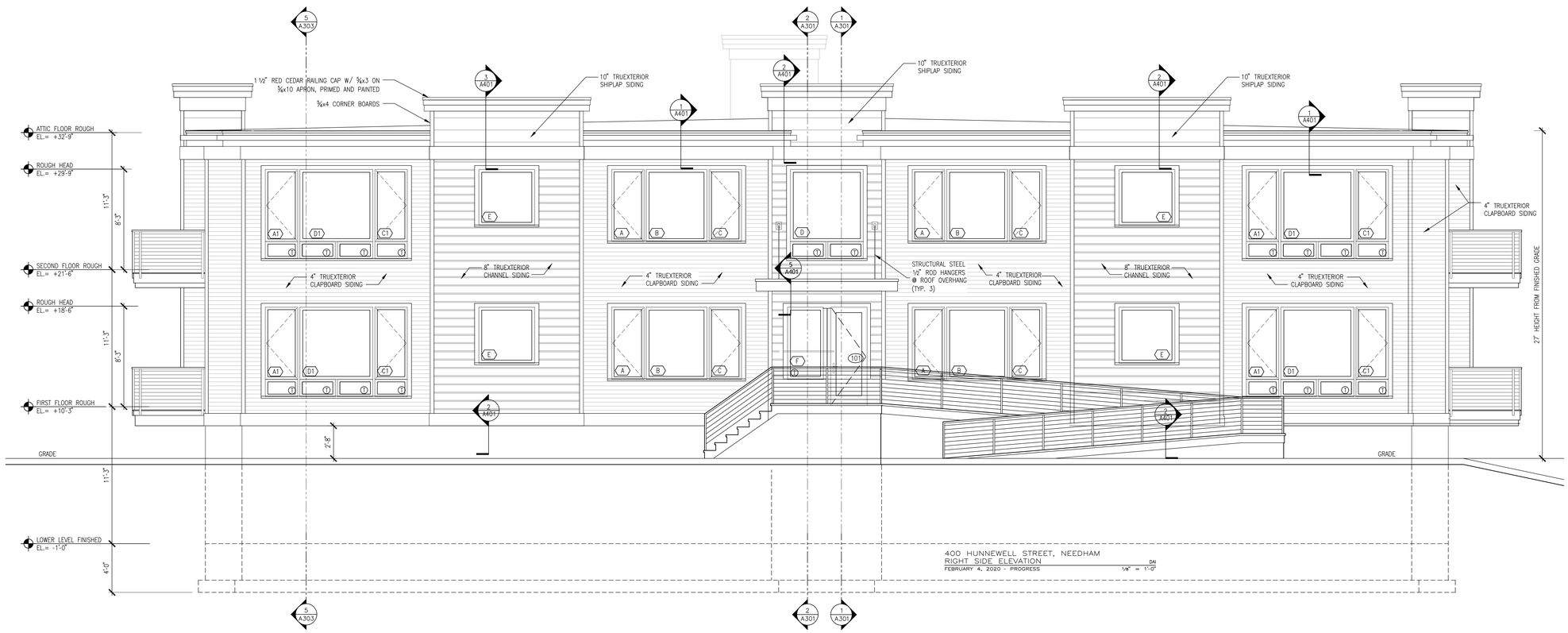
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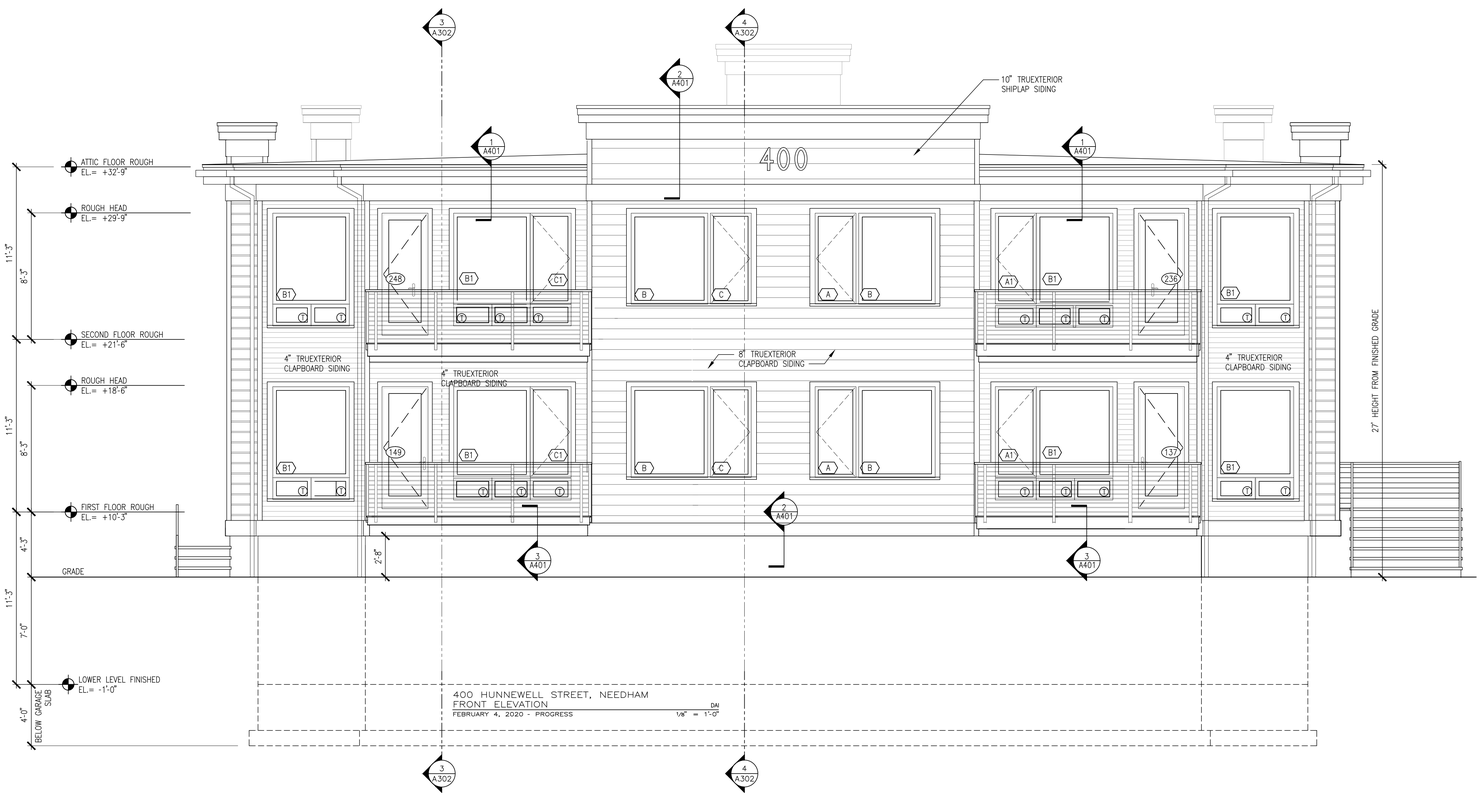
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SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

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400 Hunnewell Street
Needham, MA

PROPOSED SOUTH ELEVATION

Drawing Scale:

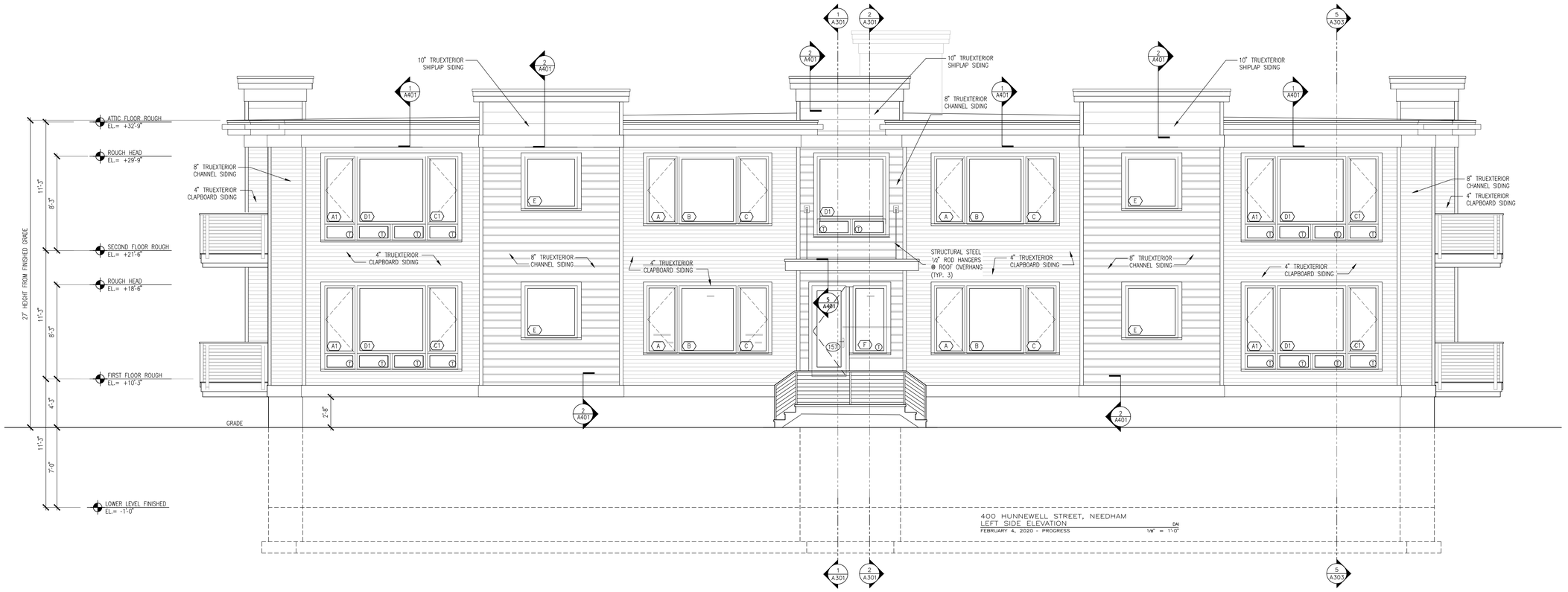
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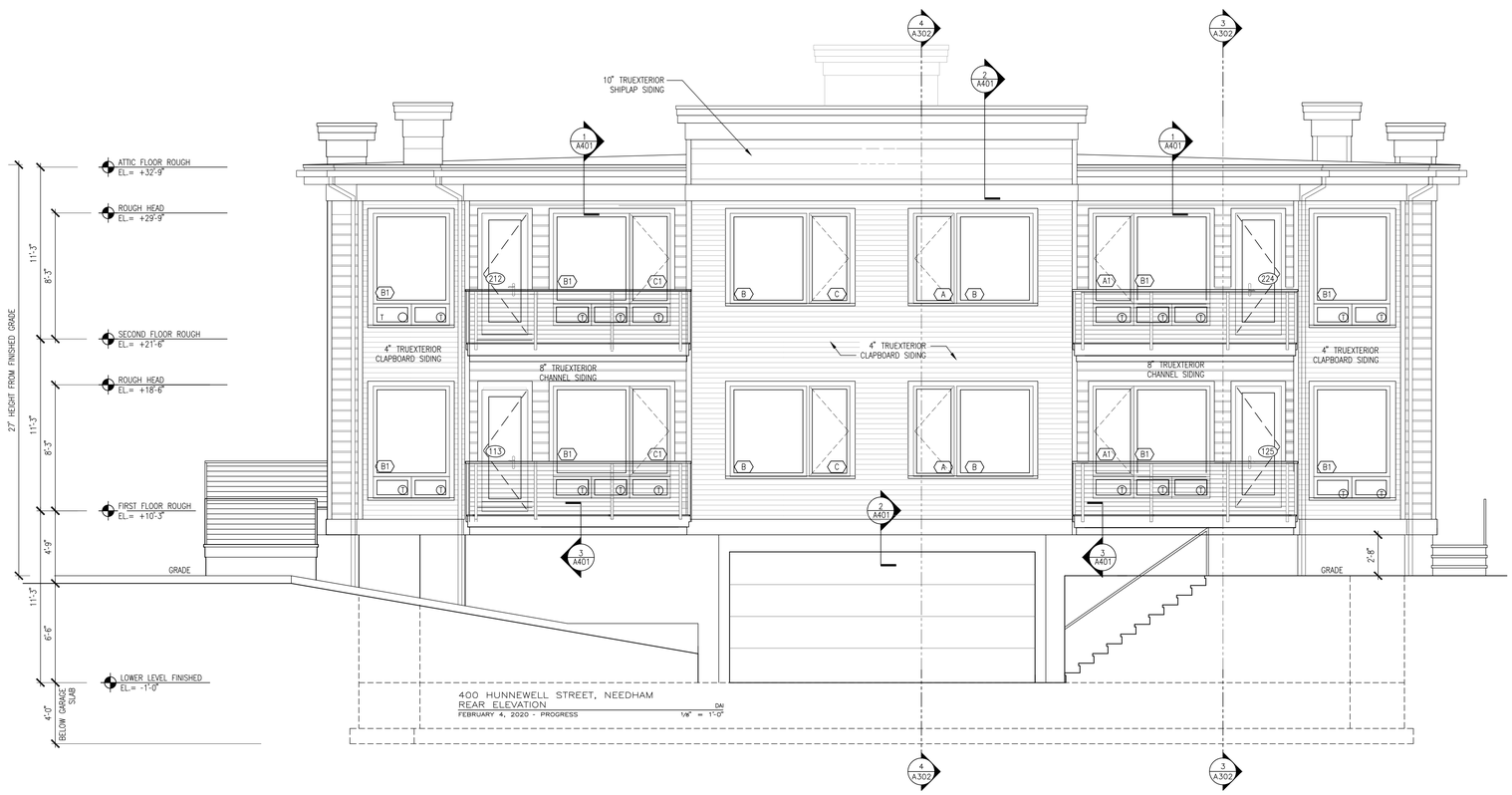
Date Issued:
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A201

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53 Central Avenue
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Telephone: 781-449-4109

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Architecture & Interior Design

PERMIT SET
DRAWING NOT FOR CONSTRUCTION
SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street
Needham, MA

PROPOSED SOUTH ELEVATION

Drawing Scale:

Project Number:
201919.00

Date Issued:
11.05.2020

A202

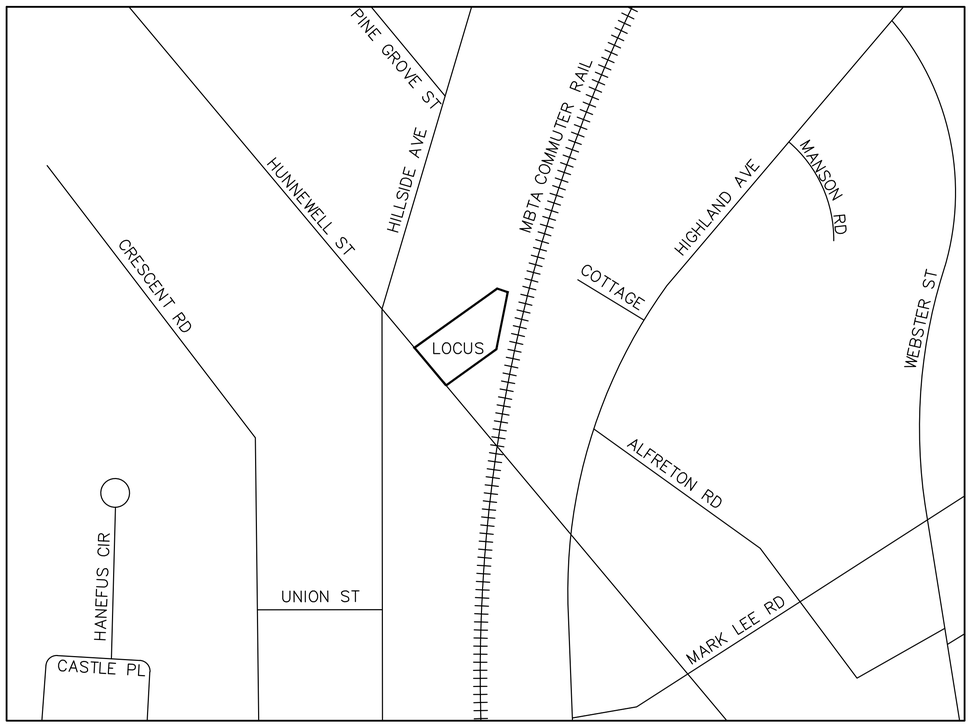
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SITE PLAN

FOR

400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494



LOCUS:
SCALE: 1'=200'

INDEX

DESCRIPTION	SHEET NUMBER
COVER	1 OF 8
EXISTING CONDITIONS PLANS	2 OF 8
LAYOUT PLAN	3 OF 8
GRADING AND DRAINAGE PLAN	4 OF 8
UTILITY PLAN	5 OF 8
EROSION & SEDIMENTATION CONTROL PLAN	6 OF 8
DETAIL PLAN	7 OF 8
DETAIL PLAN	8 OF 8

RECORD APPLICANT:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MA 02482

RECORD OWNER:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MA 02482

LAND PLANNERS–CIVIL ENGINEERS:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MA 01752
(508) 845–2500

LAND SURVEYORS:
FIELD RESOURCES INC.
281 CHESTNUT STREET
NEEDHAM, MA 02492

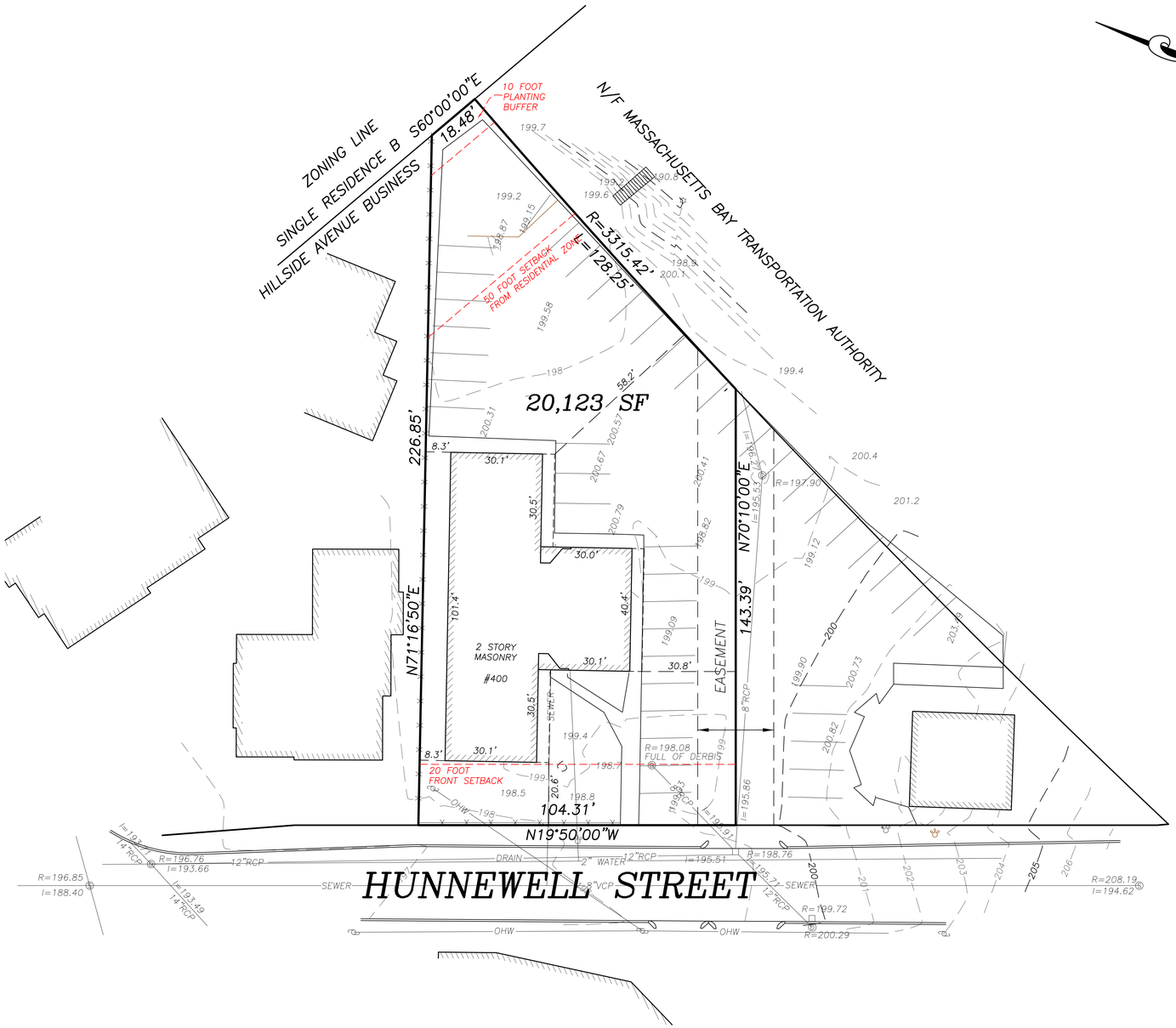
ZONING DISTRICT: HILLSIDE AVENUE BUSINESS (HAB)

JOHN M. GRENIER
CIVIL
No. 47812
REGISTERED PROFESSIONAL ENGINEER

11/2/20

REV. NO.	DATE	REVISION

SCALE: AS SHOWN	DATE: NOVEMBER 2, 2020
COVER SHEET	
SHEET NO.: SHEET 1 OF 8	PROJECT NO.: G–597

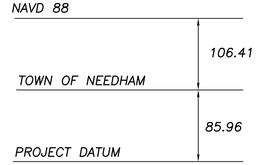


1) ELEVATIONS REFER TO PROJECT DATUM

2) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

3) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND THE LATEST PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUB-SURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL-FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 (1-888-DIG-SAFE) SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

DATUM PLANE RELATIONSHIP



ZONING INFORMATION: HILLSIDE AVENUE BUSINESS

	REQUIRED	EXISTING
MINIMUM LOT AREA	10,000 SF.	20,123 SF.
MINIMUM LOT FRONTAGE	80 FEET.	104.31 FEET
MINIMUM FRONT SETBACK	20 FEET.	20.6 FEET
MINIMUM SIDE SETBACK	0.0'.	8.3' FEET
MINIMUM DRIVEWAY OPENNING	18 FEET*.	24 FEET
MAXIMUM DRIVEWAY OPENNING	25 FEET.	24 FEET
MAXIMUM FLOOR AREA RATIO	0.7	
MAXIMUM UNITS	8.	N/A
MAXIMUM BUILDING HEIGHT	35 FEET	21± FEET
MAXIMUM BUILDING HEIGHT	2 1/2 STORIES	2 STORIES

PROPERTY REFERENCE

BOOK 38324 PAGE 432
PLAN 164 OF 1975

ZONING REFERENCE

ASSESSORS MAP 99, PARCEL 3
ZONING DISTRICT: HAB

I CERTIFY THAT THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X", AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE TOWN OF NEEDHAM, MASSACHUSETTS, COMMUNITY PANEL NO. 255215 0036 E, MAP NUMBER 25021C 0036 E EFFECTIVE DATE: JULY 17, 2012.



BRADLEY J. SIMONELLI ~ P.L.S.

DATE: NOVEMBER 5, 2020

SHEET 2 OF 8
EXISTING CONDITIONS
PLAN OF LAND
400 HUNNEWELL STREET
NEEDHAM, MASS.

Field Resources, Inc.
LAND SURVEYORS

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AUBURN, MA
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781 444 5936

fieldresources@hotmail.com

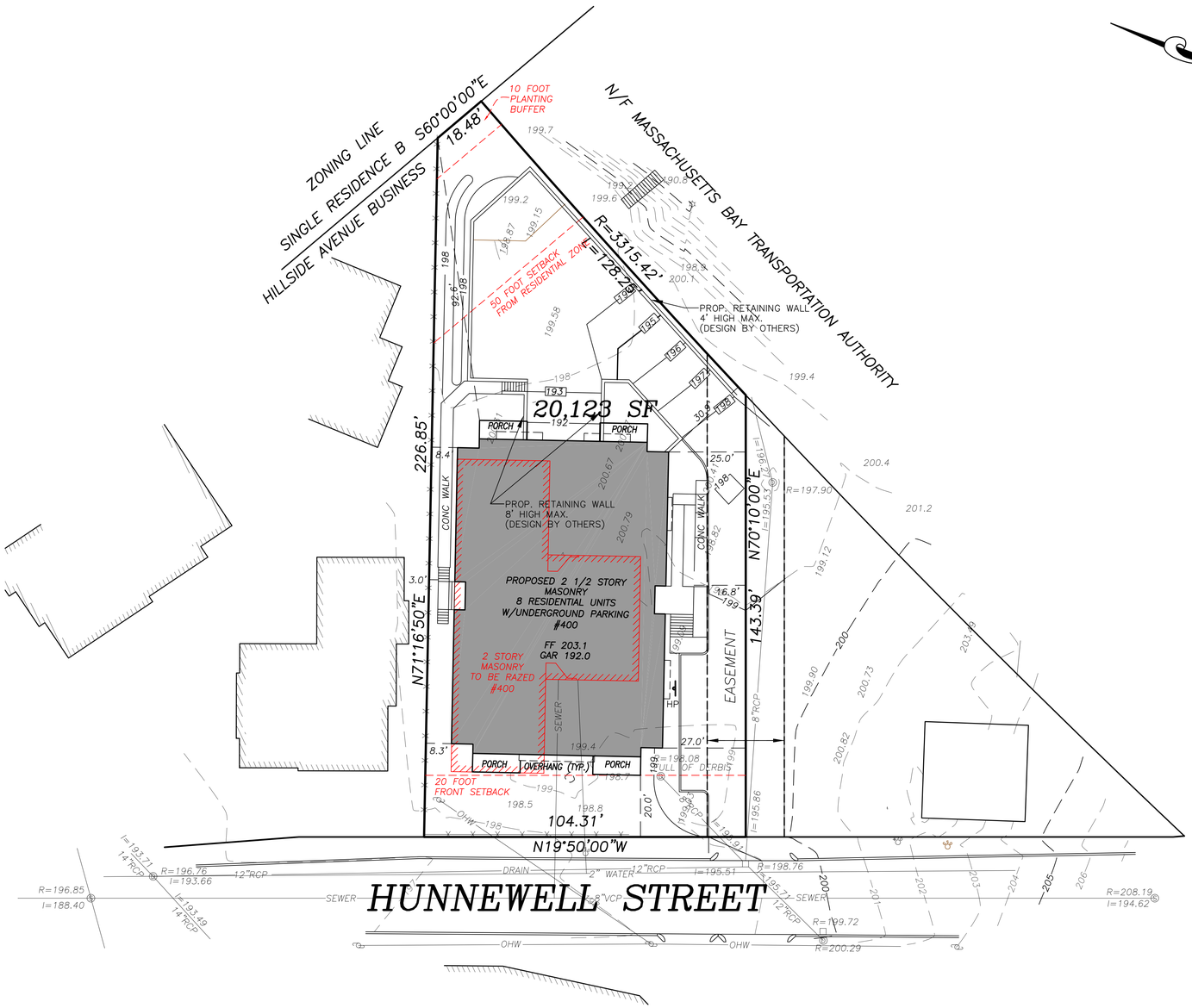
MARCH 5, 2020 SCALE 1"=20'

JOB NO. 122-19

REVISED: NOVEMBER 5, 2020
REVISED: APRIL 6, 2020

122-19

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1) ELEVATIONS REFER TO PROJECT DATUM

2) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

3) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND THE LATEST PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUB-SURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL-FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 (1-888-DIG-SAFE) SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

4) SITE PLAN INFORMATION PROVIDED BY J.M. GRENIER ASSOCIATES INC.

DATUM PLANE RELATIONSHIP

NAVD 88	
	106.41
TOWN OF NEEDHAM	
	85.96
PROJECT DATUM	

ZONING INFORMATION: HILLSIDE AVENUE BUSINESS

	REQUIRED	PROPOSED
MINIMUM LOT AREA	10,000 SF	20,123 SF.
MINIMUM LOT FRONTAGE	80 FEET	104.31 FEET
MINIMUM FRONT SETBACK	20 FEET	20.0 FEET
MINIMUM SIDE SETBACK	0.0'	3.0' FEET(STOOP)
		8.3' FEET(FACE)
MINIMUM DRIVEWAY OPENNING	18 FEET*	24 FEET
MAXIMUM DRIVEWAY OPENNING	25 FEET	24 FEET
MAXIMUM FLOOR AREA RATIO	0.7	
MAXIMUM UNITS	8	8 UNITS
MAXIMUM BUILDING HEIGHT	35 FEET	29± FEET
MAXIMUM BUILDING HEIGHT	2 1/2 STORIES	2 1/2 STORIES

PROPERTY REFERENCE

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ZONING REFERENCE

ASSESSORS MAP 99, PARCEL 3
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I CERTIFY THAT THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X", AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE TOWN OF NEEDHAM, MASSACHUSETTS, COMMUNITY PANEL NO. 255215 0036 E, MAP NUMBER 25021C 0036 E EFFECTIVE DATE: JULY 17, 2012.

COMMONWEALTH OF MASSACHUSETTS BRADLEY SIMONELLI 43091 REGISTERED LAND SURVEYOR

BRADLEY J. SIMONELLI ~ P.L.S.

DATE: NOVEMBER 5, 2020

SHEET 3 OF 8
LAYOUT PLAN
SHOWING PROPOSED STRUCTURE
400 HUNNEWELL STREET
NEEDHAM, MASS.

Field Resources, Inc.
LAND SURVEYORS

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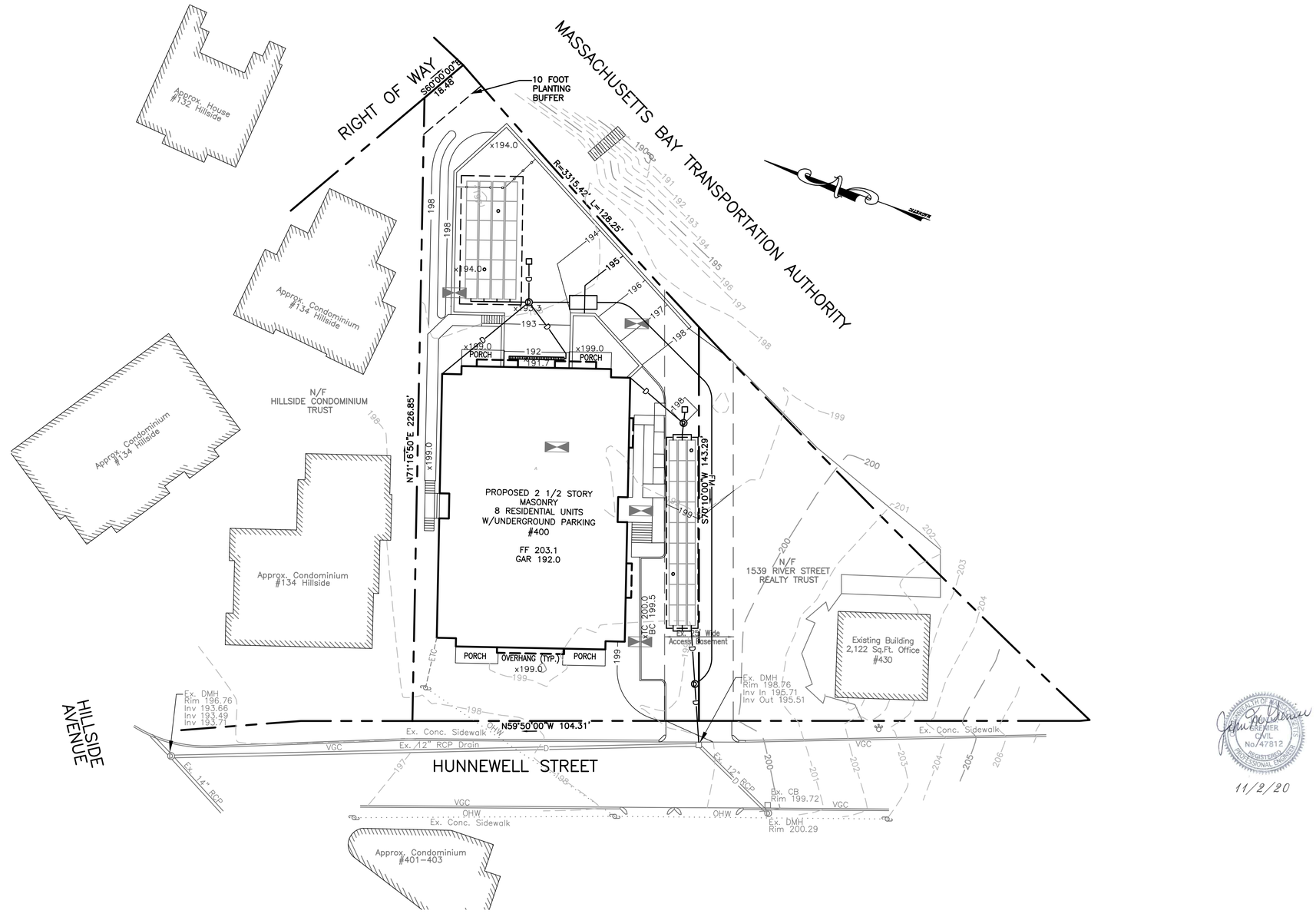
MARCH 5, 2020 SCALE 1"=20'

JOB NO. 122-19

REVISED: NOVEMBER 5, 2020
REVISED: APRIL 6, 2020

122-19

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LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CONTOUR – HIGH
- EXISTING CONTOUR – LOW
- PROPOSED CONTOUR – HIGH
- PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- EXISTING DRAIN LINE
- PROPOSED DRAIN LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

COMMONWEALTH OF MASSACHUSETTS
JOHN M. GRENIER
CIVIL
No. 47812
REGISTERED PROFESSIONAL ENGINEER

11/2/20

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

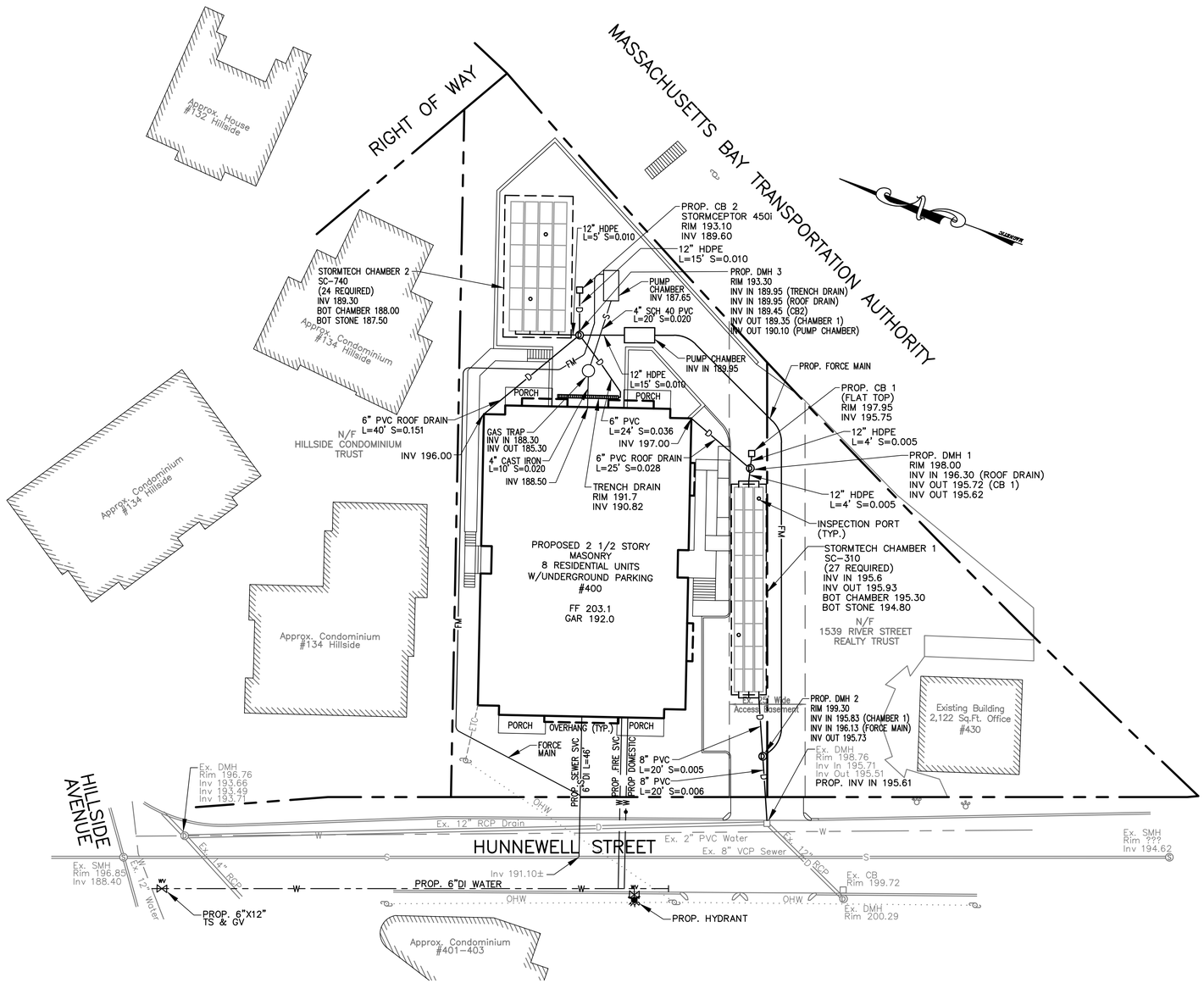
PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
1" = 20'	NOVEMBER 2, 2020

GRADING AND DRAINAGE PLAN

SHEET NO.:	PROJECT NO.:
SHEET 4 OF 8	G-597



11/2/20

LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CONTOUR – HIGH
- EXISTING CONTOUR – LOW
- PROPOSED CONTOUR – HIGH
- PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- EXISTING DRAIN LINE
- PROPOSED DRAIN LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

NOTES:

1. ALL TRENCHES WITHIN HUNNEWELL STREET AND HILLSIDE AVENUE SHALL BE BACKFILLED AS REQUIRED BY THE TOWN OF NEEDHAM.
2. EXISTING CATCH BASIN SHALL BE PROTECTED WITH INLET PROTECTION AT ALL TIMES UNTIL THE SITE IS FULLY STABILIZED.
3. SEWER SHALL BE INSTALLED WITH A MINIMUM HORIZONTAL SEPARATION OF 10 FEET FROM ALL WATER SUPPLY LINES. WHEN A 10 FOOT SEPARATION CANNOT BE MAINTAINED THE WATER MAIN SHALL BE INSTALLED IN A SEPARATE TRENCH ABOVE THE SEWER WITH AN 18 INCH VERTICAL SEPARATION BETWEEN THE CROWN OF THE SEWER AND THE INVERT OF THE WATER MAIN. ADEQUATE VERTICAL SEPARATION OF WATER/SEWER CROSSING SHALL BE CONFIRMED.
4. SIZE OF FIRE SERVICE LINE AND DOMESTIC WATER LINE TO BE DETERMINED.
5. CONTRACTOR SHALL CONTACT DIG SAFE AT 1-888-344-7233 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION.
6. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS AND CONDITIONS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
7. SHOULD FIELD CONDITIONS VARY FROM THOSE SHOWN, ENGINEER SHALL BE CONTACTED PRIOR TO COMMENCEMENT OF SITE CONSTRUCTION.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

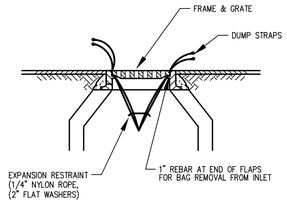
PREPARED FOR:
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14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
1" = 20'	NOVEMBER 2, 2020

UTILITY PLAN

SHEET NO.:	PROJECT NO.:
SHEET 5 OF 8	G-597

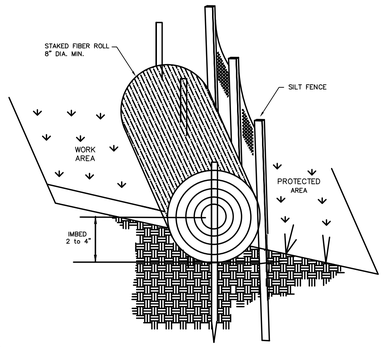


NOTE

BAGS SHOULD BE CLEANED OUT AFER EVERY RAIN EVENT AND/OR AS NEEDED.

SILT SACK DETAIL

NOT TO SCALE

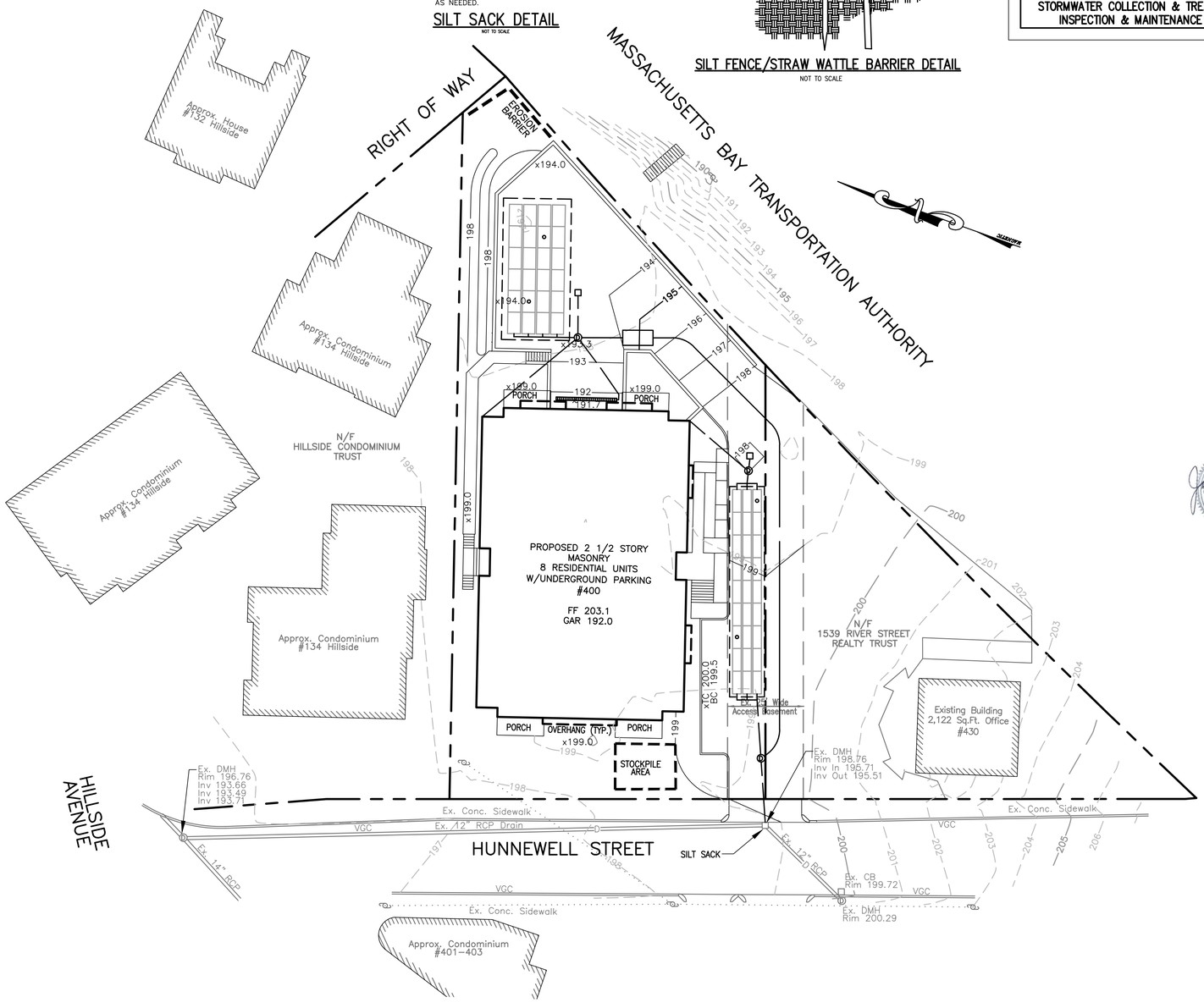


SILT FENCE/STRAW WATTLE BARRIER DETAIL

NOT TO SCALE

1. Seeding and repairs shall be performed as required. Sediment and debris shall be removed at least once a year, typically in early spring prior to the commencement of the growing season.
2. The catch basins throughout the entire site shall be inspected annually. Unit shall be cleaned when accumulated sediments reach a depth of 6 inches. Accumulated sediment must be disposed of in accordance with applicable local state, and federal guidelines and regulations. The contractor will be responsible for the maintenance of the unit until such time as the site work is complete. The maintenance will then be the responsibility of the owner(s).
3. The Stormceptor unit shall be inspected and cleaned as recommended by the manufacturer.
4. The subsurface chambers shall be inspected after every major storm for the first 3 months to ensure proper stabilization and function. The chambers shall be inspected once per year after that. Water levels should be inspected and recorded for several days after a major storm event to track infiltration capability.
5. The contractor will be responsible for the maintenance of all drainage structures and until such time as the site work is complete. The maintenance will then be the responsibility of the property owners.

STORMWATER COLLECTION & TREATMENT SYSTEM INSPECTION & MAINTENANCE GUIDELINES



GENERAL:

1. THIS PLAN IS INTENDED TO PROVIDE GUIDANCE AND INSTRUCTION TO THE TOWN OF NEEDHAM AND THE CONTRACTOR(S) IN THE PREVENTION OF EROSION AND SEDIMENTATION OFF SITE. THIS PLAN IS INTENDED TO ALLOW ANY CONDITIONS OF APPROVAL TO BE MORE SPECIFIC IN ADDRESSING ITEMS OF CONCERN. IF CONDITIONS BY THE TOWN OF NEEDHAM ARE IN CONFLICT WITH REQUIREMENTS AS SPECIFIED ON THE PLANS CONDITIONS AS SPECIFIED BY THE TOWN OF NEEDHAM SHALL SUPERSEDE THE REQUIREMENTS SPECIFIED ON THESE PLANS.

PRE-CONSTRUCTION:

1. AN EROSION CONTROL BARRIER (SEE BELOW) SHALL BE INSTALLED AS DEPICTED ON THE PLANS, BETWEEN THE AREAS TO BE DISTURBED AND RECEIVING DRAINAGE WAY AND STRUCTURES. THIS BARRIER SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY SURFACES HAVE BEEN FULLY STABILIZED. THE EROSION CONTROL BARRIERS AS SHOWN ON THE PLANS ARE THE MINIMUM PROTECTIVE MEASURES REQUIRED TO PROTECT THE ON AND OFF SITE DRAINAGE SYSTEMS.
2. THE CONTRACTOR SHALL ESTABLISH A STAGING AREA AS SHOWN ON THE PLAN FOR THE OVERNIGHT STORAGE OF EQUIPMENT AND STOCKPILING OF MATERIALS.
3. IN THE STAGING AREA, THE CONTRACTOR SHALL HAVE A STOCKPILE OF MATERIALS REQUIRED TO CONTROL EROSION ON-SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO: HAY BALES, SILT FENCE AND CRUSHED STONE.
4. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON & OFF SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED HEREIN, ON THE PLAN OR IN ANY ORDER OF CONDITIONS.

PRELIMINARY SITE WORK:

1. MATERIAL REMOVED SHOULD BE STOCKPILED, SEPARATING THE TOPSOIL FOR FUTURE USE ON THE SITE OR IN A SECURED OFF SITE AREA APPROVED BY THE OWNER. EROSION CONTROLS SHALL BE UTILIZED ALONG THE DOWN SLOPE OF THE PILES IF THE PILES ARE TO REMAIN FOR MORE THAN THREE WEEKS.
2. IF INTENSE RAINFALL IS ANTICIPATED, THE INSTALLATION OF SUPPLEMENTAL HAY BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE UTILIZED.
3. IF THE SITE CONSTRUCTION OCCURS AT ANY TIME OTHER THAN THE APRIL – DECEMBER CONSTRUCTION SEASON, ALL DRAINAGE SYSTEMS TEMPORARY OR PERMANENT SHALL MAINTAIN TO ENSURE ADEQUATE HYDRAULIC CAPACITY, AND DRAINING CHARACTERISTICS.

EROSION CONTROL MEASURES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT EROSION AND SEDIMENTATION ARE CONTROLLED. THIS PLAN SHALL BE SHALL BE ADAPTED TO FIT THE CONTRACTOR'S EQUIPMENT, WEATHER CONDITIONS, AND ANY CONDITIONS ISSUED BY THE TOWN OF NEEDHAM.
2. THE MOST IMPORTANT ASPECTS OF CONTROLLING EROSION AND SEDIMENTATION ARE LIMITING THE EXTENT OF DISTURBANCE AND STABILIZING SURFACES AS SOON AS POSSIBLE. OF SECONDARY IMPORTANCE IN EROSION CONTROL IS THE LIMITING THE SIZE AND LENGTH OF THE TRIBUTARY DRAINAGE AREA WITHIN THE WORK SITE AND DRAINAGE STRUCTURES. THESE FUNDAMENTAL PRINCIPLES SHALL BE THE KEY FACTOR IN THE CONTRACTOR'S CONTROL OF EROSION ON THE SITE.
3. THE EXISTING SOIL CONDITIONS PROVIDE THE POTENTIAL OF RUNOFF TO OFF-SITE AREAS WITH EROSION POTENTIAL.
4. ALL DISTURBED SURFACES SHALL BE STABILIZED A MINIMUM OF 14 DAYS AFTER CONSTRUCTION IN ANY PORTION OF THE SITE HAS CEASED OR IS TEMPORARILY HALTED UNLESS ADDITIONAL CONSTRUCTION IS INTENDED TO BE INITIATED WITHIN 21 DAYS.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE AND REPAIR OF ALL EROSION CONTROL DEVICES WITHIN THE LIMIT OF WORK. ALL EROSION CONTROL DEVICES SHALL BE REGULARLY INSPECTED. ANY SEDIMENTS REMOVED FROM THE CONTROL DEVICES SHALL BE DISPOSED OF.
6. AT NO TIME SHALL SILT-LADEN WATER BE ALLOWED TO ENTER SENSITIVE AREAS (WETLANDS, OFF-SITE AREAS AND DRAINAGE SYSTEMS). ANY RUNOFF FROM DISTURBED SURFACES SHALL BE DIRECTED THROUGH SETTLING BASINS AND EROSION CONTROL BARRIERS PRIOR TO ENTERING ANY SENSITIVE AREAS.

GENERAL CONSTRUCTION REQUIREMENTS:

1. ANY REFUELING OF CONSTRUCTION VEHICLES AND EQUIPMENT SHALL NOT TAKE PLACE INSIDE OF A 100 FOOT BUFFER ZONE, NEAR THE ENTRANCE TO ANY DRAINAGE SYSTEM AND SHALL NOT BE CONDUCTED IN PROXIMITY TO SEDIMENTATION BASINS.
2. NO ON-SITE DISPOSAL OF STUMPS, SOLID WASTE, INCLUDING CONSTRUCTION MATERIALS IS ALLOWED.
3. NO MATERIALS SHALL BE DISPOSED OF INTO THE WETLANDS, OR EXISTING/PROPOSED DRAINAGE SYSTEMS. ALL CONTRACTORS INCLUDING: CONCRETE SUPPLIERS, PAINTERS AND PLASTERERS, SHALL BE INFORMED THAT THE CLEANING OF EQUIPMENT IS PROHIBITED IN AREAS WHERE THE WASH-WATER WILL DRAIN DIRECTLY TO THE SITE DRAINAGE SYSTEMS.
4. THE CONTRACTOR SHALL UNDERTAKE ALL WORK TO LIMIT AIRBORNE SEDIMENTS, ONLY CLEAN, POTABLE WATER MAY BE USED TO CONTROL DUST.

LANDSCAPING:

1. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS. EROSION CONTROL BLANKETS OR MIRAFI MIRAMAT (OR SIMILAR PRODUCTS) SHALL BE AVAILABLE ON SITE.
3. IF THE SEASON OR ADVERSE WEATHER CONDITIONS DO NOT ALLOW THE ESTABLISHMENT OF VEGETATION, TEMPORARY MULCHING WITH HAY, TACKIFIED WOOD CHIPS OR OTHER METHODS SHALL BE PROVIDED.
4. ALL DISTURBED SURFACES TO BE PLANTED SHALL RECEIVE A MINIMUM OF 6" TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
5. ALL SLOPES OF 2:1 OR GREATER SHALL BE STABILIZED WITH EROSION CONTROL FABRIC.
6. TO ENSURE A DENSE, SUCCESSION GROWTH, SEED IS REQUIRED ON ALL DISTURBED SURFACES.

CONSTRUCTION SEQUENCING:

1. SELECTIVELY CUT TREES AND CLEAR BRUSH TO BE CHIPPED AND HAULED OFF SITE.
2. STAKE LOCATION OF AND INSTALL EROSION CONTROL BARRIER, AS DELINEATED ON SITE PLAN.
3. DEMOLISH EXISTING BUILDING.
4. STRIP TOP AND SUBSOIL AS NECESSARY IN WORK AREA. STOCKPILE MATERIAL ON FRONT PORTION OF LOT FOR BACKFILLING PURPOSES AT COMPLETION OF FOUNDATION CONSTRUCTION.
5. FORM AND POUR FOUNDATION FOR NEW BUILDING.
6. BACKFILL FOUNDATION AREAS AS NECESSARY.
7. CONSTRUCT BUILDING.
8. INSTALL STORMWATER MANAGEMENT SYSTEM. NOTE THAT CATCH BASINS SHALL BE COVERED WITH PLYWOOD UNTIL DRIVEWAY HAS BEEN PAVED AND SITE STABILIZED.
9. CONSTRUCT DRIVEWAY AND LOAM AND SEED DISTURBED AREAS.
10. ALL EXCESS MATERIALS TO BE REMOVED FROM THE SITE AS SOON AS PRACTICAL
11. ALL GRADED AREAS TO BE LANDSCAPED, LOAMED AND SEEDED AS SOON AS PRACTICAL TO REDUCE ANY POTENTIAL EROSION.

NOTE: PROCESSES AS DESCRIBED ABOVE ARE ESTIMATED TO TAKE 9 MONTHS. WINTER CONDITIONS MAY AFFECT THIS SCHEDULE.

COMMONWEALTH OF MASSACHUSETTS
JOSEPH M. GRENIER
ENGINEER
CIVIL
No. 47812
REGISTERED PROFESSIONAL ENGINEER

11/2/20

LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- 195 EXISTING CONTOUR – HIGH
- 196 EXISTING CONTOUR – LOW
- **195** PROPOSED CONTOUR – HIGH
- 196 PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- D EXISTING DRAIN LINE
- **D** PROPOSED DRAIN LINE
- W EXISTING WATER LINE
- **W** PROPOSED WATER LINE
- S EXISTING SEWER LINE
- **S** PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- ETC PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

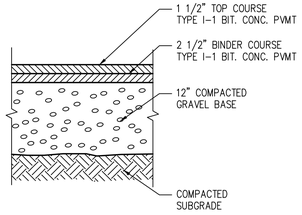
PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
1" = 20'	NOVEMBER 2, 2020

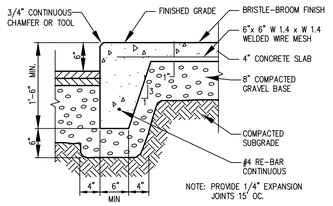
EROSION & SEDIMENTATION CONTROL PLAN

SHEET NO.:	PROJECT NO.:
SHEET 6 OF 8	G-597



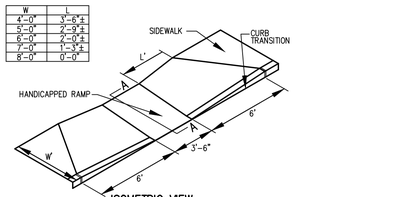
STANDARD BITUMINOUS CONCRETE PAVEMENT

NOT TO SCALE

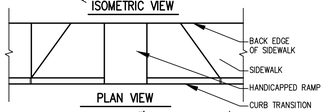


HAUNCHED CONCRETE CURB

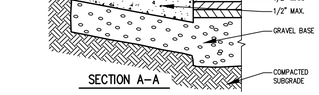
NOT TO SCALE



ISOMETRIC VIEW



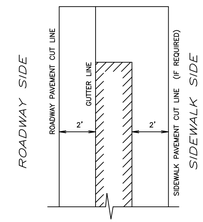
PLAN VIEW



SECTION A-A

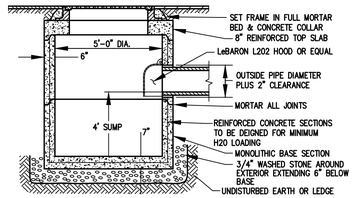
HANDICAP RAMP

NOT TO SCALE



TYPICAL GRANITE CURB DETAIL

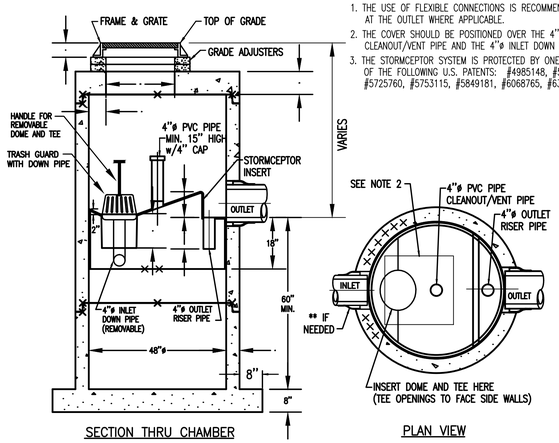
NOT TO SCALE



SECTION

FLAT TOP CATCH BASIN

NOT TO SCALE



SECTION THRU CHAMBER

PLAN VIEW

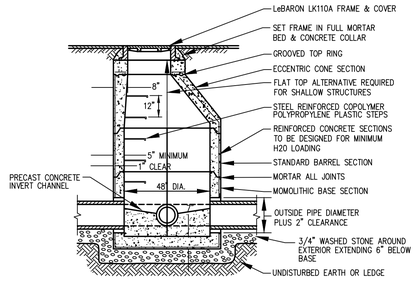
NOTES:

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 4"ø CLEANOUT/VENT PIPE AND THE 4"ø INLET DOWN PIPE.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.

PRECAST CONCRETE STORMCEPTOR HYDRO CONDUIT

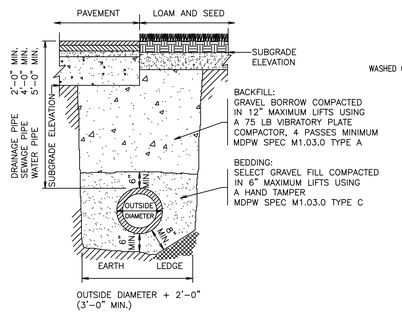
MODEL: STC 450i (OR EQUAL)

(450 US GALLON CAPACITY)



PRECAST CONCRETE DRAIN MANHOLE

NOT TO SCALE

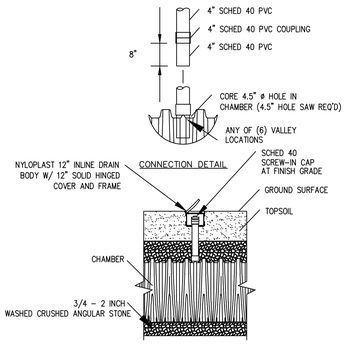


TYPICAL TRENCH DETAIL

NOT TO SCALE

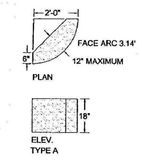
NOTES:

1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY OF (6) CHAMBER CORRUGATION VALLEYS
2. ALL PVC FITTINGS ARE TO BE SOLVENT CEMENTED



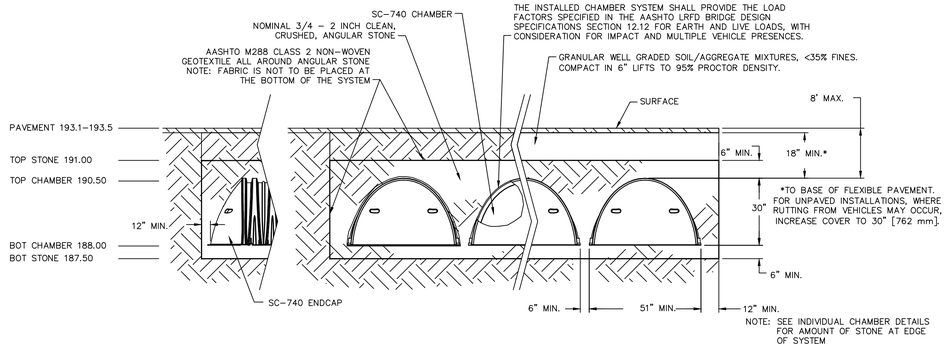
INSPECTION PORT

NOT TO SCALE



CORNER BLOCK DETAIL

NOT TO SCALE

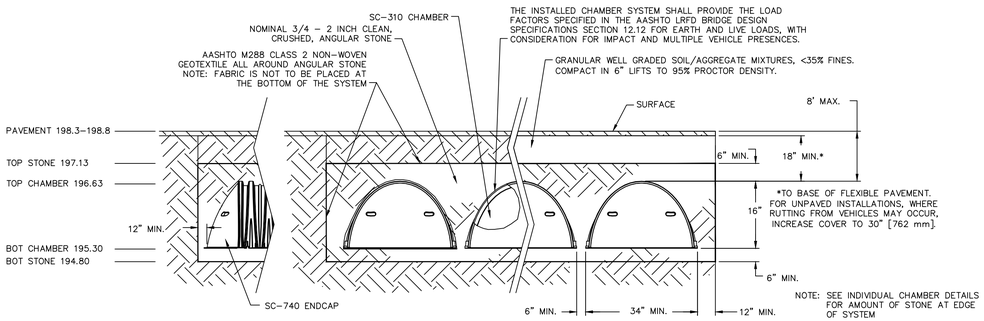


STORMTECH SC-740 CHAMBERS CROSS-SECTION

NOT TO SCALE

NOTES:

1. TOP AND SUBSOIL SHALL BE REMOVED
2. CHAMBERS SHALL HAVE A 2' SEPARATION TO GROUNDWATER AND LEDGE.
3. THERE SHALL BE A 2' OVERDIG OF REMOVE AND REPLACE OF UNSUITABLE MATERIALS HORIZONTALLY IN ALL DIRECTIONS, 6" MINIMUM INTO THE C-LAYER, AND REPLACE WITH SUITALE MATERIAL.

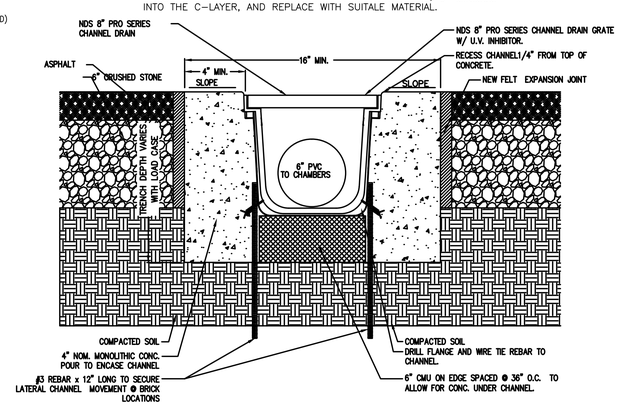


STORMTECH SC-310 CHAMBERS CROSS-SECTION

NOT TO SCALE

NOTES:

1. TOP AND SUBSOIL SHALL BE REMOVED
2. CHAMBERS SHALL HAVE A 2' SEPARATION TO GROUNDWATER AND LEDGE.
3. THERE SHALL BE A 2' OVERDIG OF REMOVE AND REPLACE OF UNSUITABLE MATERIALS HORIZONTALLY IN ALL DIRECTIONS, 6" MINIMUM INTO THE C-LAYER, AND REPLACE WITH SUITALE MATERIAL.



TRENCH DRAIN CROSS-SECTION

NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
JOHN M. GRENIER
CIVIL
No. 47812
REGISTERED PROFESSIONAL ENGINEER

11/2/20

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

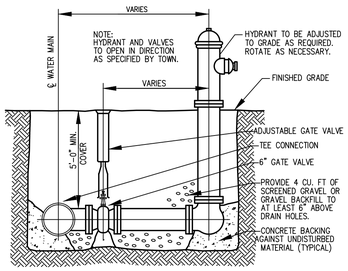
PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
AS SHOWN	NOVEMBER 2, 2020

DETAIL PLAN 1/2

SHEET NO.:	PROJECT NO.:
SHEET 7 OF 8	G-597



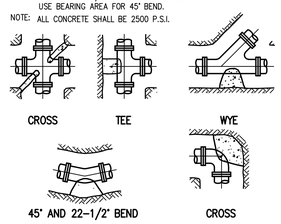
HYDRANT AND VALVE DETAIL WITH RESTRAINED JOINT HYDRANT TEE

NOT TO SCALE

TABLE OF BEARING AREA IN SQ. FT. AGAINST UNDISTURBED SOIL			
SIZE OF MAIN	90 DEGREE BEND	TEE & PLUG	45 DEGREE BEND
6"	10	8	6
8"	16	12	10
10"	26	19	15
12"	36	28	20

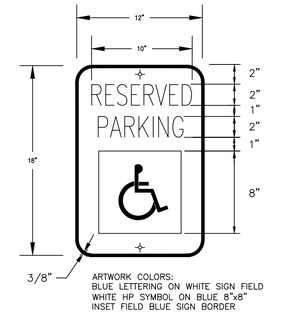
NOTE: FOR FITTINGS W/ LESS THAN 45° DEFLECTION USE BEARING AREA FOR 45° BEND.

NOTE: ALL CONCRETE SHALL BE 2500 P.S.I.



THRUST BLOCK SCHEDULE

NOT TO SCALE

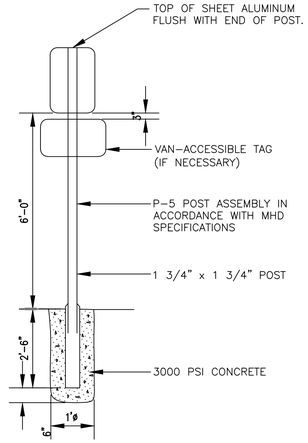


SIGN DETAIL FOR HP PARKING

NTS

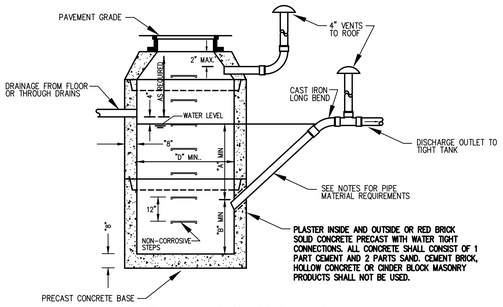


VAN-ACCESSIBLE SIGN



SIGN POST DETAIL

NTS



GAS OIL & WATER SEPARATOR

NOT TO SCALE

PIPE MATERIAL NOTES:

1. NO-HUB CAST IRON WITH PRODUCT-APPROVED STAINLESS STEEL CLAMPS.
2. SERVICE WEIGHT CAST IRON WITH PRODUCT-APPROVED RESILIENT GASKETS OR LEAD AND OAKUM JOINTS.
3. EXTRA HEAVY CAST IRON WITH PRODUCT APPROVED RESILIENT GASKETS OR LEAD AND OAKUM JOINTS.

GENERAL CONSTRUCTION NOTES:

1. THE SEPARATOR IS TO BE LOCATED OUTSIDE OF A BUILDING WHERE POSSIBLE AND THE COVER TO INCORPORATE A CENTER HOLE. A SEALED TIGHT COVER IS TO BE USED IF THE SEPARATOR IS LOCATED INSIDE OF A BUILDING. THE COVER SHALL BE NO LESS THAT A 24" DIAMETER. THE SEPARATOR SHALL BE LOCATED AND CONSTRUCTED TO PREVENT SURFACE OR SUB-SURFACE WATER FROM ENTERING. THE INLET PIPE SHALL BE NO LESS THAN FOUR INCHES ABOVE THE WATER LINE LEVEL. WHEN THE SEPARATOR IS SUBJECT TO FREEZING IT SHALL BE SET A MINIMUM OF THREE FEET BELOW GRADE. THE NON-CORROSIVE STEPS SHALL BE PLACED AT 18" APART. THE CHAMBER VENT AND OUTLET VENT SHALL RETURN TO THE INSIDE OF THE BUILDING AND EXTEND THROUGH THE ROOF.
2. IN OPEN PARKING GARAGES OR OPEN PARKING AREAS ONLY THE INLET PIPE MAY EXTEND BELOW THE WATER LINE A MAXIMUM DISTANCE OF 6".
3. CIRCULAR BASINS ARE RECOMMENDED.

SIZING TABLE

INLET	D	A	B
4"	3'-6"	3'-0"	2-6"
5"	3'-6" 3'-6"x3'-6" 4'-0" 3'-6"x3'-6" 4'-6"	5'-0" 4'-0" 3'-6" 3'-0" 3'-0"	4'-0" 3'-0" 3'-0" 2'-6" 2'-6"
6"	4'-0" 4'-0"x4'-0" 4'-6" 4'-6"x4'-6" 5'-0" 5'-0"x5'-0"	5'-0" 4'-0" 4'-0" 3'-6" 3'-6" 3'-0"	4'-6" 3'-6" 3'-6" 3'-0" 3'-0" 2'-6"
8"	5'-0" 5'-6"x5'-6" 6'-0" 6'-0"x6'-0" 6'-6" 6'-6"x6'-6"	6'-0" 4'-6" 4'-0" 3'-0" 3'-6" 3'-0"	5'-0" 4'-0" 3'-6" 2'-6" 3'-0" 2'-6"

DRAINAGE FROM FLOOR OR THROUGH DRAINS



11/2/20

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
AS SHOWN	NOVEMBER 2, 2020

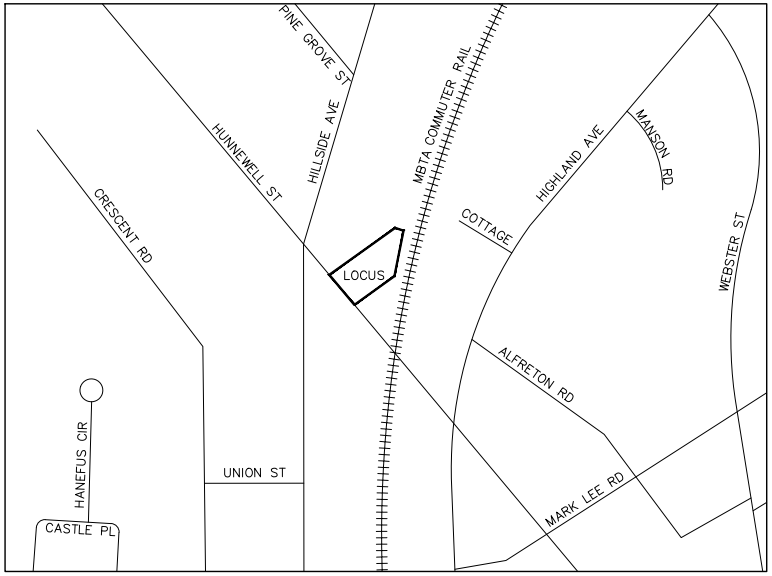
DETAIL PLAN 2/2

SHEET NO.:	PROJECT NO.:
SHEET 8 OF 8	G-597

SITE PLAN

FOR

400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494



LOCUS:
SCALE: 1'=200'

INDEX

DESCRIPTION	SHEET NUMBER
COVER	1 OF 8
EXISTING CONDITIONS PLANS	2 OF 8
LAYOUT PLAN	3 OF 8
GRADING AND DRAINAGE PLAN	4 OF 8
UTILITY PLAN	5 OF 8
EROSION & SEDIMENTATION CONTROL PLAN	6 OF 8
DETAIL PLAN	7 OF 8
DETAIL PLAN	8 OF 8

RECORD APPLICANT:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MA 02482

RECORD OWNER:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MA 02482

LAND PLANNERS–CIVIL ENGINEERS:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MA 01752
(508) 845–2500

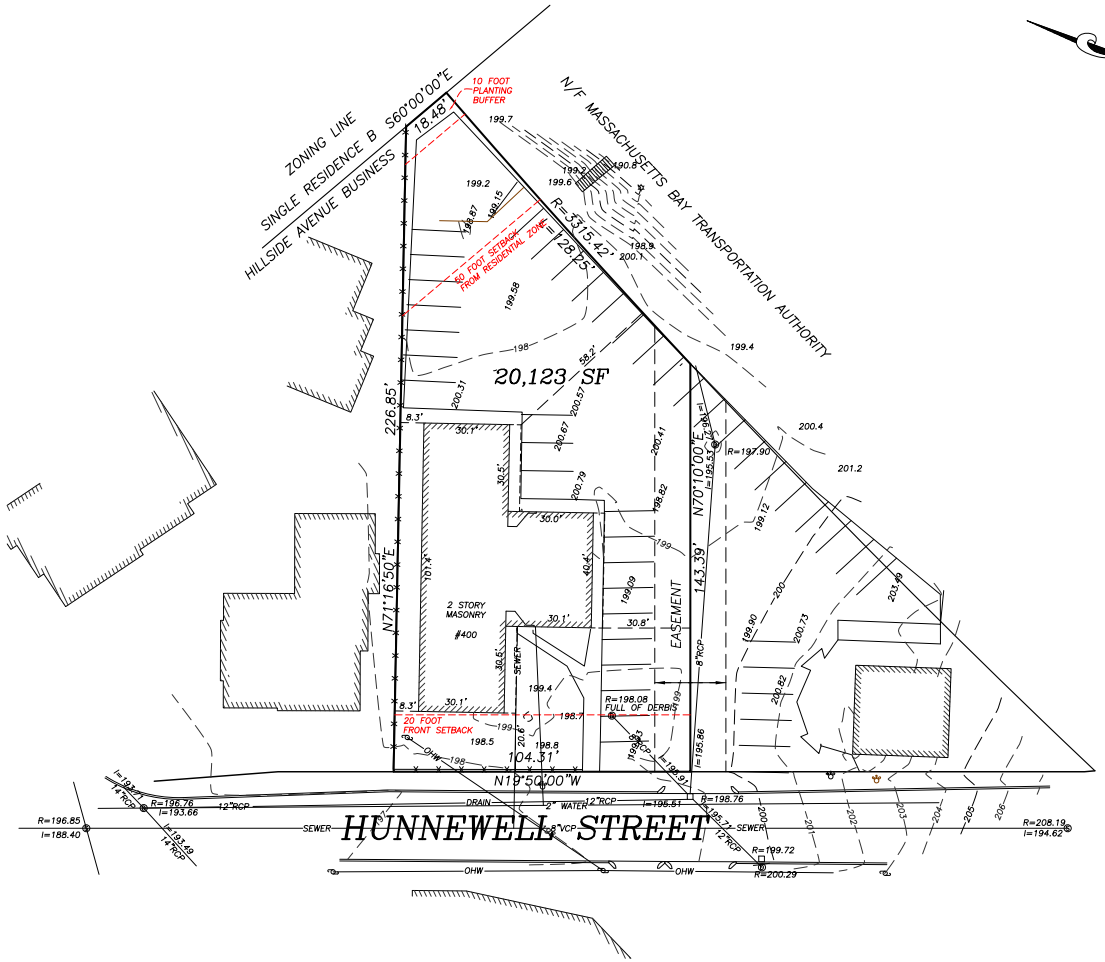
LAND SURVEYORS:
FIELD RESOURCES INC.
281 CHESTNUT STREET
NEEDHAM, MA 02492

ZONING DISTRICT: HILLSIDE AVENUE BUSINESS (HAB)

JOHN M. GRENIER
CIVIL
No. 47812
REGISTERED PROFESSIONAL ENGINEER
11/2/20

REV. NO.	DATE	REVISION

SCALE: AS SHOWN	DATE: NOVEMBER 2, 2020
COVER SHEET	
SHEET NO.: SHEET 1 OF 8	PROJECT NO.: G–597



1) ELEVATIONS REFER TO PROJECT DATUM

2) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

3) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND THE LATEST PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUB-SURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL-FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 (1-888-DIG-SAFE) SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

DATUM PLANE RELATIONSHIP

NAVD 88	
	106.41
TOWN OF NEEDHAM	
	85.96
PROJECT DATUM	

ZONING INFORMATION: HILLSIDE AVENUE BUSINESS

	REQUIRED	EXISTING
MINIMUM LOT AREA	10,000 SF.	20,123 SF.
MINIMUM LOT FRONTAGE	80 FEET	104.31 FEET
MINIMUM FRONT SETBACK	20 FEET	20.6 FEET
MINIMUM SIDE SETBACK	0.0'	8.3' FEET
MINIMUM DRIVEWAY OPENNING	18 FEET*	24 FEET
MAXIMUM DRIVEWAY OPENNING	25 FEET	24 FEET
MAXIMUM FLOOR AREA RATIO	0.7	
MAXIMUM UNITS	8	N/A
MAXIMUM BUILDING HEIGHT	35 FEET	21± FEET
MAXIMUM BUILDING HEIGHT	2 1/2 STORIES	2 STORIES

PROPERTY REFERENCE

BOOK 38324 PAGE 432
PLAN 164 OF 1975

ZONING REFERENCE

ASSESSORS MAP 99, PARCEL 3
ZONING DISTRICT: HAB

I CERTIFY THAT THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X", AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE TOWN OF NEEDHAM, MASSACHUSETTS, COMMUNITY PANEL NO. 255215 0036 E, MAP NUMBER 25021C 0036 E EFFECTIVE DATE: JULY 17, 2012.

BRADLEY J. SIMONELLI ~ P.L.S.

DATE: NOVEMBER 5, 2020

SHEET 2 OF 8
EXISTING CONDITIONS
PLAN OF LAND
400 HUNNEWELL STREET
NEEDHAM, MASS.

Field Resources, Inc.
LAND SURVEYORS

P.O. BOX 324
AUBURN, MA
508 832 4332

281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936

fieldresources@hotmail.com

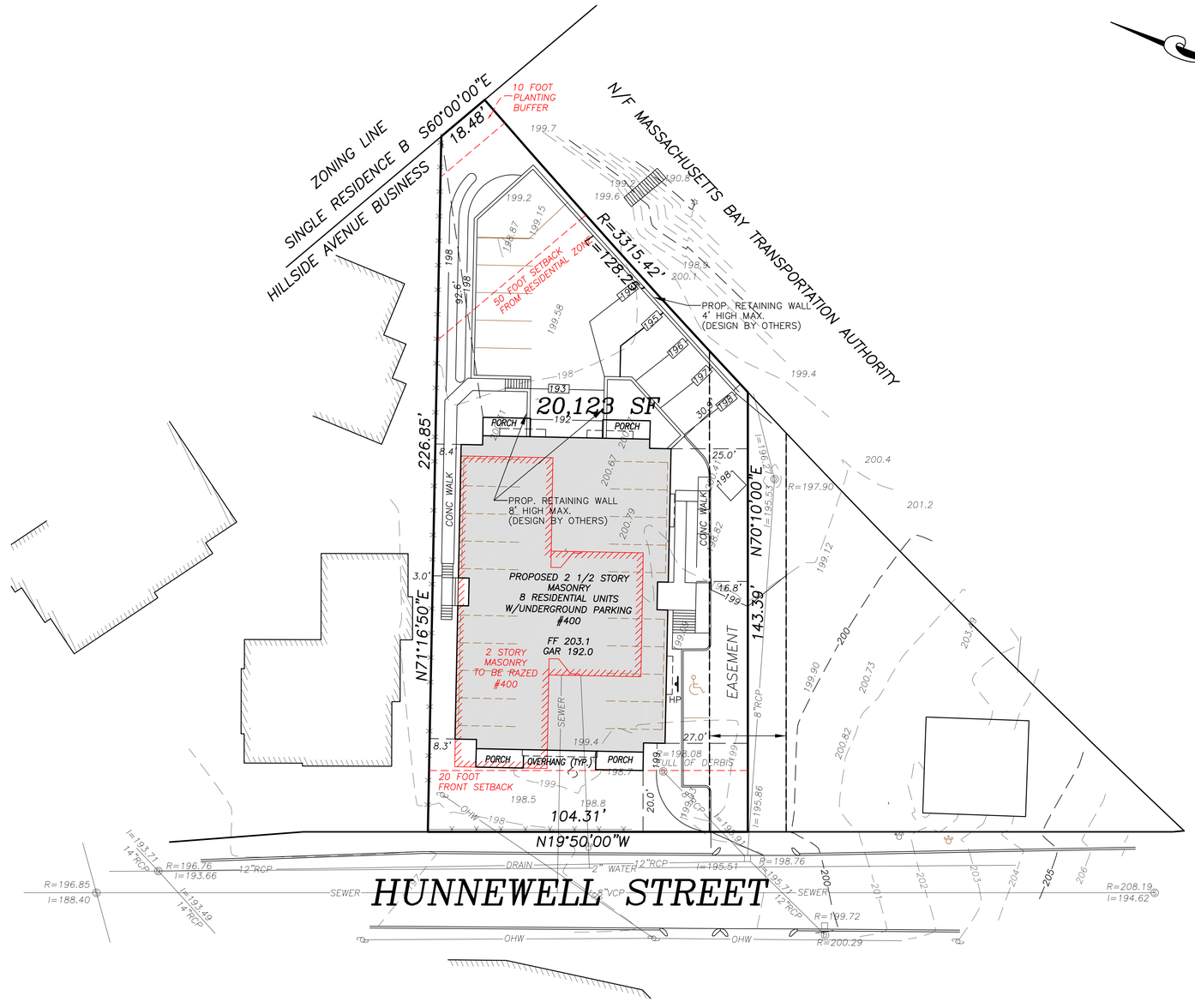
MARCH 5, 2020 SCALE 1"=20'

JOB NO. 122-19

REVISED: NOVEMBER 5, 2020
REVISED: APRIL 6, 2020

122-19

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1) ELEVATIONS REFER TO PROJECT DATUM

2) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

3) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND THE LATEST PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUB-SURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL-FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 (1-888-DIG-SAFE) SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

4) SITE PLAN INFORMATION PROVIDED BY J.M. GRENIER ASSOCIATES INC.

DATUM PLANE RELATIONSHIP

NAVD 88

106.41

TOWN OF NEEDHAM

85.96

PROJECT DATUM

PARKING SPACE REQUIREMENTS

PROPOSED USE – 400 HUNNEWELL	REQUIRED	PROPOSED
MULTI-FAMILY: 1.5/D.U X8 UNITS	12 SPACES	23 SPACES
EXISTING USE – 430 HUNNEWELL	REQUIRED	PROPOSED
OFFICE: 1/300 SF X 2,122 SF S	8 SPACES	11 SPACES

ZONING INFORMATION: HILLSIDE AVENUE BUSINESS

	REQUIRED	PROPOSED
MINIMUM LOT AREA	10,000 SF.	20,123 SF.
MINIMUM LOT FRONTAGE	80 FEET	104.31 FEET
MINIMUM FRONT SETBACK	20 FEET	20.0 FEET
MINIMUM SIDE SETBACK	0.0'	3.0' FEET(STOOP)
		8.3' FEET(FACE)
MINIMUM DRIVEWAY OPENNING	18 FEET*	24 FEET
MAXIMUM DRIVEWAY OPENNING	25 FEET	24 FEET
MAXIMUM FLOOR AREA RATIO	0.7	
MAXIMUM UNITS	8	8 UNITS
MAXIMUM BUILDING HEIGHT	35 FEET	29± FEET
MAXIMUM BUILDING HEIGHT	2 1/2 STORIES	2 1/2 STORIES

PROPERTY REFERENCE

BOOK 38324 PAGE 432
PLAN 164 OF 1975

ZONING REFERENCE

ASSESSORS MAP 99, PARCEL 3
ZONING DISTRICT: HAB

I CERTIFY THAT THE PARCEL SHOWN HEREON LIES WITHIN A ZONE "X", AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN. AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE TOWN OF NEEDHAM, MASSACHUSETTS, COMMUNITY PANEL NO. 255215 0036 E, MAP NUMBER 25021C 0036 E EFFECTIVE DATE: JULY 17, 2012.

COMMONWEALTH OF MASSACHUSETTS BRADLEY J. SIMONELLI #47581 REGISTERED LAND SURVEYOR

BRADLEY J. SIMONELLI ~ P.L.S.

DATE: NOVEMBER 23, 2020

SHEET 3 OF 8
LAYOUT PLAN
SHOWING PROPOSED STRUCTURE
400 HUNNEWELL STREET
NEEDHAM, MASS.

Field Resources, Inc.
LAND SURVEYORS

MARCH 5, 2020 SCALE 1"=20'

P.O. BOX 324
AUBURN, MA
508 832 4332

281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936

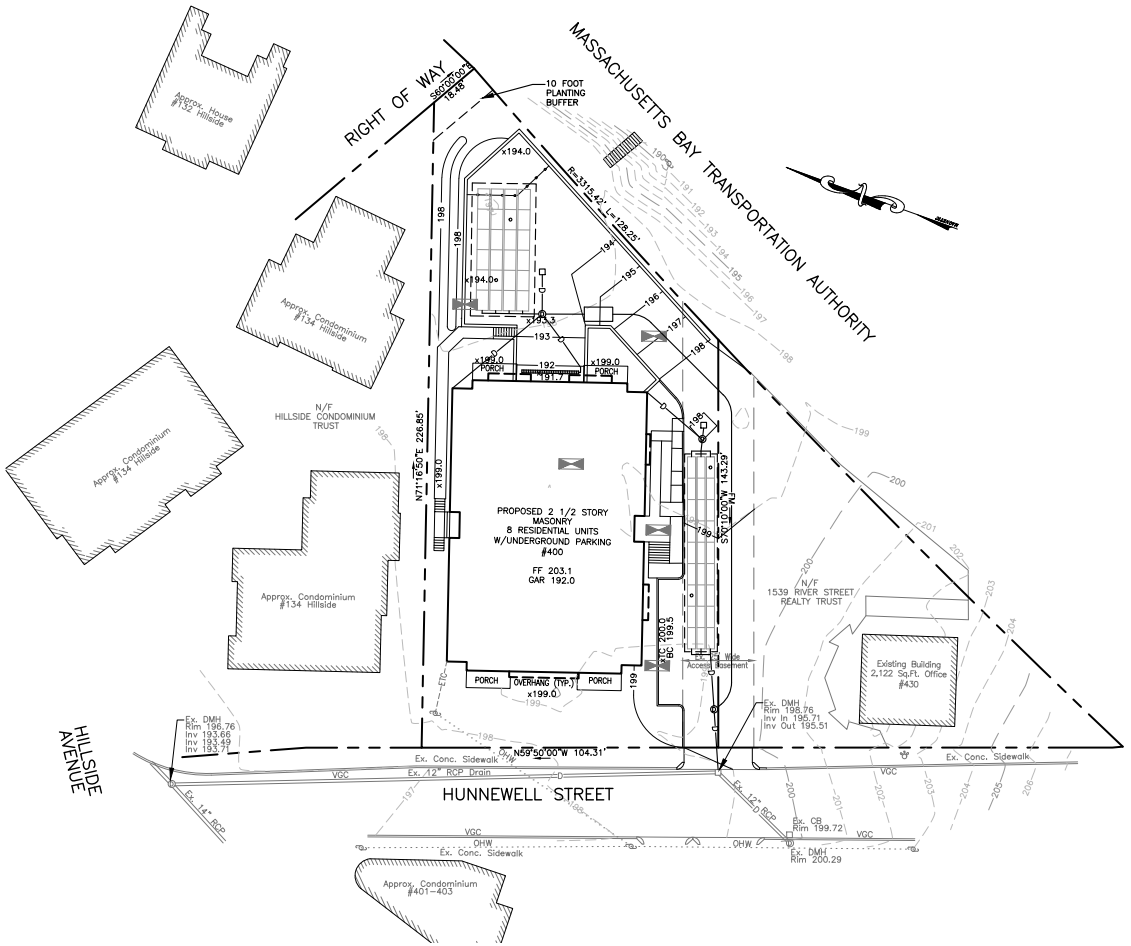
fieldresources@hotmail.com

JOB NO. 122-19

REVISED: NOVEMBER 20, 2020
REVISED: NOVEMBER 5, 2020
REVISED: APRIL 6, 2020

122-19

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LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CONTOUR – HIGH
- EXISTING CONTOUR – LOW
- PROPOSED CONTOUR – HIGH
- PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- EXISTING DRAIN LINE
- PROPOSED DRAIN LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

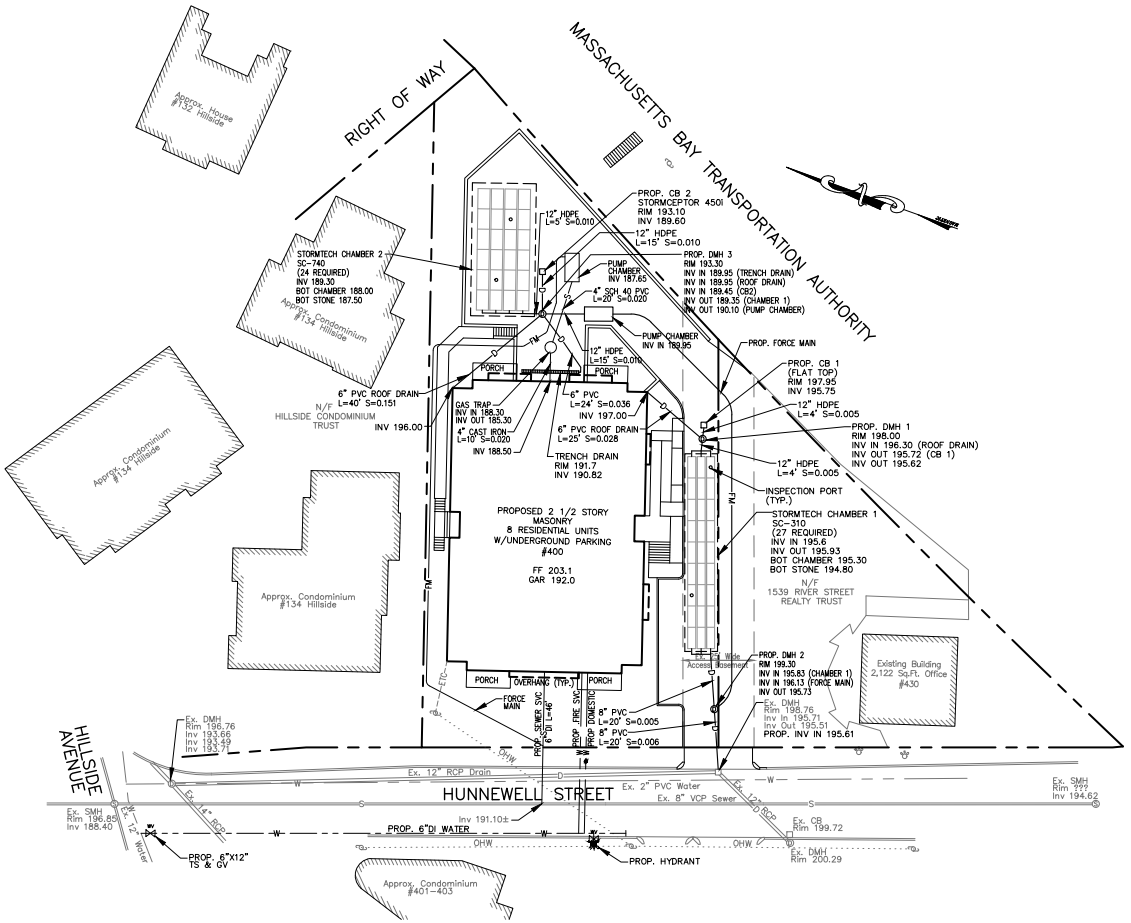
PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
1" = 20'	NOVEMBER 2, 2020

GRADING AND DRAINAGE PLAN

SHEET NO.:	PROJECT NO.:
SHEET 4 OF 8	G-597

11/2/20



LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CONTOUR – HIGH
- EXISTING CONTOUR – LOW
- PROPOSED CONTOUR – HIGH
- PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- EXISTING DRAIN LINE
- PROPOSED DRAIN LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

NOTES:

1. ALL TRENCHES WITHIN HUNNEWELL STREET AND HILLSIDE AVENUE SHALL BE BACKFILLED AS REQUIRED BY THE TOWN OF NEEDHAM.
2. EXISTING CATCH BASIN SHALL BE PROTECTED WITH INLET PROTECTION AT ALL TIMES UNTIL THE SITE IS FULLY STABILIZED.
3. SEWER SHALL BE INSTALLED WITH A MINIMUM HORIZONTAL SEPARATION OF 10 FEET FROM ALL WATER SUPPLY LINES. WHEN A 10 FOOT SEPARATION CANNOT BE MAINTAINED THE WATER MAIN SHALL BE INSTALLED IN A SEPARATE TRENCH ABOVE THE SEWER WITH AN 18 INCH VERTICAL SEPARATION BETWEEN THE CROWN OF THE SEWER AND THE INVERT OF THE WATER MAIN. ADEQUATE VERTICAL SEPARATION OF WATER/SEWER CROSSING SHALL BE CONFIRMED.
4. SIZE OF FIRE SERVICE LINE AND DOMESTIC WATER LINE TO BE DETERMINED.
5. CONTRACTOR SHALL CONTACT DIG SAFE AT 1-888-344-7233 72 HOURS PRIOR TO COMMENCING ANY EXCAVATION.
6. CONTRACTOR SHALL FIELD VERIFY DIMENSIONS AND CONDITIONS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
7. SHOULD FIELD CONDITIONS VARY FROM THOSE SHOWN, ENGINEER SHALL BE CONTACTED PRIOR TO COMMENCEMENT OF SITE CONSTRUCTION.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

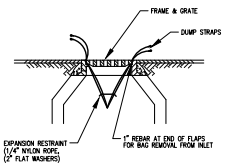
JOHN M. GRENIER No. 47812 REGISTERED PROFESSIONAL ENGINEER CIVIL

11/2/20

SCALE:	DATE:
1" = 20'	NOVEMBER 2, 2020

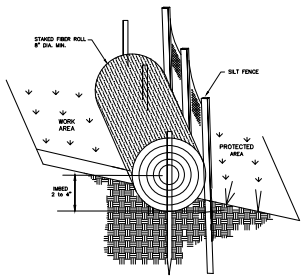
UTILITY PLAN

SHEET NO.:	PROJECT NO.:
SHEET 5 OF 8	G-597



NOTE.
BAGS SHOULD BE CLEANED OUT AFER EVERY RAIN EVENT AND/OR AS NEEDED.

SILT SACK DETAIL
NOT TO SCALE



SILT FENCE/STRAW WATTLE BARRIER DETAIL
NOT TO SCALE

1. Seeding and repairs shall be performed as required. Sediment and debris shall be removed at least once a year, typically in early spring prior to the commencement of the growing season.

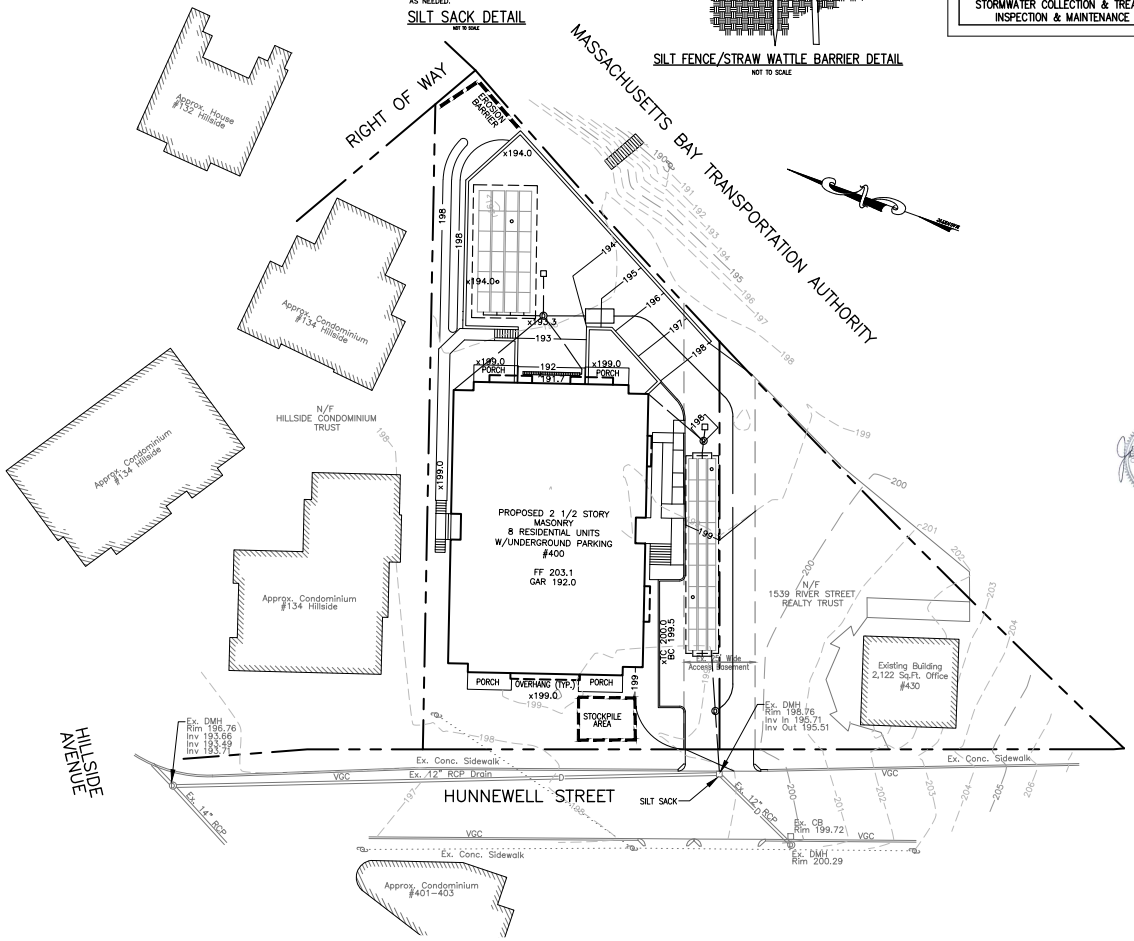
2. The catch basins throughout the entire site shall be inspected annually. Unit shall be cleaned when accumulated sediments reach a depth of 6 inches. Accumulated sediment must be disposed of in accordance with applicable local state, and federal guidelines and regulations. The contractor will be responsible for the maintenance of the unit until such time as the site work is complete. The maintenance will then be the responsibility of the owner(s).

3. The Stormceptor unit shall be inspected and cleaned as recommended by the manufacturer.

4. The subsurface chambers shall be inspected after every major storm for the first 3 months to ensure proper stabilization and function. The chambers should be inspected once per year after that. Water levels should be inspected and recorded for several days after a major storm event to track infiltration capability.

5. The contractor will be responsible for the maintenance of all drainage structures and until such time as the site work is complete. The maintenance will then be the responsibility of the property owners.

STORMWATER COLLECTION & TREATMENT SYSTEM INSPECTION & MAINTENANCE GUIDELINES



GENERAL:

1. THIS PLAN IS INTENDED TO PROVIDE GUIDANCE AND INSTRUCTION TO THE TOWN OF NEEDHAM AND THE CONTRACTOR(S) IN THE PREVENTION OF EROSION AND SEDIMENTATION OFF SITE. THIS PLAN IS INTENDED TO ALLOW ANY CONDITIONS OF APPROVAL TO BE MORE SPECIFIC IN ADDRESSING ITEMS OF CONCERN. IF CONDITIONS BY THE TOWN OF NEEDHAM ARE IN CONFLICT WITH REQUIREMENTS AS SPECIFIED ON THE PLANS CONDITIONS AS SPECIFIED BY THE TOWN OF NEEDHAM SHALL SUPERSEDE THE REQUIREMENTS SPECIFIED ON THESE PLANS.

PRE-CONSTRUCTION:

1. AN EROSION CONTROL BARRIER (SEE BELOW) SHALL BE INSTALLED AS DEPICTED ON THE PLANS, BETWEEN THE AREAS TO BE DISTURBED AND RECEIVING DRAINAGE WAY AND STRUCTURES. THIS BARRIER SHALL REMAIN IN PLACE UNTIL ALL TRIBUTARY SURFACES HAVE BEEN FULLY STABILIZED. THE EROSION CONTROL BARRIERS AS SHOWN ON THE PLANS ARE THE MINIMUM PROTECTIVE MEASURES REQUIRED TO PROTECT THE ON AND OFF SITE DRAINAGE SYSTEMS.
2. THE CONTRACTOR SHALL ESTABLISH A STAGING AREA AS SHOWN ON THE PLAN FOR THE OVERNIGHT STORAGE OF EQUIPMENT AND STOCKPILING OF MATERIALS.
3. IN THE STAGING AREA, THE CONTRACTOR SHALL HAVE A STOCKPILE OF MATERIALS REQUIRED TO CONTROL EROSION ON-SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO: HAY BALES, SILT FENCE AND CRUSHED STONE.
4. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON & OFF SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED HEREIN, ON THE PLAN OR IN ANY ORDER OF CONDITIONS.

PRELIMINARY SITE WORK:

1. MATERIAL REMOVED SHOULD BE STOCKPILED, SEPARATING THE TOPSOIL FOR FUTURE USE ON THE SITE OR IN A SECURED OFF SITE AREA APPROVED BY THE OWNER. EROSION CONTROLS SHALL BE UTILIZED ALONG THE DOWN SLOPE OF THE PILES IF THE PILES ARE TO REMAIN FOR MORE THAN THREE WEEKS.
2. IF INTENSE RAINFALL IS ANTICIPATED, THE INSTALLATION OF SUPPLEMENTAL HAY BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE UTILIZED.
3. IF THE SITE CONSTRUCTION OCCURS AT ANY TIME OTHER THAN THE APRIL – DECEMBER CONSTRUCTION SEASON, ALL DRAINAGE SYSTEMS TEMPORARY OR PERMANENT SHALL MAINTAIN TO ENSURE ADEQUATE HYDRAULIC CAPACITY, AND DRAINING CHARACTERISTICS.

EROSION CONTROL MEASURES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT EROSION AND SEDIMENTATION ARE CONTROLLED. THIS PLAN SHALL BE SHALL BE ADAPTED TO FIT THE CONTRACTOR'S EQUIPMENT, WEATHER CONDITIONS, AND ANY CONDITIONS ISSUED BY THE TOWN OF NEEDHAM.
2. THE MOST IMPORTANT ASPECTS OF CONTROLLING EROSION AND SEDIMENTATION ARE LIMITING THE EXTENT OF DISTURBANCE AND STABILIZING SURFACES AS SOON AS POSSIBLE. OF SECONDARY IMPORTANCE IN EROSION CONTROL IS THE LIMITING THE SIZE AND LENGTH OF THE TRIBUTARY DRAINAGE AREA WITHIN THE WORK SITE AND DRAINAGE STRUCTURES. THESE FUNDAMENTAL PRINCIPLES SHALL BE THE KEY FACTOR IN THE CONTRACTOR'S CONTROL OF EROSION ON THE SITE.
3. THE EXISTING SOIL CONDITIONS PROVIDE THE POTENTIAL OF RUNOFF TO OFF-SITE AREAS WITH EROSION POTENTIAL.
4. ALL DISTURBED SURFACES SHALL BE STABILIZED A MINIMUM OF 14 DAYS AFTER CONSTRUCTION IN ANY PORTION OF THE SITE HAS CEASED OR IS TEMPORARILY HALTED UNLESS ADDITIONAL CONSTRUCTION IS INTENDED TO BE INITIATED WITHIN 21 DAYS.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE AND REPAIR OF ALL EROSION CONTROL DEVICES WITHIN THE LIMIT OF WORK. ALL EROSION CONTROL DEVICES SHALL BE REGULARLY INSPECTED. ANY SEDIMENTS REMOVED FROM THE CONTROL DEVICES SHALL BE DISPOSED OF.
6. AT NO TIME SHALL SILT-LADEN WATER BE ALLOWED TO ENTER SENSITIVE AREAS (WETLANDS, OFF-SITE AREAS AND DRAINAGE SYSTEMS). ANY RUNOFF FROM DISTURBED SURFACES SHALL BE DIRECTED THROUGH SETTLING BASINS AND EROSION CONTROL BARRIERS PRIOR TO ENTERING ANY SENSITIVE AREAS.

GENERAL CONSTRUCTION REQUIREMENTS:

1. ANY REFUELING OF CONSTRUCTION VEHICLES AND EQUIPMENT SHALL NOT TAKE PLACE INSIDE OF A 100 FOOT BUFFER ZONE, NEAR THE ENTRANCE TO ANY DRAINAGE SYSTEM AND SHALL NOT BE CONDUCTED IN PROXIMITY TO SEDIMENTATION BASINS.
2. NO ON-SITE DISPOSAL OF STUMPS, SOLID WASTE, INCLUDING CONSTRUCTION MATERIALS IS ALLOWED.
3. NO MATERIALS SHALL BE DISPOSED OF INTO THE WETLANDS, OR EXISTING/PROPOSED DRAINAGE SYSTEMS. ALL CONTRACTORS INCLUDING: CONCRETE SUPPLIERS, PAINTERS AND PLASTERERS, SHALL BE INFORMED THAT THE CLEANING OF EQUIPMENT IS PROHIBITED IN AREAS WHERE THE WASH-WATER WILL DRAIN DIRECTLY TO THE SITE DRAINAGE SYSTEMS.
4. THE CONTRACTOR SHALL UNDERTAKE ALL WORK TO LIMIT AIRBORNE SEDIMENTS, ONLY CLEAN, POTABLE WATER MAY BE USED TO CONTROL DUST.

LANDSCAPING:

1. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. CONTRACTOR SHALL UTILIZE A VARIETY OF SLOPE STABILIZATION METHODS AND MATERIALS WHICH SHALL BE ADJUSTED TO THE SITE CONDITIONS. EROSION CONTROL BLANKETS OR MIRAFI MIRAMAT (OR SIMILAR PRODUCTS) SHALL BE AVAILABLE ON SITE.
3. IF THE SEASON OR ADVERSE WEATHER CONDITIONS DO NOT ALLOW THE ESTABLISHMENT OF VEGETATION, TEMPORARY MULCHING WITH HAY, TACKIFIED WOOD CHIPS OR OTHER METHODS SHALL BE PROVIDED.
4. ALL DISTURBED SURFACES TO BE PLANTED SHALL RECEIVE A MINIMUM OF 6" TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
5. ALL SLOPES OF 2:1 OR GREATER SHALL BE STABILIZED WITH EROSION CONTROL FABRIC.
6. TO ENSURE A DENSE, SUCCESSION GROWTH, SEED IS REQUIRED ON ALL DISTURBED SURFACES.

CONSTRUCTION SEQUENCING:

1. SELECTIVELY CUT TREES AND CLEAR BRUSH TO BE CHIPPED AND HAULED OFF SITE.
2. STAKE LOCATION OF AND INSTALL EROSION CONTROL BARRIER, AS DELINEATED ON SITE PLAN.
3. DEMOLISH EXISTING BUILDING.
4. STRIP TOP AND SUBSOIL AS NECESSARY IN WORK AREA. STOCKPILE MATERIAL ON FRONT PORTION OF LOT FOR BACKFILLING PURPOSES AT COMPLETION OF FOUNDATION CONSTRUCTION.
5. FORM AND POUR FOUNDATION FOR NEW BUILDING.
6. BACKFILL FOUNDATION AREAS AS NECESSARY.
7. CONSTRUCT BUILDING.
8. INSTALL STORMWATER MANAGEMENT SYSTEM. NOTE THAT CATCH BASINS SHALL BE COVERED WITH PLYWOOD UNTIL DRIVEWAY HAS BEEN PAVED AND SITE STABILIZED.
9. CONSTRUCT DRIVEWAY AND LOAM AND SEED DISTURBED AREAS.
10. ALL EXCESS MATERIALS TO BE REMOVED FROM THE SITE AS SOON AS PRACTICAL.
11. ALL GRADED AREAS TO BE LANDSCAPED, LOAMED AND SEEDED AS SOON AS PRACTICAL TO REDUCE ANY POTENTIAL EROSION.

NOTE: PROCESSES AS DESCRIBED ABOVE ARE ESTIMATED TO TAKE 9 MONTHS. WINTER CONDITIONS MAY AFFECT THIS SCHEDULE.



11/2/20

LEGEND:

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING CONTOUR – HIGH
- EXISTING CONTOUR – LOW
- PROPOSED CONTOUR – HIGH
- PROPOSED CONTOUR – LOW
- EXISTING EDGE PAVEMENT
- EXISTING CURB
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB
- EXISTING DRAIN LINE
- PROPOSED DRAIN LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING SEWER LINE
- PROPOSED SEWER LINE
- EXISTING OVERHEAD WIRES
- PROPOSED UNDERGROUND ELECTRIC
- PROPOSED EROSION CONTROL
- ZONE LINE

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

REV. NO.	DATE	REVISION

TITLE:

SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

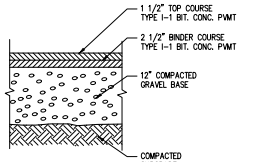
PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE: 1" = 20'
DATE: NOVEMBER 2, 2020

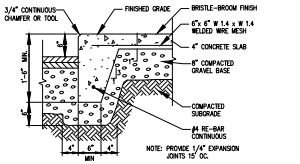
EROSION & SEDIMENTATION CONTROL PLAN

SHEET NO.: SHEET 6 OF 8
PROJECT NO.: G-597



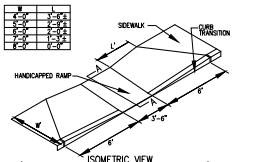
STANDARD BITUMINOUS CONCRETE PAVEMENT

NOT TO SCALE



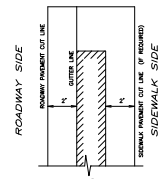
HAUNCHED CONCRETE CURB

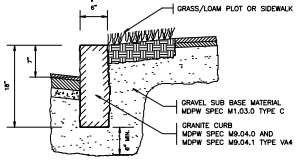
NOT TO SCALE



HANDICAP RAMP

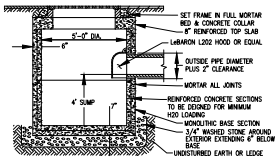
NOT TO SCALE





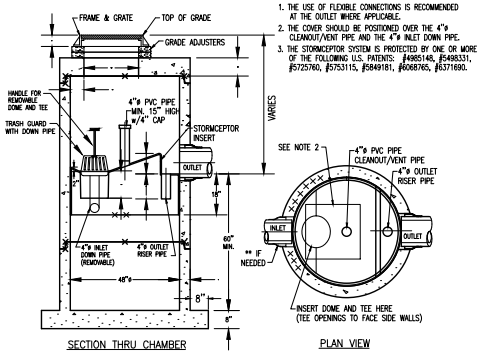
TYPICAL GRANITE CURB DETAIL

NOT TO SCALE

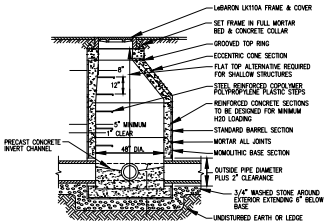


FLAT TOP CATCH BASIN

NOT TO SCALE

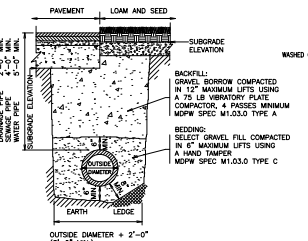


PRECAST CONCRETE STORMCEPTOR
HYDRO CONDUIT
MODEL: STC 450i (OR EQUAL)
(450 US GALLON CAPACITY)



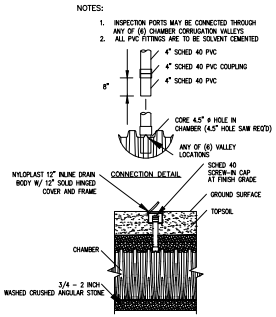
PRECAST CONCRETE DRAIN MANHOLE

NOT TO SCALE



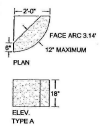
TYPICAL TRENCH DETAIL

NOT TO SCALE



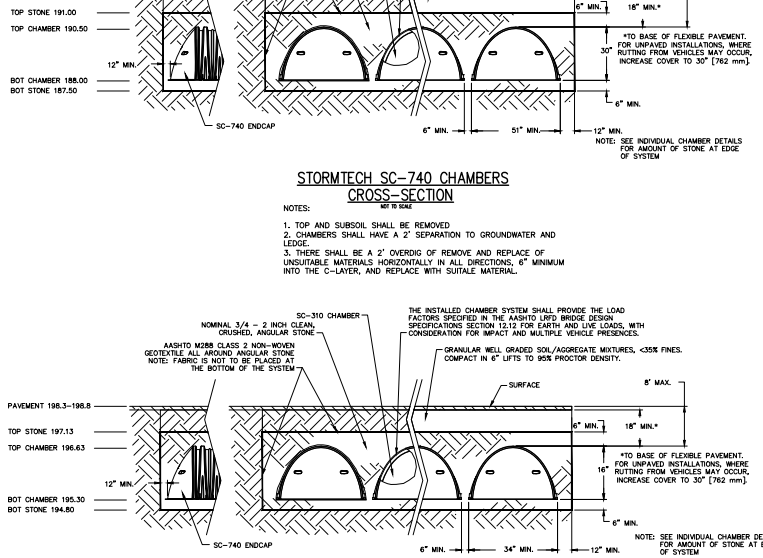
INSPECTION PORT

NOT TO SCALE



CORNER BLOCK DETAIL

NOT TO SCALE



STORMTECH SC-740 CHAMBERS
CROSS-SECTION

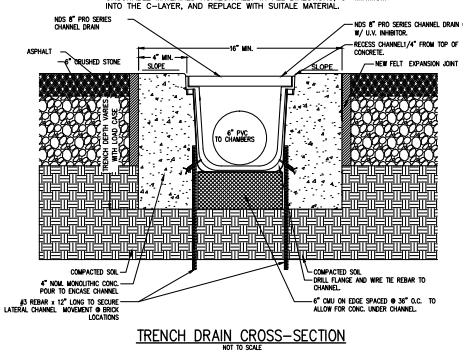
NOT TO SCALE

NOTES:
1. TOP AND SUBSOIL SHALL BE REMOVED
2. CHAMBERS SHALL HAVE A 2' SEPARATION TO GROUNDWATER AND LEDGE.
3. THERE SHALL BE A 2' OVERDIG OF REMOVE AND REPLACE OF UNSUITABLE MATERIALS HORIZONTALLY IN ALL DIRECTIONS, 6" MINIMUM INTO THE C-LAYER, AND REPLACE WITH SUITALE MATERIAL.

STORMTECH SC-310 CHAMBERS
CROSS-SECTION

NOT TO SCALE

NOTES:
1. TOP AND SUBSOIL SHALL BE REMOVED
2. CHAMBERS SHALL HAVE A 2' SEPARATION TO GROUNDWATER AND LEDGE.
3. THERE SHALL BE A 2' OVERDIG OF REMOVE AND REPLACE OF UNSUITABLE MATERIALS HORIZONTALLY IN ALL DIRECTIONS, 6" MINIMUM INTO THE C-LAYER, AND REPLACE WITH SUITALE MATERIAL.



TRENCH DRAIN CROSS-SECTION

NOT TO SCALE



11/2/20

REV. NO.	DATE	REVISION

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SITE PLAN
FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

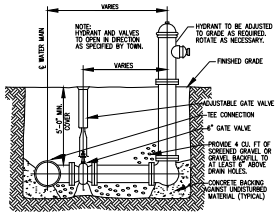
PREPARED FOR:
400 HUNNEWELL STREET, LLC
14A BROOKS STREET
WELLESLEY, MASSACHUSETTS 02482

PREPARED BY:
J.M. GRENIER ASSOCIATES INC.
325 DONALD LYNCH BOULEVARD SUITE 100
MARLBOROUGH, MASSACHUSETTS 01752
TELE NO.: (508) 845-2500

SCALE:	DATE:
AS SHOWN	NOVEMBER 2, 2020

DETAIL PLAN 1/2

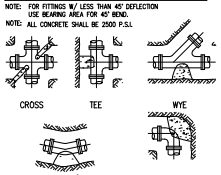
SHEET NO.:	PROJECT NO.:
SHEET 7 OF 8	G-597



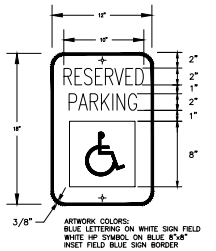
HYDRANT AND VALVE DETAIL WITH
RESTRAINED JOINT HYDRANT TEE
NOT TO SCALE

TABLE OF BEARING AREA IN SQ. FT. AGAINST UNDISTURBED SOIL			
SIZE OF MAIN	90 DEGREE BEND	TEE & PLUG	45 DEGREE BEND
6"	10	8	6
8"	16	12	10
10"	26	19	15
12"	36	28	20

NOTE: FOR FITTINGS W/ LESS THAN 45° DEFLECTION USE BEARING AREA FOR 45° BEND.
NOTE: ALL CONCRETE SHALL BE 2500 P.S.I.



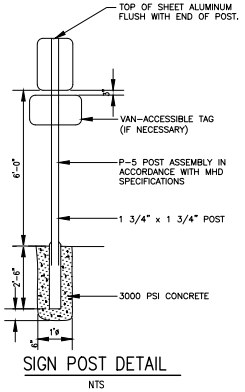
THRUST BLOCK SCHEDULE
NOT TO SCALE



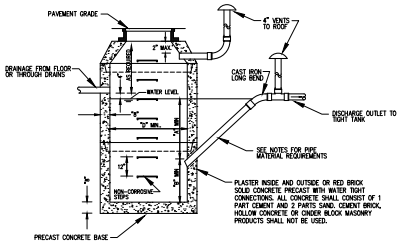
SIGN DETAIL FOR HP PARKING
NTS



VAN-ACCESSIBLE SIGN



SIGN POST DETAIL
NTS



GAS OIL & WATER SEPARATOR
NOT TO SCALE

PIPE MATERIAL NOTES:

1. NO-HUB CAST IRON WITH PRODUCT-APPROVED STAINLESS STEEL CLAMPS.
2. SERVICE WEIGHT CAST IRON WITH PRODUCT-APPROVED RESILIENT GASKETS OR LEAD AND OAKUM JOINTS.
3. EXTRA HEAVY CAST IRON WITH PRODUCT APPROVED RESILIENT GASKETS OR LEAD AND OAKUM JOINTS.

GENERAL CONSTRUCTION NOTES:

1. THE SEPARATOR IS TO BE LOCATED OUTSIDE OF A BUILDING WHERE POSSIBLE AND THE COVER TO INCORPORATE A CENTER HOLE. A SEALED TIGHT COVER IS TO BE USED IF THE SEPARATOR IS LOCATED INSIDE OF A BUILDING. THE COVER SHALL BE NO LESS THAT A 24" DIAMETER. THE SEPARATOR SHALL BE LOCATED AND CONSTRUCTED TO PREVENT SURFACE OR SUB-SURFACE WATER FROM ENTERING. THE INLET PIPE SHALL BE NO LESS THAN FOUR INCHES ABOVE THE WATER LINE LEVEL. WHEN THE SEPARATOR IS SUBJECT TO FREEZING IT SHALL BE SET A MINIMUM OF THREE FEET BELOW GRADE. THE NON-CORROSIVE STEPS SHALL BE PLACED AT 18" APART. THE CHAMBER VENT AND OUTLET VENT SHALL RETURN TO THE INSIDE OF THE BUILDING AND EXTEND THROUGH THE ROOF.
2. IN OPEN PARKING GARAGES OR OPEN PARKING AREAS ONLY THE INLET PIPE MAY EXTEND BELOW THE WATER LINE A MAXIMUM DISTANCE OF 6".
3. CIRCULAR BASINS ARE RECOMMENDED.

SIZING TABLE

INLET	D	A	B
4"	3'-6"	3'-0"	2'-6"
5"	3'-6" 3'-6"x3'-6" 4'-6" 3'-6"x3'-6" 4'-6"	5'-0" 4'-0" 5'-6" 3'-0" 3'-0"	4'-0" 3'-0" 3'-0" 2'-6" 2'-6"
6"	4'-0" 4'-0"x4'-0" 4'-6" 4'-6"x4'-6" 5'-0" 5'-0"x5'-0"	5'-0" 4'-0" 4'-0" 5'-6" 3'-6" 3'-0"	4'-6" 3'-6" 3'-6" 3'-0" 3'-0" 2'-6"
8"	5'-0" 5'-6"x5'-6" 6'-0" 6'-0"x6'-0" 6'-6" 6'-6"x6'-6"	6'-0" 6'-6" 6'-0" 5'-0" 5'-0" 3'-0"	5'-0" 4'-0" 3'-6" 3'-6" 3'-0" 2'-6"

DRAINAGE FROM FLOOR OR THROUGH DRAINS



11/2/20

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FOR
400 HUNNEWELL STREET
NEEDHAM, MASSACHUSETTS 02494

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TELE NO.: (508) 845-2500

SCALE:	DATE:
AS SHOWN	NOVEMBER 2, 2020

DETAIL PLAN 2/2

SHEET NO.:	PROJECT NO.:
SHEET 8 OF 8	G-597

DUCKHAM
ARCHITECTURE & INTERIORS

400 HUNNEWELL

Needham, MA

PERMIT SET - Nov, 05 2020



PROJECT DIRECTORY

OWNER:	400 Hunnewell Street, llc 14A Brooks Street Wellesley, MA 02482
ARCHITECT:	Duckham Architecture & Interiors 53 Central Avenue Needham, MA 02494 T. (781) 449-4109 Contact: Kent Duckham
LANDSCAPE ARCHITECT:	Verdant Lanscape Architecture 318 Harvard St #25 Brookline, MA 02446 T. (6171) 735-1180 Contact:
CIVIL/SITE SURVEY:	Field Resources Land Surveyor 281 Chestnut St #1 Needham, MA 02492 T. (781) 444-5936 Contact:
STRUCTURAL ENGINEER:	Dov Kirstajn, P.E. Structural Consultant 103 Beaumont Ave Newton, Ma 02460 (617) 969-3539 dkirstajnx@gmail.com
MECHANICAL ELECATRICAL FIRE PROTECTION	LVR Corporation 88 Foundry Street Wakefield, MA 01880 P 781-245-9888 C 617-719-2119 Contact: Larry Roy
GENERAL CONTRACTOR:	

DRAWING INDEX

1/8	SITE PLAN COVER SHEET
2/8	EXISTING CONDITIONS PLAN
3/8	LAYOUT PLAN
4/8	GRADING & DRAINAGE PLAN
5/8	UTILITY PLAN
6/8	EROSION & SEDIMENTATION CONTROL PLAN
7/8	DETAIL PLAN 1/2
8/8	DETAIL PLAN 2/2
A.1.0	PROPOSED BASEMENT FLOOR PLAN
A.1.1	PROPOSED FIRST FLOOR PLAN
A.1.2	PROPOSED SECOND FLOOR PLAN
A.1.4	PROPOSED ROOF PLAN
A.2.1	EXTERIOR ELEVATIONS
A.2.2	EXTERIOR ELEVATIONS

400 HUNNEWELL STREET ZONING LEGEND:

DUCKHAM
ARCHITECTURE & INTERIORS

REV: 06-24-2016

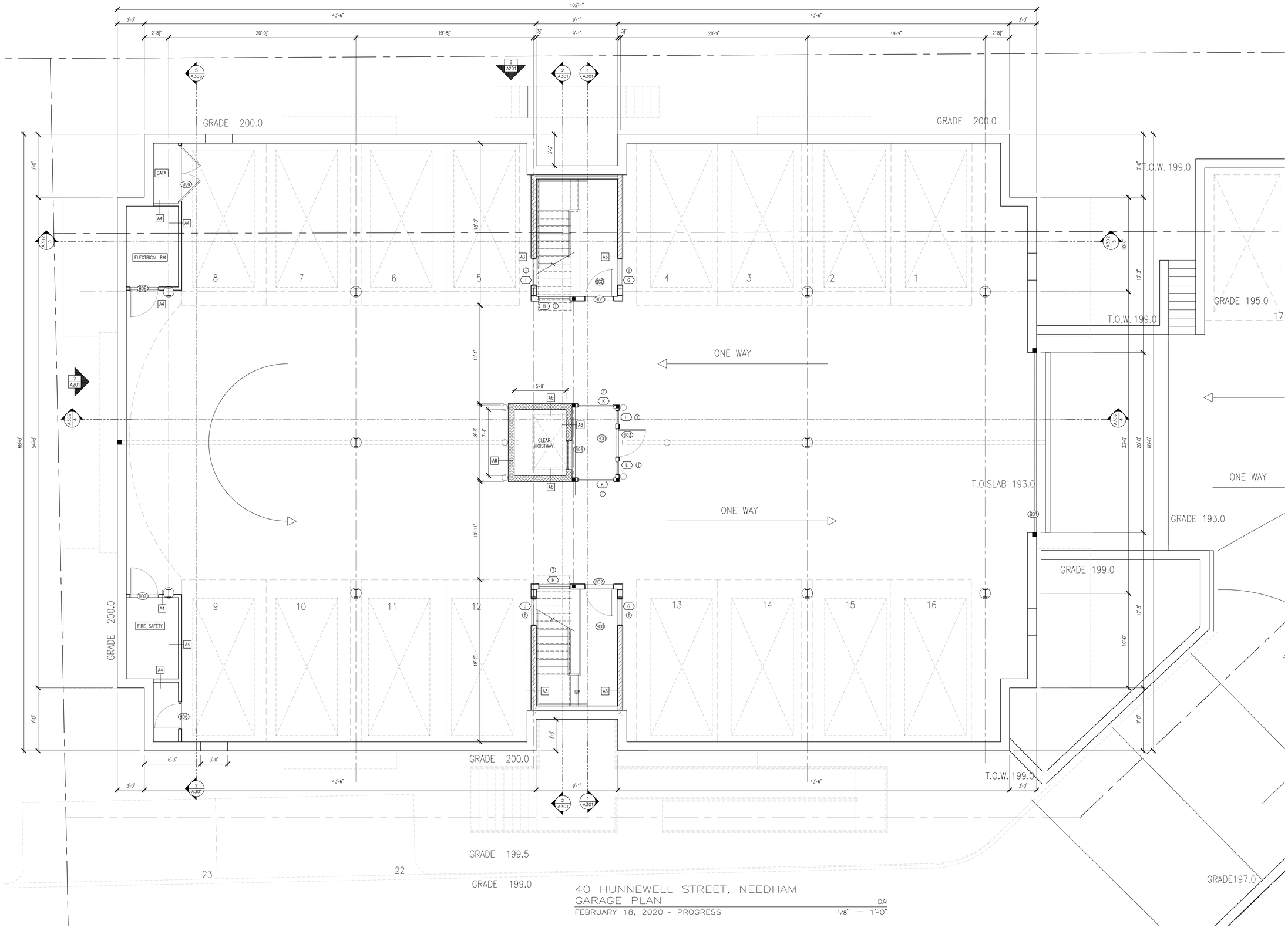
ZONING DISTRICT: HILLSIDE AVENUE BUSINESS DISTRICTS

CATEGORY	REQUIRED	EXISTING	PROPOSED
USE	N/A	OFFICE BUILDING	RESIDENTIAL (8-UNITS)
MINIMUM LOT SIZE	10,000	20,123 SQ. FT.	20,123 SQ. FT.
MINIMUM LOT FRONTAGE	80'	104.31'	104.31'
MAX GROSS AREA	14,086	8,520	14,076
MAX FLOOR AREA RATIO	0.7	0.4	0.7
MINIMUM FRONT YARD SETBACK	20'	21'	21'
MINIMUM SIDE YARD SETBACK	N/A	8.3'	8.3'
MINIMUM REAR YARD SETBACK	N/A	99.5'	80'
MAX BUILDING HEIGHT	35'	8,534 +/-	29'
MAX BUILDING HEIGHT	2 ½ STORIES	2 STORIES	2 ½ STORIES
PARKING			
a. EXISTING OFFICE	a. 28.45 (1/300)	30 SPACES	
b. PROPOSED RESIDENTIAL	b. 12 (1.5 Units)		23 SPACES

GENERAL NOTES

1. ALL WORK PERFORMED, INCLUDING MATERIALS FURNISHED, WORKMANSHIP, AND MEANS AND METHODS OF CONSTRUCTION SHALL CONFORM TO THE APPLICABLE AND THE LATEST REQUIREMENTS OF THE MASSACHUSETTS STATE BUILDING CODE AND THE APPLICABLE CITY OR TOWNSHIP, ALL LOCAL AND STATE HANDICAP AND FEDERAL REQUIREMENTS, AND GENERAL CONDITIONS PER AIA DOCUMENT #A205 AND OWNER/CONTRACTOR AGREEMENT DOCUMENT #A105.
2. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FILE ALL REQUIRED CERTIFICATES OF INSURANCE WITH THE OWNER AND THE DEPARTMENT OF BUILDINGS, OBTAIN ALL REQUIRED PERMITS, AND PAY ALL FEES REQUIRED BY THE GOVERNING AGENCIES.
3. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THAT ALL EXISTING CONDITIONS AGREE WITH THE INFORMATION SHOWN ON THE DRAWINGS. ANY CONFLICTS, OMISSIONS OR DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT FOR RESOLUTION PRIOR TO COMMENCEMENT OF ANY WORK. NO ALLOWANCES WILL SUBSEQUENTLY BE MADE ON BEHALF OF THE ARCHITECT FOR ANY ADDITIONAL EXPENSES WHICH ARE INCURRED DUE TO NEGLECT OR WHICH COULD HAVE BEEN REASONABLY FORESEEN BY PRIOR INSPECTION OF EXISTING CONDITIONS.
4. PRIOR TO COMMENCING WORK, ORDERING OF MATERIALS AND SHOP FABRICATION OF ANY MATERIALS, THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AS INDICATED ON THE DRAWINGS AND SHALL REPORT ANY DISCREPANCIES TO THE ARCHITECT FOR RESOLUTION.
5. DRAWINGS INDICATE LOCATION, DIMENSIONS, REFERENCE AND TYPICAL DETAIL FOR CONSTRUCTION. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER CONSTRUCTION OF ANY PART OF THE WORK SHALL BE INCLUDED AS IF THEY WERE INDICATED IN THE DRAWINGS, FOR CONDITIONS NOT ILLUSTRATED, NOTIFY ARCHITECTS FOR CLARIFICATION AND/OR SIMILAR DETAIL.
6. THE SCOPE OF WORK INCLUDES ALTERATION TO EXISTING FACILITIES. WORK WHICH IS OBVIOUSLY REQUIRED TO BE PERFORMED OR PROVIDE A COMPLETE AND FINISHED PRODUCT WITHIN THE SCOPE OF WORK, BUT WHICH IS NOT SPECIFICALLY INCLUDED ON THE CONTRACT DOCUMENTS, SHALL BE PERFORMED BY THE CONTRACTOR AND BE INCLUDED IN THE BID. CONTRACTOR TO INSPECT AT TIME OF DELIVERY ALL FIXTURES PROVIDED BY OWNER TO INSURE PROPER QUANTITY, THAT ITEMS ARE DEFECT FREE, AND MATCH INVOICE. CONTRACTOR TO BE RESPONSIBLE FOR INSTALLATION, WHICH MAY INCLUDE BLOCKING, SHIMMING, ETC. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE ALL ITEMS SUPPLIED BY OWNER'S VENDORS AND TO VERIFY THAT ALL MATERIALS RECEIVED ARE IN ACCORDANCE WITH THE SPECIFICATIONS, HEREIN. ANY DAMAGED ITEMS OR DISCREPANCIES BETWEEN MATERIALS SPECIFIED AND MATERIALS SHIPPED, SHALL BE REPORTED TO THE ARCHITECT PROMPTLY.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL INSTALLATIONS, CONDITIONS MATERIALS AND FINISHES WITH THE PROPOSED CONSTRUCTION AREA AND ALL ADJOINING PROPERTY AFFECTED BY CONTRACTOR'S OPERATIONS. THE CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND BRACING FOR STRUCTURAL OR REMOVAL TASKS. THE CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR ANY DAMAGE OR INJURIES CAUSED BY OR DURING THE EXECUTION OF THE WORK. ANY EXISTING MATERIALS AND FINISHES WHICH ARE DAMAGED, SHALL BE REPLACED AS NECESSARY WITH NEW MATCHING MATERIALS AT THE CONTRACTOR'S OWN COST AND EXPENSE.
8. THE CONTRACTOR SHALL DO ALL CUTTING, CHASING, CORE DRILLING, PATCHING AND REPAIRING AS REQUIRED TO PERFORM ALL THE WORK THAT MAY BE INDICATED ON THE DRAWINGS, AND ALL OTHER WORK THAT MAY BE REQUIRED TO COMPLETE THE JOB. PATCHING SHALL MATCH ADJACENT SYSTEMS, MATERIALS AND FINISHES UNLESS OTHERWISE NOTED.
9. CONTRACTOR SHALL EMPLOY ADEQUATE NUMBER OF SKILLED WORKMEN WHO ARE THOROUGHLY TRAINED AND EXPERIENCED IN THE NECESSARY CRAFTS AND WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND THE METHODS NEEDED FOR PROPER PERFORMANCE OF THE WORK. ALL WORK SHALL BE PERFORMED BY DULY LICENSED PROFESSIONALS AND AS REQUIRED BY STATE AND LOCAL GOVERNMENTS FOR EACH APPLICABLE TRADE, (PLUMBING, ELECTRICAL, ETC.), WHO SHALL ARRANGE FOR AND OBTAIN REQUIRED INSPECTIONS AND SIGN-OFFS.
10. THESE DRAWINGS ARE DIVIDED INTO SECTIONS FOR CONVENIENCE ONLY. CONTRACTOR, SUBCONTRACTORS, VENDORS AND MATERIAL SUPPLIERS SHALL REFER TO ALL RELEVANT SECTIONS IN BIDDING AND PERFORMING THEIR WORK AND SHALL BE RESPONSIBLE FOR ALL ASPECTS OF THEIR WORK REGARDLESS OF WHERE THE INFORMATION OCCURS ON THE DRAWINGS.
11. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WORK OF ALL TRADES AND SHALL PROVIDE ALL DIMENSIONS REQUIRED FOR OTHER TRADES, SUBCONTRACTORS SHALL BE RESPONSIBLE FOR COORDINATION OF THEIR WORK WITH THE WORK OF OTHERS, AND SHALL VERIFY THAT ANY WORK RELATING TO THEM WHICH MUST BE PROVIDED BY OTHERS, HAS BEEN COMPLETED AND IS ADEQUATE PRIOR TO COMMENCING WORK.
12. CONTRACTOR SHALL PROVIDE STRUCTURAL BACKING/BLOCKING FOR ALL WALL MOUNTED FIXTURES, FINISHES AND EQUIPMENT, AND FOR ALL HANGING FIXTURES, BLINDS, ETC.
13. CONTRACTOR SHALL INSTALL ALL MATERIALS AND EQUIPMENT AS PER MANUFACTURER'S WRITTEN INSTRUCTIONS AND/OR RECOMMENDATIONS.
14. CONTRACTOR SHALL AT ALL TIMES DURING THE COURSE OF THE CONTRACT KEEP ADJOINING PREMISES, INCLUDING STREETS AND OTHER AREAS ASSIGNED TO OR USED BY THE CONTRACTOR, FREE FROM ACCUMULATIONS OF WASTE MATERIALS AND RUBBISH CAUSED BY CONTRACTOR'S EMPLOYEES, SUBCONTRACTOR OR THEIR WORK.
15. CONTRACTOR SHALL ASSIST DELIVERY AND STORAGE OF OWNER SUPPLIED ITEMS, AND DISPOSE OF ANY RESULTING TRASH.
16. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL TRADES PRIOR TO INSTALLATION, AND SAMPLES OF ALL MATERIAL AND COLOR/FINISHES FOR ARCHITECT'S APPROVAL ON ANY DEVIATION/SUBSTITUTION FROM CONTRACT DOCUMENTS.
17. CONTRACTOR TO VERIFY ALL FIXTURE COUNTS, AS APPLICABLE TO THEIR CONTRACT, WITH OWNER.
18. CONTRACTOR SHALL BE RESPONSIBLE FOR CLOSEOUT, PRIOR TO FINAL PAYMENT, INCORPORATING ALL STANDARD GUARANTIES AND WARRANTIES AND ORIGINALS OF ALL APPLICABLE CERTIFICATES OF TESTING, INSPECTION, TEMPORARY FINAL CERTIFICATE OF OCCUPANCY, COORDINATE WITH OWNER.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR A THOROUGH, PROFESSIONAL CLEANING OF THE ENTIRE FACILITY PRIOR TO OWNER TAKEOVER DATE. ALL EXPOSED HORIZONTAL AND VERTICAL SURFACES INCLUDING, BUT NOT LIMITED TO THE FOLLOWING MUST BE WIPED CLEAN AND FREE OF DUST; WALLS, EXPOSED STRUCTURAL MEMBERS, STAIRS AND RAILINGS, CABINETRY. ALL FLOORS MUST BE MOPPED CLEAN.
20. CONTRACTOR TO PROVIDE 3 COPIES OF AS BUILT INFORMATION, OPERATION AND MAINTENANCE MANUALS, INCLUDING ALL PRODUCT GUARANTIES AND WARRANTIES.
21. CONTRACTOR TO KEEP A SET OF THE MOST CURRENT DRAWINGS ON SITE AT ALL TIMES.

201919
400 HUNNEWELL ST
DUCKHAM
09.10.2020



40 HUNNEWELL STREET, NEEDHAM
GARAGE PLAN

FEBRUARY 18, 2020 - PROGRESS

DAI

1/8" = 1'-0"

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DUCKHAM
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Telephone: 781-449-4109

www.kentduckham.com

Architecture & Interior Design

KENT L. DUCKHAM REGISTERED ARCHITECT No. 9858 COMMONWEALTH OF MASSACHUSETTS

PERMIT SET

DRAWING NOT FOR CONSTRUCTION

SEPTERMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

**400 Hunnewell Street
Needham, MA**

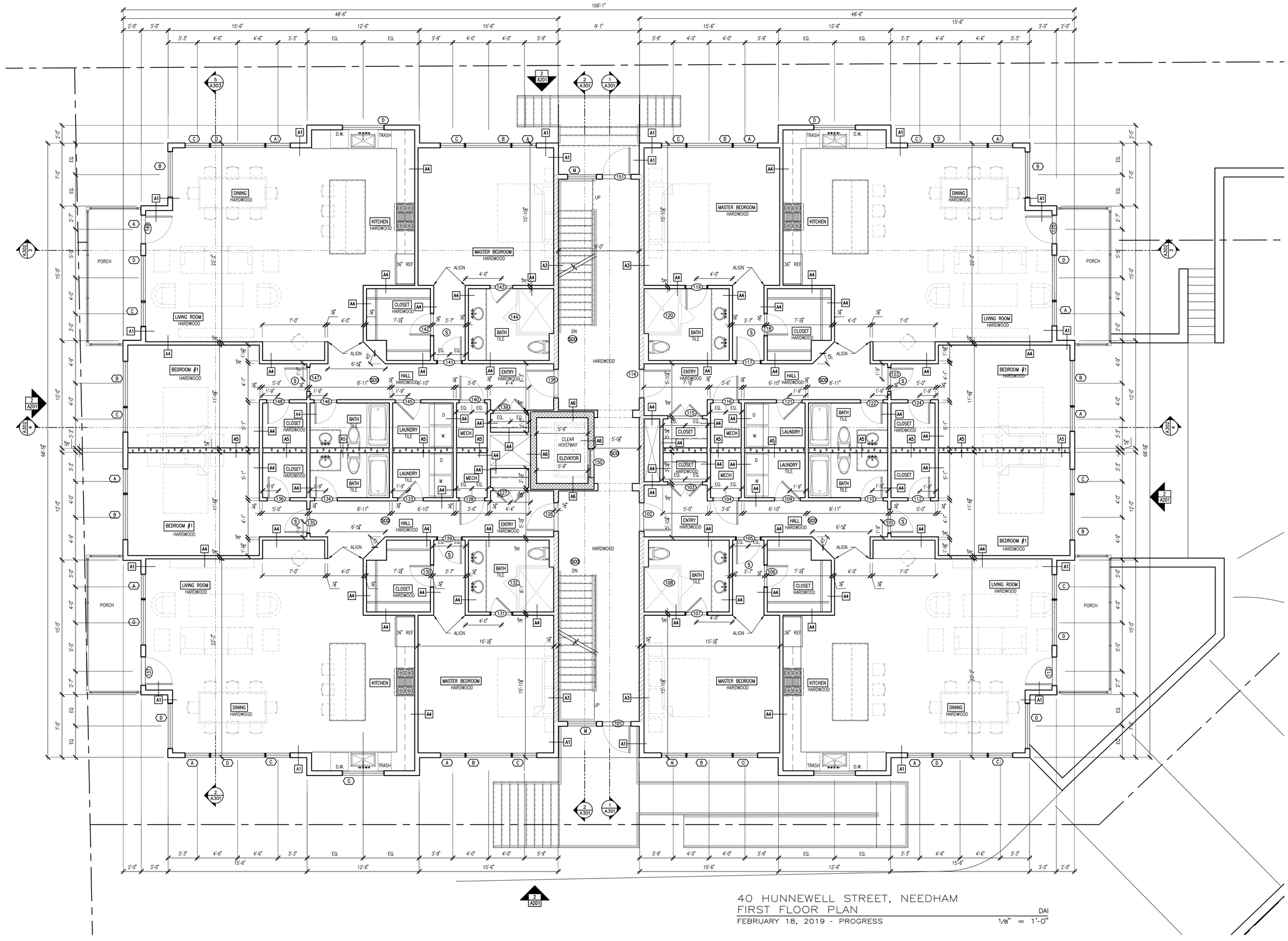
LOWER LEVEL
GARAGE PLAN

Drawing Scale:
1/4"=1'-0"

Project Number:
201919.00

Date Issued:
11.05.2020

A.B.1



40 HUNNEWELL STREET, NEEDHAM
FIRST FLOOR PLAN
FEBRUARY 18, 2019 - PROGRESS

DAI
1/8" = 1'-0"

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SEPTEMBER 10, 2020

Issues
Number Date Description

Revisions
Number Date Description

Checked by :

Drawn by : JRM

**400 Hunnewell Street
Needham, MA**

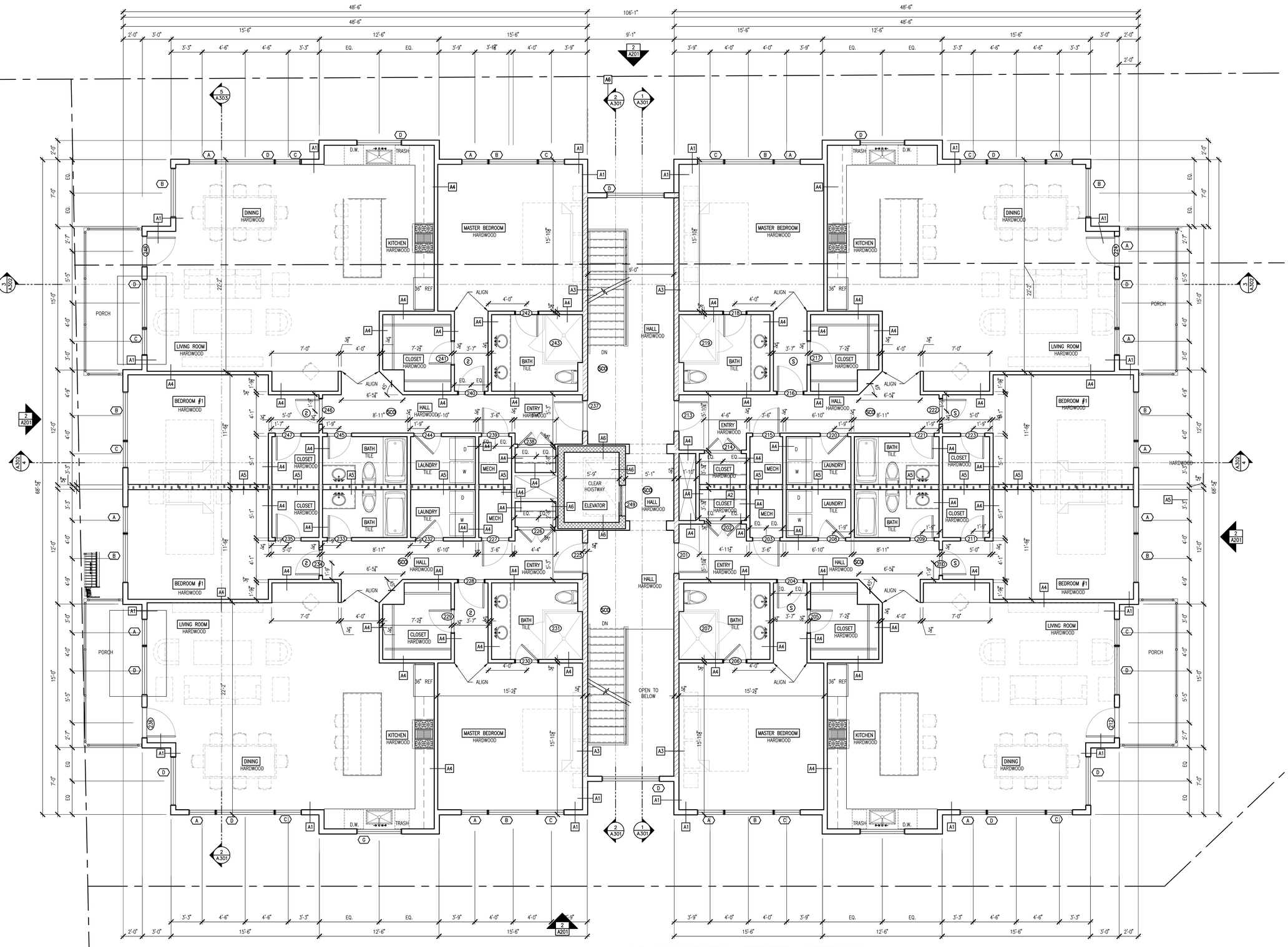
1st FLOOR PLAN

Drawing Scale:
1/4"=1'-0"

Project Number:
201919.00

Date Issued:
11.05.2020

A.1.1



40 HUNNEWELL STREET, NEEDHAM
SECOND FLOOR PLAN
FEBRUARY 18, 2020 - PROGRESS
DAI
1/8" = 1'-0"

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SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street Needham, MA

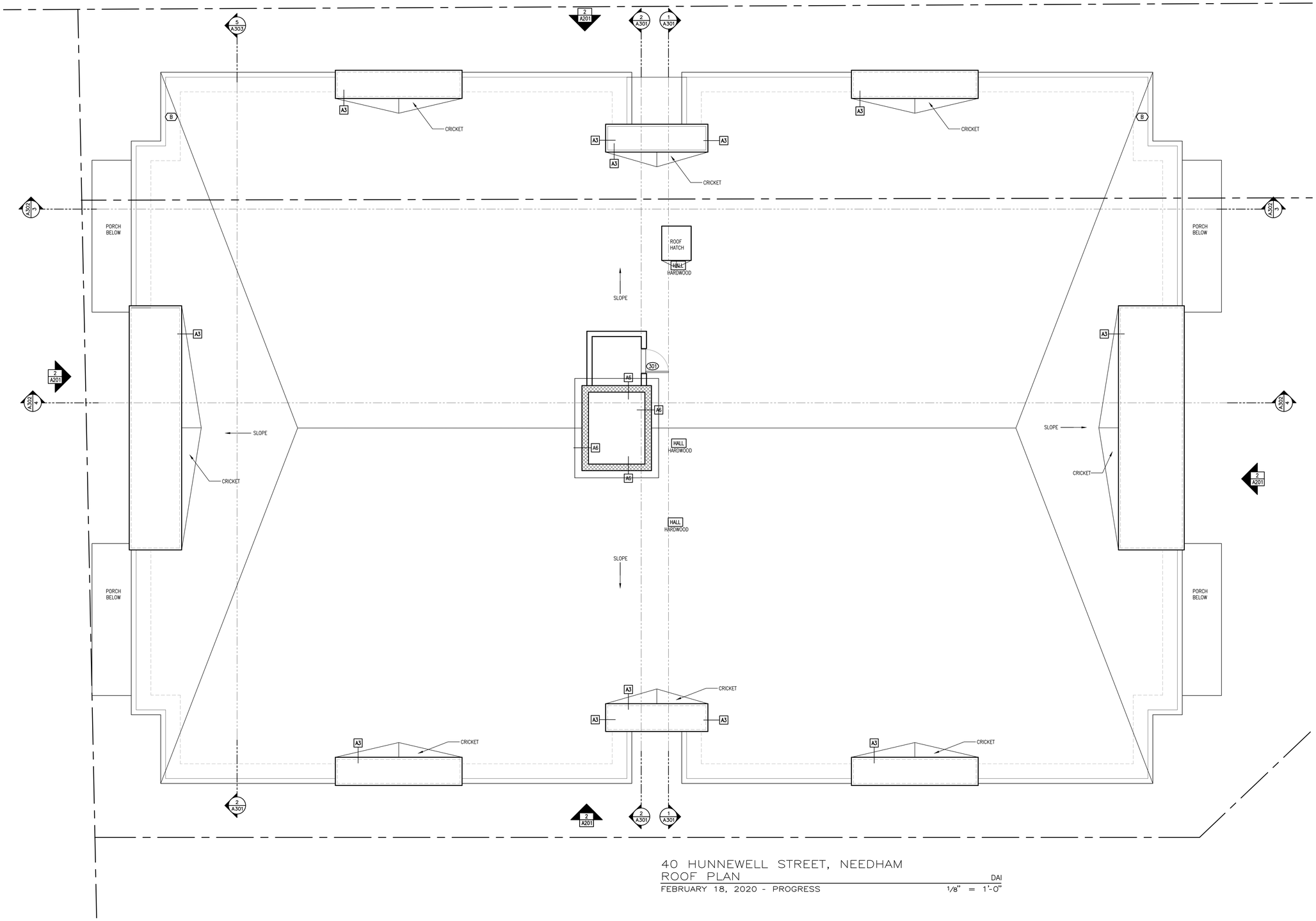
2nd FLOOR PLAN

Drawing Scale: 1/4"=1'-0"

Project Number: 201919.00

Date Issued: 11.05.2020

A.1.2



40 HUNNEWELL STREET, NEEDHAM
ROOF PLAN
FEBRUARY 18, 2020 - PROGRESS

DAI
1/8" = 1'-0"

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DRAWING NOT FOR CONSTRUCTION
SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street
Needham, MA

ROOF PLAN

Drawing Scale:
1/4"=1'-0"

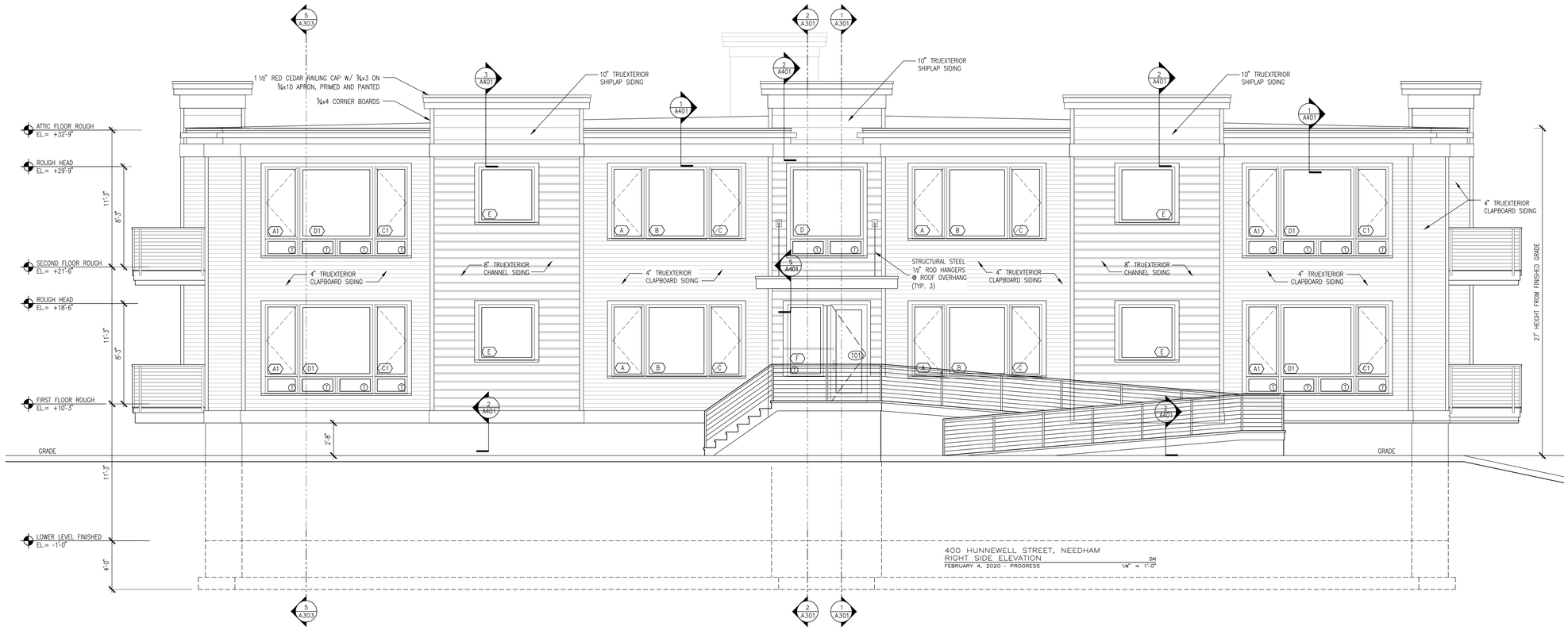
Project Number:
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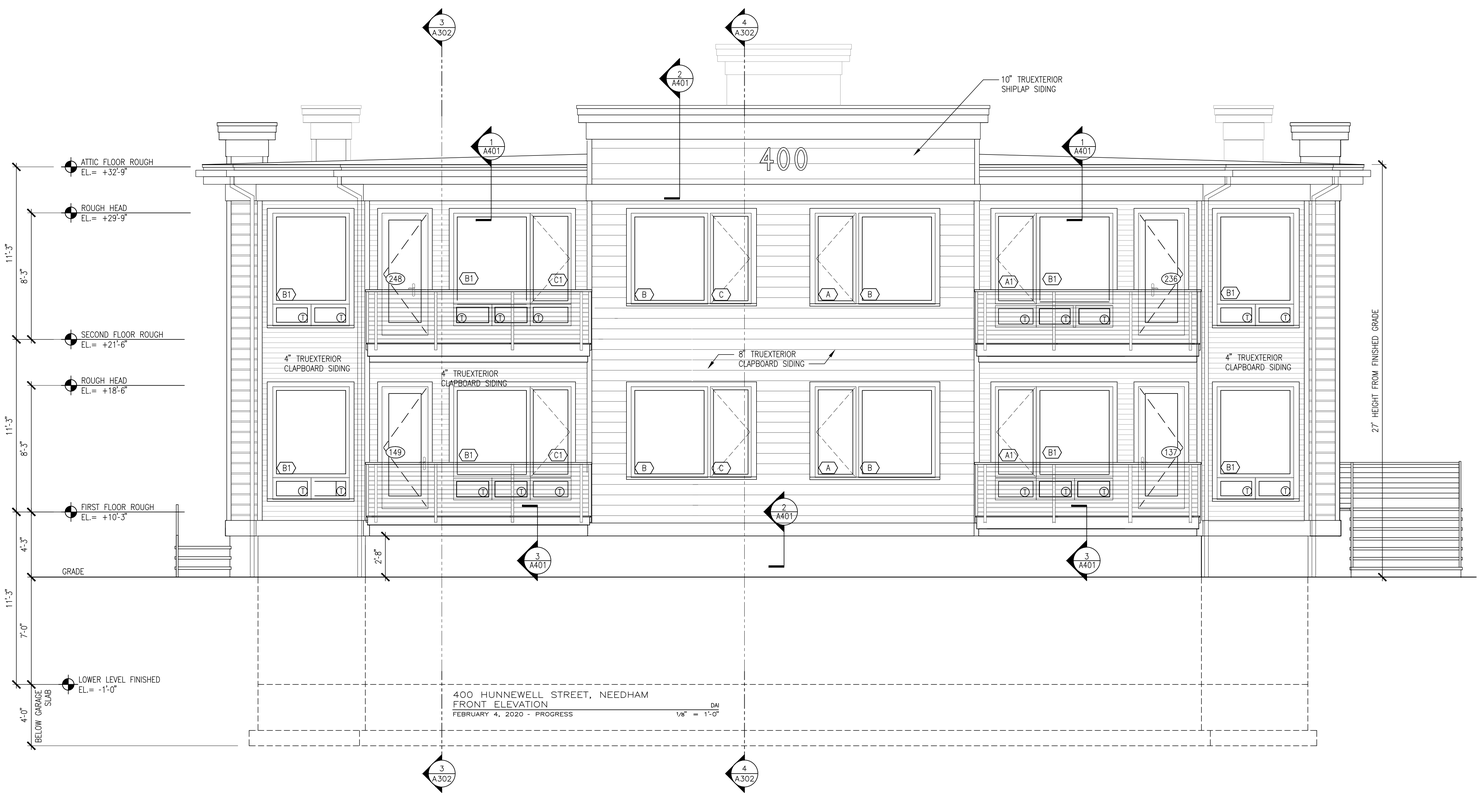
Date Issued:
11.05.2020

A.1.3

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DRAWING NOT FOR CONSTRUCTION
SEPTEMBER 10, 2020

Issues

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Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street
Needham, MA

PROPOSED ELEVATIONS

Drawing Scale:

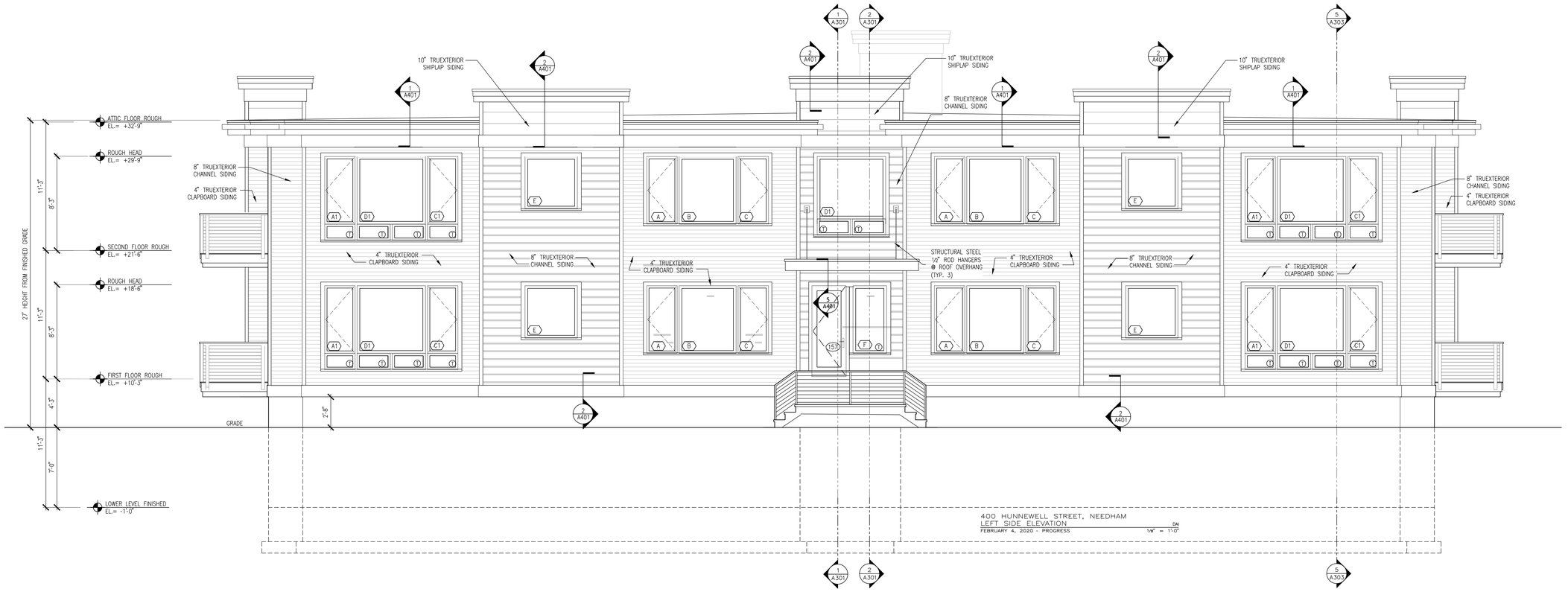
Project Number:
201919.00

Date Issued:
11.05.2020

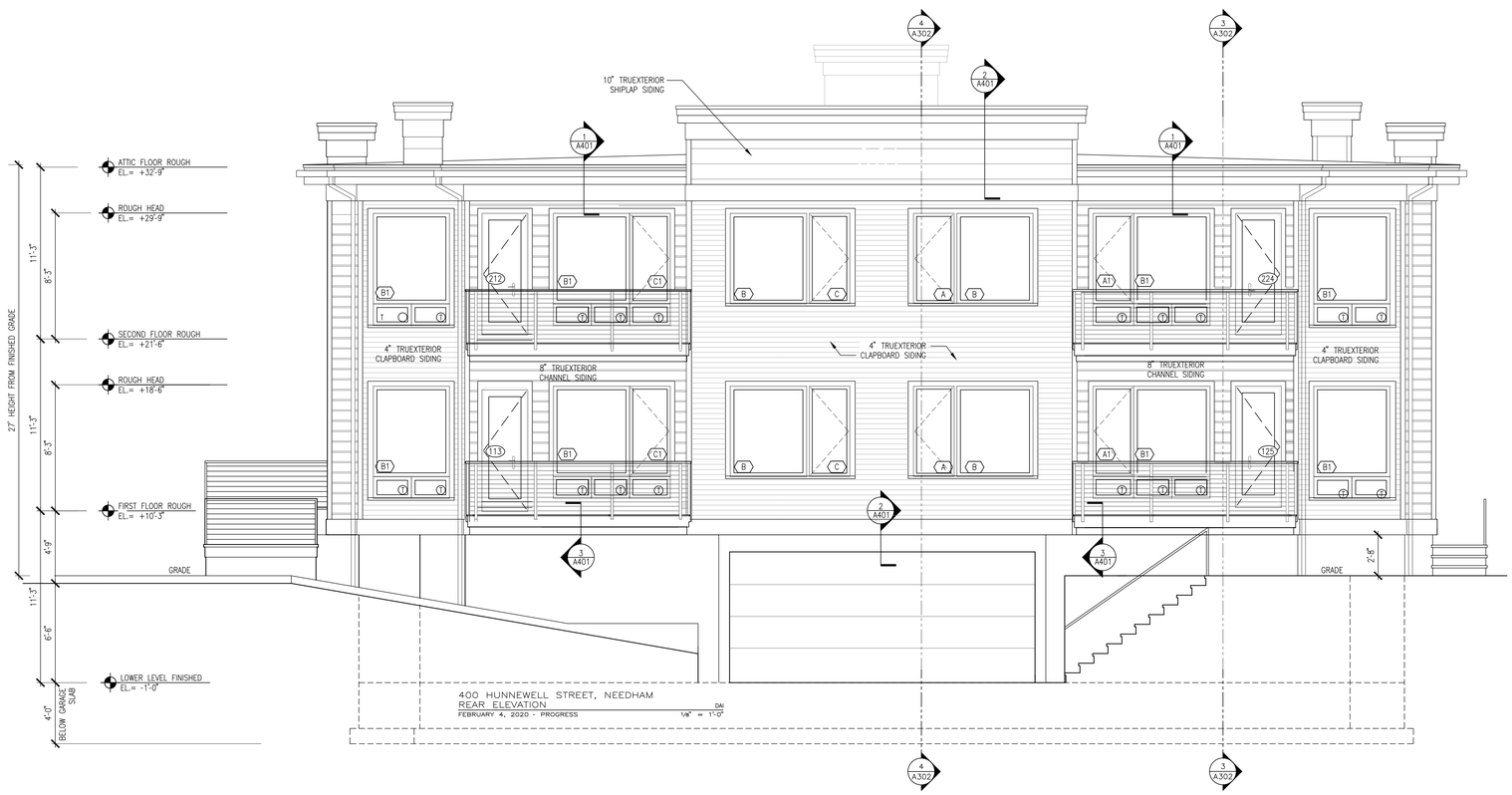
A201

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400 HUNNEWELL STREET, NEEDHAM
LEFT SIDE ELEVATION
FEBRUARY 4, 2020 - PROGRESS
DAI
1/8" = 1'-0"



400 HUNNEWELL STREET, NEEDHAM
REAR ELEVATION
FEBRUARY 4, 2020 - PROGRESS
DAI
1/8" = 1'-0"

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Architecture & Interior Design

PERMIT SET
DRAWING NOT FOR CONSTRUCTION
SEPTEMBER 10, 2020

Issues

Number	Date	Description

Revisions

Number	Date	Description

Checked by :

Drawn by : JRM

400 Hunnewell Street
Needham, MA

PROPOSED ELEVATIONS

Drawing Scale:

Project Number:
201919.00

Date Issued:
11.05.2020

A202

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Stepping Stones connect building entrance to sidewalk



Amelanchier grandiflora - habitat planting for pollinators and birds



Privacy Wood Board Fence with or without Lattice Topper



Slender Silhouette
Sweet Gum
Accents architecture

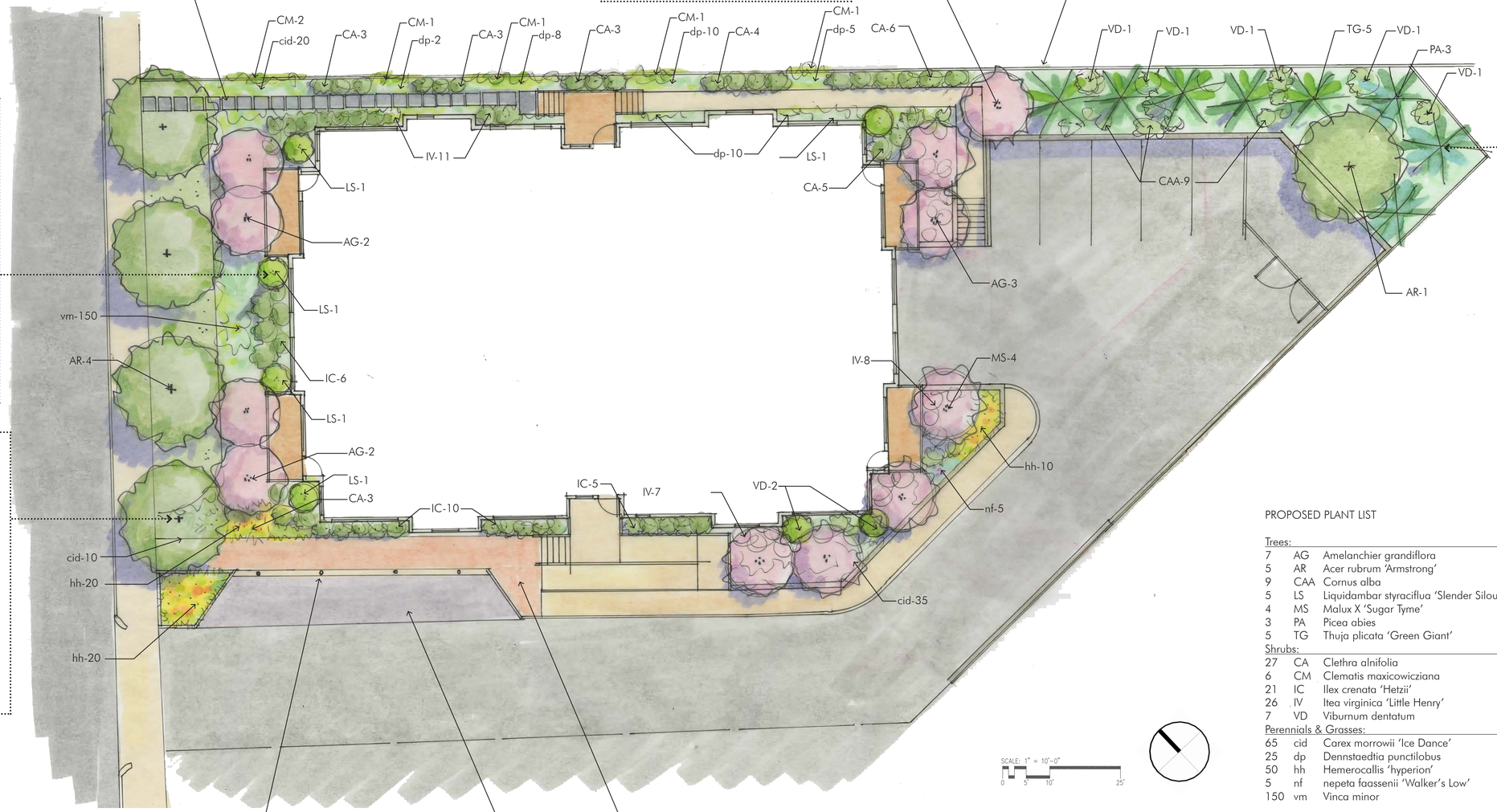


Armstrong Red Maple



Evergreen Screening Planting
Green Giant Cedar and
Norway Spruce







Bollard Lights at HC Parking



Precast Permeable Concrete Pavers - accent walk from HC parking with different colors.

PROPOSED PLANT LIST

Trees:					
7	AG	Amelanchier grandiflora	Serviceberry	8-10' ht.	B&B
5	AR	Acer rubrum 'Armstrong'	Armstrong Red Maple	3-3.5"cal.	B&B
9	CAA	Cornus alba	White Dogwood	2.5-3" cal.	B&B
5	LS	Liquidambar styraciflua 'Slender Silouette'	Fastigiate Sweetgum	3-3.5" cal.	B&B
4	MS	Malux X 'Sugar Tyme'	Sugar Tyme Crabapple	2.5-3" cal.	B&B
3	PA	Picea abies	Norway Spruce	8-10' ht.	B&B
5	TG	Thuja plicata 'Green Giant'	Green Giant Arborvitea	8-10' ht.	B&B
Shrubs:					
27	CA	Clethra alnifolia	Sweet Pepperbush	3 gal.	Pots
6	CM	Clematis maxicowicziana	Sweet Autumn Clematis	3 gal.	Pots.
21	IC	Ilex crenata 'Hetzii'	Hetz Japanese Holly	18-24" ht.	Pots
26	IV	Itea virginica 'Little Henry'	Little Henry Virginia Sweetspire	24" ht.	Pots
7	VD	Viburnum dentatum	Arrowwood Viburnum	3-4' ht.	B&B
Perennials & Grasses:					
65	cid	Carex morrowii 'Ice Dance'	Ice Dance Sedge	2" plug	12" o.c.
25	dp	Dennstaedtia punctilobus	Hayscented Fern	2 gal.	18" o.c
50	hh	Hemerocallis 'hyperion'	Daylily Hyperion	2 gal.	12" o.c.
5	nf	nepeta faassenii 'Walker's Low'	Catmint	2 gal.	12" o.c.
150	vm	Vinca minor	Myrtle	2 gal.	18" o.c.



VERDANT
LANDSCAPE ARCHITECTURE

LANDSCAPE PLAN
400 HUNNEWELL ST
NEEDHAM, MA
DECEMBER 2020

LI

From: John Schlittler
To: Alexandra Clee; David Roche; Anthony DelGaizo
Subject: RE: Request for comment - 400 Hunnewell
Date: Friday, December 4, 2020 2:20:03 PM

If I am reading the plan correctly the Armstrong Maple would be at the exit of the lot onto Hunnewell St? If so, I am worried about this impeding the vision of vehicle operators exiting the lot. This is a tricky lot already with the train bridge and don't want it to impact it any further. Just not sure I have layout correct.

From: Alexandra Clee <aclee@needhamma.gov>
Sent: Friday, December 4, 2020 12:14 PM
To: David Roche <droche@needhamma.gov>; Anthony DelGaizo <ADelgaizo@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Carys Lustig <clustig@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>
Subject: RE: Request for comment - 400 Hunnewell

Dear all, I have just received the Landscaping Plan for this project. It is attached to this email and is also located in the K drive in the relevant project folder. K:\Planning_400Hunnewell

Accordingly, please find attached:

1. Plan prepared by Verdant Landscape Architecture, entitled "Landscape Plan, 400 Hunnewell Street, Needham MA," dated December, 2020.

Thanks, alex.

Alexandra Clee
Assistant Town Planner
Needham, MA
www.needhamma.gov

From: Alexandra Clee
Sent: Tuesday, November 24, 2020 10:36 AM
To: David Roche <droche@needhamma.gov>; Anthony DelGaizo <ADelgaizo@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Carys Lustig <clustig@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>
Subject: RE: Request for comment - 400 Hunnewell

Dear all,

I received the attached revised Layout Plan from the petitioner. The earlier Layout Plan did not delineate the surface parking spaces. I have also added this plan to the folder in the K drive.

Accordingly, please find attached:

1. Plan prepared by Field Resources, 281 Chestnut Street, Needham, MA, entitled "Layout Plan showing proposed Structure," dated March 5, 2020, revised April 6, 2020, November 5, 2020 and November 20, 2020.

Thanks, alex.

_____
Alexandra Clee
Assistant Town Planner
Town of Needham
Google Voice Phone: 339-225-9522
**** Please note: Due to Covid-19, I am working primarily remotely. Email is the quickest way to reach me.**

From: Alexandra Clee
Sent: Monday, November 23, 2020 11:06 AM
To: David Roche <droche@needhamma.gov>; Anthony DelGaizo <ADelgaizo@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Carys Lustig <clustig@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>
Subject: Request for comment - 400 Hunnewell

Dear all,

The Planning Board will be holding a hearing on proposal for a Major Project Site Plan Special Permit at 400 Hunnwell. More information is included in the submitted documents, detailed below, which can be found attached to this email and also at this location K:\Planning_400Hunnewell. (some of you will receive a hard copy in the inter-office mail as well).

The documents attached for your review are:

1. Application submitted by Hunnewell Needham, LLC.
2. Addendum A.
3. Letter from George Giunta Jr. Attorney, dated November 5, 2020
4. Plan set prepared by Field Resources, 281 Chestnut Street, Needham, MA, J.M. Grenier Associates, Inc., 325 Donald Lynch Blvd., Suite 100, Marlborough, MA, 01752, consisting of 8 sheets: Sheet 1, Cover Sheet, dated November 2, 2020; Sheet 2, entitled "Existing Conditions Plan of Land," dated March 5, 2020, revised April 6, 2020 and November 5, 2020; Sheet 3, entitled "Layout Plan

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6. Stormwater Management Report, prepared by J.M. Grenier Associates, Inc., 325 Donald Lynch Blvd., Suite 100, Marlborough, MA, 01752, dated November 2, 2020. ***This item is not attached and is located in the K drive at the link provided above.***

The hearing is scheduled for December 15, 2020. If you wish to comment, please submit your comment by Wednesday December 9, 2020, so that the Petitioner has time to address any concerns or questions in advance of the hearing.

Thanks, alex.

_____
Alexandra Clee
Assistant Town Planner
Town of Needham
500 Dedham Avenue
Needham, MA 02492
781-455-7550 Ext 271
Needhamma.gov

From:	Tara Gurge
To:	Alexandra Clee
Subject:	RE: Public Health Division comments RE: 400 Hunnewell St. Special Permit
Date:	Thursday, December 10, 2020 2:47:13 PM
Attachments:	image002.png image003.png
Importance:	High

Alex –

Here are the Public Health Division's comments re: **Major Project Site Plan Special Permit for the property located at 400 Hunnwell St.** See comments below:

- Prior to demolition, we will need to ensure that the applicant fills out the online Demolition permit form, through the Building Dept., via ViewPoint Cloud, and submits the Demolition review fee, along with uploading the required supplemental demolition report documents online for our review and approval (as noted on the form.)
- Ensure that a licensed pest control service company is contracted and will conduct routine site visits to the site, first initially to bait the interior/exterior prior to demolition, and also continue to make routine site visits (to re-bait/set traps) throughout the duration of the construction project. Pest reports must be submitted on an on-going basis for review.
- Please ensure that sufficient space is provided to accommodate a separate Trash Dumpster and a separate Recycling Dumpster, per Needham Board of Health Waste Hauler regulation requirements. These covered waste containers must be kept clean and maintained, and be placed on a sufficient service schedule in order to contain all waste produced on site. These containers may not cause any potential public health and safety concerns with attraction of pest activity due to improper cleaning and maintenance.
- Proposed additional lighting on site shall not cause a public health nuisance, with lighting being allowed to migrate on to other abutting properties. If complaints are received, lighting may need to be adjusted so it will not cause a public health nuisance.

Please let me know if you have any questions or need any additional information on those requirements.

Thanks,



TARA E. GURGE, R.S., C.E.H.T., M.S.
ASSISTANT PUBLIC HEALTH DIRECTOR
Needham Public Health Division
Health and Human Services Department
178 Rosemary Street
Needham, MA 02494
Ph- (781) 455-7940; Ext. 211/Fax- (781) 455-7922
Mobile- (781) 883-0127
Email - tgurge@needhamma.gov
Web- www.needhamma.gov/health

please consider the environment before printing this email

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Follow Needham Public Health on Twitter!

From: Alexandra Clee <aclee@needhamma.gov>
Sent: Thursday, December 10, 2020 1:25 PM
To: David Roche <droche@needhamma.gov>; Anthony DelGaizo <ADelgaizo@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Carys Lustig <clustig@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>
Subject: RE: Request for comment - 400 Hunnewell

Reminder to submit comments on 400 Hunnewell if you have not yet and wish to. I will need them by tomorrow morning to go in Planning Board packets.

Thanks!

_____
Alexandra Clee
Assistant Town Planner
Town of Needham
Google Voice Phone: 339-225-9522
**** Please note: Due to Covid-19, I am working primarily remotely. Email is the quickest way to reach me.**

From: Alexandra Clee
Sent: Monday, November 23, 2020 11:06 AM
To: David Roche <droche@needhamma.gov>; Anthony DelGaizo <ADelgaizo@needhamma.gov>; Timothy McDonald <tmcdonald@needhamma.gov>; John Schlittler <JSchlittler@needhamma.gov>; Dennis Condon <DCondon@needhamma.gov>; Carys Lustig <clustig@needhamma.gov>
Cc: Lee Newman <LNewman@needhamma.gov>; Elisa Litchman <elitchman@needhamma.gov>; Thomas Ryder <tryder@needhamma.gov>; Tara Gurge <TGurge@needhamma.gov>
Subject: Request for comment - 400 Hunnewell

Dear all,

The Planning Board will be holding a hearing on proposal for a Major Project Site Plan Special Permit at 400 Hunnwell. More information is included in the submitted documents, detailed below, which can be found attached to this email and also at this location K:\Planning_400Hunnewell. (some of you will receive a hard copy in the inter-office mail as well).

The documents attached for your review are:

1. Application submitted by Hunnewell Needham, LLC.
2. Addendum A.
3. Letter from George Giunta Jr. Attorney, dated November 5, 2020
4. Plan set prepared by Field Resources, 281 Chestnut Street, Needham, MA, J.M. Grenier Associates, Inc., 325 Donald Lynch Blvd., Suite 100, Marlborough, MA, 01752, consisting of 8 sheets: Sheet 1, Cover Sheet, dated November 2, 2020; Sheet 2, entitled "Existing Conditions Plan of Land," dated March 5, 2020, revised April 6, 2020 and November 5, 2020; Sheet 3, entitled "Layout Plan showing proposed Structure," dated March 5, 2020, revised April 6, 2020 and November 5, 2020; Sheet 4, entitled "Grading and Drainage Plan," dated November 2, 2020; Sheet 5, entitled "Utility Plan," dated November 2, 2020; Sheet 6, entitled "Erosion and Sediment Control Plan," dated November 2, 2020; Sheet 7, entitled "Details ½," dated November 2, 2020; Sheet 8, entitled "Details 2/2," dated November 2, 2020.
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The hearing is scheduled for December 15, 2020. If you wish to comment, please submit your comment by Wednesday December 9, 2020, so that the Petitioner has time to address any concerns or questions in advance of the hearing.

Thanks, alex.

_____

Alexandra Clee
Assistant Town Planner
Town of Needham
500 Dedham Avenue
Needham, MA 02492

781-455-7550 Ext 271
Needhamma.gov

TOWN OF NEEDHAM
TOWN HALL
1471 Highland Avenue
Needham, MA 02492-2669

Design Review Board

Memo: Major Project Site Plan Review, 400 Hunnewell Street
December 7, 2020

The Board reviewed the design drawings for the new building proposed for this site.

The proposed building is an 8-unit apartment building with below grade parking under the apartments and a small amount of grade parking.

There was a question about setbacks, the applicant explained the requirements for the zone the building is in. There are not side setback requirements.

The Board asked about the site plan layout, and there was discussion of the driveway slope. The applicant estimated it to be 8%. There is limited area for the driveway to reach the lower level due to the shared access requirements with the adjacent property. The slope was a concern especially during winter. Snow removal will be important. The Board asked whether the applicant was planning to heat the driveway. They are not.

The landscaping was reviewed, and the Board thought it was a lush and included a nice variety of materials. There was a question about the size of the canopy for the tree selection in the planting area between the building and the sloped drive area. The was concern it would be wide enough to interfere with cars passing. Since the planting bed will actually be raised from the level of the drive, the Board found it acceptable.

The Board discussed the building height compared to the existing building. The finish wall material selections were discussed. The balcony railing materials were not certain at this time, they will be metal railings, with small scale infill piping or cables.

There was not a lighting plan for the Board to review. The applicant stated they plan only accent lighting, not extensive site lighting.

The project was approved in total as presented; the Board presents these comments for the Planning Boards consideration.

End of Notes

TOWN OF NEEDHAM, MASSACHUSETTS
PUBLIC WORKS DEPARTMENT
500 Dedham Avenue, Needham, MA 02492
Telephone (781) 455-7550 FAX (781) 449-9023

December 14, 2020

Needham Planning Board
Needham Public Service Administration Building
Needham, MA 02492

RE: Major Project Special Permit
400 Hunnewell- Children's Hospital

Dear Members of the Board,

The Department of Public Works has completed its review of the above referenced request for a Major Project Special Permit. The applicant requests to redevelop a 20,123 square foot commercial facility at 400 Hunnewell Street and in its place construct an 8-unit residential building.

The review was conducted in accordance with the Planning Board's regulations and standard engineering practice. The documents submitted for review are as follows:

1. Application submitted by Hunnewell Needham, LLC.
2. Addendum A.
3. Letter from George Giunta Jr. Attorney, dated November 5, 2020
4. Plan set prepared by Field Resources, 281 Chestnut Street, Needham, MA, J.M. Grenier Associates, Inc., 325 Donald Lynch Blvd., Suite 100, Marlborough, MA, 01752, consisting of 8 sheets: Sheet 1, Cover Sheet, dated November 2, 2020; Sheet 2, entitled "Existing Conditions Plan of Land," dated March 5, 2020, revised April 6, 2020 and November 5, 2020; Sheet 3, entitled "Layout Plan showing proposed Structure," dated March 5, 2020, revised April 6, 2020 and November 5, 2020; Sheet 4, entitled "Grading and Drainage Plan," dated November 2, 2020; Sheet 5, entitled "Utility Plan," dated November 2, 2020; Sheet 6, entitled "Erosion and Sediment Control Plan," dated November 2, 2020; Sheet 7, entitled "Details ½," dated November 2, 2020; Sheet 8, entitled "Details 2/2," dated November 2, 2020.
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6. Stormwater Management Report, prepared by J.M. Grenier Associates, Inc., 325 Donald Lynch Blvd., Suite 100, Marlborough, MA, 01752, dated November 2, 2020.

Our comments and recommendations are as follows:

- The landscape plan should be revised to eliminate the proposed the Armstrong Red Maple nearest to the exit of drive to accommodate better traffic visibility.

- As part of the NPDES requirements, the applicant will need to comply with the Public Out Reach & Education and Public Participation & Involvement control measures. The applicant shall submit a letter to the DPW identifying the measures selected and dates by which the measures will be completed in order to incorporate it into the Planning Board's decision.

If you have any questions regarding the above, please contact our office at 781-455-7538.

Truly yours,

Thomas Ryder
Assistant Town Engineer

December 4, 2020

Ms. Lee Newman

Planning Director/ Zoning Board

Town Hall Room 20

Needham, MA 02492

Re: 400 Hunnewell Street

Dear Ms. Newman,

We are residents of the condominium complex at 160 Hillside Avenue, units 6,7,8. We have received notice of an application for a site plan review regarding construction at 400 Hunnewell Street which abuts our homes.

Having reviewed the plan documents and architectural drawings, we have some concerns:

1. The height of the planned building seems to be 29' to the attic floor. The present commercial building has an approximate height of 21'. Since the proposed new building will be so close to the property line, additional height will significantly block sunlight, leaving the back of our units (bedrooms and living rooms) in perpetual shadow. This height change will impact the natural light intake into approximately 75% of our homes. This is a matter of great concern, raising quality of life issues. We have strong objections to the proposed height increase.
2. Is a variance necessary to raise the height to 29' as indicated in the plans?
3. Is the building to be razed actually in the business district and, if so, what are the height limitations of this district?
4. One of the drawings shows a section "Fill of Derbis". We assume that should be "debris". The question is, what kind of debris will be used for fill? There are environmental concerns.

We expect to participate in the Zoom meeting on the December 15, 2020.

Thank you for addressing these concerns.

Sincerely,

Bette Vogel

Rushit Kamani

Annie Atlas

Bette Vogel

bgmusic@outlook.com

STORMWATER ANALYSIS AND CALCULATIONS REPORT

for

390 GROVE STREET
NEEDHAM, MASSACHUSETTS

Prepared for:

Moritz Schmidt
390 Grove Street
Needham, Massachusetts 02492

Prepared by:

Meridian Associates, Inc.
500 Cummings Center, Suite 5950
Beverly, Massachusetts 01915
(978) 299-0447

October 4, 2019
Revised: November 24, 2020

MERIDIAN ASSOCIATES

TABLE OF CONTENTS

Calculation Methods

Source of Data

Report Summary:

* Calculation Objectives
* Selection of Storm Events
* Classification of Soils
* Existing Conditions Overview
* Proposed Conditions Overview
* Performance of Peak Rate Runoff
* Conclusion

Stormwater Analysis:

* Existing Conditions
  - Watershed Routing Diagram
  - 2-Year 24 Hour Storm Event Analysis
  - 10-Year 24 Hour Storm Event Analysis
  - 20-Year 24 Hour Storm Event Analysis
  - 100-Year 24 Hour Storm Event Analysis

* Proposed Conditions
  - Watershed Routing Diagram
  - 2-Year 24 Hour Storm Event Analysis
  - 10-Year 24 Hour Storm Event Analysis
  - 20-Year 24 Hour Storm Event Analysis
  - 100-Year 24 Hour Storm Event Analysis

Appendix:

* Pre-Development Drainage Plan
* Post-Development Drainage Plan
* NRCS – Soils Map
* Operation and Maintenance & Erosion and Sedimentation Control Program

CALCULATION METHODS

- TR 20 SCS Unit Hydrograph Procedure
- Runoff Curve Numbers
- Time of Concentration by TR55 Methodology
- Reach and Pond Rating by the Dynamic Storage-Indication Method
- Manning Equation

SOURCE OF DATA

- Technical Report No. 20
- Technical Report No. 55
- Technical Paper No. 40
- Field Survey and Soil Testing by Meridian Associates, Inc.
- Massachusetts Stormwater Handbook February 2008

REPORT SUMMARY:

This project proposes the razing of an existing single-family dwelling and the construction of a new two-lot subdivision with a proposed entry road and associated grading.

Calculation Objective

The purpose of this drainage analysis is to design a stormwater management system that maintains and/or reduces the peak rates and volumes of stormwater runoff from pre-development conditions in the post development conditions for the 2, 10, 20, and 100-year design storm events

The proposed stormwater management system designed for this project will consist of deep sump catch basins, drain manholes and one (1) subsurface infiltration system to infiltrate the runoff from the two (2) lots and the roadway. There is also one (1) subsurface infiltration basin proposed to infiltrate the runoff from for each of the two (2) proposed dwellings. The systems have been designed to infiltrate stormwater runoff for all the required design storms. The installation of the subsurface infiltration systems will allow the proposed site improvements to not have an increase in stormwater runoff (rate or volume) from the site during the 2, 10, 20 and 100-year design storms.

Classification of Soils:

Existing soil conditions within the limits of the watershed analyzed for this study have been categorized as:

- Swansea muck, 0-1% Slopes, Hydrologic Group B/D
- Whitman fine sandy loam, 0-3% Slopes, extremely stony, Hydrologic Group D
- Paxton fine sandy loam, 3-8% Slopes, Hydrologic Group C
- Woodbridge fine sandy loam, 0-8% slopes, extremely stony, Hydrologic Group C/D

The classification is based upon the Natural Resource Conservation Service Maps dated May 1984. A copy of this soil map is contained in the Appendix of this report. Onsite soil testing was conducted by Meridian Associates Inc. on October 13, 2017 in the areas depicted on the attached plan. This testing revealed a loamy sand parent material.

Selection of Storm Events

The storm event frequencies and intensities have been selected based upon the Massachusetts Stormwater Guidelines and Town of Needham Stormwater Regulations requirements. The storm event rainfall data has been compiled from the Northeast Regional Climate Center “Atlas of Precipitation Extremes for the Northeastern United

States and Southeastern Canada." Rainfall frequency data has been provided as follows:

Frequency	Rainfall [24-hour event(inch)]
2-year	3.35
10-year	5.24
20-year	6.03
100-year	8.23

Existing Site Overview

The site consists of one lot (Lot 9) that has an area of approximately 5.3 acres and is mostly overgrown with wooded area along with a single-family house, grassed area, and a bituminous concrete driveway.

- **Subcatchment SC1 –** This subcatchment area consists of the existing house, existing bituminous concrete drive, and portions of proposed landscape areas. Stormwater runoff generated in this subcatchment flows westerly across the lot towards Grove Street **(DP1)**.

- **Subcatchment SC2 –** This subcatchment area consists of portions of proposed landscape areas. Stormwater runoff generated in this subcatchment flows southerly across the lot towards an abutter **(DP2)**.

- **Subcatchment SC3 –** This subcatchment area consists of portions of the existing wooded area. Stormwater runoff generated in this subcatchment flows easterly across the lot towards an abutter **(DP3)**.

Proposed Site Overview

The proposed project is comprised of the redevelopment of the existing single-family lot. The proposed development will include a new entry road, two (2) residential dwellings, new utilities and associated grassed/landscaped areas.

A formal drainage system has been designed in order to comply with the Town of Needham Stormwater Bylaw. The proposed project has been developed with the intent of maintaining the existing drainage patterns of the site to the maximum extent practicable. To mitigate any increases in rate and volume of runoff from the subject property, runoff from the proposed roofs, the proposed entry road and landscape areas will be directed to subsurface infiltration systems and to the selected Design Points during the designated storm rainfall events. The seven (7) subcatchments in the post construction scenario are as follows:

- **Subcatchment SC101 –** This subcatchment area consists of portions of the existing and proposed landscape areas. Stormwater runoff generated in this subcatchment flows westerly across the lot towards Grove Street **(DP1)**.

- **Subcatchment SC102 –** This subcatchment area consists of portions of proposed landscape areas. Stormwater runoff generated in this subcatchment flows westerly across the lot towards Grove Street **(DP1)**.

- **Subcatchment SC103 –** This subcatchment area consists of portions of the proposed paved entry road. Stormwater runoff generated in this subcatchment flows westerly across the lot towards Grove Street **(DP1)**.

- **Subcatchment SC201 –** This subcatchment area consists of portions of proposed landscape areas. Stormwater runoff generated in this subcatchment flows southerly across the lot towards an abutter **(DP2)**.

- **Subcatchment SC301 –** This subcatchment area consists of portions of the proposed landscape area and existing wooded area. Stormwater runoff generated in this subcatchment flows easterly across the lot towards an abutter **(DP3)**.

- **Subcatchment SC401 –** This subcatchment area consists of a grass swale located adjacent to the entry road. Stormwater runoff generated in this subcatchment will be directed to a catch basin and into proposed subsurface infiltration system (PSIS-1).

- **Subcatchment SC501 –** This subcatchment area consists of the proposed entry road. Stormwater runoff generated in this subcatchment will be directed to a catch basin and into proposed subsurface infiltration system (PSIS-1).

Summary of Flows at the Design Point

Design Point 1 (DP1)

Peak Rates (CFS)

DP1	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	1.4	3.1	3.9	6.1
Proposed	1.2	2.8	3.5	5.6

Peak Volumes (CF)

DP1	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	6,135	13,129	16,290	25,494
Proposed	4,389	9,585	11,993	19,082

Design Point 2 (DP2)

Peak Rates (CFS)

DP2	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	0.3	0.7	0.8	1.3
Proposed	0.2	0.6	0.7	1.2

Peak Volumes (CF)

DP2	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	946	2,127	2,670	4,268
Proposed	817	1,836	2,305	3,685

Design Point 3 (DP3)

Peak Rates (CFS)

DP3	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	2.0	4.4	5.5	8.6
Proposed	2.0	4.4	5.5	8.5

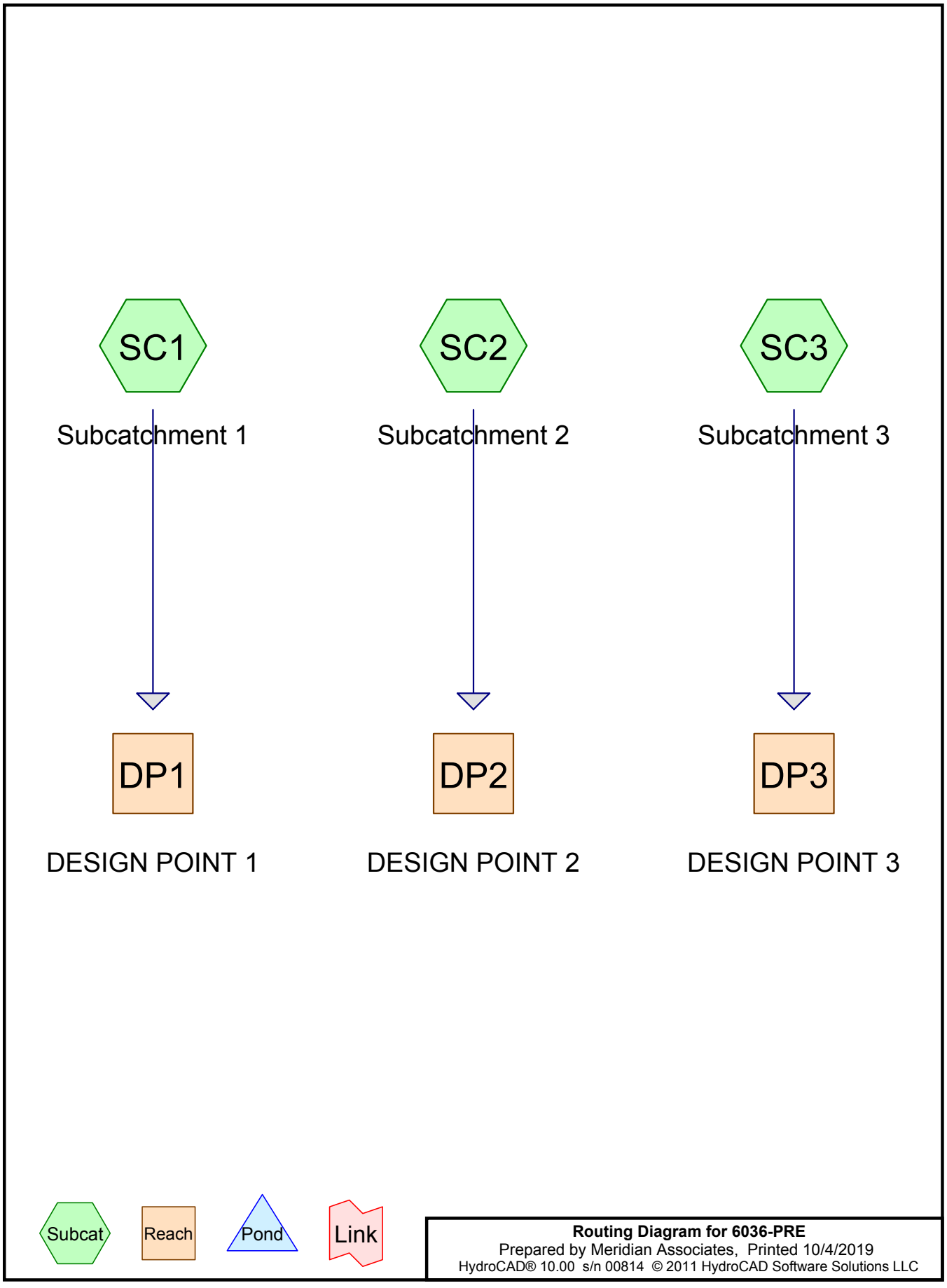
Peak Volumes (CF)

DP3	2-Year Storm	10-Year Storm	20-Year Storm	100-Year Storm
Existing	7,240	15,744	19,610	30,904
Proposed	6,881	14,725	18,270	28,593

Conclusion

The calculations for each of the selected Design Points demonstrate that proposed site improvements will not result in an increase in the peak rate or volume of stormwater runoff for the 2-year, 10-year, 20-year, or 100-year 24-hour storm events at the design point with the proposed stormwater mitigation system improvements.

EXISTING CONDITIONS
WATERSHED ROUTING DIAGRAM



Routing Diagram for 6036-PRE
Prepared by Meridian Associates, Printed 10/4/2019
HydroCAD® 10.00 s/n 00814 © 2011 HydroCAD Software Solutions LLC

EXISTING CONDITIONS
2-YEAR 24 HOUR STORM EVENT ANALYSIS

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,220	70	Woods, Good, HSG C (SC3)
60,563	74	>75% Grass cover, Good, HSG C (SC1, SC2, SC3)
57,681	77	Woods, Good, HSG D (SC3)
3,704	98	Paved parking, HSG C (SC1)
3,668	98	Roofs, HSG C (SC1)
134,836	**76**	**TOTAL AREA**

Summary for Subcatchment SC1: Subcatchment 1

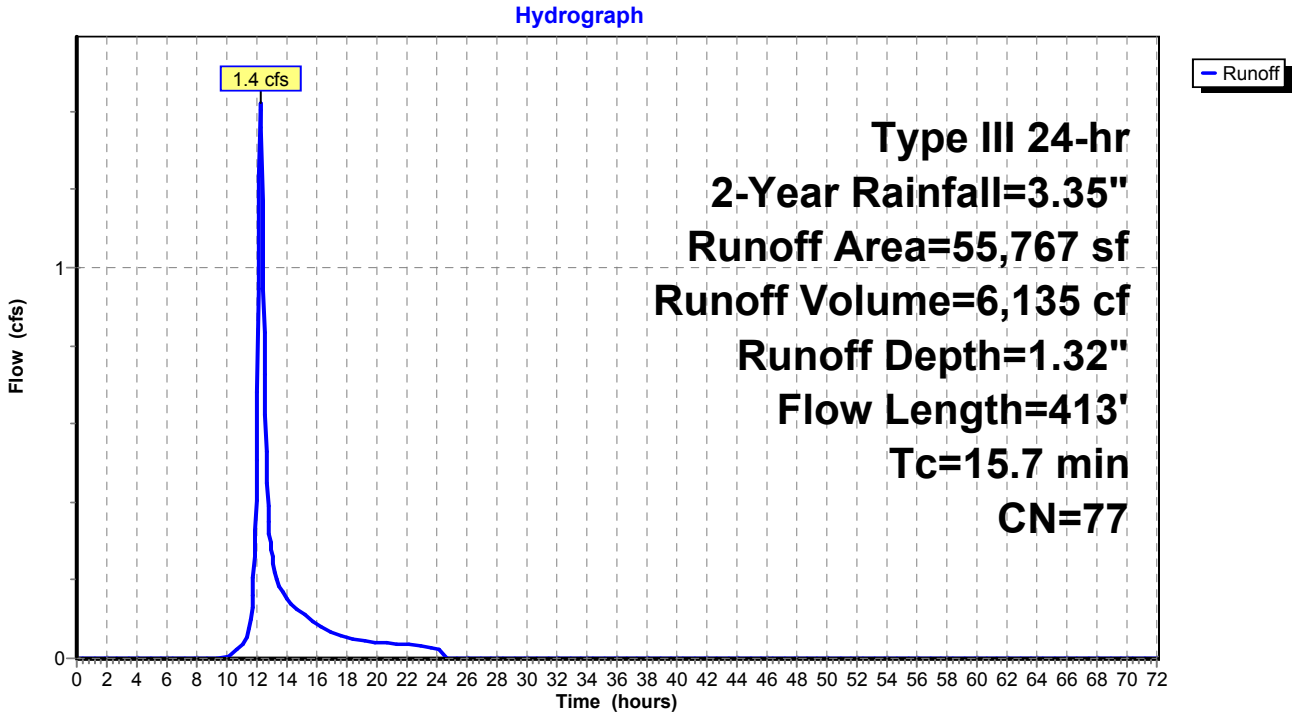
Runoff = 1.4 cfs @ 12.23 hrs, Volume= 6,135 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
48,395	74	>75% Grass cover, Good, HSG C
3,668	98	Roofs, HSG C
3,704	98	Paved parking, HSG C
55,767	77	Weighted Average
48,395		86.78% Pervious Area
7,372		13.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0030	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.7	64	0.0016	0.6		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.8	105	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Grass Steep flow** Unpaved Kv= 16.1 fps
1.0	178	0.0319	2.9		**Shallow Concentrated Flow, Grass Shallow** Unpaved Kv= 16.1 fps
15.7	413	Total			

Subcatchment SC1: Subcatchment 1



Summary for Subcatchment SC2: Subcatchment 2

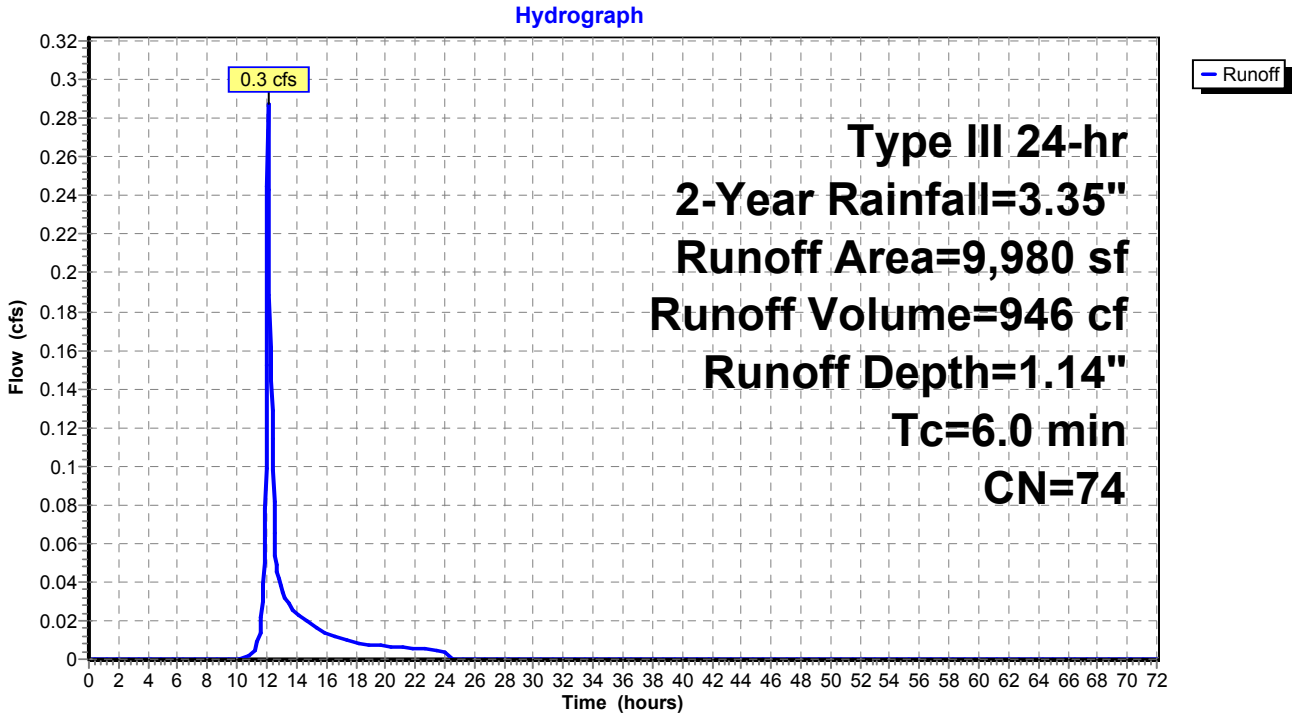
Runoff = 0.3 cfs @ 12.10 hrs, Volume= 946 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
9,980	74	>75% Grass cover, Good, HSG C
9,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Subcatchment SC2: Subcatchment 2



Summary for Subcatchment SC3: Subcatchment 3

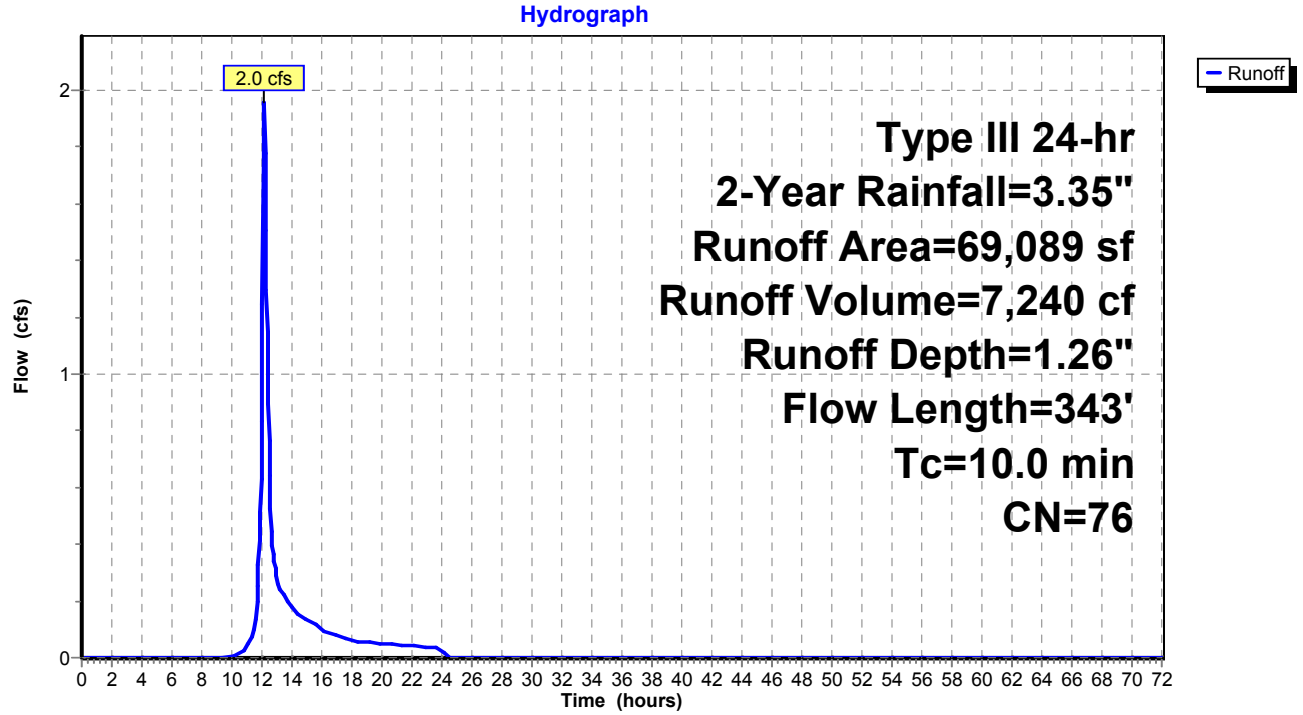
Runoff = 2.0 cfs @ 12.15 hrs, Volume= 7,240 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
57,681	77	Woods, Good, HSG D
9,220	70	Woods, Good, HSG C
2,188	74	>75% Grass cover, Good, HSG C
69,089	76	Weighted Average
69,089		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	20	0.0140	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.2	130	0.0104	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	343	Total			

Subcatchment SC3: Subcatchment 3

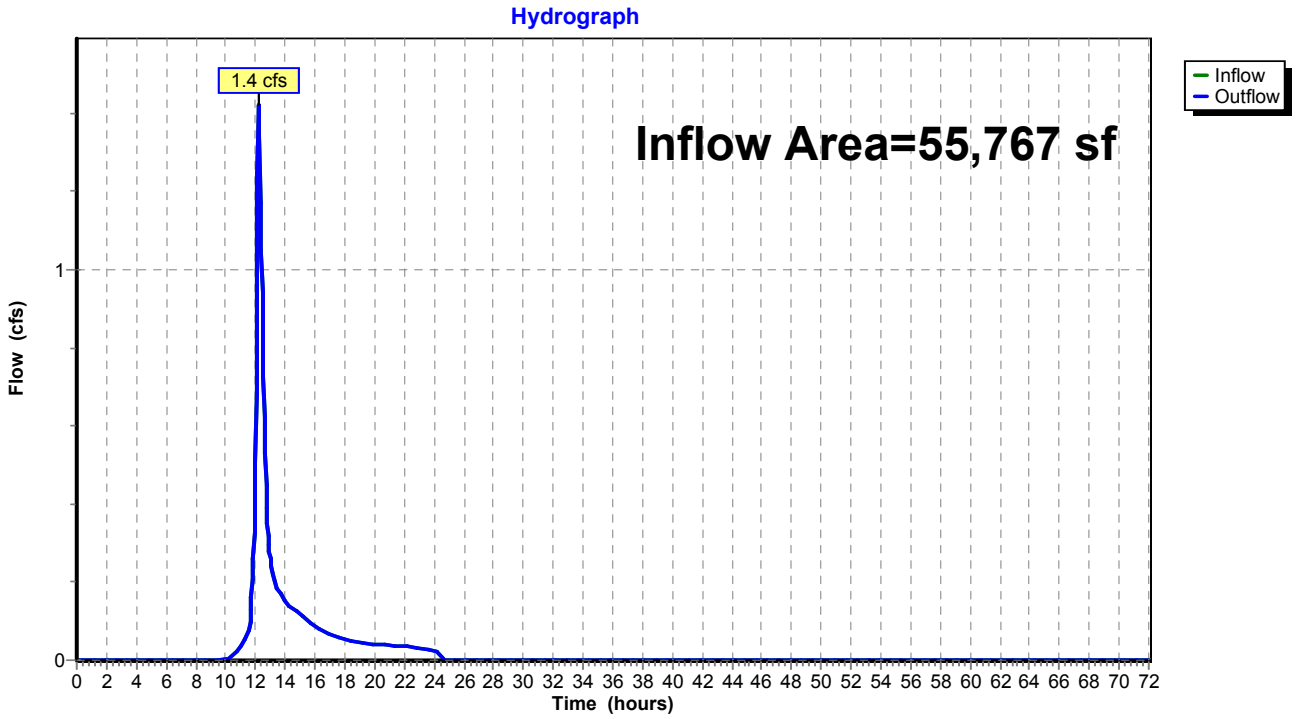


Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 55,767 sf, 13.22% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 1.4 cfs @ 12.23 hrs, Volume= 6,135 cf
Outflow = 1.4 cfs @ 12.23 hrs, Volume= 6,135 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP1: DESIGN POINT 1

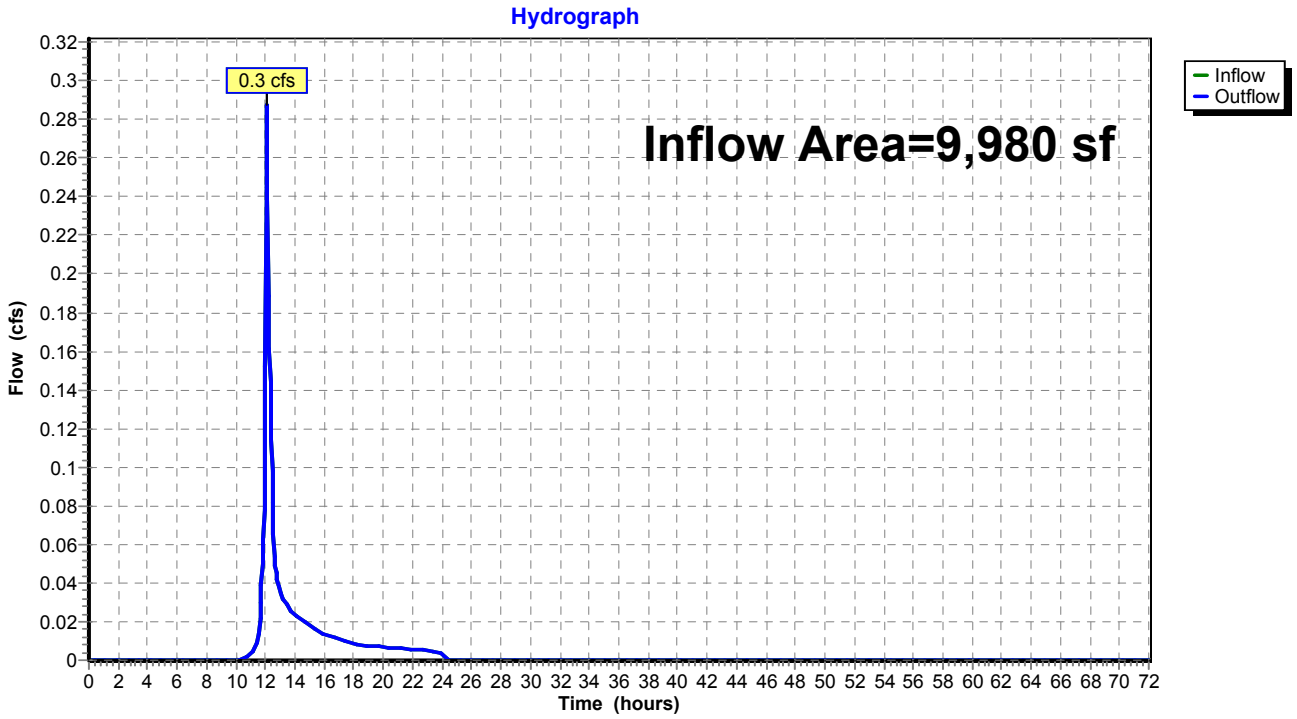


Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 9,980 sf, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.3 cfs @ 12.10 hrs, Volume= 946 cf
Outflow = 0.3 cfs @ 12.10 hrs, Volume= 946 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP2: DESIGN POINT 2

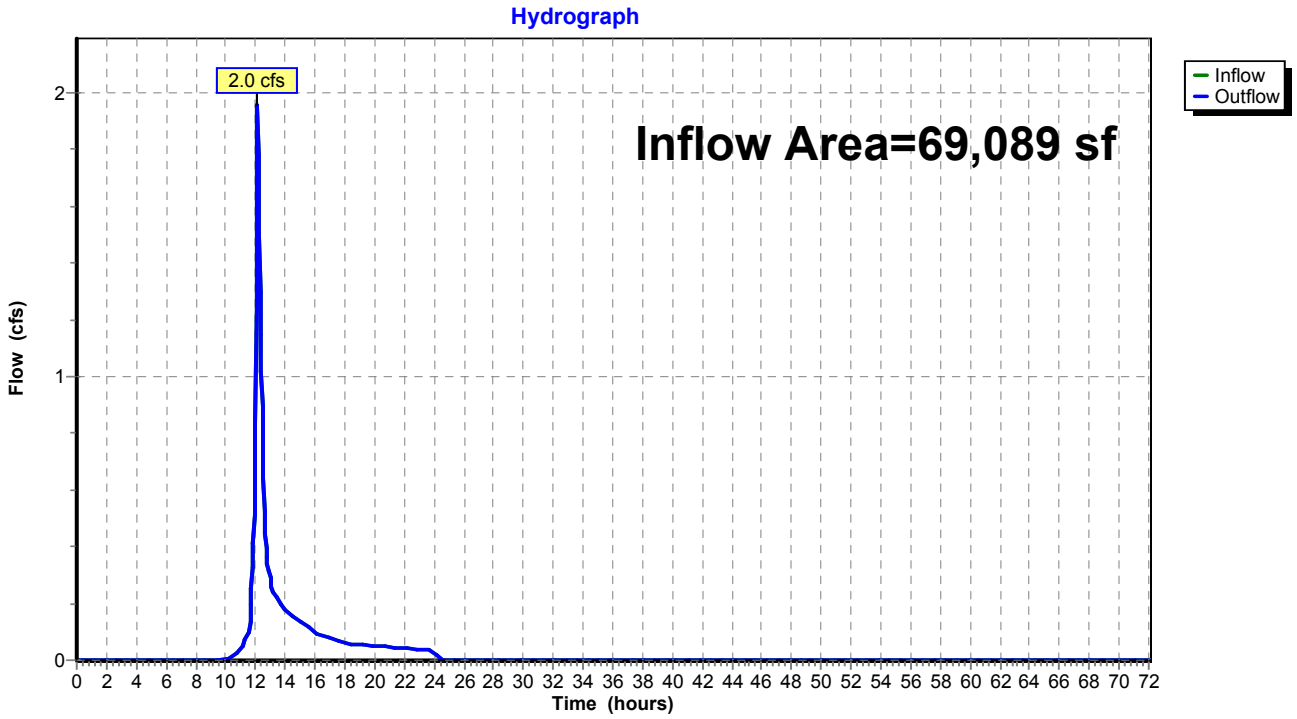


Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 69,089 sf, 0.00% Impervious, Inflow Depth = 1.26" for 2-Year event
Inflow = 2.0 cfs @ 12.15 hrs, Volume= 7,240 cf
Outflow = 2.0 cfs @ 12.15 hrs, Volume= 7,240 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP3: DESIGN POINT 3



EXISTING CONDITIONS
10-YEAR 24 HOUR STORM EVENT ANALYSIS

Summary for Subcatchment SC1: Subcatchment 1

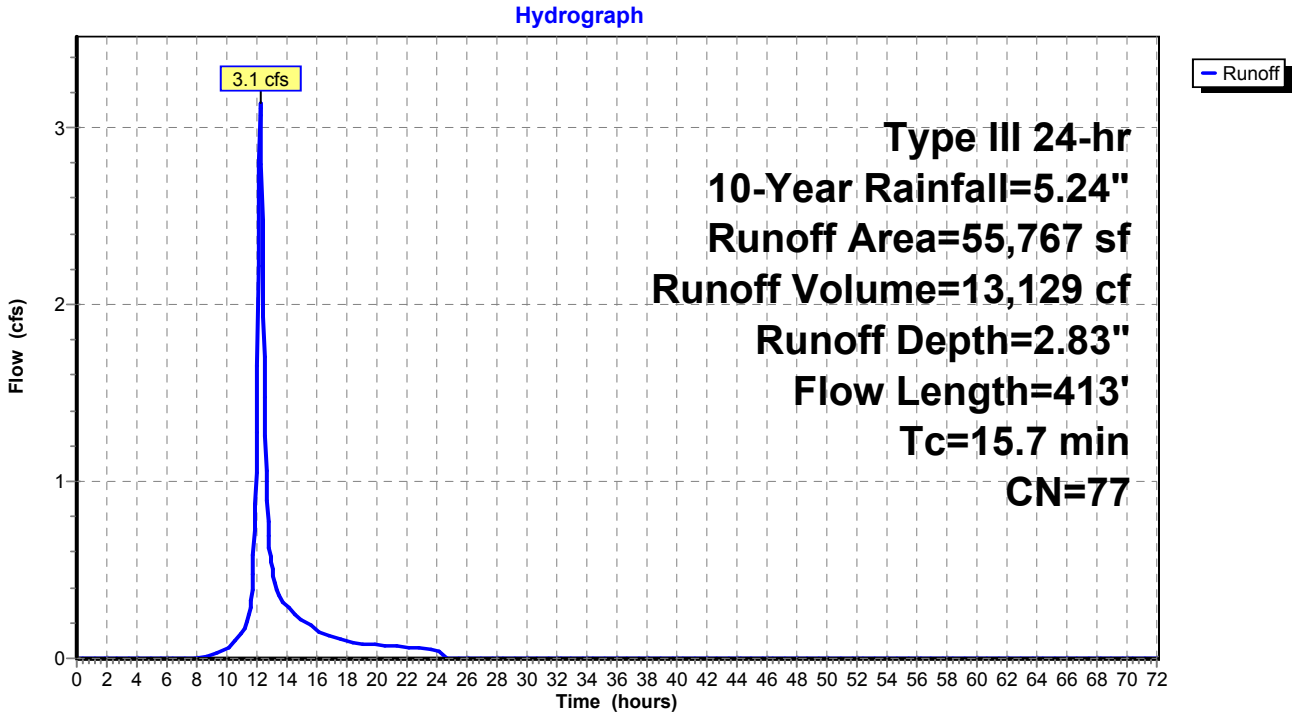
Runoff = 3.1 cfs @ 12.22 hrs, Volume= 13,129 cf, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
48,395	74	>75% Grass cover, Good, HSG C
3,668	98	Roofs, HSG C
3,704	98	Paved parking, HSG C
55,767	77	Weighted Average
48,395		86.78% Pervious Area
7,372		13.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0030	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.7	64	0.0016	0.6		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.8	105	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Grass Steep flow** Unpaved Kv= 16.1 fps
1.0	178	0.0319	2.9		**Shallow Concentrated Flow, Grass Shallow** Unpaved Kv= 16.1 fps
15.7	413	Total			

Subcatchment SC1: Subcatchment 1



Summary for Subcatchment SC2: Subcatchment 2

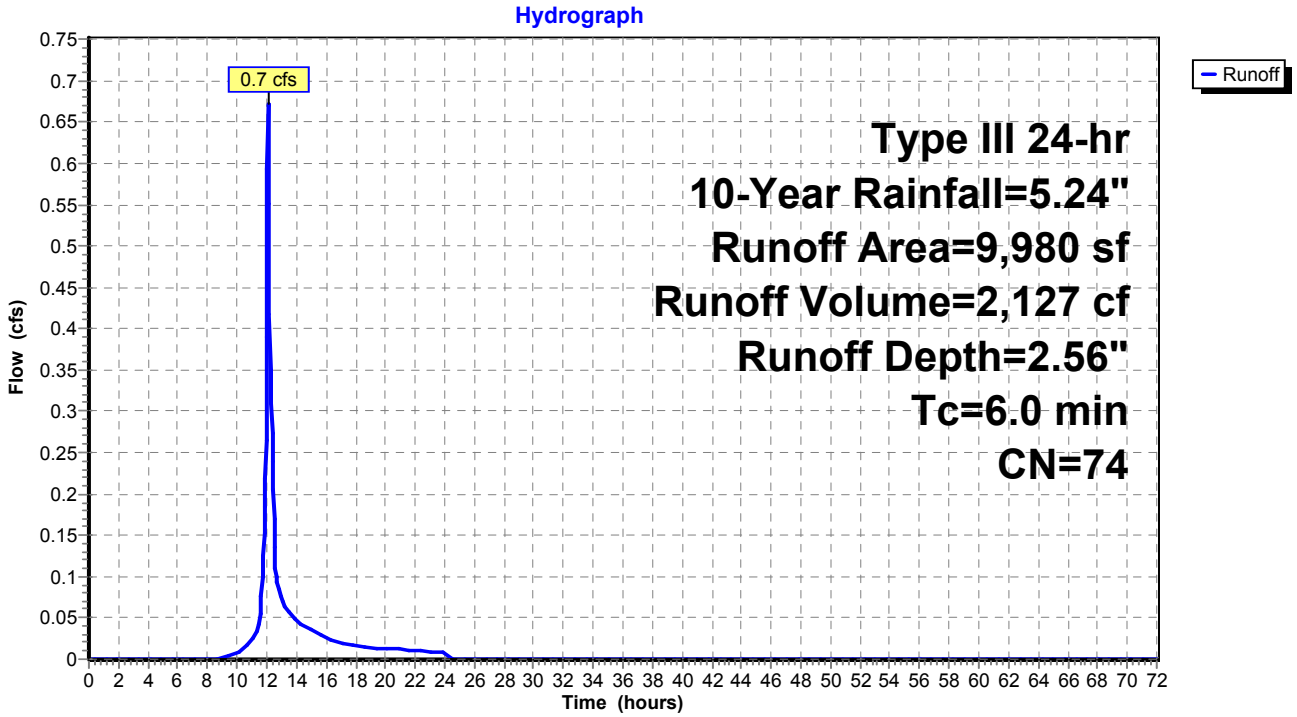
Runoff = 0.7 cfs @ 12.09 hrs, Volume= 2,127 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
9,980	74	>75% Grass cover, Good, HSG C
9,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Subcatchment SC2: Subcatchment 2



Summary for Subcatchment SC3: Subcatchment 3

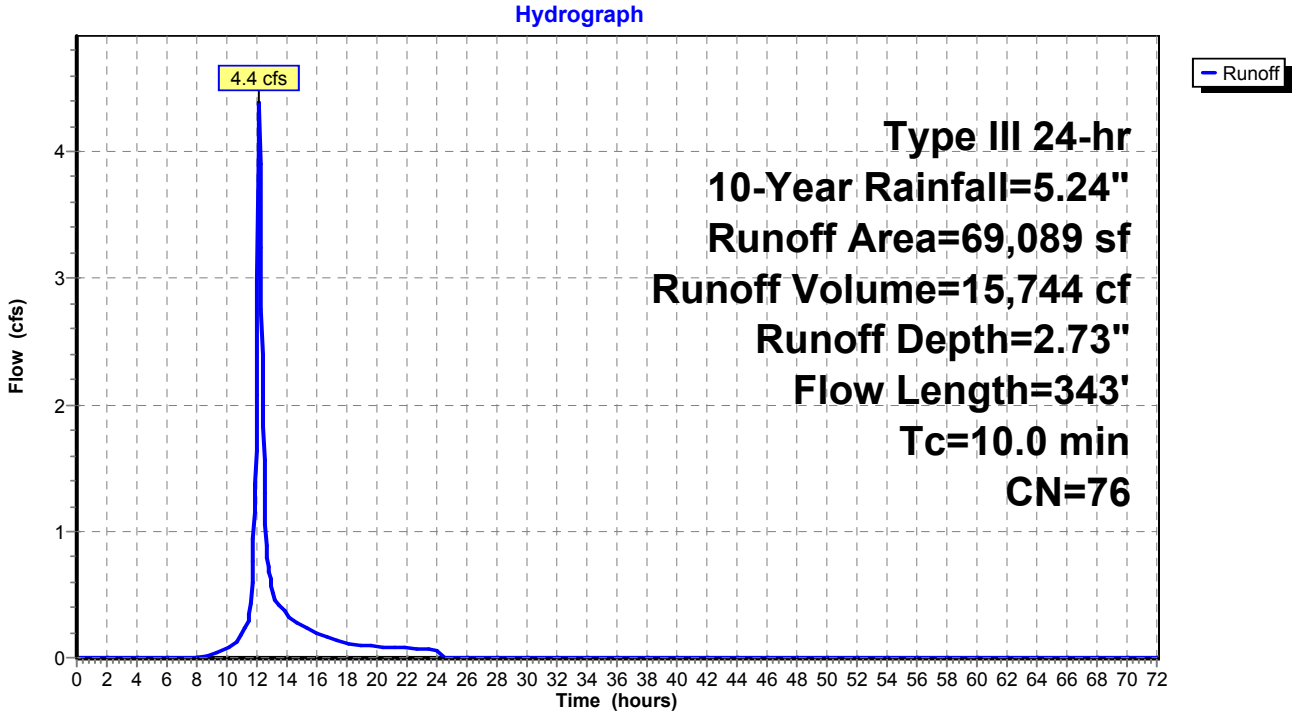
Runoff = 4.4 cfs @ 12.15 hrs, Volume= 15,744 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
57,681	77	Woods, Good, HSG D
9,220	70	Woods, Good, HSG C
2,188	74	>75% Grass cover, Good, HSG C
69,089	76	Weighted Average
69,089		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	20	0.0140	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.2	130	0.0104	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	343	Total			

Subcatchment SC3: Subcatchment 3

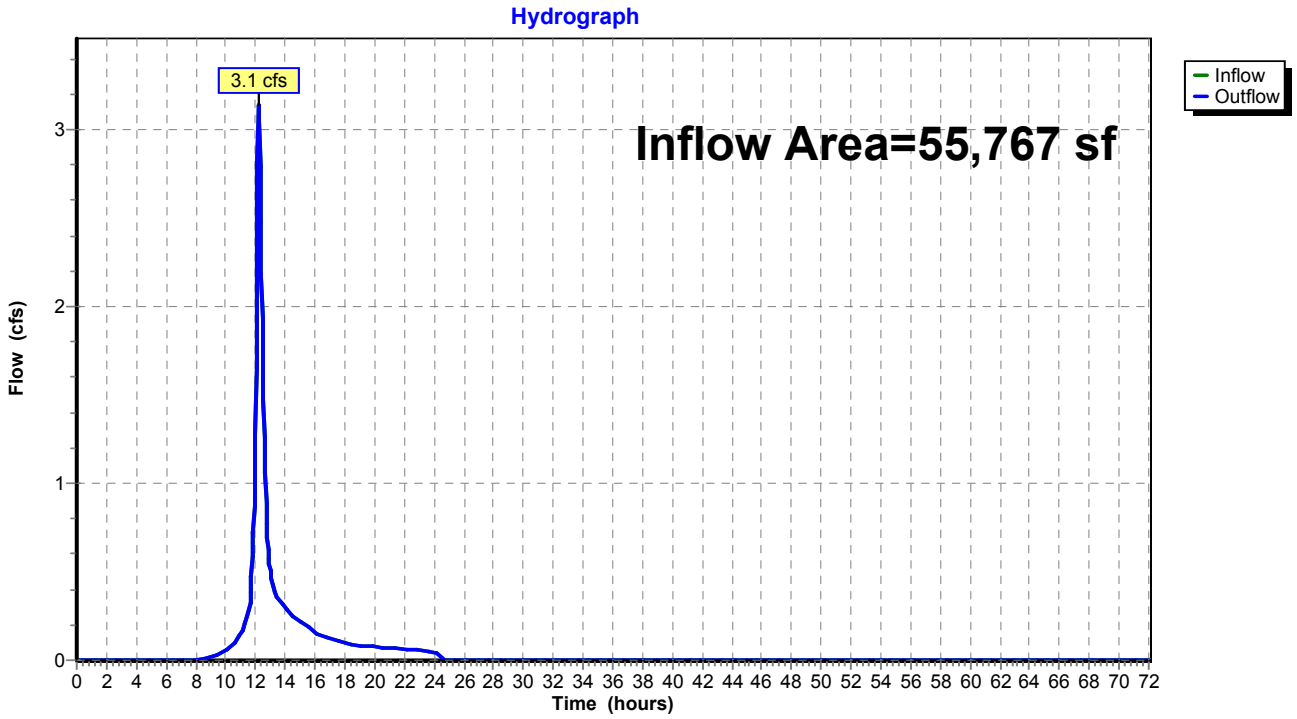


Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 55,767 sf, 13.22% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 3.1 cfs @ 12.22 hrs, Volume= 13,129 cf
Outflow = 3.1 cfs @ 12.22 hrs, Volume= 13,129 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP1: DESIGN POINT 1

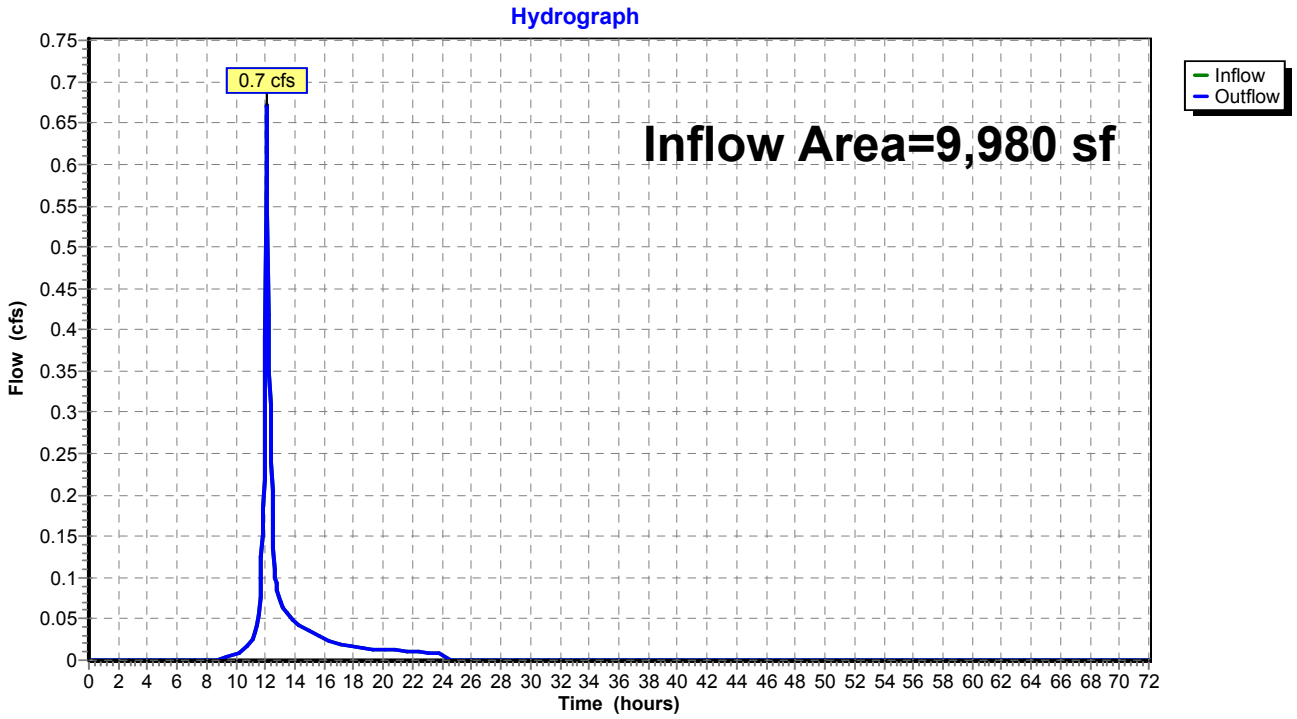


Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 9,980 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,127 cf
Outflow = 0.7 cfs @ 12.09 hrs, Volume= 2,127 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP2: DESIGN POINT 2

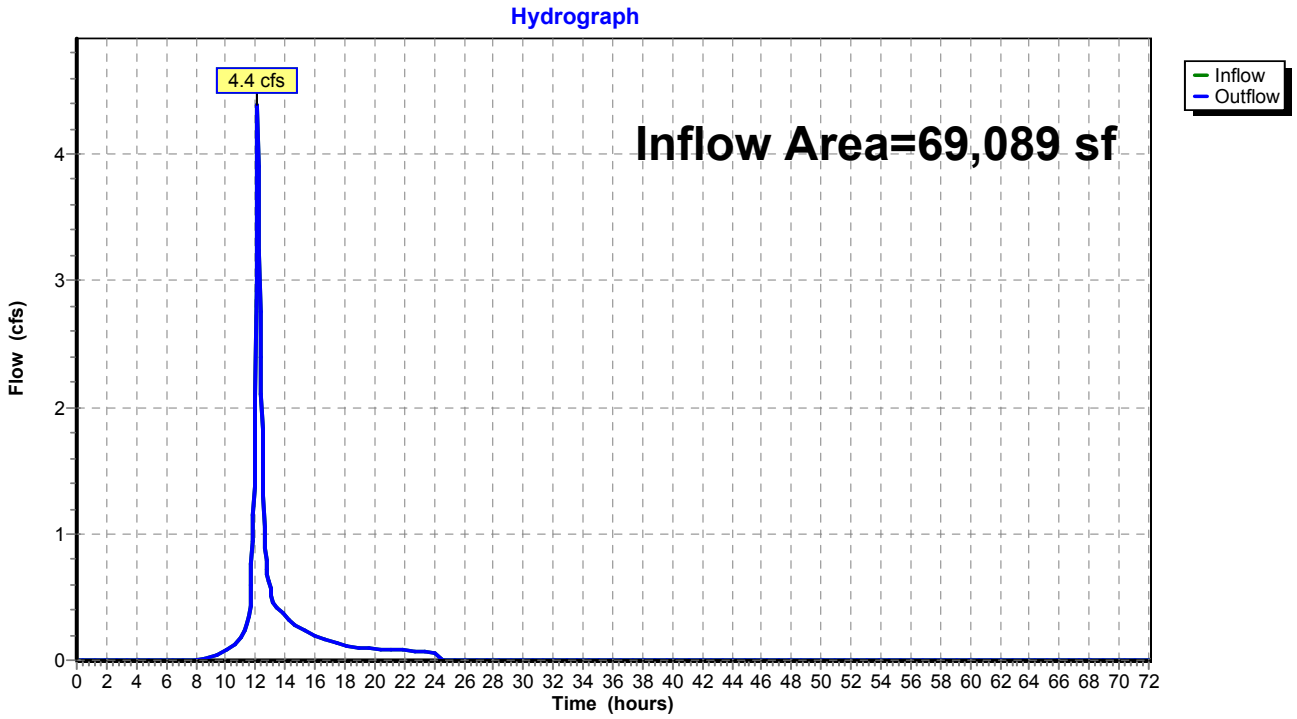


Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 69,089 sf, 0.00% Impervious, Inflow Depth = 2.73" for 10-Year event
Inflow = 4.4 cfs @ 12.15 hrs, Volume= 15,744 cf
Outflow = 4.4 cfs @ 12.15 hrs, Volume= 15,744 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP3: DESIGN POINT 3



EXISTING CONDITIONS
20-YEAR 24 HOUR STORM EVENT ANALYSIS

Summary for Subcatchment SC1: Subcatchment 1

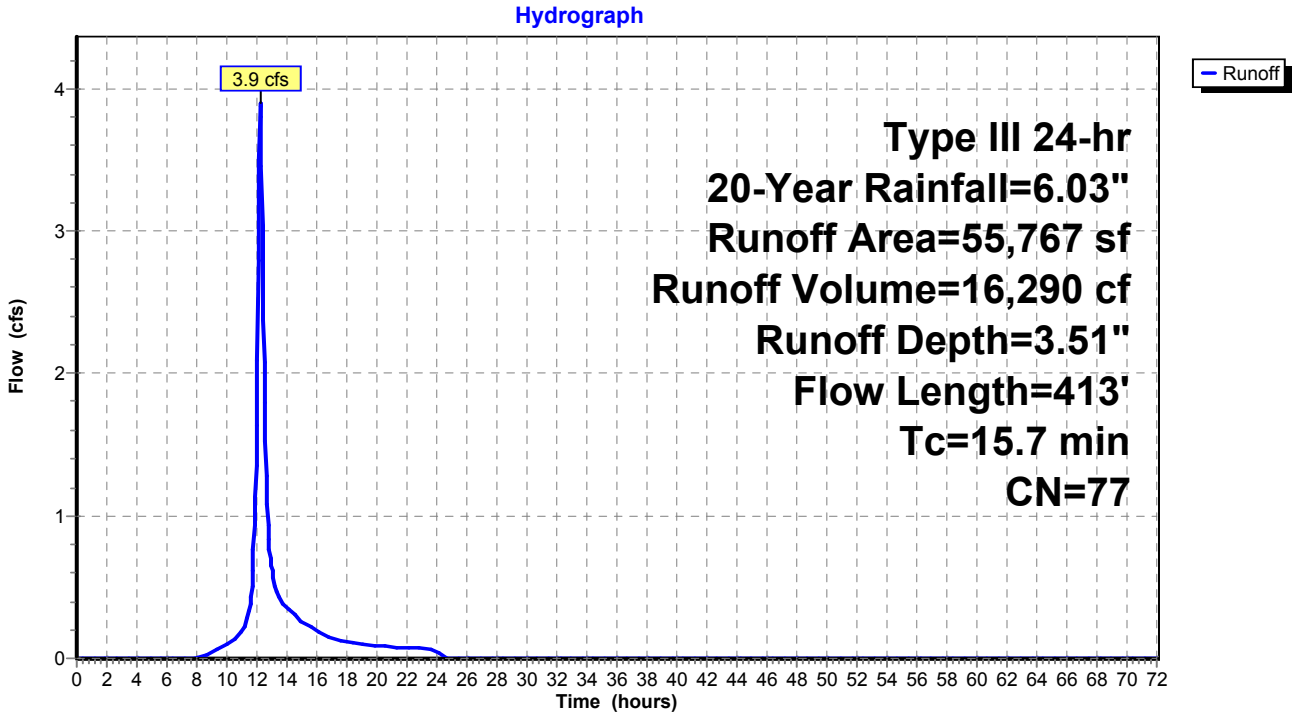
Runoff = 3.9 cfs @ 12.22 hrs, Volume= 16,290 cf, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
48,395	74	>75% Grass cover, Good, HSG C
3,668	98	Roofs, HSG C
3,704	98	Paved parking, HSG C
55,767	77	Weighted Average
48,395		86.78% Pervious Area
7,372		13.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0030	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.7	64	0.0016	0.6		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.8	105	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Grass Steep flow** Unpaved Kv= 16.1 fps
1.0	178	0.0319	2.9		**Shallow Concentrated Flow, Grass Shallow** Unpaved Kv= 16.1 fps
15.7	413	Total			

Subcatchment SC1: Subcatchment 1



Summary for Subcatchment SC2: Subcatchment 2

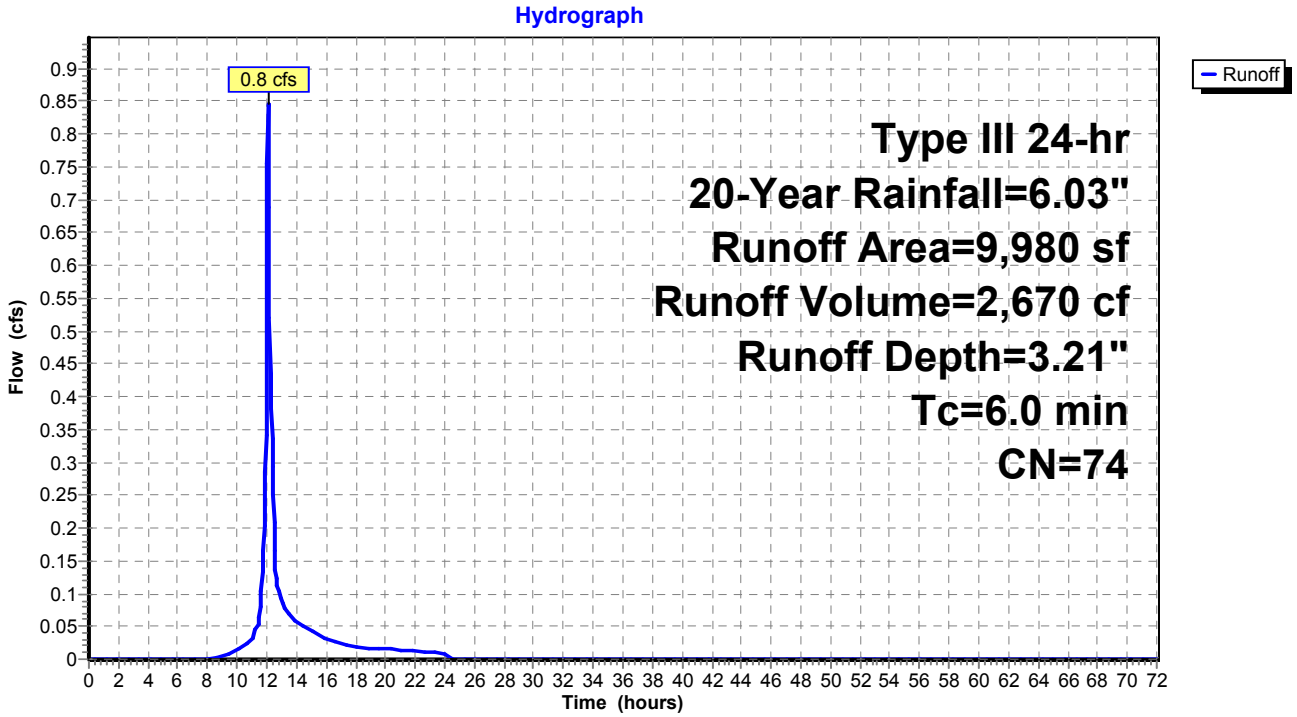
Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,670 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
9,980	74	>75% Grass cover, Good, HSG C
9,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Subcatchment SC2: Subcatchment 2



Summary for Subcatchment SC3: Subcatchment 3

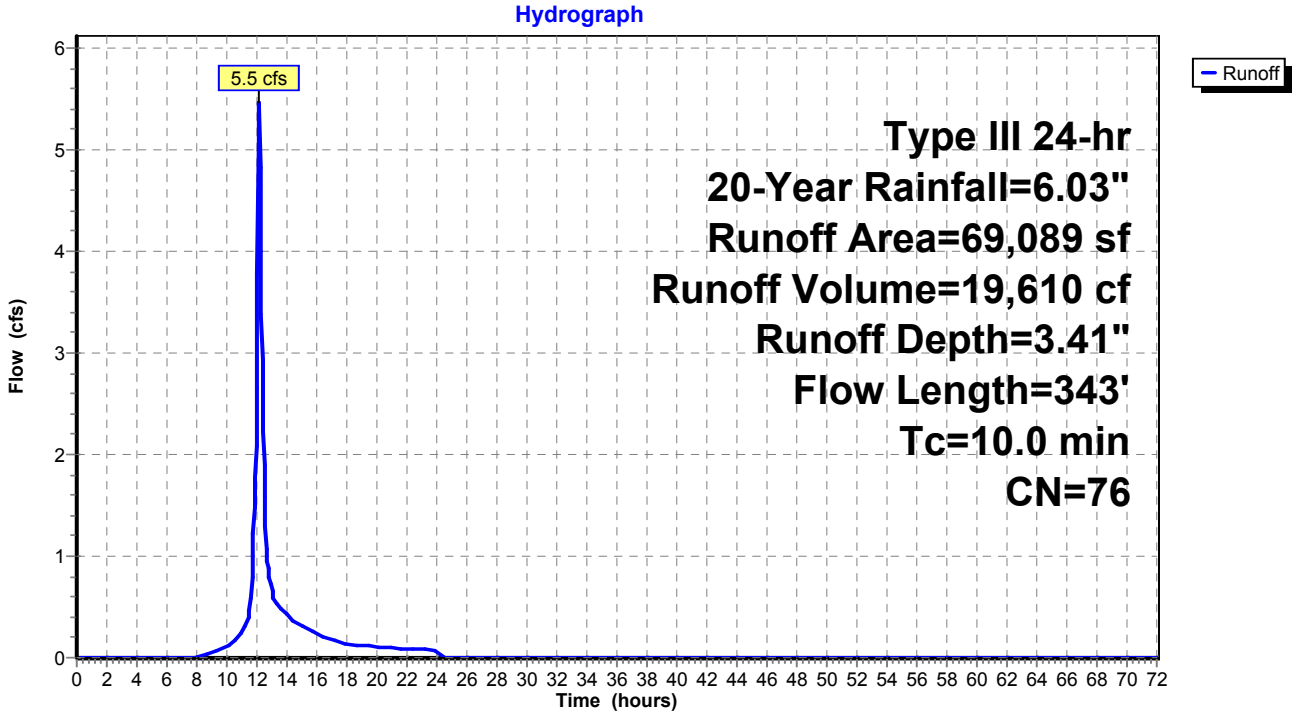
Runoff = 5.5 cfs @ 12.14 hrs, Volume= 19,610 cf, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
57,681	77	Woods, Good, HSG D
9,220	70	Woods, Good, HSG C
2,188	74	>75% Grass cover, Good, HSG C
69,089	76	Weighted Average
69,089		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	20	0.0140	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.2	130	0.0104	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	343	Total			

Subcatchment SC3: Subcatchment 3

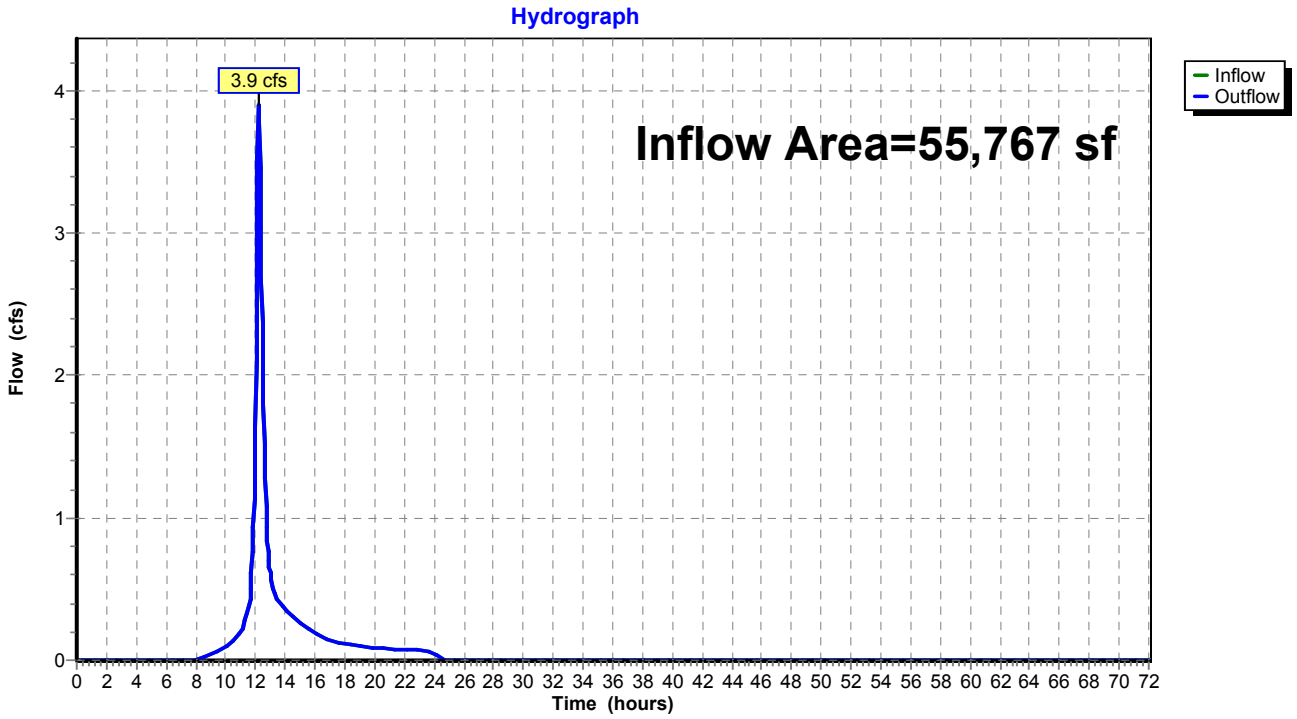


Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 55,767 sf, 13.22% Impervious, Inflow Depth = 3.51" for 20-Year event
Inflow = 3.9 cfs @ 12.22 hrs, Volume= 16,290 cf
Outflow = 3.9 cfs @ 12.22 hrs, Volume= 16,290 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP1: DESIGN POINT 1

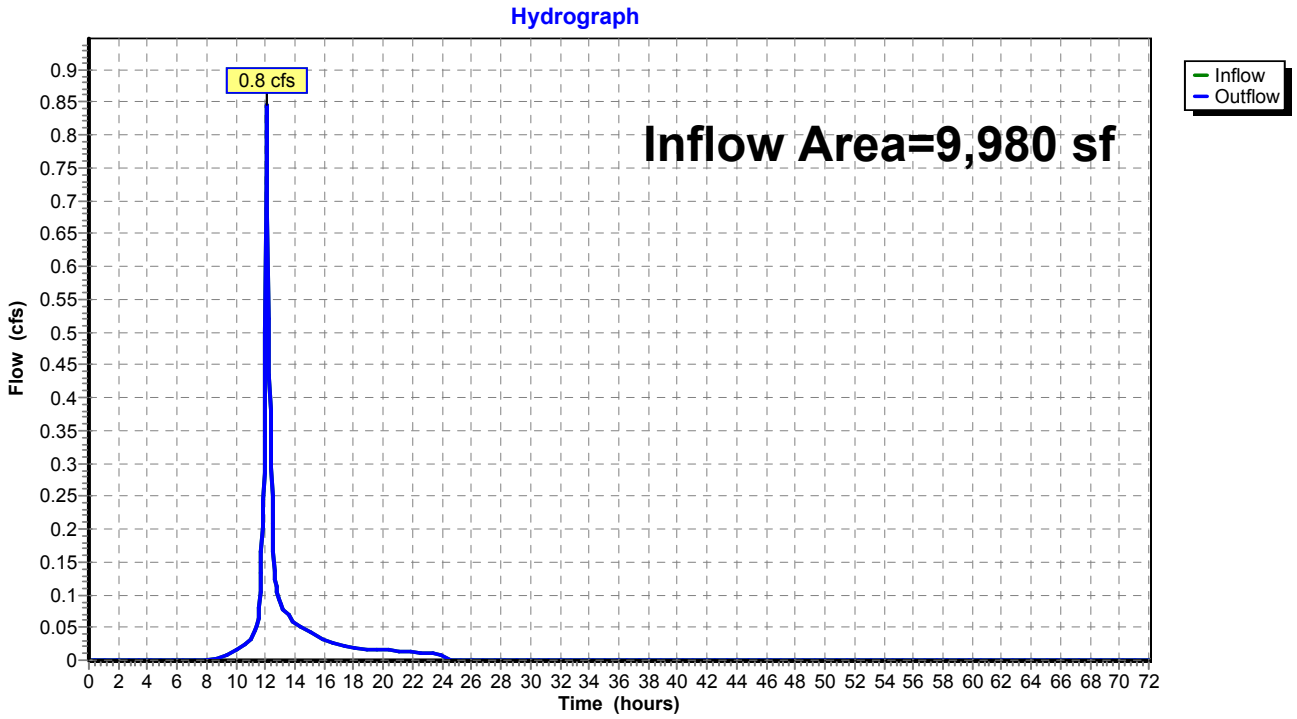


Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 9,980 sf, 0.00% Impervious, Inflow Depth = 3.21" for 20-Year event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,670 cf
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 2,670 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP2: DESIGN POINT 2

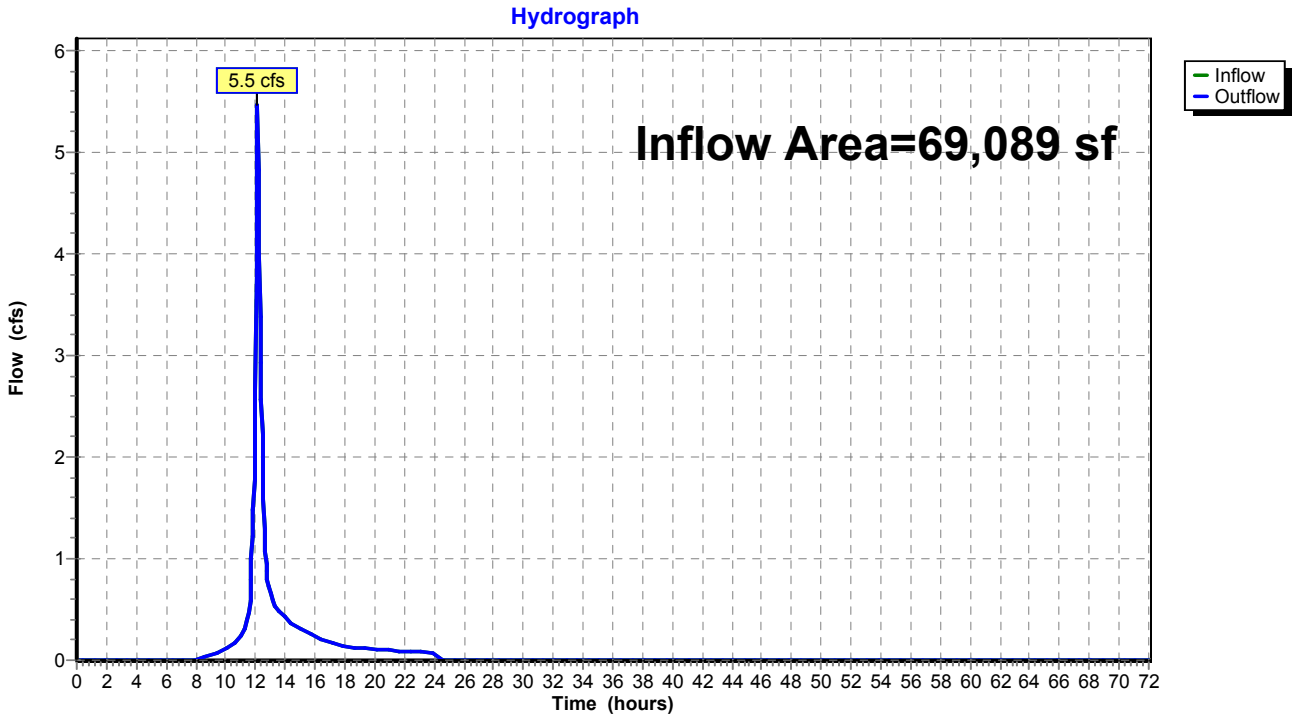


Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 69,089 sf, 0.00% Impervious, Inflow Depth = 3.41" for 20-Year event
Inflow = 5.5 cfs @ 12.14 hrs, Volume= 19,610 cf
Outflow = 5.5 cfs @ 12.14 hrs, Volume= 19,610 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP3: DESIGN POINT 3



EXISTING CONDITIONS
100-YEAR 24 HOUR STORM EVENT ANALYSIS

Summary for Subcatchment SC1: Subcatchment 1

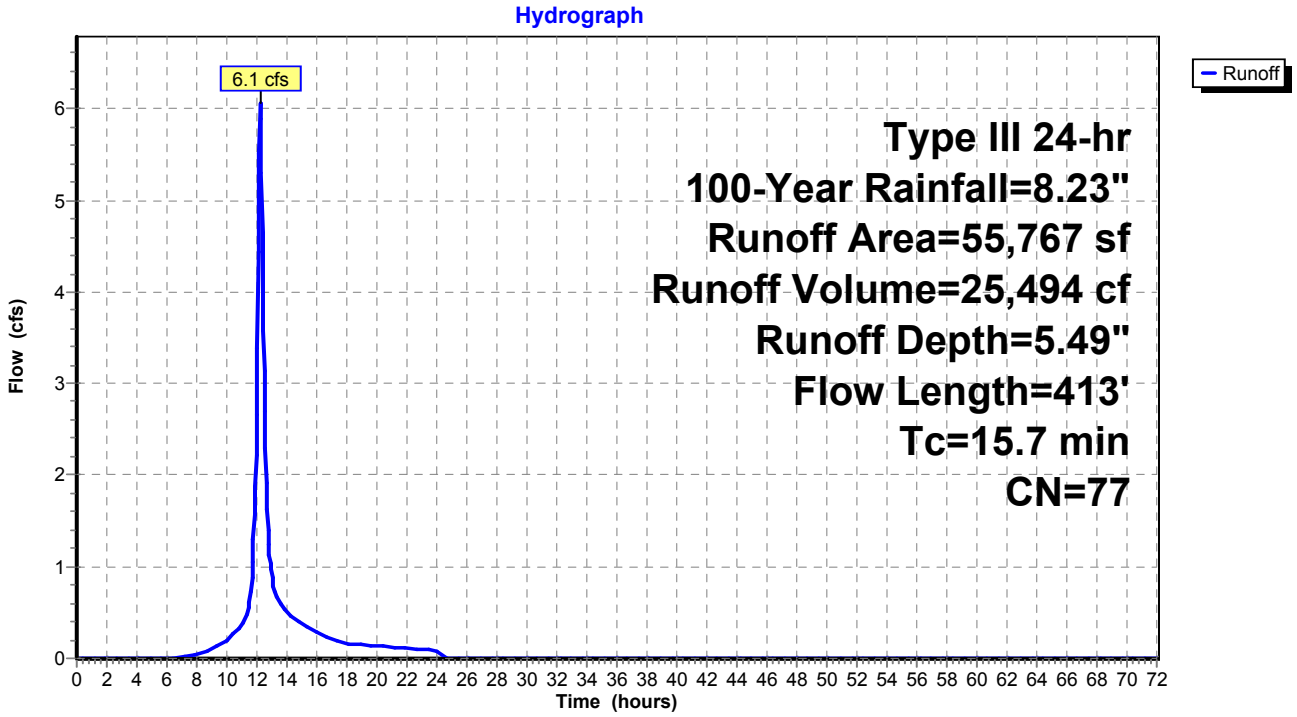
Runoff = 6.1 cfs @ 12.21 hrs, Volume= 25,494 cf, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
48,395	74	>75% Grass cover, Good, HSG C
3,668	98	Roofs, HSG C
3,704	98	Paved parking, HSG C
55,767	77	Weighted Average
48,395		86.78% Pervious Area
7,372		13.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0030	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.7	64	0.0016	0.6		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.8	105	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass Flow** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Grass Steep flow** Unpaved Kv= 16.1 fps
1.0	178	0.0319	2.9		**Shallow Concentrated Flow, Grass Shallow** Unpaved Kv= 16.1 fps
15.7	413	Total			

Subcatchment SC1: Subcatchment 1



Summary for Subcatchment SC2: Subcatchment 2

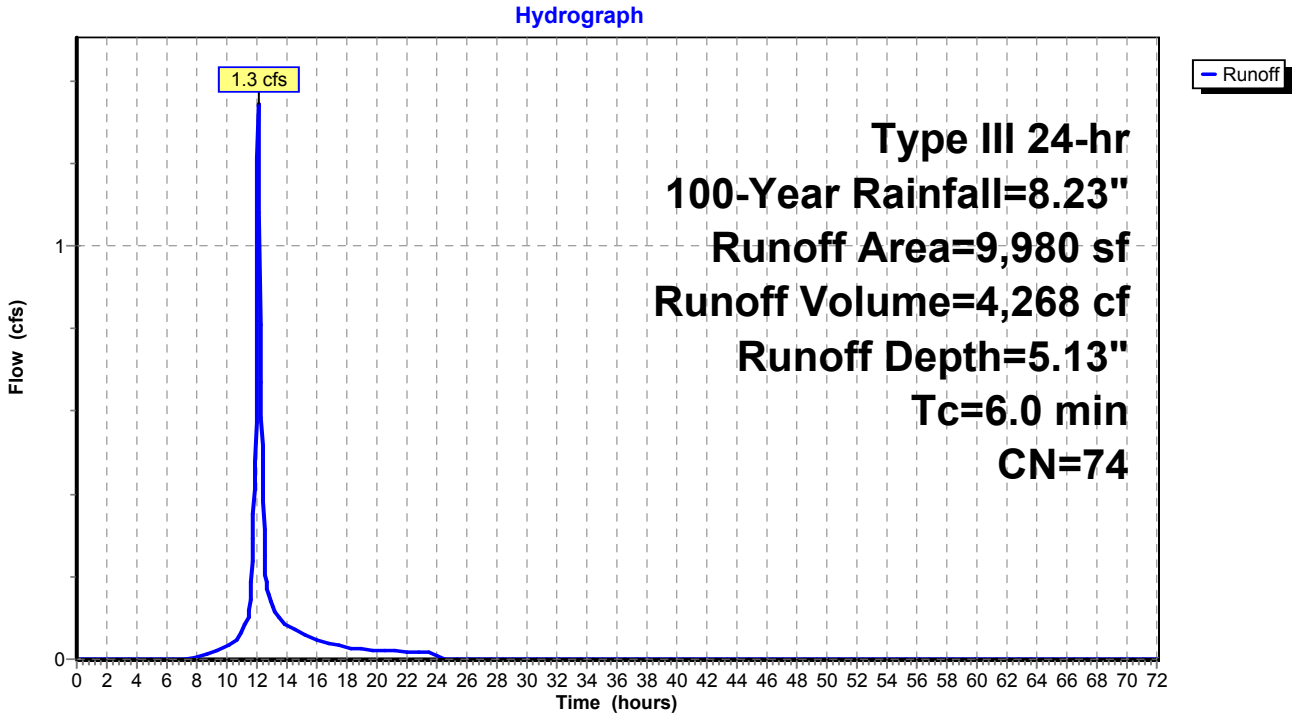
Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,268 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
9,980	74	>75% Grass cover, Good, HSG C
9,980		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Subcatchment SC2: Subcatchment 2



Summary for Subcatchment SC3: Subcatchment 3

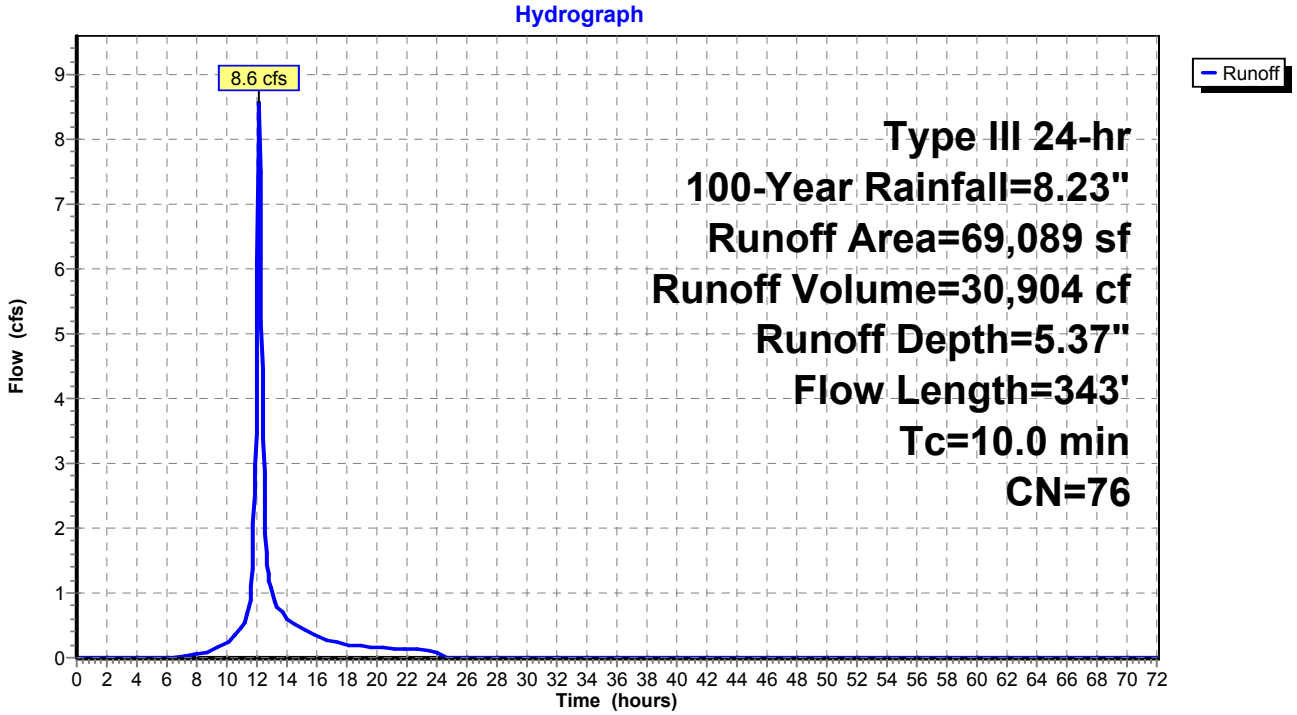
Runoff = 8.6 cfs @ 12.14 hrs, Volume= 30,904 cf, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
57,681	77	Woods, Good, HSG D
9,220	70	Woods, Good, HSG C
2,188	74	>75% Grass cover, Good, HSG C
69,089	76	Weighted Average
69,089		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	20	0.0140	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.2	130	0.0104	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.0	343	Total			

Subcatchment SC3: Subcatchment 3

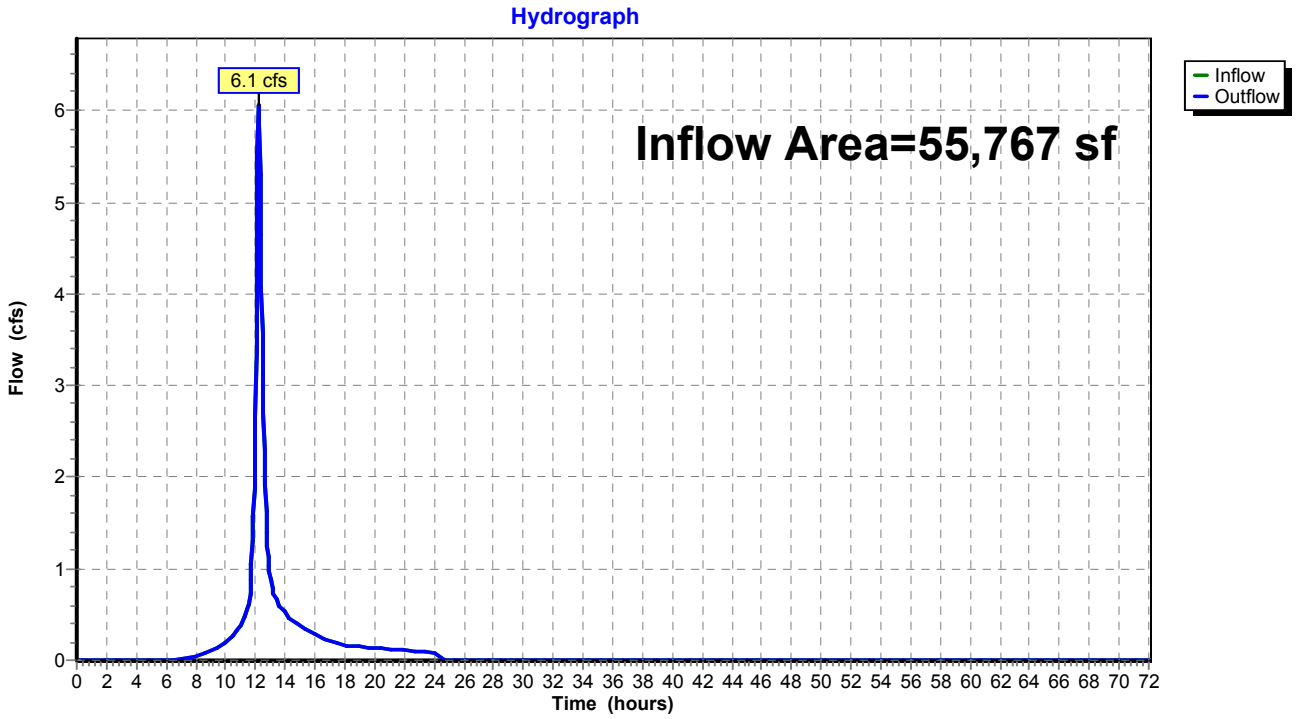


Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 55,767 sf, 13.22% Impervious, Inflow Depth = 5.49" for 100-Year event
Inflow = 6.1 cfs @ 12.21 hrs, Volume= 25,494 cf
Outflow = 6.1 cfs @ 12.21 hrs, Volume= 25,494 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP1: DESIGN POINT 1

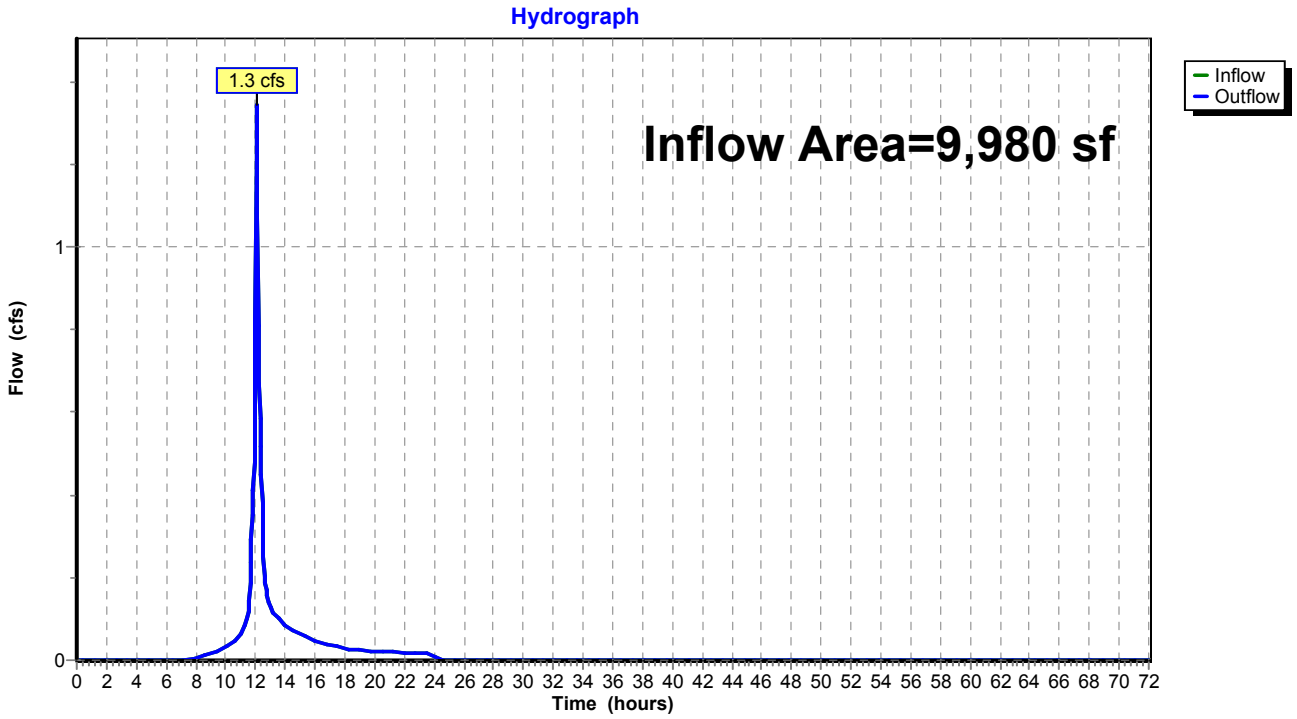


Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 9,980 sf, 0.00% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 4,268 cf
Outflow = 1.3 cfs @ 12.09 hrs, Volume= 4,268 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP2: DESIGN POINT 2

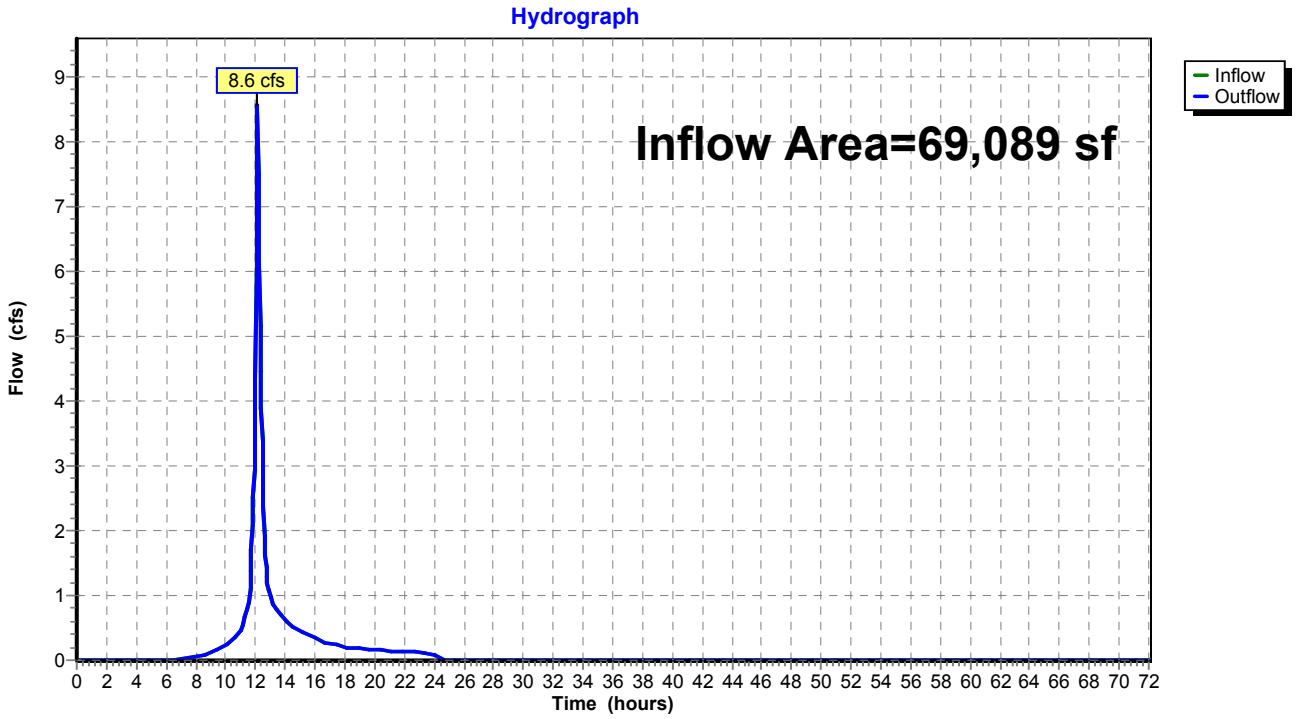


Summary for Reach DP3: DESIGN POINT 3

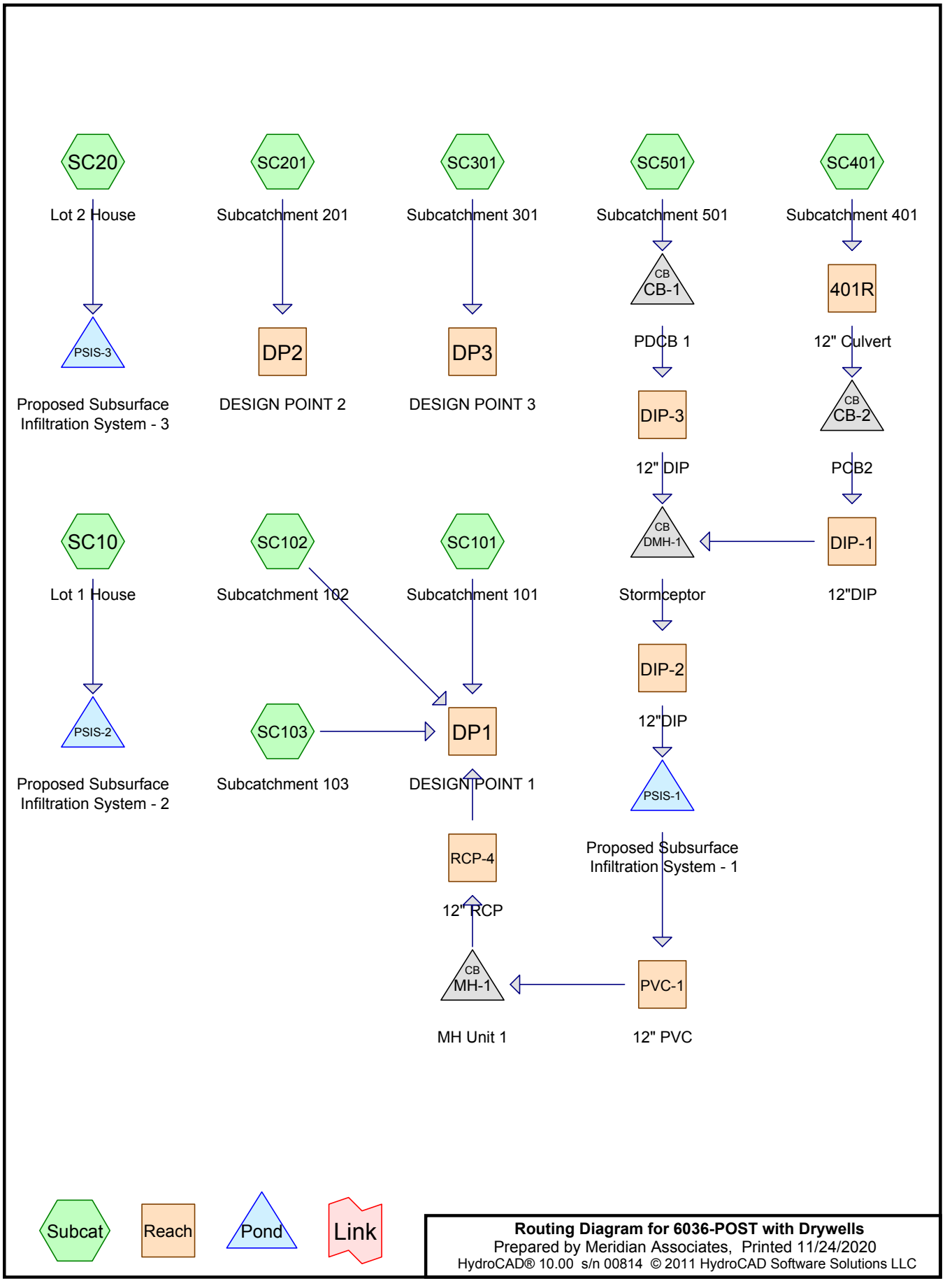
Inflow Area = 69,089 sf, 0.00% Impervious, Inflow Depth = 5.37" for 100-Year event
Inflow = 8.6 cfs @ 12.14 hrs, Volume= 30,904 cf
Outflow = 8.6 cfs @ 12.14 hrs, Volume= 30,904 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Reach DP3: DESIGN POINT 3



PROPOSED CONDITIONS
WATERSHED ROUTING DIAGRAM



Routing Diagram for 6036-POST with Drywells
Prepared by Meridian Associates, Printed 11/24/2020
HydroCAD® 10.00 s/n 00814 © 2011 HydroCAD Software Solutions LLC

PROPOSED CONDITIONS
2-YEAR 24 HOUR STORM EVENT ANALYSIS

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,192	70	Woods, Good, HSG C (SC301)
57,836	74	>75% Grass cover, Good, HSG C (SC101, SC102, SC201, SC301, SC401)
320	74	>75% Pervious Pavers, HSG C (SC501)
49,068	77	Woods, Good, HSG D (SC301)
8,613	80	>75% Grass cover, Good, HSG D (SC301)
7,807	98	Paved roads w/curbs & sewers, HSG C (SC103, SC501)
7,000	98	Roofs, HSG C (SC10, SC20)
134,836	**78**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC10: Lot 1 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.3 cfs 909 cf

SubcatchmentSC101: Subcatchment101 Runoff Area=35,000 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=436' Tc=8.5 min CN=74 Runoff=0.9 cfs 3,318 cf

SubcatchmentSC102: Subcatchment102 Runoff Area=8,071 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=425' Tc=7.8 min CN=74 Runoff=0.2 cfs 765 cf

SubcatchmentSC103: Subcatchment103 Runoff Area=975 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.1 cfs 253 cf

SubcatchmentSC20: Lot 2 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=3.12"
Tc=6.0 min CN=98 Runoff=0.3 cfs 909 cf

SubcatchmentSC201: Subcatchment201 Runoff Area=8,617 sf 0.00% Impervious Runoff Depth=1.14"
Tc=6.0 min CN=74 Runoff=0.2 cfs 817 cf

SubcatchmentSC301: Subcatchment301 Runoff Area=62,547 sf 0.00% Impervious Runoff Depth=1.32"
Flow Length=308' Tc=7.9 min CN=77 Runoff=2.0 cfs 6,881 cf

SubcatchmentSC401: Subcatchment401 Runoff Area=5,474 sf 0.00% Impervious Runoff Depth=1.14"
Flow Length=272' Slope=0.0280 '/' Tc=6.4 min CN=74 Runoff=0.2 cfs 519 cf

SubcatchmentSC501: Subcatchment501 Runoff Area=7,152 sf 95.53% Impervious Runoff Depth=3.01"
Tc=6.0 min CN=97 Runoff=0.5 cfs 1,791 cf

Reach 401R: 12" Culvert Avg. Flow Depth=0.15' Max Vel=2.2 fps Inflow=0.2 cfs 519 cf
12.0" Round Pipe n=0.013 L=17.0' S=0.0088 '/' Capacity=3.3 cfs Outflow=0.2 cfs 519 cf

Reach DIP-1: 12"DIP Avg. Flow Depth=0.12' Max Vel=3.0 fps Inflow=0.2 cfs 519 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.2 cfs 519 cf

Reach DIP-2: 12"DIP Avg. Flow Depth=0.36' Max Vel=2.6 fps Inflow=0.7 cfs 2,310 cf
12.0" Round Pipe n=0.010 L=36.0' S=0.0028 '/' Capacity=2.4 cfs Outflow=0.7 cfs 2,310 cf

Reach DIP-3: 12" DIP Avg. Flow Depth=0.21' Max Vel=4.3 fps Inflow=0.5 cfs 1,791 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.5 cfs 1,791 cf

Reach DP1: DESIGN POINT 1 Inflow=1.2 cfs 4,336 cf
Outflow=1.2 cfs 4,336 cf

Reach DP2: DESIGN POINT 2 Inflow=0.2 cfs 817 cf
Outflow=0.2 cfs 817 cf

Reach DP3: DESIGN POINT 3 Inflow=2.0 cfs 6,881 cf
Outflow=2.0 cfs 6,881 cf

Reach PVC-1: 12" PVC Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.010 L=10.0' S=0.3830 '/' Capacity=28.7 cfs Outflow=0.0 cfs 0 cf

Reach RCP-4: 12" RCP Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.013 L=8.8' S=0.1364 '/' Capacity=13.2 cfs Outflow=0.0 cfs 0 cf

Pond CB-1: PDCB 1 Peak Elev=197.64' Inflow=0.5 cfs 1,791 cf
Outflow=0.5 cfs 1,791 cf

Pond CB-2: PCB2 Peak Elev=197.56' Inflow=0.2 cfs 519 cf
Outflow=0.2 cfs 519 cf

Pond DMH-1: Stormceptor Peak Elev=198.51' Inflow=0.7 cfs 2,310 cf
Outflow=0.7 cfs 2,310 cf

Pond MH-1: MH Unit 1 Peak Elev=195.02' Inflow=0.0 cfs 0 cf
Outflow=0.0 cfs 0 cf

Pond PSIS-1: Proposed Subsurface Infiltration Peak Elev=198.54' Storage=764 cf Inflow=0.7 cfs 2,310 cf
Discarded=0.1 cfs 2,310 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 2,310 cf

Pond PSIS-2: Proposed Subsurface Infiltration Peak Elev=200.68' Storage=322 cf Inflow=0.3 cfs 909 cf
Outflow=0.0 cfs 909 cf

Pond PSIS-3: Proposed Subsurface Infiltration Peak Elev=200.68' Storage=322 cf Inflow=0.3 cfs 909 cf
Outflow=0.0 cfs 909 cf

Total Runoff Area = 134,836 sf Runoff Volume = 16,162 cf Average Runoff Depth = 1.44"
89.02% Pervious = 120,029 sf 10.98% Impervious = 14,807 sf

Summary for Subcatchment SC10: Lot 1 House

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 909 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC101: Subcatchment 101

Runoff = 0.9 cfs @ 12.13 hrs, Volume= 3,318 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
35,000	74	>75% Grass cover, Good, HSG C
35,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.3	172	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Steep Grass** Unpaved Kv= 16.1 fps
1.2	198	0.0300	2.8		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
8.5	436	Total			

Summary for Subcatchment SC102: Subcatchment 102

Runoff = 0.2 cfs @ 12.12 hrs, Volume= 765 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
8,071	74	>75% Grass cover, Good, HSG C
8,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
2.6	375	0.0230	2.4		**Shallow Concentrated Flow, Grass shallow** Unpaved Kv= 16.1 fps
7.8	425	Total			

Summary for Subcatchment SC103: Subcatchment 103

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 253 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
975	98	Paved roads w/curbs & sewers, HSG C
975		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Summary for Subcatchment SC20: Lot 2 House

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 909 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC201: Subcatchment 201

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 817 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
8,617	74	>75% Grass cover, Good, HSG C
8,617		100.00% Pervious Area

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

Summary for Subcatchment SC301: Subcatchment 301

Runoff = 2.0 cfs @ 12.12 hrs, Volume= 6,881 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
49,068	77	Woods, Good, HSG D
4,192	70	Woods, Good, HSG C
8,613	80	>75% Grass cover, Good, HSG D
674	74	>75% Grass cover, Good, HSG C
62,547	77	Weighted Average
62,547		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0555	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.1	75	0.0140	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	308	Total			

Summary for Subcatchment SC401: Subcatchment 401

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 519 cf, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

Area (sf)	CN	Description
5,474	74	>75% Grass cover, Good, HSG C
5,474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0280	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.4	222	0.0280	2.7		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
6.4	272	Total			

Summary for Subcatchment SC501: Subcatchment 501

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.35"

	Area (sf)	CN	Description
*	320	74	>75% Pervious Pavers, HSG C
	6,832	98	Paved roads w/curbs & sewers, HSG C
	7,152	97	Weighted Average
	320		4.47% Pervious Area
	6,832		95.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

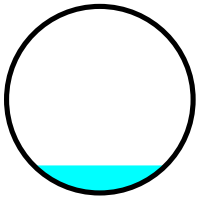
Summary for Reach 401R: 12" Culvert

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 519 cf
Outflow = 0.2 cfs @ 12.11 hrs, Volume= 519 cf, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 0.3 min

Peak Storage= 1 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.15'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.3 cfs

12.0" Round Pipe
n= 0.013 Cast iron, coated
Length= 17.0' Slope= 0.0088 '/'
Inlet Invert= 204.85', Outlet Invert= 204.70'



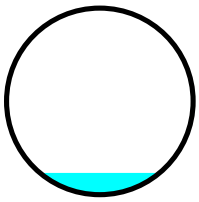
Summary for Reach DIP-1: 12"DIP

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 519 cf
Outflow = 0.2 cfs @ 12.11 hrs, Volume= 519 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



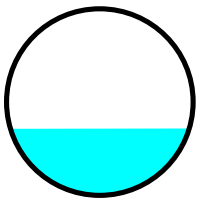
Summary for Reach DIP-2: 12"DIP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 2.20" for 2-Year event
Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,310 cf
Outflow = 0.7 cfs @ 12.10 hrs, Volume= 2,310 cf, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 0.7 min

Peak Storage= 9 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.4 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 36.0' Slope= 0.0028 '/'
Inlet Invert= 198.10', Outlet Invert= 198.00'



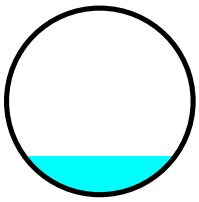
Summary for Reach DIP-3: 12" DIP

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 3.01" for 2-Year event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf
Outflow = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 56,672 sf, 13.78% Impervious, Inflow Depth = 0.92" for 2-Year event
Inflow = 1.2 cfs @ 12.13 hrs, Volume= 4,336 cf
Outflow = 1.2 cfs @ 12.13 hrs, Volume= 4,336 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 8,617 sf, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.2 cfs @ 12.10 hrs, Volume= 817 cf
Outflow = 0.2 cfs @ 12.10 hrs, Volume= 817 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 62,547 sf, 0.00% Impervious, Inflow Depth = 1.32" for 2-Year event
Inflow = 2.0 cfs @ 12.12 hrs, Volume= 6,881 cf
Outflow = 2.0 cfs @ 12.12 hrs, Volume= 6,881 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

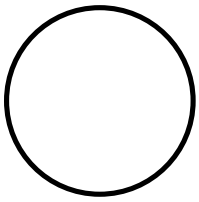
Summary for Reach PVC-1: 12" PVC

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 28.7 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.3830 '/'
Inlet Invert= 199.83', Outlet Invert= 196.00'



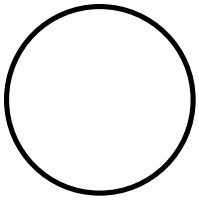
Summary for Reach RCP-4: 12" RCP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 13.2 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.8' Slope= 0.1364 '/'
Inlet Invert= 195.90', Outlet Invert= 194.70'



Summary for Pond CB-1: PDCB 1

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 3.01" for 2-Year event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf
Outflow = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.5 cfs @ 12.09 hrs, Volume= 1,791 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.64' @ 12.09 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.5 cfs @ 12.09 hrs HW=197.63' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.5 cfs @ 1.2 fps)

Summary for Pond CB-2: PCB2

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 1.14" for 2-Year event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 519 cf
Outflow = 0.2 cfs @ 12.11 hrs, Volume= 519 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.2 cfs @ 12.11 hrs, Volume= 519 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.56' @ 12.11 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 12.11 hrs HW=197.56' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.2 cfs @ 0.8 fps)

Summary for Pond DMH-1: Stormceptor

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 2.20" for 2-Year event
Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,310 cf
Outflow = 0.7 cfs @ 12.09 hrs, Volume= 2,310 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.7 cfs @ 12.09 hrs, Volume= 2,310 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 198.51' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	198.10'	**12.0" Vert. 12" Orifice/Grate** C= 0.600

Primary OutFlow Max=0.7 cfs @ 12.09 hrs HW=198.51' (Free Discharge)
↑—**1=12" Orifice/Grate** (Orifice Controls 0.7 cfs @ 2.2 fps)

Summary for Pond MH-1: MH Unit 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.02' @ 0.00 hrs
Flood Elev= 198.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.02'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=195.02' (Free Discharge)
↑—**1=12" Outlet** (Controls 0.0 cfs)

Summary for Pond PSIS-1: Proposed Subsurface Infiltration System - 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 2.20" for 2-Year event
Inflow = 0.7 cfs @ 12.10 hrs, Volume= 2,310 cf
Outflow = 0.1 cfs @ 12.79 hrs, Volume= 2,310 cf, Atten= 88%, Lag= 41.4 min
Discarded = 0.1 cfs @ 12.79 hrs, Volume= 2,310 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 198.54' @ 12.79 hrs Surf.Area= 3,257 sf Storage= 764 cf

Plug-Flow detention time= 70.3 min calculated for 2,309 cf (100% of inflow)
Center-of-Mass det. time= 70.2 min (857.2 - 787.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	198.00'	2,279 cf	**54.83'W x 59.40'L x 2.33'H Field A** 7,600 cf Overall - 1,901 cf Embedded = 5,698 cf x 40.0% Voids
#2A	198.50'	1,901 cf	**StormTech SC-310** x 128 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 16 rows
		4,181 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	198.00'	**1.020 in/hr Exfiltration over Wetted area**
#2	Primary	199.83'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.1 cfs @ 12.79 hrs HW=198.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond PSIS-2: Proposed Subsurface Infiltration System - 2

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 3.12" for 2-Year event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 909 cf
Outflow = 0.0 cfs @ 12.89 hrs, Volume= 909 cf, Atten= 90%, Lag= 48.3 min
Discarded = 0.0 cfs @ 12.89 hrs, Volume= 909 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 200.68' @ 12.89 hrs Surf.Area= 950 sf Storage= 322 cf

Plug-Flow detention time= 94.3 min calculated for 908 cf (100% of inflow)
Center-of-Mass det. time= 94.2 min (849.6 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.89 hrs HW=200.68' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Summary for Pond PSIS-3: Proposed Subsurface Infiltration System - 3

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 3.12" for 2-Year event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 909 cf
Outflow = 0.0 cfs @ 12.89 hrs, Volume= 909 cf, Atten= 90%, Lag= 48.3 min
Discarded = 0.0 cfs @ 12.89 hrs, Volume= 909 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 200.68' @ 12.89 hrs Surf.Area= 950 sf Storage= 322 cf

Plug-Flow detention time= 94.3 min calculated for 908 cf (100% of inflow)

Center-of-Mass det. time= 94.2 min (849.6 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.89 hrs HW=200.68' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

PROPOSED CONDITIONS
10-YEAR 24 HOUR STORM EVENT ANALYSIS

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC10: Lot 1 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,459 cf

SubcatchmentSC101: Subcatchment101 Runoff Area=35,000 sf 0.00% Impervious Runoff Depth=2.56"
Flow Length=436' Tc=8.5 min CN=74 Runoff=2.2 cfs 7,458 cf

SubcatchmentSC102: Subcatchment102 Runoff Area=8,071 sf 0.00% Impervious Runoff Depth=2.56"
Flow Length=425' Tc=7.8 min CN=74 Runoff=0.5 cfs 1,720 cf

SubcatchmentSC103: Subcatchment103 Runoff Area=975 sf 100.00% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=98 Runoff=0.1 cfs 406 cf

SubcatchmentSC20: Lot 2 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=5.00"
Tc=6.0 min CN=98 Runoff=0.4 cfs 1,459 cf

SubcatchmentSC201: Subcatchment201 Runoff Area=8,617 sf 0.00% Impervious Runoff Depth=2.56"
Tc=6.0 min CN=74 Runoff=0.6 cfs 1,836 cf

SubcatchmentSC301: Subcatchment301 Runoff Area=62,547 sf 0.00% Impervious Runoff Depth=2.83"
Flow Length=308' Tc=7.9 min CN=77 Runoff=4.4 cfs 14,725 cf

SubcatchmentSC401: Subcatchment401 Runoff Area=5,474 sf 0.00% Impervious Runoff Depth=2.56"
Flow Length=272' Slope=0.0280 '/' Tc=6.4 min CN=74 Runoff=0.4 cfs 1,166 cf

SubcatchmentSC501: Subcatchment501 Runoff Area=7,152 sf 95.53% Impervious Runoff Depth=4.89"
Tc=6.0 min CN=97 Runoff=0.8 cfs 2,912 cf

Reach 401R: 12" Culvert Avg. Flow Depth=0.22' Max Vel=2.8 fps Inflow=0.4 cfs 1,166 cf
12.0" Round Pipe n=0.013 L=17.0' S=0.0088 '/' Capacity=3.3 cfs Outflow=0.4 cfs 1,166 cf

Reach DIP-1: 12"DIP Avg. Flow Depth=0.18' Max Vel=3.9 fps Inflow=0.4 cfs 1,166 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.4 cfs 1,166 cf

Reach DIP-2: 12"DIP Avg. Flow Depth=0.49' Max Vel=3.1 fps Inflow=1.2 cfs 4,079 cf
12.0" Round Pipe n=0.010 L=36.0' S=0.0028 '/' Capacity=2.4 cfs Outflow=1.2 cfs 4,079 cf

Reach DIP-3: 12" DIP Avg. Flow Depth=0.26' Max Vel=5.0 fps Inflow=0.8 cfs 2,912 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.8 cfs 2,912 cf

Reach DP1: DESIGN POINT 1 Inflow=2.8 cfs 9,585 cf
Outflow=2.8 cfs 9,585 cf

Reach DP2: DESIGN POINT 2 Inflow=0.6 cfs 1,836 cf
Outflow=0.6 cfs 1,836 cf

Reach DP3: DESIGN POINT 3 Inflow=4.4 cfs 14,725 cf
Outflow=4.4 cfs 14,725 cf

Reach PVC-1: 12" PVC Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.010 L=10.0' S=0.3830 '/' Capacity=28.7 cfs Outflow=0.0 cfs 0 cf

Reach RCP-4: 12" RCP Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.013 L=8.8' S=0.1364 '/' Capacity=13.2 cfs Outflow=0.0 cfs 0 cf

Pond CB-1: PDCB 1 Peak Elev=197.68' Inflow=0.8 cfs 2,912 cf
Outflow=0.8 cfs 2,912 cf

Pond CB-2: PCB2 Peak Elev=197.61' Inflow=0.4 cfs 1,166 cf
Outflow=0.4 cfs 1,166 cf

Pond DMH-1: Stormceptor Peak Elev=198.67' Inflow=1.2 cfs 4,079 cf
Outflow=1.2 cfs 4,079 cf

Pond MH-1: MH Unit 1 Peak Elev=195.02' Inflow=0.0 cfs 0 cf
Outflow=0.0 cfs 0 cf

Pond PSIS-1: Proposed Subsurface Peak Elev=198.90' Storage=1,680 cf Inflow=1.2 cfs 4,079 cf
Discarded=0.1 cfs 4,079 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 4,079 cf

Pond PSIS-2: Proposed Subsurface Infiltration Peak Elev=201.09' Storage=607 cf Inflow=0.4 cfs 1,459 cf
Outflow=0.0 cfs 1,459 cf

Pond PSIS-3: Proposed Subsurface Infiltration Peak Elev=201.09' Storage=607 cf Inflow=0.4 cfs 1,459 cf
Outflow=0.0 cfs 1,459 cf

Total Runoff Area = 134,836 sf Runoff Volume = 33,143 cf Average Runoff Depth = 2.95"
89.02% Pervious = 120,029 sf 10.98% Impervious = 14,807 sf

Summary for Subcatchment SC10: Lot 1 House

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,459 cf, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC101: Subcatchment 101

Runoff = 2.2 cfs @ 12.12 hrs, Volume= 7,458 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
35,000	74	>75% Grass cover, Good, HSG C
35,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.3	172	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Steep Grass** Unpaved Kv= 16.1 fps
1.2	198	0.0300	2.8		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
8.5	436	Total			

Summary for Subcatchment SC102: Subcatchment 102

Runoff = 0.5 cfs @ 12.12 hrs, Volume= 1,720 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
8,071	74	>75% Grass cover, Good, HSG C
8,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
2.6	375	0.0230	2.4		**Shallow Concentrated Flow, Grass shallow** Unpaved Kv= 16.1 fps
7.8	425	Total			

Summary for Subcatchment SC103: Subcatchment 103

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 406 cf, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
975	98	Paved roads w/curbs & sewers, HSG C
975		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Summary for Subcatchment SC20: Lot 2 House

Runoff = 0.4 cfs @ 12.09 hrs, Volume= 1,459 cf, Depth= 5.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC201: Subcatchment 201

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,836 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
8,617	74	>75% Grass cover, Good, HSG C
8,617		100.00% Pervious Area

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

Summary for Subcatchment SC301: Subcatchment 301

Runoff = 4.4 cfs @ 12.11 hrs, Volume= 14,725 cf, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
49,068	77	Woods, Good, HSG D
4,192	70	Woods, Good, HSG C
8,613	80	>75% Grass cover, Good, HSG D
674	74	>75% Grass cover, Good, HSG C
62,547	77	Weighted Average
62,547		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0555	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.1	75	0.0140	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	308	Total			

Summary for Subcatchment SC401: Subcatchment 401

Runoff = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
5,474	74	>75% Grass cover, Good, HSG C
5,474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0280	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.4	222	0.0280	2.7		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
6.4	272	Total			

Summary for Subcatchment SC501: Subcatchment 501

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf, Depth= 4.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

	Area (sf)	CN	Description
*	320	74	>75% Pervious Pavers, HSG C
	6,832	98	Paved roads w/curbs & sewers, HSG C
	7,152	97	Weighted Average
	320		4.47% Pervious Area
	6,832		95.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

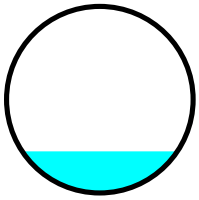
Summary for Reach 401R: 12" Culvert

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf
Outflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 0.3 min

Peak Storage= 2 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.3 cfs

12.0" Round Pipe
n= 0.013 Cast iron, coated
Length= 17.0' Slope= 0.0088 '/'
Inlet Invert= 204.85', Outlet Invert= 204.70'



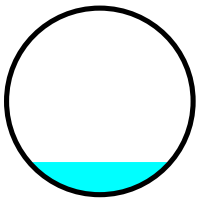
Summary for Reach DIP-1: 12"DIP

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf
Outflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



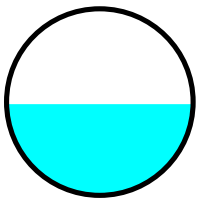
Summary for Reach DIP-2: 12"DIP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 4,079 cf
Outflow = 1.2 cfs @ 12.10 hrs, Volume= 4,079 cf, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 0.6 min

Peak Storage= 14 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.4 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 36.0' Slope= 0.0028 '/'
Inlet Invert= 198.10', Outlet Invert= 198.00'



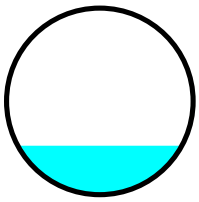
Summary for Reach DIP-3: 12" DIP

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 4.89" for 10-Year event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.6 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.26'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 56,672 sf, 13.78% Impervious, Inflow Depth = 2.03" for 10-Year event
Inflow = 2.8 cfs @ 12.12 hrs, Volume= 9,585 cf
Outflow = 2.8 cfs @ 12.12 hrs, Volume= 9,585 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 8,617 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 1,836 cf
Outflow = 0.6 cfs @ 12.09 hrs, Volume= 1,836 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 62,547 sf, 0.00% Impervious, Inflow Depth = 2.83" for 10-Year event
Inflow = 4.4 cfs @ 12.11 hrs, Volume= 14,725 cf
Outflow = 4.4 cfs @ 12.11 hrs, Volume= 14,725 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

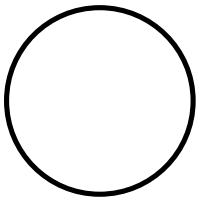
Summary for Reach PVC-1: 12" PVC

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 28.7 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.3830 '/'
Inlet Invert= 199.83', Outlet Invert= 196.00'



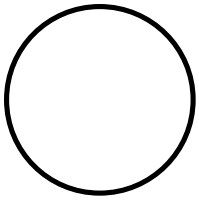
Summary for Reach RCP-4: 12" RCP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 13.2 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.8' Slope= 0.1364 '/'
Inlet Invert= 195.90', Outlet Invert= 194.70'



Summary for Pond CB-1: PDCB 1

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 4.89" for 10-Year event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf
Outflow = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,912 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.68' @ 12.09 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.8 cfs @ 12.09 hrs HW=197.68' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.8 cfs @ 1.4 fps)

Summary for Pond CB-2: PCB2

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 2.56" for 10-Year event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf
Outflow = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.4 cfs @ 12.10 hrs, Volume= 1,166 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.61' @ 12.10 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.4 cfs @ 12.10 hrs HW=197.61' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.4 cfs @ 1.1 fps)

Summary for Pond DMH-1: Stormceptor

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 4,079 cf
Outflow = 1.2 cfs @ 12.09 hrs, Volume= 4,079 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.2 cfs @ 12.09 hrs, Volume= 4,079 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 198.67' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	198.10'	**12.0" Vert. 12" Orifice/Grate** C= 0.600

Primary OutFlow Max=1.2 cfs @ 12.09 hrs HW=198.66' (Free Discharge)
↑—**1=12" Orifice/Grate** (Orifice Controls 1.2 cfs @ 2.5 fps)

Summary for Pond MH-1: MH Unit 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.02' @ 0.00 hrs
Flood Elev= 198.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.02'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=195.02' (Free Discharge)
↑—**1=12" Outlet** (Controls 0.0 cfs)

Summary for Pond PSIS-1: Proposed Subsurface Infiltration System - 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 3.88" for 10-Year event
Inflow = 1.2 cfs @ 12.10 hrs, Volume= 4,079 cf
Outflow = 0.1 cfs @ 13.64 hrs, Volume= 4,079 cf, Atten= 93%, Lag= 92.3 min
Discarded = 0.1 cfs @ 13.64 hrs, Volume= 4,079 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 198.90' @ 13.64 hrs Surf.Area= 3,257 sf Storage= 1,680 cf

Plug-Flow detention time= 173.5 min calculated for 4,076 cf (100% of inflow)
Center-of-Mass det. time= 173.4 min (952.0 - 778.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	198.00'	2,279 cf	**54.83'W x 59.40'L x 2.33'H Field A** 7,600 cf Overall - 1,901 cf Embedded = 5,698 cf x 40.0% Voids
#2A	198.50'	1,901 cf	**StormTech SC-310** x 128 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 16 rows
		4,181 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	198.00'	**1.020 in/hr Exfiltration over Wetted area**
#2	Primary	199.83'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.1 cfs @ 13.64 hrs HW=198.90' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond PSIS-2: Proposed Subsurface Infiltration System - 2

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-Year event
Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,459 cf
Outflow = 0.0 cfs @ 13.57 hrs, Volume= 1,459 cf, Atten= 94%, Lag= 89.2 min
Discarded = 0.0 cfs @ 13.57 hrs, Volume= 1,459 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 201.09' @ 13.57 hrs Surf.Area= 950 sf Storage= 607 cf

Plug-Flow detention time= 189.5 min calculated for 1,458 cf (100% of inflow)
Center-of-Mass det. time= 189.3 min (936.6 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 13.57 hrs HW=201.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Summary for Pond PSIS-3: Proposed Subsurface Infiltration System - 3

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 5.00" for 10-Year event
Inflow = 0.4 cfs @ 12.09 hrs, Volume= 1,459 cf
Outflow = 0.0 cfs @ 13.57 hrs, Volume= 1,459 cf, Atten= 94%, Lag= 89.2 min
Discarded = 0.0 cfs @ 13.57 hrs, Volume= 1,459 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 201.09' @ 13.57 hrs Surf.Area= 950 sf Storage= 607 cf

Plug-Flow detention time= 189.5 min calculated for 1,458 cf (100% of inflow)

Center-of-Mass det. time= 189.3 min (936.6 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 13.57 hrs HW=201.09' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

PROPOSED CONDITIONS
20-YEAR 24 HOUR STORM EVENT ANALYSIS

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC10: Lot 1 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=5.79"
Tc=6.0 min CN=98 Runoff=0.5 cfs 1,689 cf

SubcatchmentSC101: Subcatchment101 Runoff Area=35,000 sf 0.00% Impervious Runoff Depth=3.21"
Flow Length=436' Tc=8.5 min CN=74 Runoff=2.7 cfs 9,363 cf

SubcatchmentSC102: Subcatchment102 Runoff Area=8,071 sf 0.00% Impervious Runoff Depth=3.21"
Flow Length=425' Tc=7.8 min CN=74 Runoff=0.6 cfs 2,159 cf

SubcatchmentSC103: Subcatchment103 Runoff Area=975 sf 100.00% Impervious Runoff Depth=5.79"
Tc=6.0 min CN=98 Runoff=0.1 cfs 471 cf

SubcatchmentSC20: Lot 2 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=5.79"
Tc=6.0 min CN=98 Runoff=0.5 cfs 1,689 cf

SubcatchmentSC201: Subcatchment201 Runoff Area=8,617 sf 0.00% Impervious Runoff Depth=3.21"
Tc=6.0 min CN=74 Runoff=0.7 cfs 2,305 cf

SubcatchmentSC301: Subcatchment301 Runoff Area=62,547 sf 0.00% Impervious Runoff Depth=3.51"
Flow Length=308' Tc=7.9 min CN=77 Runoff=5.5 cfs 18,270 cf

SubcatchmentSC401: Subcatchment401 Runoff Area=5,474 sf 0.00% Impervious Runoff Depth=3.21"
Flow Length=272' Slope=0.0280 '/' Tc=6.4 min CN=74 Runoff=0.5 cfs 1,464 cf

SubcatchmentSC501: Subcatchment501 Runoff Area=7,152 sf 95.53% Impervious Runoff Depth=5.67"
Tc=6.0 min CN=97 Runoff=0.9 cfs 3,382 cf

Reach 401R: 12" Culvert Avg. Flow Depth=0.25' Max Vel=3.0 fps Inflow=0.5 cfs 1,464 cf
12.0" Round Pipe n=0.013 L=17.0' S=0.0088 '/' Capacity=3.3 cfs Outflow=0.5 cfs 1,464 cf

Reach DIP-1: 12"DIP Avg. Flow Depth=0.20' Max Vel=4.2 fps Inflow=0.5 cfs 1,464 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.5 cfs 1,464 cf

Reach DIP-2: 12"DIP Avg. Flow Depth=0.54' Max Vel=3.2 fps Inflow=1.4 cfs 4,846 cf
12.0" Round Pipe n=0.010 L=36.0' S=0.0028 '/' Capacity=2.4 cfs Outflow=1.4 cfs 4,846 cf

Reach DIP-3: 12" DIP Avg. Flow Depth=0.28' Max Vel=5.2 fps Inflow=0.9 cfs 3,382 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.9 cfs 3,382 cf

Reach DP1: DESIGN POINT 1 Inflow=3.5 cfs 11,993 cf
Outflow=3.5 cfs 11,993 cf

Reach DP2: DESIGN POINT 2 Inflow=0.7 cfs 2,305 cf
Outflow=0.7 cfs 2,305 cf

Reach DP3: DESIGN POINT 3 Inflow=5.5 cfs 18,270 cf
Outflow=5.5 cfs 18,270 cf

Reach PVC-1: 12" PVC Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.010 L=10.0' S=0.3830 '/' Capacity=28.7 cfs Outflow=0.0 cfs 0 cf

Reach RCP-4: 12" RCP Avg. Flow Depth=0.00' Max Vel=0.0 fps Inflow=0.0 cfs 0 cf
12.0" Round Pipe n=0.013 L=8.8' S=0.1364 '/' Capacity=13.2 cfs Outflow=0.0 cfs 0 cf

Pond CB-1: PDCB 1 Peak Elev=197.70' Inflow=0.9 cfs 3,382 cf
Outflow=0.9 cfs 3,382 cf

Pond CB-2: PCB2 Peak Elev=197.63' Inflow=0.5 cfs 1,464 cf
Outflow=0.5 cfs 1,464 cf

Pond DMH-1: Stormceptor Peak Elev=198.73' Inflow=1.4 cfs 4,846 cf
Outflow=1.4 cfs 4,846 cf

Pond MH-1: MH Unit 1 Peak Elev=195.02' Inflow=0.0 cfs 0 cf
Outflow=0.0 cfs 0 cf

Pond PSIS-1: Proposed Subsurface Peak Elev=199.09' Storage=2,134 cf Inflow=1.4 cfs 4,846 cf
Discarded=0.1 cfs 4,846 cf Primary=0.0 cfs 0 cf Outflow=0.1 cfs 4,846 cf

Pond PSIS-2: Proposed Subsurface Infiltration Peak Elev=201.29' Storage=741 cf Inflow=0.5 cfs 1,689 cf
Outflow=0.0 cfs 1,689 cf

Pond PSIS-3: Proposed Subsurface Infiltration Peak Elev=201.29' Storage=741 cf Inflow=0.5 cfs 1,689 cf
Outflow=0.0 cfs 1,689 cf

Total Runoff Area = 134,836 sf Runoff Volume = 40,793 cf Average Runoff Depth = 3.63"
89.02% Pervious = 120,029 sf 10.98% Impervious = 14,807 sf

Summary for Subcatchment SC10: Lot 1 House

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,689 cf, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC101: Subcatchment 101

Runoff = 2.7 cfs @ 12.12 hrs, Volume= 9,363 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
35,000	74	>75% Grass cover, Good, HSG C
35,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.3	172	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Steep Grass** Unpaved Kv= 16.1 fps
1.2	198	0.0300	2.8		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
8.5	436	Total			

Summary for Subcatchment SC102: Subcatchment 102

Runoff = 0.6 cfs @ 12.11 hrs, Volume= 2,159 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
8,071	74	>75% Grass cover, Good, HSG C
8,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
2.6	375	0.0230	2.4		**Shallow Concentrated Flow, Grass shallow** Unpaved Kv= 16.1 fps
7.8	425	Total			

Summary for Subcatchment SC103: Subcatchment 103

Runoff = 0.1 cfs @ 12.09 hrs, Volume= 471 cf, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
975	98	Paved roads w/curbs & sewers, HSG C
975		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Summary for Subcatchment SC20: Lot 2 House

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,689 cf, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC201: Subcatchment 201

Runoff = 0.7 cfs @ 12.09 hrs, Volume= 2,305 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
8,617	74	>75% Grass cover, Good, HSG C
8,617		100.00% Pervious Area

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

Summary for Subcatchment SC301: Subcatchment 301

Runoff = 5.5 cfs @ 12.11 hrs, Volume= 18,270 cf, Depth= 3.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
49,068	77	Woods, Good, HSG D
4,192	70	Woods, Good, HSG C
8,613	80	>75% Grass cover, Good, HSG D
674	74	>75% Grass cover, Good, HSG C
62,547	77	Weighted Average
62,547		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0555	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.1	75	0.0140	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	308	Total			

Summary for Subcatchment SC401: Subcatchment 401

Runoff = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

Area (sf)	CN	Description
5,474	74	>75% Grass cover, Good, HSG C
5,474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0280	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.4	222	0.0280	2.7		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
6.4	272	Total			

Summary for Subcatchment SC501: Subcatchment 501

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf, Depth= 5.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 20-Year Rainfall=6.03"

	Area (sf)	CN	Description
*	320	74	>75% Pervious Pavers, HSG C
	6,832	98	Paved roads w/curbs & sewers, HSG C
	7,152	97	Weighted Average
	320		4.47% Pervious Area
	6,832		95.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

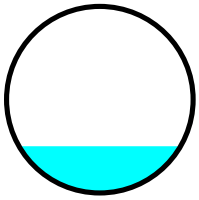
Summary for Reach 401R: 12" Culvert

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 3.21" for 20-Year event
Inflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf
Outflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.0 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 0.3 min

Peak Storage= 3 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.3 cfs

12.0" Round Pipe
n= 0.013 Cast iron, coated
Length= 17.0' Slope= 0.0088 '/'
Inlet Invert= 204.85', Outlet Invert= 204.70'



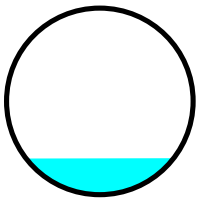
Summary for Reach DIP-1: 12"DIP

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 3.21" for 20-Year event
Inflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf
Outflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.2 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



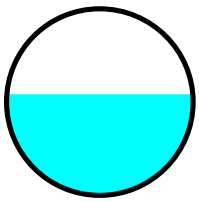
Summary for Reach DIP-2: 12"DIP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 4.61" for 20-Year event
Inflow = 1.4 cfs @ 12.09 hrs, Volume= 4,846 cf
Outflow = 1.4 cfs @ 12.10 hrs, Volume= 4,846 cf, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.2 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 0.6 min

Peak Storage= 16 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.4 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 36.0' Slope= 0.0028 '/'
Inlet Invert= 198.10', Outlet Invert= 198.00'



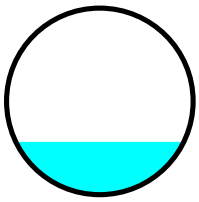
Summary for Reach DIP-3: 12" DIP

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 5.67" for 20-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf
Outflow = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.2 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 56,672 sf, 13.78% Impervious, Inflow Depth = 2.54" for 20-Year event
Inflow = 3.5 cfs @ 12.12 hrs, Volume= 11,993 cf
Outflow = 3.5 cfs @ 12.12 hrs, Volume= 11,993 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 8,617 sf, 0.00% Impervious, Inflow Depth = 3.21" for 20-Year event
Inflow = 0.7 cfs @ 12.09 hrs, Volume= 2,305 cf
Outflow = 0.7 cfs @ 12.09 hrs, Volume= 2,305 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 62,547 sf, 0.00% Impervious, Inflow Depth = 3.51" for 20-Year event
Inflow = 5.5 cfs @ 12.11 hrs, Volume= 18,270 cf
Outflow = 5.5 cfs @ 12.11 hrs, Volume= 18,270 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

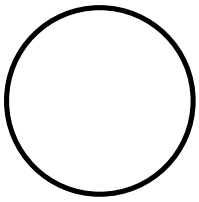
Summary for Reach PVC-1: 12" PVC

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 20-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 28.7 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.3830 '/'
Inlet Invert= 199.83', Outlet Invert= 196.00'



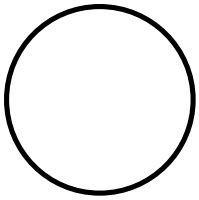
Summary for Reach RCP-4: 12" RCP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 20-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 13.2 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.8' Slope= 0.1364 '/'
Inlet Invert= 195.90', Outlet Invert= 194.70'



Summary for Pond CB-1: PDCB 1

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 5.67" for 20-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf
Outflow = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.9 cfs @ 12.09 hrs, Volume= 3,382 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.70' @ 12.09 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.9 cfs @ 12.09 hrs HW=197.70' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.9 cfs @ 1.5 fps)

Summary for Pond CB-2: PCB2

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 3.21" for 20-Year event
Inflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf
Outflow = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.5 cfs @ 12.10 hrs, Volume= 1,464 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.63' @ 12.10 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.5 cfs @ 12.10 hrs HW=197.63' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.5 cfs @ 1.2 fps)

Summary for Pond DMH-1: Stormceptor

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 4.61" for 20-Year event
Inflow = 1.4 cfs @ 12.09 hrs, Volume= 4,846 cf
Outflow = 1.4 cfs @ 12.09 hrs, Volume= 4,846 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.4 cfs @ 12.09 hrs, Volume= 4,846 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 198.73' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	198.10'	**12.0" Vert. 12" Orifice/Grate** C= 0.600

Primary OutFlow Max=1.4 cfs @ 12.09 hrs HW=198.72' (Free Discharge)
↑**1=12" Orifice/Grate** (Orifice Controls 1.4 cfs @ 2.7 fps)

Summary for Pond MH-1: MH Unit 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.00" for 20-Year event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.02' @ 0.00 hrs
Flood Elev= 198.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.02'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=195.02' (Free Discharge)
↑**1=12" Outlet** (Controls 0.0 cfs)

Summary for Pond PSIS-1: Proposed Subsurface Infiltration System - 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 4.61" for 20-Year event
Inflow = 1.4 cfs @ 12.10 hrs, Volume= 4,846 cf
Outflow = 0.1 cfs @ 13.99 hrs, Volume= 4,846 cf, Atten= 94%, Lag= 113.5 min
Discarded = 0.1 cfs @ 13.99 hrs, Volume= 4,846 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 199.09' @ 13.99 hrs Surf.Area= 3,257 sf Storage= 2,134 cf

Plug-Flow detention time= 225.1 min calculated for 4,843 cf (100% of inflow)
Center-of-Mass det. time= 225.1 min (1,001.1 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	198.00'	2,279 cf	**54.83'W x 59.40'L x 2.33'H Field A** 7,600 cf Overall - 1,901 cf Embedded = 5,698 cf x 40.0% Voids
#2A	198.50'	1,901 cf	**StormTech SC-310** x 128 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 16 rows
		4,181 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	198.00'	**1.020 in/hr Exfiltration over Wetted area**
#2	Primary	199.83'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.1 cfs @ 13.99 hrs HW=199.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond PSIS-2: Proposed Subsurface Infiltration System - 2

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 5.79" for 20-Year event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,689 cf
Outflow = 0.0 cfs @ 13.85 hrs, Volume= 1,689 cf, Atten= 94%, Lag= 105.9 min
Discarded = 0.0 cfs @ 13.85 hrs, Volume= 1,689 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 201.29' @ 13.85 hrs Surf.Area= 950 sf Storage= 741 cf

Plug-Flow detention time= 233.0 min calculated for 1,688 cf (100% of inflow)
Center-of-Mass det. time= 232.9 min (978.0 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 13.85 hrs HW=201.29' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Summary for Pond PSIS-3: Proposed Subsurface Infiltration System - 3

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 5.79" for 20-Year event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,689 cf
Outflow = 0.0 cfs @ 13.85 hrs, Volume= 1,689 cf, Atten= 94%, Lag= 105.9 min
Discarded = 0.0 cfs @ 13.85 hrs, Volume= 1,689 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 201.29' @ 13.85 hrs Surf.Area= 950 sf Storage= 741 cf

Plug-Flow detention time= 233.0 min calculated for 1,688 cf (100% of inflow)

Center-of-Mass det. time= 232.9 min (978.0 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 13.85 hrs HW=201.29' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

PROPOSED CONDITIONS
100-YEAR 24 HOUR STORM EVENT ANALYSIS

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentSC10: Lot 1 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=0.6 cfs 2,330 cf

SubcatchmentSC101: Subcatchment101 Runoff Area=35,000 sf 0.00% Impervious Runoff Depth=5.13"
Flow Length=436' Tc=8.5 min CN=74 Runoff=4.4 cfs 14,968 cf

SubcatchmentSC102: Subcatchment102 Runoff Area=8,071 sf 0.00% Impervious Runoff Depth=5.13"
Flow Length=425' Tc=7.8 min CN=74 Runoff=1.0 cfs 3,452 cf

SubcatchmentSC103: Subcatchment103 Runoff Area=975 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=0.2 cfs 649 cf

SubcatchmentSC20: Lot 2 House Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=0.6 cfs 2,330 cf

SubcatchmentSC201: Subcatchment201 Runoff Area=8,617 sf 0.00% Impervious Runoff Depth=5.13"
Tc=6.0 min CN=74 Runoff=1.2 cfs 3,685 cf

SubcatchmentSC301: Subcatchment301 Runoff Area=62,547 sf 0.00% Impervious Runoff Depth=5.49"
Flow Length=308' Tc=7.9 min CN=77 Runoff=8.5 cfs 28,593 cf

SubcatchmentSC401: Subcatchment401 Runoff Area=5,474 sf 0.00% Impervious Runoff Depth=5.13"
Flow Length=272' Slope=0.0280 '/' Tc=6.4 min CN=74 Runoff=0.7 cfs 2,341 cf

SubcatchmentSC501: Subcatchment501 Runoff Area=7,152 sf 95.53% Impervious Runoff Depth=7.87"
Tc=6.0 min CN=97 Runoff=1.3 cfs 4,691 cf

Reach 401R: 12" Culvert Avg. Flow Depth=0.32' Max Vel=3.4 fps Inflow=0.7 cfs 2,341 cf
12.0" Round Pipe n=0.013 L=17.0' S=0.0088 '/' Capacity=3.3 cfs Outflow=0.7 cfs 2,341 cf

Reach DIP-1: 12"DIP Avg. Flow Depth=0.25' Max Vel=4.8 fps Inflow=0.7 cfs 2,341 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=0.7 cfs 2,341 cf

Reach DIP-2: 12"DIP Avg. Flow Depth=0.69' Max Vel=3.5 fps Inflow=2.0 cfs 7,032 cf
12.0" Round Pipe n=0.010 L=36.0' S=0.0028 '/' Capacity=2.4 cfs Outflow=2.0 cfs 7,032 cf

Reach DIP-3: 12" DIP Avg. Flow Depth=0.33' Max Vel=5.7 fps Inflow=1.3 cfs 4,691 cf
12.0" Round Pipe n=0.011 L=6.0' S=0.0167 '/' Capacity=5.4 cfs Outflow=1.3 cfs 4,691 cf

Reach DP1: DESIGN POINT 1 Inflow=5.6 cfs 19,082 cf
Outflow=5.6 cfs 19,082 cf

Reach DP2: DESIGN POINT 2 Inflow=1.2 cfs 3,685 cf
Outflow=1.2 cfs 3,685 cf

Reach DP3: DESIGN POINT 3 Inflow=8.5 cfs 28,593 cf
Outflow=8.5 cfs 28,593 cf

Reach PVC-1: 12" PVC Avg. Flow Depth=0.01' Max Vel=3.2 fps Inflow=0.0 cfs 13 cf
12.0" Round Pipe n=0.010 L=10.0' S=0.3830 '/' Capacity=28.7 cfs Outflow=0.0 cfs 13 cf

Reach RCP-4: 12" RCP Avg. Flow Depth=0.01' Max Vel=1.9 fps Inflow=0.0 cfs 13 cf
12.0" Round Pipe n=0.013 L=8.8' S=0.1364 '/' Capacity=13.2 cfs Outflow=0.0 cfs 13 cf

Pond CB-1: PDCB 1 Peak Elev=197.75' Inflow=1.3 cfs 4,691 cf
Outflow=1.3 cfs 4,691 cf

Pond CB-2: PCB2 Peak Elev=197.67' Inflow=0.7 cfs 2,341 cf
Outflow=0.7 cfs 2,341 cf

Pond DMH-1: Stormceptor Peak Elev=198.89' Inflow=2.0 cfs 7,032 cf
Outflow=2.0 cfs 7,032 cf

Pond MH-1: MH Unit 1 Peak Elev=195.02' Inflow=0.0 cfs 13 cf
Outflow=0.0 cfs 13 cf

Pond PSIS-1: Proposed Subsurface Peak Elev=199.86' Storage=3,559 cf Inflow=2.0 cfs 7,032 cf
Discarded=0.1 cfs 7,018 cf Primary=0.0 cfs 13 cf Outflow=0.1 cfs 7,032 cf

Pond PSIS-2: Proposed Subsurface Peak Elev=202.18' Storage=1,142 cf Inflow=0.6 cfs 2,330 cf
Outflow=0.0 cfs 2,330 cf

Pond PSIS-3: Proposed Subsurface Peak Elev=202.18' Storage=1,142 cf Inflow=0.6 cfs 2,330 cf
Outflow=0.0 cfs 2,330 cf

Total Runoff Area = 134,836 sf Runoff Volume = 63,040 cf Average Runoff Depth = 5.61"
89.02% Pervious = 120,029 sf 10.98% Impervious = 14,807 sf

Summary for Subcatchment SC10: Lot 1 House

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 2,330 cf, Depth= 7.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC101: Subcatchment 101

Runoff = 4.4 cfs @ 12.12 hrs, Volume= 14,968 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
35,000	74	>75% Grass cover, Good, HSG C
35,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0180	0.1		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.3	172	0.0180	2.2		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
0.0	16	0.2450	8.0		**Shallow Concentrated Flow, Steep Grass** Unpaved Kv= 16.1 fps
1.2	198	0.0300	2.8		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
8.5	436	Total			

Summary for Subcatchment SC102: Subcatchment 102

Runoff = 1.0 cfs @ 12.11 hrs, Volume= 3,452 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
8,071	74	>75% Grass cover, Good, HSG C
8,071		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	50	0.0250	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
2.6	375	0.0230	2.4		**Shallow Concentrated Flow, Grass shallow** Unpaved Kv= 16.1 fps
7.8	425	Total			

Summary for Subcatchment SC103: Subcatchment 103

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 649 cf, Depth= 7.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
975	98	Paved roads w/curbs & sewers, HSG C
975		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

Summary for Subcatchment SC20: Lot 2 House

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 2,330 cf, Depth= 7.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
3,500	98	Roofs, HSG C
3,500		100.00% Impervious Area

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

Summary for Subcatchment SC201: Subcatchment 201

Runoff = 1.2 cfs @ 12.09 hrs, Volume= 3,685 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
8,617	74	>75% Grass cover, Good, HSG C
8,617		100.00% Pervious Area

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

Summary for Subcatchment SC301: Subcatchment 301

Runoff = 8.5 cfs @ 12.11 hrs, Volume= 28,593 cf, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
49,068	77	Woods, Good, HSG D
4,192	70	Woods, Good, HSG C
8,613	80	>75% Grass cover, Good, HSG D
674	74	>75% Grass cover, Good, HSG C
62,547	77	Weighted Average
62,547		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0555	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
2.1	75	0.0140	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.6	193	0.0604	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.9	308	Total			

Summary for Subcatchment SC401: Subcatchment 401

Runoff = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

Area (sf)	CN	Description
5,474	74	>75% Grass cover, Good, HSG C
5,474		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	50	0.0280	0.2		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.4	222	0.0280	2.7		**Shallow Concentrated Flow, Shallow Grass** Unpaved Kv= 16.1 fps
6.4	272	Total			

Summary for Subcatchment SC501: Subcatchment 501

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf, Depth= 7.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.23"

	Area (sf)	CN	Description
*	320	74	>75% Pervious Pavers, HSG C
	6,832	98	Paved roads w/curbs & sewers, HSG C
	7,152	97	Weighted Average
	320		4.47% Pervious Area
	6,832		95.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Min. Standard Engineering Practice**

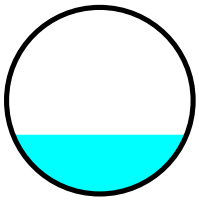
Summary for Reach 401R: 12" Culvert

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf
Outflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 0.2 min

Peak Storage= 4 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.3 cfs

12.0" Round Pipe
n= 0.013 Cast iron, coated
Length= 17.0' Slope= 0.0088 '/'
Inlet Invert= 204.85', Outlet Invert= 204.70'



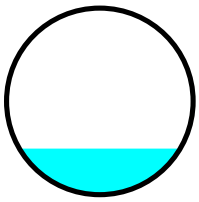
Summary for Reach DIP-1: 12"DIP

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf
Outflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.8 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



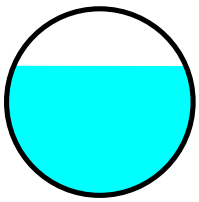
Summary for Reach DIP-2: 12"DIP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 6.68" for 100-Year event
Inflow = 2.0 cfs @ 12.09 hrs, Volume= 7,032 cf
Outflow = 2.0 cfs @ 12.10 hrs, Volume= 7,032 cf, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 0.5 min

Peak Storage= 21 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.69'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.4 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 36.0' Slope= 0.0028 '/'
Inlet Invert= 198.10', Outlet Invert= 198.00'



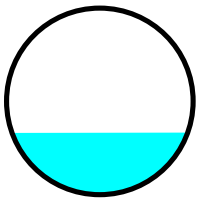
Summary for Reach DIP-3: 12" DIP

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 7.87" for 100-Year event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf
Outflow = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.7 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.4 cfs

12.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 6.0' Slope= 0.0167 '/'
Inlet Invert= 198.20', Outlet Invert= 198.10'



Summary for Reach DP1: DESIGN POINT 1

Inflow Area = 56,672 sf, 13.78% Impervious, Inflow Depth = 4.04" for 100-Year event
Inflow = 5.6 cfs @ 12.12 hrs, Volume= 19,082 cf
Outflow = 5.6 cfs @ 12.12 hrs, Volume= 19,082 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: DESIGN POINT 2

Inflow Area = 8,617 sf, 0.00% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 3,685 cf
Outflow = 1.2 cfs @ 12.09 hrs, Volume= 3,685 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: DESIGN POINT 3

Inflow Area = 62,547 sf, 0.00% Impervious, Inflow Depth = 5.49" for 100-Year event
Inflow = 8.5 cfs @ 12.11 hrs, Volume= 28,593 cf
Outflow = 8.5 cfs @ 12.11 hrs, Volume= 28,593 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

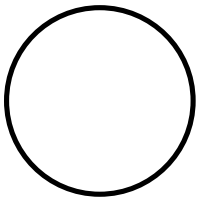
Summary for Reach PVC-1: 12" PVC

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.01" for 100-Year event
Inflow = 0.0 cfs @ 14.89 hrs, Volume= 13 cf
Outflow = 0.0 cfs @ 14.88 hrs, Volume= 13 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.2 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.2 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 14.88 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 28.7 cfs

12.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.3830 '/'
Inlet Invert= 199.83', Outlet Invert= 196.00'



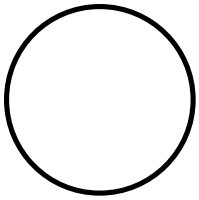
Summary for Reach RCP-4: 12" RCP

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.01" for 100-Year event
Inflow = 0.0 cfs @ 14.88 hrs, Volume= 13 cf
Outflow = 0.0 cfs @ 14.88 hrs, Volume= 13 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.9 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 14.87 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 13.2 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 8.8' Slope= 0.1364 '/'
Inlet Invert= 195.90', Outlet Invert= 194.70'



Summary for Pond CB-1: PDCB 1

Inflow Area = 7,152 sf, 95.53% Impervious, Inflow Depth = 7.87" for 100-Year event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf
Outflow = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.3 cfs @ 12.09 hrs, Volume= 4,691 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.75' @ 12.09 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=1.3 cfs @ 12.09 hrs HW=197.75' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 1.3 cfs @ 1.6 fps)

Summary for Pond CB-2: PCB2

Inflow Area = 5,474 sf, 0.00% Impervious, Inflow Depth = 5.13" for 100-Year event
Inflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf
Outflow = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.7 cfs @ 12.10 hrs, Volume= 2,341 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 197.67' @ 12.10 hrs
Flood Elev= 200.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	197.50'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.7 cfs @ 12.10 hrs HW=197.67' (Free Discharge)
↑**1=12" Outlet** (Weir Controls 0.7 cfs @ 1.4 fps)

Summary for Pond DMH-1: Stormceptor

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 6.68" for 100-Year event
Inflow = 2.0 cfs @ 12.09 hrs, Volume= 7,032 cf
Outflow = 2.0 cfs @ 12.09 hrs, Volume= 7,032 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.0 cfs @ 12.09 hrs, Volume= 7,032 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 198.89' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	198.10'	**12.0" Vert. 12" Orifice/Grate** C= 0.600

Primary OutFlow Max=2.0 cfs @ 12.09 hrs HW=198.88' (Free Discharge)
↑—**1=12" Orifice/Grate** (Orifice Controls 2.0 cfs @ 3.0 fps)

Summary for Pond MH-1: MH Unit 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 0.01" for 100-Year event
Inflow = 0.0 cfs @ 14.88 hrs, Volume= 13 cf
Outflow = 0.0 cfs @ 14.88 hrs, Volume= 13 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 14.88 hrs, Volume= 13 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 195.02' @ 14.88 hrs
Flood Elev= 198.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	195.02'	**12.0" Horiz. 12" Outlet** C= 0.600 in 24.0" Grate Limited to weir flow at low heads

Primary OutFlow Max=0.0 cfs @ 14.88 hrs HW=195.02' (Free Discharge)
↑—**1=12" Outlet** (Weir Controls 0.0 cfs @ 0.1 fps)

Summary for Pond PSIS-1: Proposed Subsurface Infiltration System - 1

Inflow Area = 12,626 sf, 54.11% Impervious, Inflow Depth = 6.68" for 100-Year event
Inflow = 2.0 cfs @ 12.10 hrs, Volume= 7,032 cf
Outflow = 0.1 cfs @ 14.89 hrs, Volume= 7,032 cf, Atten= 95%, Lag= 167.4 min
Discarded = 0.1 cfs @ 14.89 hrs, Volume= 7,018 cf
Primary = 0.0 cfs @ 14.89 hrs, Volume= 13 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 199.86' @ 14.89 hrs Surf.Area= 3,257 sf Storage= 3,559 cf

Plug-Flow detention time= 372.3 min calculated for 7,032 cf (100% of inflow)
Center-of-Mass det. time= 372.3 min (1,142.5 - 770.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	198.00'	2,279 cf	**54.83'W x 59.40'L x 2.33'H Field A** 7,600 cf Overall - 1,901 cf Embedded = 5,698 cf x 40.0% Voids
#2A	198.50'	1,901 cf	**StormTech SC-310** x 128 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 16 rows
		4,181 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	198.00'	**1.020 in/hr Exfiltration over Wetted area**
#2	Primary	199.83'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.1 cfs @ 14.89 hrs HW=199.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 14.89 hrs HW=199.86' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.0 cfs @ 0.5 fps)

Summary for Pond PSIS-2: Proposed Subsurface Infiltration System - 2

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 7.99" for 100-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 2,330 cf
Outflow = 0.0 cfs @ 14.48 hrs, Volume= 2,330 cf, Atten= 95%, Lag= 143.5 min
Discarded = 0.0 cfs @ 14.48 hrs, Volume= 2,330 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 202.18' @ 14.48 hrs Surf.Area= 950 sf Storage= 1,142 cf

Plug-Flow detention time= 347.9 min calculated for 2,330 cf (100% of inflow)
Center-of-Mass det. time= 347.8 min (1,088.7 - 740.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 14.48 hrs HW=202.18' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Summary for Pond PSIS-3: Proposed Subsurface Infiltration System - 3

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 7.99" for 100-Year event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 2,330 cf
Outflow = 0.0 cfs @ 14.48 hrs, Volume= 2,330 cf, Atten= 95%, Lag= 143.5 min
Discarded = 0.0 cfs @ 14.48 hrs, Volume= 2,330 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 202.18' @ 14.48 hrs Surf.Area= 950 sf Storage= 1,142 cf

Plug-Flow detention time= 347.9 min calculated for 2,330 cf (100% of inflow)

Center-of-Mass det. time= 347.8 min (1,088.7 - 740.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	200.00'	678 cf	**18.17'W x 52.28'L x 2.33'H Field A** 2,216 cf Overall - 521 cf Embedded = 1,696 cf x 40.0% Voids
#2A	200.50'	521 cf	**StormTech SC-310** x 35 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 5 rows
		1,199 cf	Total Available Storage

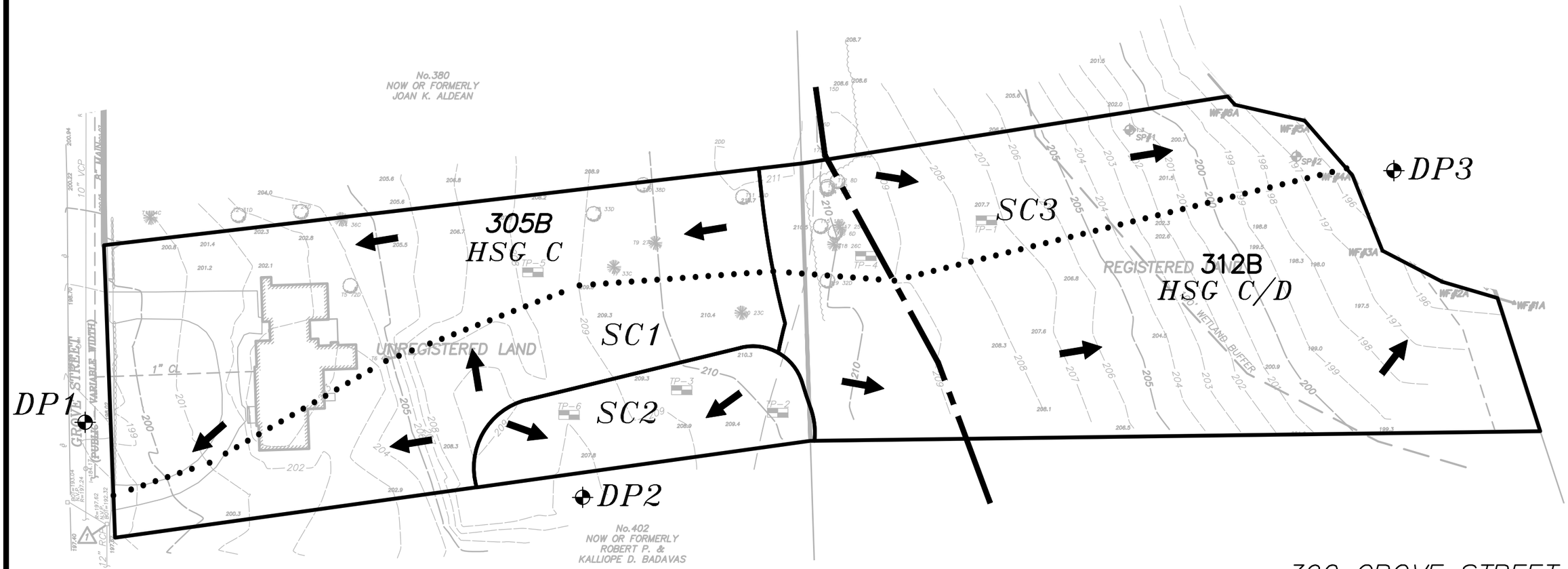
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	200.00'	**1.020 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 14.48 hrs HW=202.18' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

APPENDIX

PRE DEVELOPMENT DRAINAGE PLAN



LEGEND:

➡	OVERLAND FLOW DIRECTION
———	SUBCATCHMENT DIVIDE
SC1	SUBCATCHMENT
DP1	DESIGN POINT
305B	SOIL TYPE
HSG	HYDROLOGIC SOIL GROUP
— - —	SOIL DIVIDE
• • • • • • • • • •	TIME OF CONCENTRATION

390 GROVE STREET
PRE-DEVELOPMENT DRAINAGE PLAN

LOCATED IN

NEEDHAM, MASSACHUSETTS

(SUFFOLK COUNTY)

PREPARED FOR

MORITZ SCHMIDT

SCALE: 1"= 60' DATE: OCTOBER 4, 2019

30 0 30 60 120

MERIDIAN ASSOCIATES

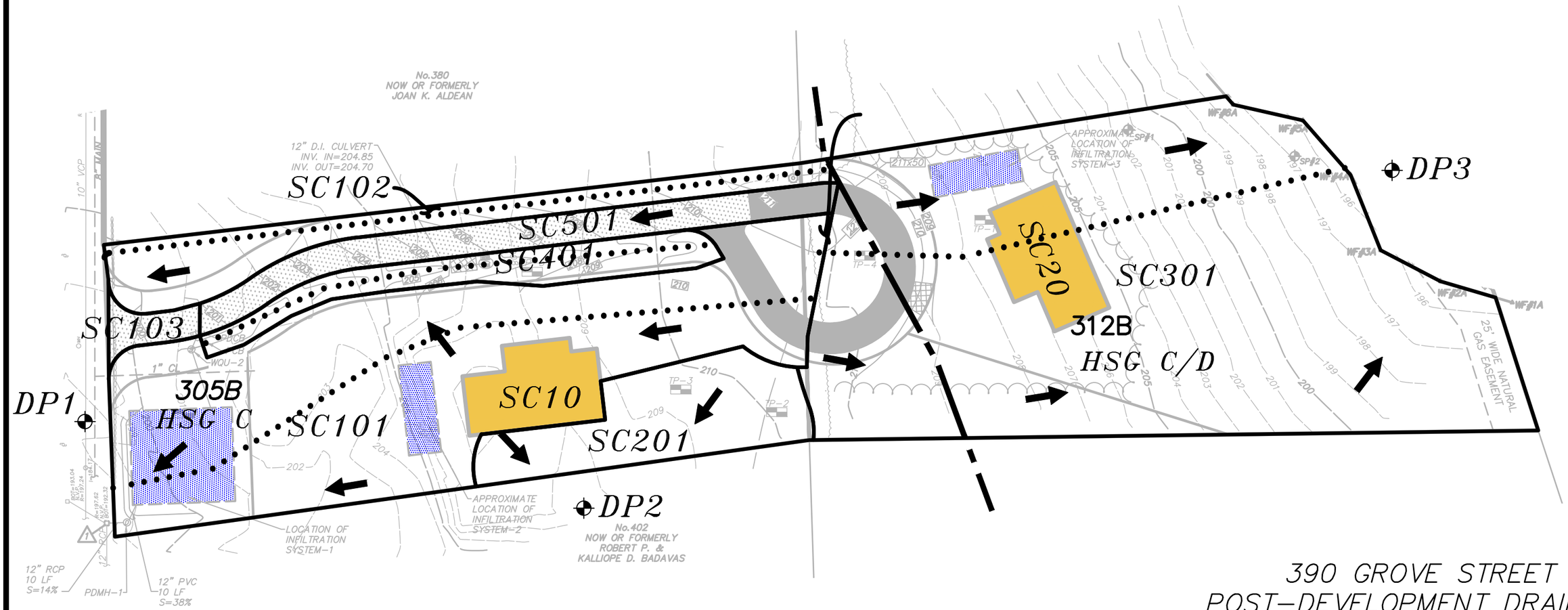
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447

69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030

WWW.MERIDIANASSOC.COM

DWG. No. 6036-PRE

POST DEVELOPMENT DRAINAGE PLAN



LEGEND:

→	OVERLAND FLOW DIRECTION
———	SUBCATCHMENT DIVIDE
SC101	SUBCATCHMENT
DP1	DESIGN POINT
305B	SOIL TYPE
HSG	HYDROLOGIC SOIL GROUP
— - —	SOIL DIVIDE
• • • • • • • • • •	TIME OF CONCENTRATION

390 GROVE STREET
POST-DEVELOPMENT DRAINAGE PLAN

LOCATED IN

NEEDHAM, MASSACHUSETTS

(SUFFOLK COUNTY)

PREPARED FOR

MORITZ SCHMIDT

SCALE: 1"= 60' DATE: NOVEMBER 23, 2020

30 0 30 60 120

MERIDIAN ASSOCIATES

500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447

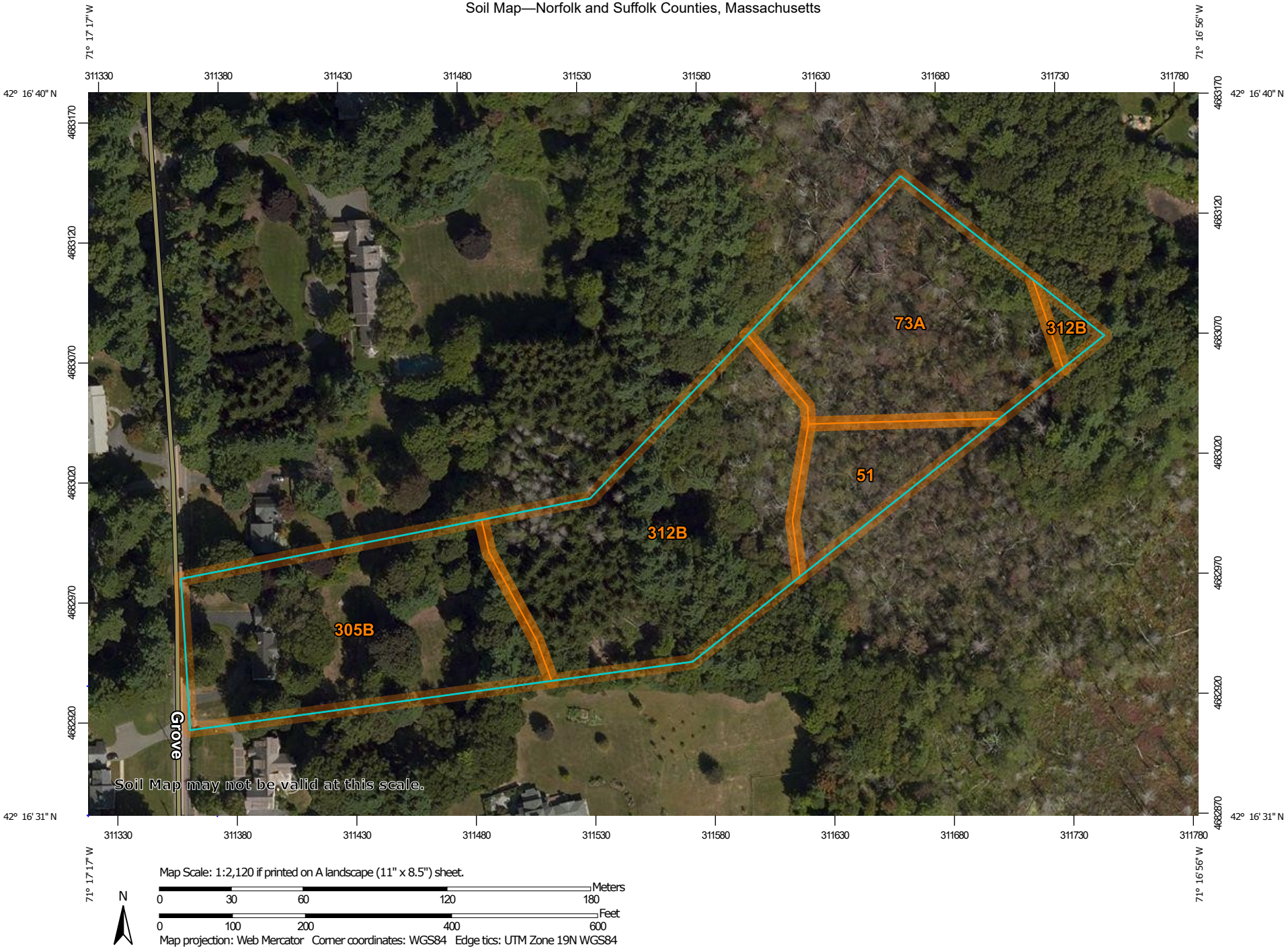
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030

WWW.MERIDIANASSOC.COM

DWG. No. 6036-POST

NRCS SOILS MAP

Soil Map—Norfolk and Suffolk Counties, Massachusetts



Map Scale: 1:2,120 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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
51	Swansea muck, 0 to 1 percent slopes	0.7	8.4%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	2.1	26.7%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	2.3	29.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	2.8	35.7%
Totals for Area of Interest		**7.9**	**100.0%**

OPERATION AND MAINTENANCE & EROSION AND SEDIMENTATION CONTROL PLAN

OPERATION AND MAINTENANCE &
EROSION AND SEDIMENTATION CONTROL PROGRAM

For

A PROPOSED STORMWATER MANAGEMENT SYSTEM

located at

390 GROVE STREET
NEEDHAM, MASSACHUSETTS

Applicant:

Moritz Schmidt
390 Grove Street
Needham, Massachusetts 02492

Prepared by:

Meridian Associates, Inc.
500 Cummings Center, Suite 5950
Beverly, Massachusetts 01915
(978) 299-0447

October 4, 2019

Project Name: 390 Grove Street

Owner Name: Elisabeth Schmidt-Scheuber

Party Responsible for Maintenance During Construction: Contractor

Party Responsible for Maintenance After Construction: Homeowner

Erosion and Sedimentation Control Measures during Construction Activities

Filtermitt (or approved equal)

Filtermitt (or approved equal) will be installed along the down gradient limit of work as depicted on the Site Plan. The FilterMitt shall be installed prior to the commencement of any work on-site and in accordance with the design plans. An additional supply of filtermitt shall be on-site to replace and/or repair any filtermitt that have been disturbed or are in poor condition. The line of FilterMitt shall be inspected and maintained on a weekly basis and after every major storm event (2-year) during construction. No construction activities are to occur beyond the FilterMitt at any time. Deposited sediments shall be removed when the volume of the deposition reaches approximately one-half the height of the filtermitt.

Stockpiles

All unused debris, soil, and other material shall be stockpiled in locations of relatively flat grades, away from any trees identified to be saved and upgradient of the filtermitt. Stockpile side slopes shall not be greater than 2:1. All stockpiles shall be surrounded by a row of filtermitt. Surrounding filtermitt shall be inspected and maintained on a daily basis.

Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction. Disturbed areas remaining idle for more than 14 days shall be stabilized. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter any infiltration system or formal drainage system. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

a. Temporary Seeding
b. Temporary Mulching
c. Permanent Seeding
d. Placement of Sod
e. Hydroseeding
f. Placement of Hay
g. Placement of Jute Netting

Dust shall be controlled at the site.

Tree Protection

Existing trees to be saved shall be protected with orange construction fence (offset from the tree trunk by professional standard based on canopy).

Construction Tracking Pad

A construction tracking pad shall be installed at the designated entrances/exits, as shown on the Site plans, to the site to reduce the amount of sediment transported off site. The construction tracking pad shall be inspected weekly.

Silt Sacks

Silt Sacks shall be installed within the basins. The performance of the basins shall be checked after every major storm event during construction, in the event of clogging within the Silt Sack, it shall be removed and replaced with a clean Silt Sack. Stormwater quality unit shall be checked bi-weekly.

Catch Basins

Silt Sacks shall be installed within the basins. The performance of the basins shall be checked after every major storm event during construction, in the event of clogging within the Silt Sack, it shall be removed and replaced with a clean Silt Sack.

Subsurface Infiltration Facilities

Construction activity above and around the proposed location of the subsurface infiltration facility shall be limited to prevent compaction of the existing soil. Care shall be taken to redirect stormwater runoff from this area to prevent ponding. Installation of this system shall occur under dry weather conditions and system shall be backfilled immediately to prohibit the introduction of fines or other material that would compromise the functionality of this system.

Removal of Sediment and Erosion Controls

At the completion of construction activities and after receiving approval from the Town of Lexington, all physical sediment and erosion controls shall be removed from the site per Town of Lexington. The areas where the controls have been removed shall be seeded and stabilized immediately upon removal.

Long-Term Inspection and Maintenance Measures after Construction

Erosion Control

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

Deep Sump Catch Basins

The catch basins shall be inspected four (4) times per year (two of which being the end of the foliage and snow removal seasons), and if necessary, any maintenance shall be performed so that it functions as designed. The basins shall be cleaned four (4) times per year, or when sediment in the bottom of the sump reaches ½ the depth from the bottom of the invert of the lowest pipe in the basin. Inlet and outlet pipes should be checked for clogging.

Subsurface Infiltration Facilities

The infiltration system inspections should include inspections following the first several rainfall events or first few months after construction, after all major storms (3.2" inches of rain over a 24-hour period or greater), and on regular bi-annual scheduled dates, to ascertain whether captured runoff drains within 72 hours following the event. Ponded water inside the system (as visible from the observation well) after several dry days often indicates that the bottom of the system is clogged. If the water does not drain, then a qualified professional should be retained to determine the cause of apparent infiltration failure and recommend corrective action. Such corrective action should be immediately implemented by the homeowner. If depth of sediment is observed to be greater than 3" then the system should be cleaned. The homeowner shall contact a sewer and drain cleaning company to flood the system via pump truck so the water is forced back to the upstream cleanout where sediment can be vacuumed out.

Debris and Litter Removal

Trash may collect in the BMP's, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary, and after each storm event. Sediment and debris collected from vacuuming and/or sweeping should be disposed of at a permitted waste disposal facility. Avoid disposing of this material on site, where it could be washed into the proposed subsurface infiltration systems.

Lawn Mowing

All lawn mowing to take place will be done with a mulch mower so grass clippings will not be an issue.

<u>Good Housekeeping Practices</u> (in accordance with Standard 10 of the Stormwater Management Handbook to prevent illicit discharges)

Provisions for storing paints, cleaners, automotive waste and other potentially hazardous household waste products inside or under cover

- All materials on site will be stored inside in a neat, orderly, manner in their appropriate containers with the original manufacturer's label.
- Only store enough material necessary. Whenever possible, all of a product shall be used up before disposing of container.
- Manufacturer, local, and State recommendations for proper use and disposal shall be followed.

Vehicle washing controls

- A commercial car wash shall be used when possible. Car washes treat and/or recycle water.
- Cars shall be washed on gravel, grass, or other permeable surfaces to allow filtration to occur.
- Use biodegradable soaps.
- A water hose with a nozzle that automatically turns off when left unattended.

Requirements for routine inspection and maintenance of stormwater BMPs

- See Inspection and Maintenance Measures after Construction.

Spill prevention and response plans

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

Provisions for maintenance of lawns, gardens, and other landscaped areas

- Grass shall not be cut shorter than 2 to 3 inches and mulch clipping should be left on lawn as a natural fertilizer.
- Use low volume water approaches such as drip-type or sprinkler systems. Water plants only when needed to enhance root growth and avoid runoff problems.
- The use of mulch shall be utilized where possible. Mulch helps retain water and prevents erosion.

Requirements for storage and use of fertilizers, herbicides and pesticides

- Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
- Do not fertilize before a rainstorm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Pesticides shall be applied on lawns and gardens only when necessary and applied only in the minimum amounts recommended by the manufacturer.

Pet waste management

- Scoop up and seal pet wastes in a plastic bag. Dispose of properly, in the garbage.

Provisions for solid waste management

- All solid waste shall be disposed of or recycled in accordance with local town regulations.

Snow disposal and plowing plans relative to Resource Area

- Snow shall be plowed and stored on gravel, grass, or other permeable surfaces to allow filtration to occur.
- Once snow melts all sand salt and debris shall be extracted from surface and properly disposed of.
- Snow shall not be disposed of in any resource area or waterbody.
- Avoid disposing snow on top of storm drain catchbasins or stormwater drainage swale.

Winter Road Salt and/or Sand use and storage restrictions

- Sand storage piles should be located outside the 100-year buffer zone and shall be covered at all times. No salt to be stored or used on site.
- Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

Roadway and Parking Lot sweeping schedule

- Pavement sweeping shall be conducted at a frequency of not less than once per year.
- Removal of any accumulated sand, grit, and debris from driveway after the snow melts shall be completed shortly after snow melts for the season.

Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL

Not Applicable

Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan

To be determined by the owner.

List of Emergency contacts for implementing Long-Term Pollution Prevention Plan

To be determined by the owner.

Applicant's Certification

I certify under penalty of law that I have read, understand and agree to abide by the practices outlined in this document.

Signed:_____ Date:_____

Moritz Schmidt

Contractor's Certification

I certify under penalty of law that I have read, understand and agree to abide by the practices outlined in this document.

Signed:_____ Date:_____

Contractor

STORMWATER MANAGEMENT
CONSTRUCTION PHASE

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

PROJECT LOCATION: 390 Grove Street, Needham, MA **WEATHER:** _____

Inspection Date	*Inspector*	*Area Inspected*	*Required Inspection Frequency if BMP*	*Comments*	*Recommendation*	*Follow-up Inspection Required (yes/no)*
		FilterMitt	*Weekly and After Major Storm Events*			
		Construction Tracking Pad	*Weekly and After Major Storm Events*			
		Silt Sacks	*Weekly and After Major Storm Events*			
		Deep Sump Catch Basins	*Weekly and After Major Storm Events*			
		Subsurface Infiltration Systems	*Weekly and After Major Storm Events*			
		Drain Manholes	*Weekly and After Major Storm Events*			

(1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.
(2) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)
Stormwater Control Manager: _____

STORMWATER MANAGEMENT
AFTER CONSTRUCTION

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

PROJECT LOCATION: 390 Grove Street, Needham, MA **WEATHER:** _____

Inspection Date	***Inspector***	***Area Inspected***	***Required Inspection Frequency if BMP***	***Comments***	***Recommendation***	***Follow-up Inspection Required (yes/no)***
		Deep Sump Catch Basins	*Bi-annually and After Major Storm Events*			
		Subsurface Infiltration Systems	*Bi-annually and After Major Storm Events*			
		Drain Manholes	*Weekly and After Major Storm Events*			

(3) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(4) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.

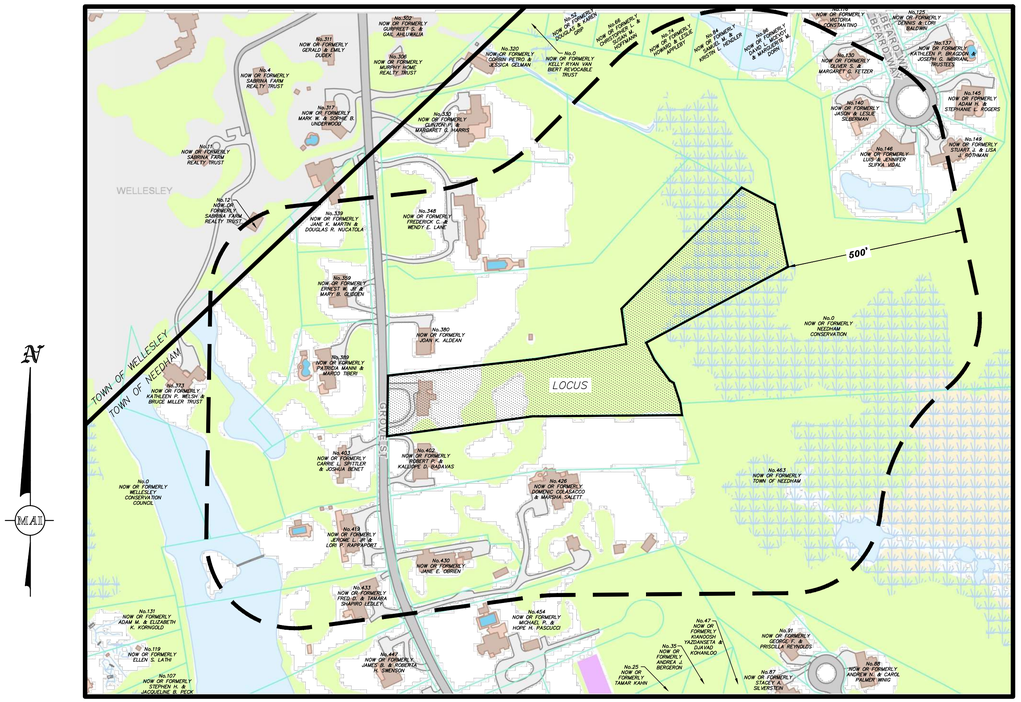
Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)

Stormwater Control Manager: _____

NOTES:

1. THE INFORMATION DEPICTED ON THIS PLAN HAS BEEN COMPILED FROM THE TOWN OF NEEDHAM GEOGRAPHIC INFORMATION SYSTEM.
2. LAND USE WITHIN 500 FEET OF THE SUBJECT PROPERTY IS PRIMARILY SINGLE AND TWO FAMILY DWELLINGS.

FOR REGISTRY USE ONLY



LOCUS CONTEXT MAP:

GRAPHIC SCALE
SCALE: 1"=200'

FEET 200 0 100 200 400 800
METERS 0 20 40 80 160 240

SCHEDULE OF DIMENSIONAL CONTROLS

ZONING DISTRICT: SINGLE RESIDENCE A

REQUIREMENT	REQUIRED
LOT AREA:	43,560
FRONTAGE:	150 FT.
FRONT SETBACK:	30 FT.
SIDE SETBACK:	25 FT.
REAR SETBACK:	15 FT.
MAX STORIES:	2-1/2
MAX HEIGHT:	35 FT.
STREET DESIGNATION:	MINOR

390 GROVE STREET
(ASSESSOR'S MAP 221 – LOT 9)
DEFINITIVE SUBDIVISION PLAN

IN ACCORDANCE WITH SECTION 4.2 OF THE TOWN OF NEEDHAM ZONING BY-LAW

LOCATED IN

NEEDHAM, MASSACHUSETTS

DATE: JULY 20, 2018
REVISED: NOVEMBER 2, 2018
REVISED: MARCH 29, 2019
REVISED: JULY 12, 2019
REVISED: AUGUST 22, 2019
REVISED: OCTOBER 4, 2019
REVISED: FEBRUARY 7, 2020
REVISED: MARCH 2, 2020
REVISED: NOVEMBER 24, 2020

RECORD OWNER:

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

APPLICANT:

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

PREPARED BY:

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER SUITE 5950, BEVERLY, MASSACHUSETTS 01915
69 MILK STREET, SUITE 302, WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (978) 299-0447 TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DIRECTOR OF PUBLIC WORKS

DATE APPROVED _____

TOWN ENGINEER

DATE APPROVED _____

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

_____
DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED

TOWN OF NEEDHAM PLANNING BOARD

BY: _____

APPROVED:

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL
NO. 49389
REGISTERED PROFESSIONAL ENGINEER

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DRAWING INDEX:

SHEET 1 COVER SHEET & CONTEXT MAP
SHEET 2 RECORD CONDITIONS' PLAN
SHEET 3 (BY RIGHT) SUBDIVISION PLAN
SHEET 4 LOTTING PLAN
SHEET 5 PROPOSED SITE & GRADING PLAN
SHEET 6 PROPOSED UTILITIES & PROFILE
SHEET 7 PROPOSED LANDSCAPE PLAN
SHEET 8 PROPOSED LANDSCAPE DETAILS
SHEET 9 SITE DETAILS 1
SHEET 10 SITE DETAILS 2

DWG. No. 6036-CVR
(IMAGE: GIS Map 200scale)

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UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020 BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" ^C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E.S.H.G.W. @ 59"
NO WEEPING OBSERVED

UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
NO WEEPING OBSERVED

EST PIT: TP-2
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
NO WEEPING OBSERVED

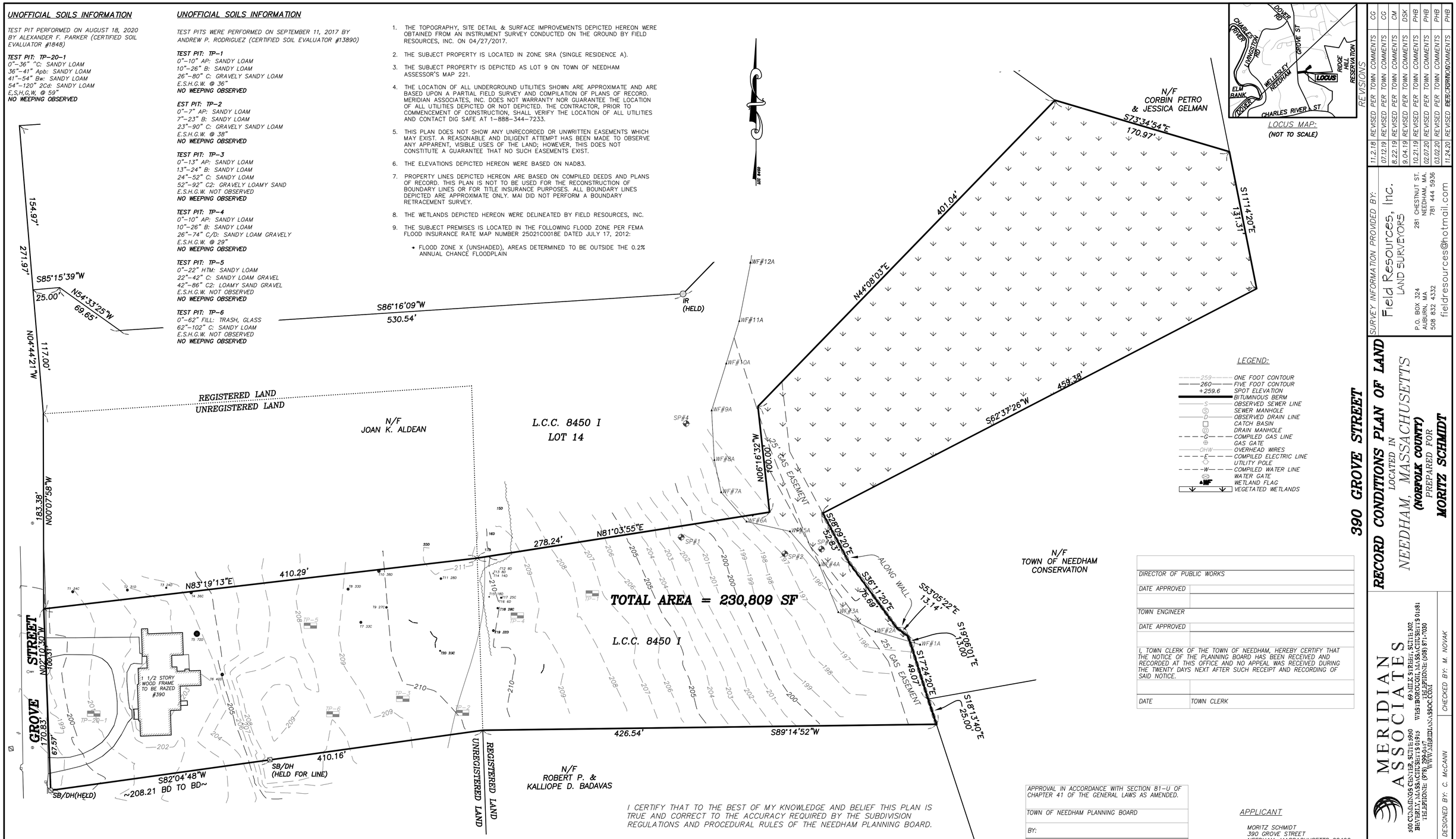
TEST PIT: TP-3
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

TEST PIT: TP-4
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
NO WEEPING OBSERVED

TEST PIT: TP-5
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

TEST PIT: TP-6
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

1. THE TOPOGRAPHY, SITE DETAIL & SURFACE IMPROVEMENTS DEPICTED HEREON WERE OBTAINED FROM AN INSTRUMENT SURVEY CONDUCTED ON THE GROUND BY FIELD RESOURCES, INC. ON 04/27/2017.
2. THE SUBJECT PROPERTY IS LOCATED IN ZONE SRA (SINGLE RESIDENCE A).
3. THE SUBJECT PROPERTY IS DEPICTED AS LOT 9 ON TOWN OF NEEDHAM ASSESSOR'S MAP 221.
4. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
5. THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT, VISIBLE USES OF THE LAND; HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
6. THE ELEVATIONS DEPICTED HEREON WERE BASED ON NAD83.
7. PROPERTY LINES DEPICTED HEREON ARE BASED ON COMPILED DEEDS AND PLANS OF RECORD. THIS PLAN IS NOT TO BE USED FOR THE RECONSTRUCTION OF BOUNDARY LINES OR FOR TITLE INSURANCE PURPOSES. ALL BOUNDARY LINES DEPICTED ARE APPROXIMATE ONLY. MAI DID NOT PERFORM A BOUNDARY RETRACEMENT SURVEY.
8. THE WETLANDS DEPICTED HEREON WERE DELINEATED BY FIELD RESOURCES, INC.
9. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONE PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN



REVISIONS		
11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
10.21.19	REVISED PER TOWN COMMENTS	PHB
02.07.20	REVISED PER TOWN COMMENTS	PHB
03.02.20	REVISED PER TOWN COMMENTS	PHB
11.24.20	REVISED PER TOWN COMMENTS	PHB

RECORD CONDITIONS PLAN OF LAND
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

390 GROVE STREET

DIRECTOR OF PUBLIC WORKS	
DATE APPROVED	
TOWN ENGINEER	
DATE APPROVED	
I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.	
DATE	TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

#47681 PROFESSIONAL LAND SURVEYOR

TEMPORARY BENCHMARK CHART:

T.B.M.#	DESCRIPTION	ELEVATION
1	CATCH BASIN RIM	197.62

ALL UNDERGROUND UTILITY DATA REPRESENTS RECORD INFORMATION RECOVERED THROUGH RESEARCH WITHOUT SURFACE DEMARCATION NOR SUBSURFACE VERIFICATION.

120-16

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

MERIDIAN ASSOCIATES
400 CUMMINGS CENTER, SUITE 4906
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 2 OF 10
PROJECT No. 6036

6036-TB

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UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1 ELEV.=207.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
E.S.H.G.W. ELEV.=204.5
NO WEEPING OBSERVED

EST PIT: TP-2 ELEV.=210.1
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
E.S.H.G.W. ELEV.=206.9
NO WEEPING OBSERVED

TEST PIT: TP-3 ELEV.=209.5
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.8
NO WEEPING OBSERVED

TEST PIT: TP-4 ELEV.=209.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
E.S.H.G.W. ELEV.=207.1
NO WEEPING OBSERVED

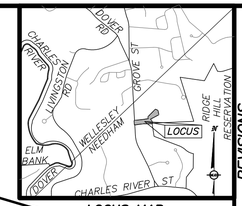
TEST PIT: TP-5 ELEV.=208.2
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.2
NO WEEPING OBSERVED

TEST PIT: TP-6 ELEV.=208.2
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=199.7
NO WEEPING OBSERVED

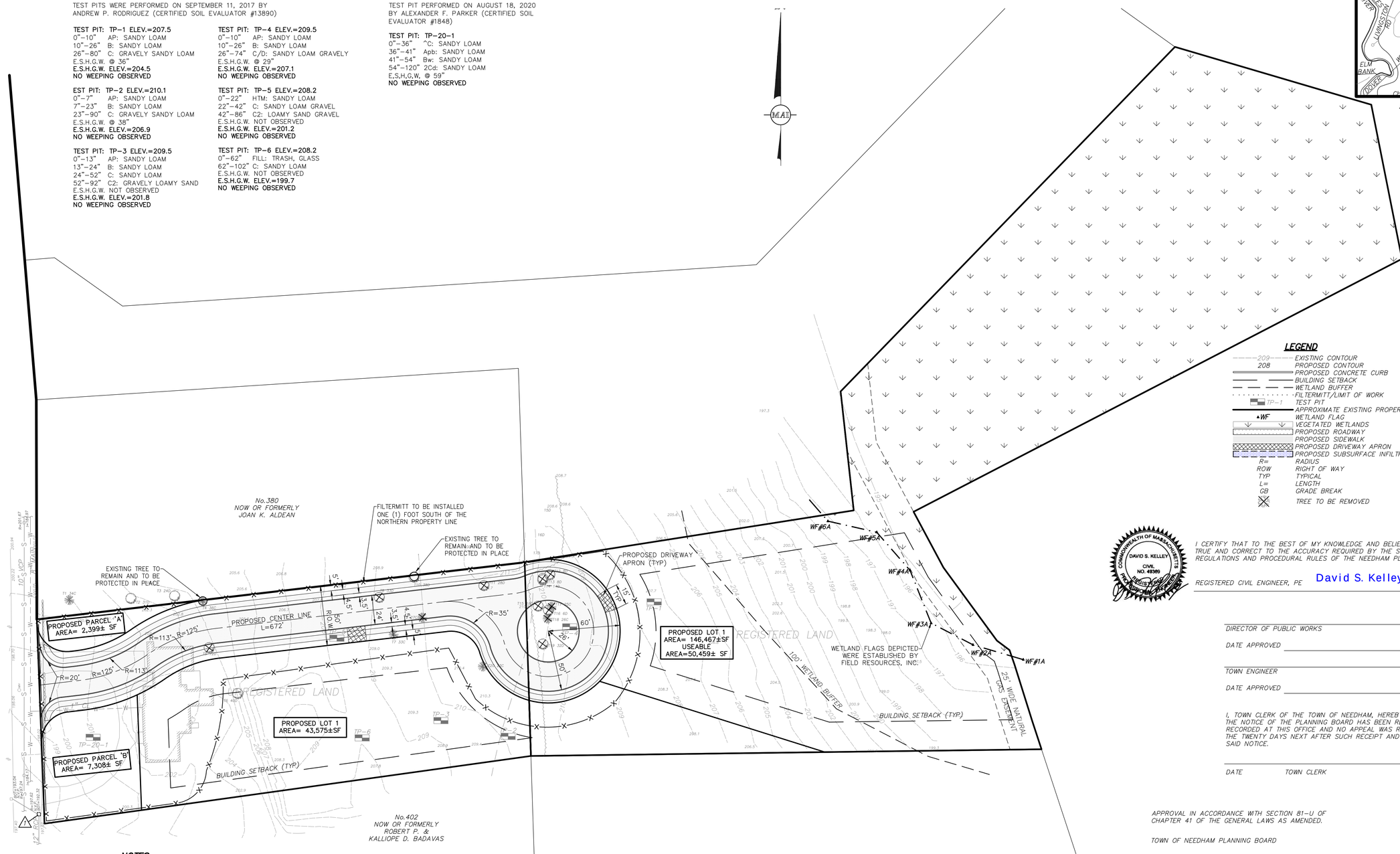
UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020 BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" "C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E,S,H,G,W. @ 59"
NO WEEPING OBSERVED



LOCUS MAP:
(NOT TO SCALE)



LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED CONCRETE CURB
- BUILDING SETBACK
- WETLAND BUFFER
- FILTERMITT/LIMIT OF WORK
- TEST PIT
- APPROXIMATE EXISTING PROPERTY LINES
- WETLAND FLAG
- VEGETATED WETLANDS
- PROPOSED ROADWAY
- PROPOSED SIDEWALK
- PROPOSED DRIVEWAY APRON
- PROPOSED SUBSURFACE INFILTRATION SYSTEM
- R= RADIUS
- ROW RIGHT OF WAY
- TYP TYPICAL
- L= LENGTH
- GB GRADE BREAK
- TREE TO BE REMOVED

NOTES

1. THE SUBJECT PROPERTY IS LOCATED IN ZONE SRA (SINGLE RESIDENCE A).
2. THE SUBJECT PROPERTY IS DEPICTED AS LOT 9 ON TOWN OF NEEDHAM ASSESSOR'S MAP 221.
3. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
4. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONES PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN
5. PER TOWN OF NEEDHAM 'TYPICAL PERMANENT TURNAROUND' DETAIL, PAGE 41 OF THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE PLANNING BOARD, DATED 1993, "WALK MAYBE OMITTED BEYOND LAST DRIVEWAY ON EACH SIDE."

GRAPHIC SCALE
SCALE: 1"=40

FEET 40 0 20 40 80 160
METERS 0 10 20 40 60

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

COMMONWEALTH OF MASSACHUSETTS — DAVID S. KELLEY — CIVIL NO. 49360 — REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT
MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS
ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036-SITE BY-RIGHT

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
02.07.20	REVISED PER TOWN COMMENTS	DSK
03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324, AUBURN, MA.
281 CHESTNUT ST. NEEDHAM, MA.
508 832 4332 781 444 5936
fieldresources@hotmail.com

390 GROVE STREET
(BY RIGHT) SUBDIVISION PLAN
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
6 VALLEY STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 3 OF 10
PROJECT No. 6036

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APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

N86°16'09"E 125.00'

S03°43'51"E 125.08'

154.97'

271.97'

S85°15'39"W 25.00'

N54°33'25"W 69.65'

N04°44'21"W 117.00'

N86°16'09"E 440.00'

N03°43'51"W 413.97'

SB/DH (HELD)

S86°16'09"W 530.54'

IR (HELD)

L.C.C. 8450 I
LOT 13

WF#16A
WF#15A
WF#14A
WF#13A
WF#12A
WF#11A
WF#10A
WF#9A
WF#8A
WF#7A
WF#6A
WF#5A
WF#4A
WF#3A
WF#2A
WF#1A
SP#5
SP#4
SP#3
SP#2
SP#1

S44°08'03"W 355.42'

IR (HELD)

N54°25'55"W 125.67'

N/F
CORBIN PETRO
& JESSICA GELMAN

S73°34'54"E 170.97'

S11°14'20"E 131.31'

401.04'

N44°08'03"E

PARCEL B
AREA = 91,374 SF

459.38'

S62°37'26"W

N06°16'32"W 100.00'

25' GAS EASEMENT

S28°09'20"E 52.83'

ALONG WALL

S36°11'20"E 75.69'

S53°05'22"E 13.14'

S19°05'01"E 13.00'

S17°24'20"E 49.07'

S18°13'40"E 25.00'

S89°14'52"W 180.99'

426.54'

245.55'

S72°32'41"E 197.18'

L=124.13'

R=60.00'

L=274.13'

L=150.00'

123.85'

90°

TOTAL AREA = 230,809 SF

L.C.C. 8450 I

LOT 2
AREA = 146,467 SF
3.3624± ACRES

N/F
TOWN OF NEEDHAM
CONSERVATION

N/F
TOWN OF NEEDHAM

FOR REGISTRY USE ONLY

REGISTERED LAND
UNREGISTERED LAND

N/F
JOAN K. ALDEAN

L.C.C. 8450 I
LOT 14

183.38'

N00°07'58"W

S02°10'30"E 2.95'

N83°19'13"E 147.85'

L=74.12'
R=150.00'

L=41.24'
R=25.00'

R=100.00'

4.58'

L=49.42'

N83°19'13"E

N02°10'30"W 100.31'

N83°19'13"E 12.46'

R=150.00'

L=47.44'

L=26.69'
R=150.00'

L=49.42'
R=100.00'

L=37.30'
R=25.00'

TP-20-1

PARCEL A
7,308 SF

170.83'

67.57'

N87°49'30"E 55.82'

81.79'

S82°04'48"W

~208.21 BD TO BD~

SB/DH(HELD)

PRIVATE WAY
AREA=31,061 SF

410.29'

262.44'

278.24'

N81°03'55"E 267.72'

10.52'

50.00'

N83°19'13"E 191.73'

L=34.70'
R=25.00'

R=60.00'

LOT 1
AREA = 43,574 SF

300.57'

96.36'

N02°10'30"W

96.00'

TP-1
TP-2
TP-3
TP-4
TP-5
TP-6

328.37'

410.16'

SB/DH
(HELD FOR LINE)

UNREGISTERED LAND

REGISTERED LAND

N/F
ROBERT P. &
KALLIOPE D. BADAVAS

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

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

COMMONWEALTH OF MASSACHUSETTS
#47581
PROFESSIONAL LAND SURVEYOR

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

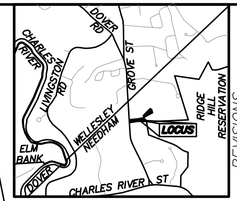
TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

LOCUS MAP:
(NOT TO SCALE)



REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
10.21.19	REVISED PER TOWN COMMENTS	PHB
02.07.20	REVISED PER TOWN COMMENTS	PHB
03.02.20	REVISED PER TOWN COMMENTS	PHB
11.24.20	REVISED PER TOWN COMMENTS	PHB

390 GROVE STREET

LOTTING PLAN

LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

MERIDIAN ASSOCIATES
400 COMMONS CENTER, SUITE 6490
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0407
69 ALLEN STREET, SUITE 302
WORCESTER, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 4 OF 10
PROJECT No. 6036

6036-TB

120-16

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UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020
BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" ^C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E.S.H.G.W. @ 59"
NO WEEPING OBSERVED

UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY
ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1 ELEV.=207.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
E.S.H.G.W. ELEV.=204.5
NO WEEPING OBSERVED

EST PIT: TP-2 ELEV.=210.1
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
E.S.H.G.W. ELEV.=206.9
NO WEEPING OBSERVED

TEST PIT: TP-3 ELEV.=209.5
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.8
NO WEEPING OBSERVED

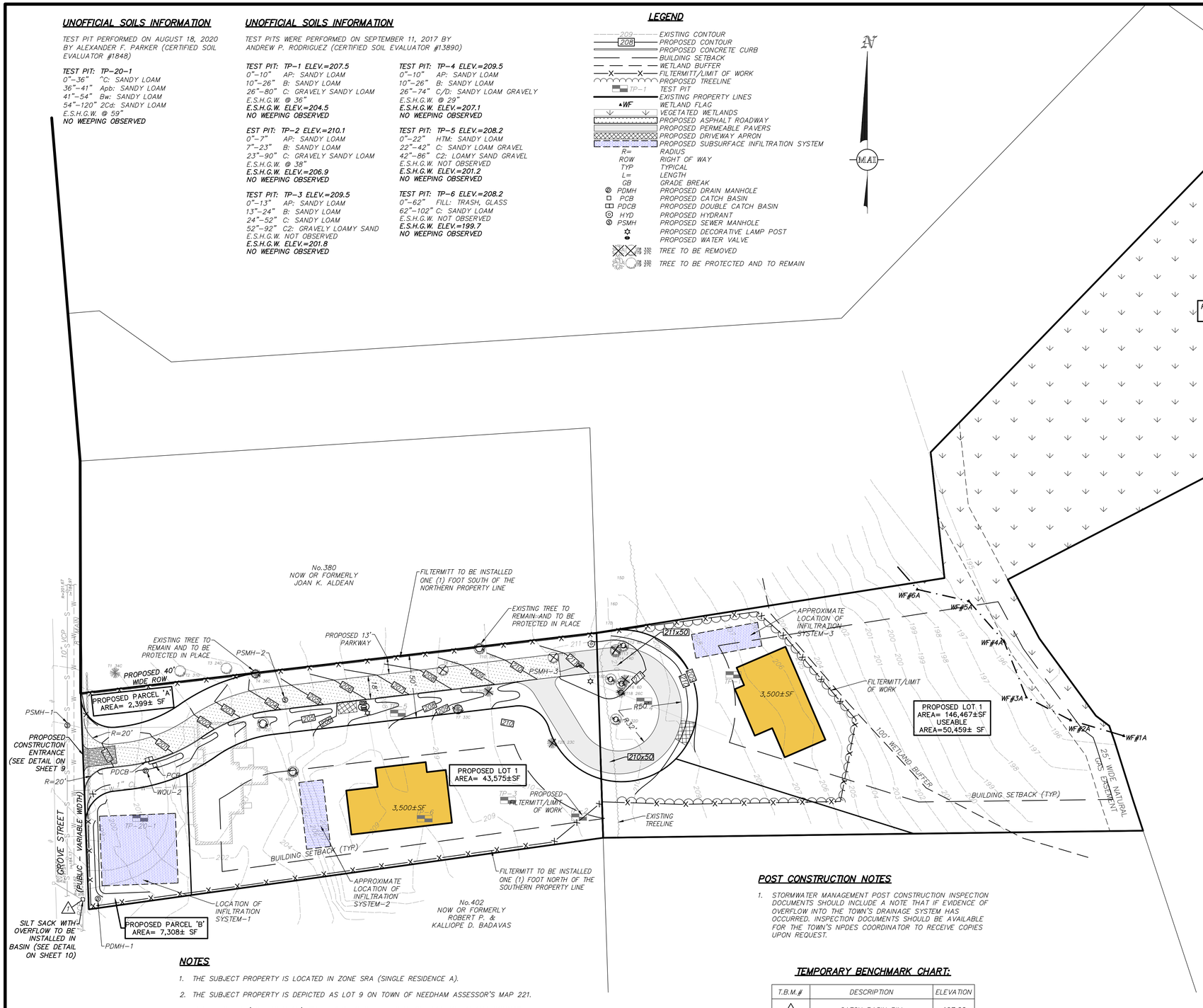
TEST PIT: TP-4 ELEV.=209.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
E.S.H.G.W. ELEV.=207.1
NO WEEPING OBSERVED

TEST PIT: TP-5 ELEV.=208.2
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.2
NO WEEPING OBSERVED

TEST PIT: TP-6 ELEV.=208.2
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=199.7
NO WEEPING OBSERVED

LEGEND

- 209 — EXISTING CONTOUR
- 208 — PROPOSED CONTOUR
- PROPOSED CONCRETE CURB
- BUILDING SETBACK
- WETLAND BUFFER
- FILTERMITT/LIMIT OF WORK
- PROPOSED TREELINE
- TP-1 — TEST PIT
- EXISTING PROPERTY LINES
- WF — WETLAND FLAG
- VEGETATED WETLANDS
- PROPOSED ASPHALT ROADWAY
- PROPOSED PERMEABLE PAVERS
- PROPOSED DRIVEWAY APRON
- PROPOSED SUBSURFACE INFILTRATION SYSTEM
- R= RADIUS
- ROW RIGHT OF WAY
- TYP TYPICAL
- L= LENGTH
- GB GRADE BREAK
- PDMH PROPOSED DRAIN MANHOLE
- PCB PROPOSED CATCH BASIN
- PDCB PROPOSED DOUBLE CATCH BASIN
- HYD PROPOSED HYDRANT
- PSMH PROPOSED SEWER MANHOLE
- PROPOSED DECORATIVE LAMP POST
- PROPOSED WATER VALVE
- DBH 330 — TREE TO BE REMOVED
- DBH 330 — TREE TO BE PROTECTED AND TO REMAIN



POST CONSTRUCTION NOTES

1. STORMWATER MANAGEMENT POST CONSTRUCTION INSPECTION DOCUMENTS SHOULD INCLUDE A NOTE THAT IF EVIDENCE OF OVERFLOW INTO THE TOWN'S DRAINAGE SYSTEM HAS OCCURRED, INSPECTION DOCUMENTS SHOULD BE AVAILABLE FOR THE TOWN'S NPDES COORDINATOR TO RECEIVE COPIES UPON REQUEST.

NOTES

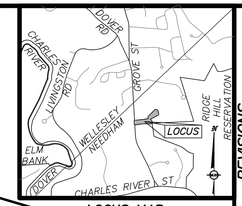
1. THE SUBJECT PROPERTY IS LOCATED IN ZONE SRA (SINGLE RESIDENCE A).
2. THE SUBJECT PROPERTY IS DEPICTED AS LOT 9 ON TOWN OF NEEDHAM ASSESSOR'S MAP 221.
3. REFER TO THE 'LOTTING PLAN', SHEET 4 OF 9 OF THE PLAN SET FOR METES AND BOUNDS DESCRIPTIONS OF THE EXISTING AND PROPOSED LOTS AND RIGHT-OF-WAY.
4. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
5. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONES PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN

TEMPORARY BENCHMARK CHART:

T.B.M.#	DESCRIPTION	ELEVATION
1	CATCH BASIN RIM	197.62

GRAPHIC SCALE
SCALE: 1"= 40

FEET 40 0 20 40 80 160
METERS 0 10 20 40 60



LOCUS MAP:
(NOT TO SCALE)

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
02.07.20	REVISED PER TOWN COMMENTS	DSK
03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE — David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

390 GROVE STREET

PROPOSED SITE & GRADING PLAN

LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

SURVEY INFORMATION PROVIDED BY:

Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

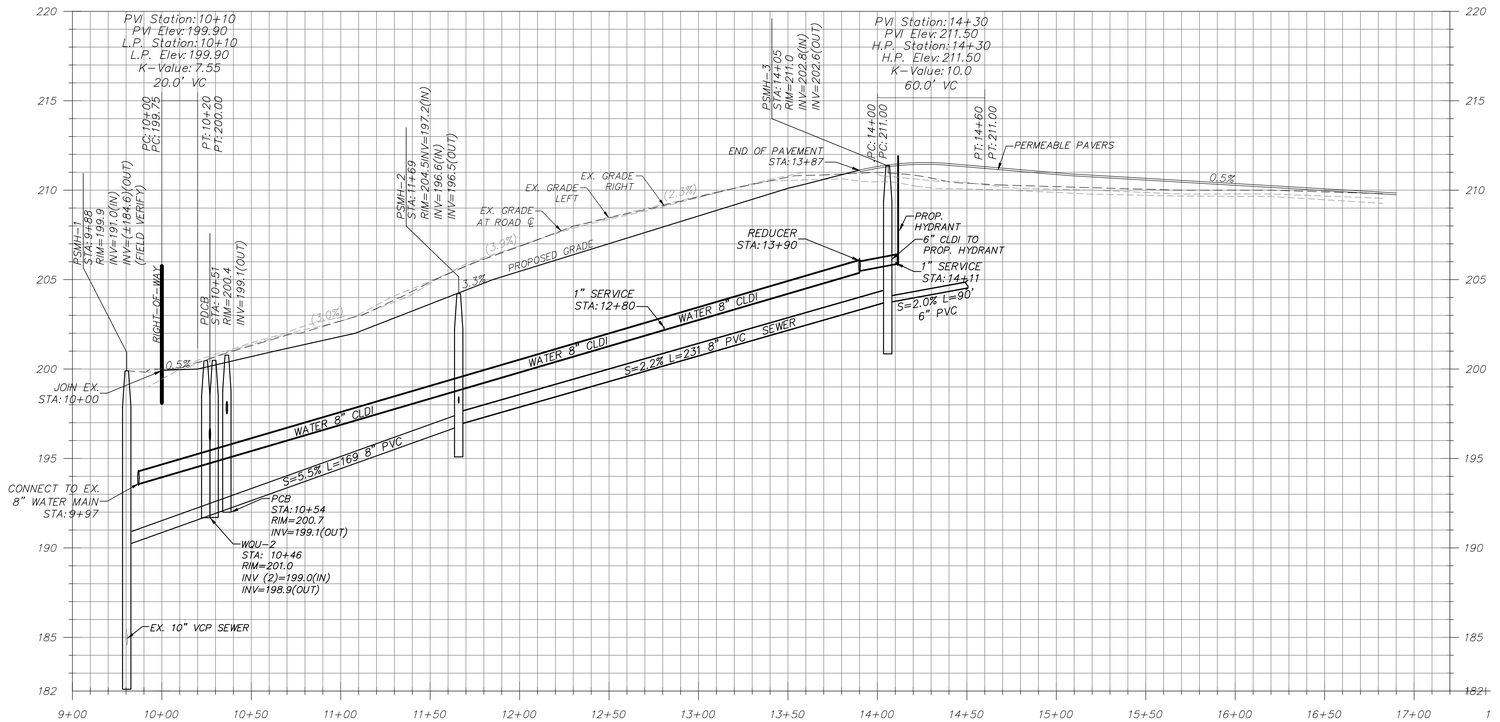
MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
40 MAPLE STREET, SUITE 302
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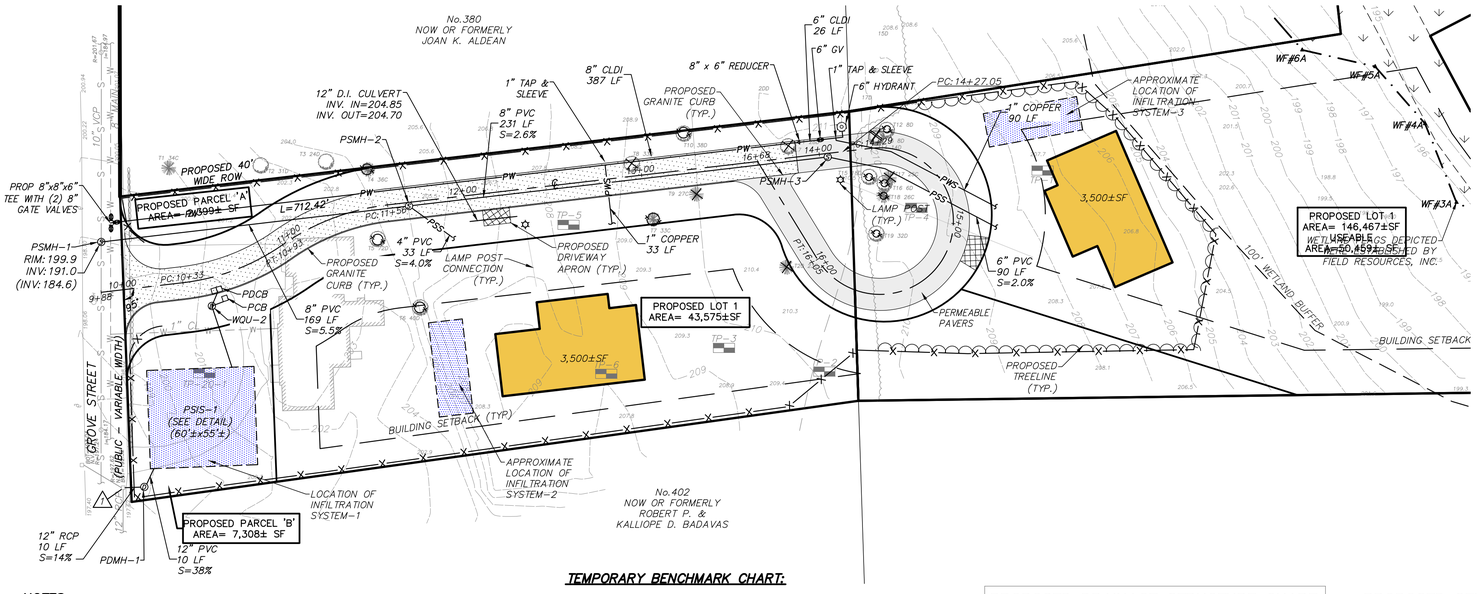
DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 5 OF 10
PROJECT No. 6036

6036-SITE

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No.380
NOW OR FORMERLY
JOAN K. ALDEAN
No.402
NOW OR FORMERLY
ROBERT P. &
KALLIOPE D. BADAVAS
GROVE STREET
(PUBLIC - VARIABLE WIDTH)
PROPOSED PARCEL 'A'
AREA= 79,599± SF
PROPOSED PARCEL 'B'
AREA= 7,308± SF
PROPOSED LOT 1
AREA= 43,575±SF
PROPOSED LOT 1
AREA= 146,467±SF
USEABLE AREA=80,457±SF
PROPOSED 40' WIDE ROW
L=712.42'
PROP 8"x8"x6" TEE WITH (2) 8" GATE VALVES
PSMH-1
RIM: 199.9
INV: 191.0
(INV: 184.6)
PSMH-2
PSMH-3
PSIS-1
(SEE DETAIL)
(60'±x55'±)
PDMH-1
PDCB
PCB
WQU-2
12" D.I. CULVERT
INV. IN=204.85
INV. OUT=204.70
8" PVC
231 LF
S=2.6%
8" CLDI
387 LF
8" x 6" REDUCER
1" TAP & SLEEVE
PROPOSED GRANITE CURB (TYP.)
6" CLDI
26 LF
6" GV
1" TAP & SLEEVE
6" HYDRANT
PC:14+27.05
1" COPPER
90 LF
6" PVC
90 LF
S=2.0%
4" PVC
33 LF
S=4.0%
1" COPPER
33 LF
LAMP POST CONNECTION (TYP.)
PROPOSED DRIVEWAY APRON (TYP.)
8" PVC
169 LF
S=5.5%
12" RCP
10 LF
S=14%
12" PVC
10 LF
S=38%
LOCATION OF INFILTRATION SYSTEM-1
APPROXIMATE LOCATION OF INFILTRATION SYSTEM-2
APPROXIMATE LOCATION OF INFILTRATION SYSTEM-3
3,500±SF
3,500±SF
PERMEABLE PAVERS
PROPOSED TREELINE (TYP.)
100' WETLAND BUFFER
BUILDING SETBACK
BUILDING SETBACK (TYP)
WF#6A
WF#5A
WF#4A
WF#3A
WETLANDS DEPICTED HEREON DELINEATED BY FIELD RESOURCES, INC.
PROPOSED PARCEL 'A' AREA= 79,599± SF
L=712.42'
PC:11+58
PT:12+71
PSS-1
PSS-2
PSS-3
PMS-1
PW
S
G
W
T3 340
T3 360
T3 380
T3 400
T3 420
T3 440
T3 460
T3 480
T3 500
T3 520
T3 540
T3 560
T3 580
T3 600
T3 620
T3 640
T3 660
T3 680
T3 700
T3 720
T3

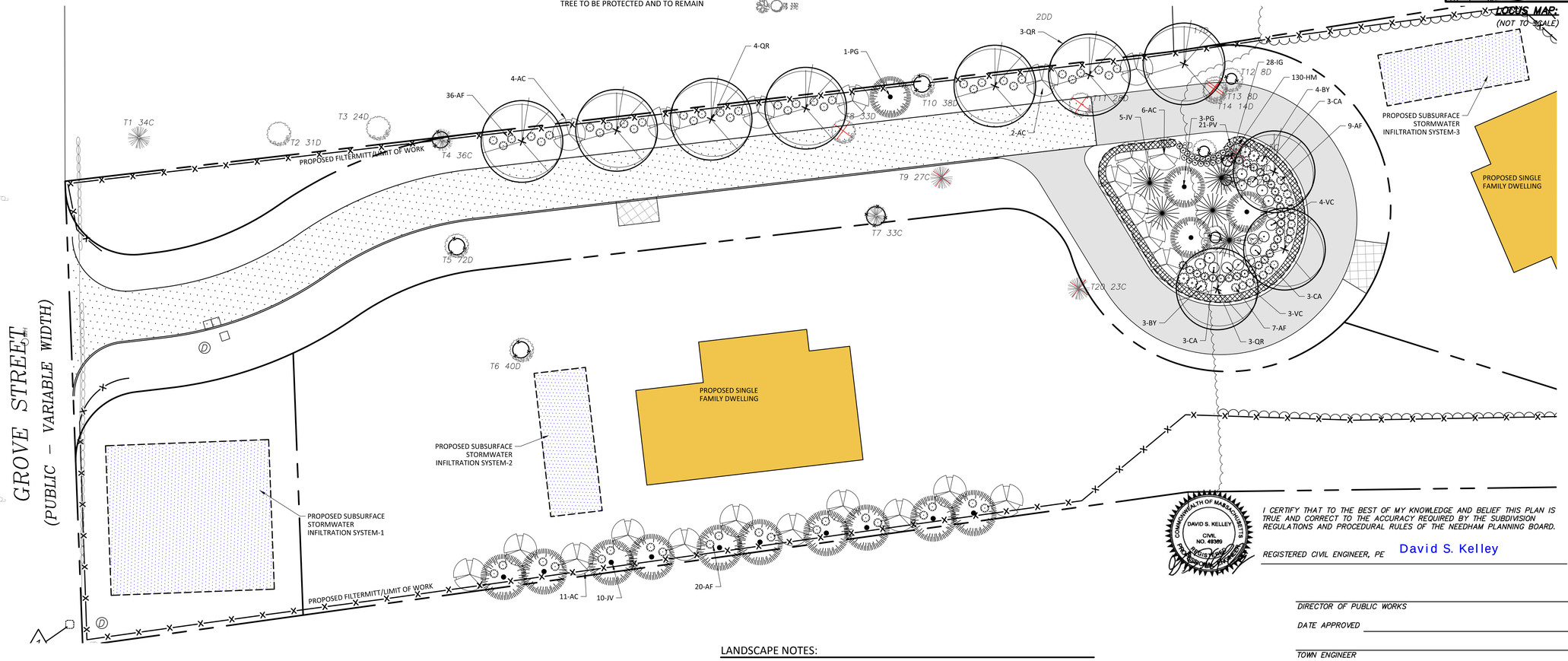
PROPOSED LEGEND

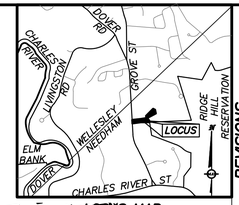
SHRUBS, PERENNIALS & GROUNDCOVERS

EVERGREEN, SHADE & ORNAMENTAL TREES

TREE TO BE REMOVED

TREE TO BE PROTECTED AND TO REMAIN





LOCUS MAP:
(NOT TO SCALE)

PLANT SCHEDULE

QTY	SYM	SCIENTIFIC NAME	COMMON NAME	SIZE	NOTES
TREES					
23	AC	Amelanchier Canadensis	Shadblow Serviceberry	6'-8' Ht. | B&B	BR | N | ST | White | Birds | Showy | Edible Fruit | Fall Color | April-May
15	JV	Juniperus virginiana	Eastern Red Cedar	10'-12' Ht. | B&B	DR | DT | N | ST | Blueish/Black Fruit | Wildlife | Evergreen
4	PG	Picea glauca	White Spruce	7'-8' Ht. | B&B	DR | N | Birds/Small Mammals | Evergreen | Winter Interest
10	QR	Quercus rubra	Red Oak	3"-3.5" Cal. | B&B	DR | DT | N | ST | Yellowish/Green | Fall interest | May
SHRUBS					
9	CA	Clethra alnifolia	Summersweet	24"-30" Ht. | #3 Pot	N | ST | 48" OC | White | Butterflies | Showy | Fragrant | Heavy Shade | July-August
7	BY	Cornus sericea 'Bud's Yellow'	Bud's Yellow Redosier Dogwood	24"-30" Ht. | #3 Pot	DR | N | ST | 48" OC | Yellow/White | Birds/Butterflies | Fall/Winter Interest | May-June
72	AF	Cornus sericea 'Farrow Artic Fire'	Artic Fire Redosier Dogwood	24"-30" Ht. | #3 Pot	DT | N | ST | 36" OC | White | Birds/Butterflies | Fall/Winter Interest | May-June
28	IG	Ilex glabra 'Shamrock'	Shamrock inkberry	24"-30" Ht. | B&B	DR | DT | N | ST | 36" OC | Greenish-White | Birds | Evergreen | May-June
7	VC	Vaccinium corymbosum 'Bluecrop'	Bluecrop Blueberry	24"-30" Ht. | #5 Pot	DT | N | 48" OC | White | Showy | Edible Fruit | Wildlife | Fall Color | May
ORNAMENTAL GRASSES					
21	PV	Panicum virgatum 'Heavy Metal'	Heavy Metal Switchgrass	#3 Pot	DR | DT | N | ST | 24" OC | Pink-Tinged |Winter Interest | July-February
PERENNIALS & GROUNDCOVER					
130	HM	Hemerocallis 'Apricot Sparkles'	Apricot Sparkles Daylily	#1 Pot	DR | DT | ST | 24" OC | Apricot | Butterflies | Showy | May-October

ABBREVIATIONS:
B&B: BALL AND BURLAP
CAL: CALIPER
DR: DEER RESISTANT
DT: DROUGHT TOLERANT
N: NATIVE
OC: ON CENTER
ST: SALT TOLERANT

LANDSCAPE NOTES:

1. REFER TO LANDSCAPE DETAILS FOR LANDSCAPE DETAILS.
2. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY AmericanHort 2014 AND AS AMENDED.
3. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL ACCEPTANCE.
4. VERIFY LOCATIONS OF ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND REPORT ANY CONFLICTS TO THE OWNER OR OWNER'S REPRESENTATIVE.
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6. BALLED AND BURLAPPED PLANTS MAY BE PLANTED IN THE SPRING FROM APRIL 1ST UNTIL JUNE 15TH AND IN THE FALL FROM AUGUST 15TH TO NOVEMBER 1ST.
7. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT OF PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
8. ALL SHADE TREES ALONG SIDEWALKS SHALL HAVE A MINIMUM SIX (6) FOOT BRANCHING HEIGHT.
9. PLANT MATERIALS DEPICTED IN ROWS SHALL CONTAIN MATCHING PLANT SPECIMENS SPACED EQUALLY ALONG INDICATED AREA.
10. ALL PLANT MATERIALS AND LAWN AREAS TO BE MAINTAINED BY LANDSCAPE CONTRACTOR UNTIL FINAL WRITTEN ACCEPTANCE PROVIDED TO CONTRACTOR BY OWNER OR OWNER'S REPRESENTATIVE.
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13. LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE INDICATED ON PLAN. LOAM WITH TOPSOIL SPREAD TO A MINIMUM DEPTH OF (6) SIX INCHES.
14. SEED OR PROVIDE SOD FOR ALL TURFGRASS LAWN AREAS WITH A DROUGHT TOLERANT TURFGRASS SEED MIX (80% TALL FESCUE, 10% PERENNIAL RYEGRASS, 10% KENTUCKY BLUEGRASS).
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SCALE: 1" = 20'

20' 10' 0 20' 40' 60'

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81–U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT–SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036–LAND

REVISIONS		
11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
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9.04.19	REVISED PER TOWN COMMENTS	DSK
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11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

PROPOSED LANDSCAPE PLAN

LOCATED IN

NEEDHAM, MASSACHUSETTS

(NORFOLK COUNTY)

PREPARED FOR

MORITZ SCHMIDT

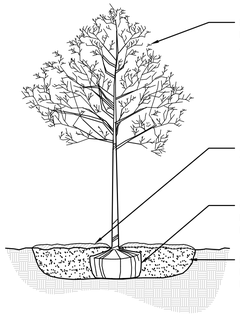
390 GROVE STREET

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=20'
SHEET No. 7 OF 10
PROJECT No. 6036

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NOTES:

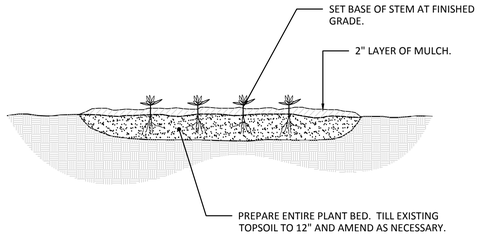
BACKFILL PLANTING HOLE WITH EXISTING SOIL AMENDED AS NECESSARY.

BACKFILL HALF THE SOIL AND WATER TO SETTLE OUT AIR POCKETS, COMPLETE BACKFILLING AND REPEAT WATERING.

IF ROOTS ARE CIRCLING THE ROOTBALL EXTERIOR, CUT ROOTS VERTICALLY IN SEVERAL PLACES PRIOR TO PLANTING.

ONLY STAKE TREES SITUATED ON WINDY SITES OR EXPOSED TO SUBSTANTIAL PEDESTRIAN TRAFFIC.

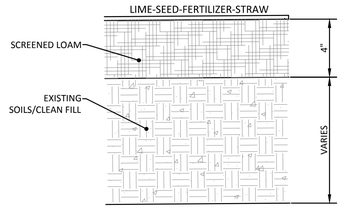
TREE PLANTING
NOT TO SCALE



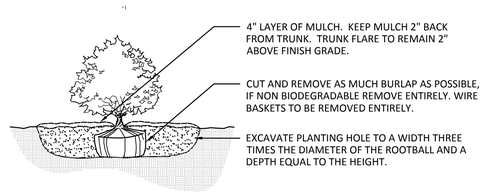
NOTE:

SPACE PLANTS EQUALLY TO PROVIDE CONSISTANT COVER OVER INDICATED PLANTING BED.

GROUNDCOVER PLANTING
(NOT TO SCALE)



TYPICAL LOAM & SEED CROSS - SECTION
NOT TO SCALE



NOTES:

BACKFILL PLANTING HOLE WITH EXISTING SOIL AMENDED AS NECESSARY.

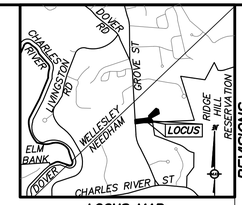
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SHRUB PLANTING
(NOT TO SCALE)

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LOCUS MAP:
(NOT TO SCALE)

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
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8.22.19	REVISED PER TOWN COMMENTS	CM
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COMMONWEALTH OF MASSACHUSETTS — DAVID S. KELLEY — CIVIL NO. 49369 — REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

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TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT–SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036–LAND

390 GROVE STREET

PROPOSED LANDSCAPE DETAILS
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

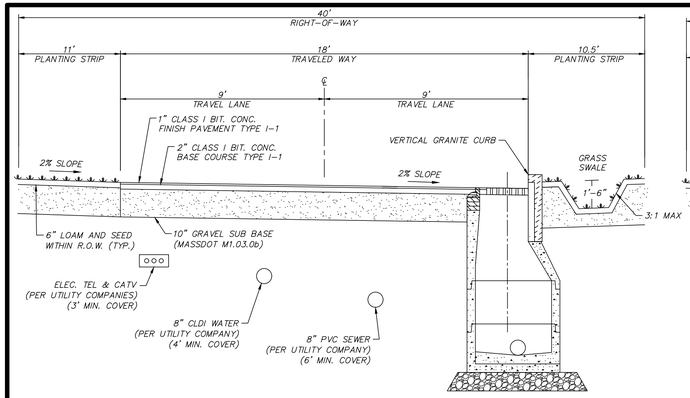
SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
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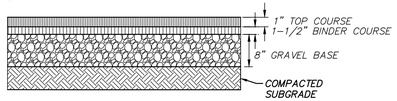
DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: AS NOTED
SHEET No. 8 OF 10
PROJECT No. 6036

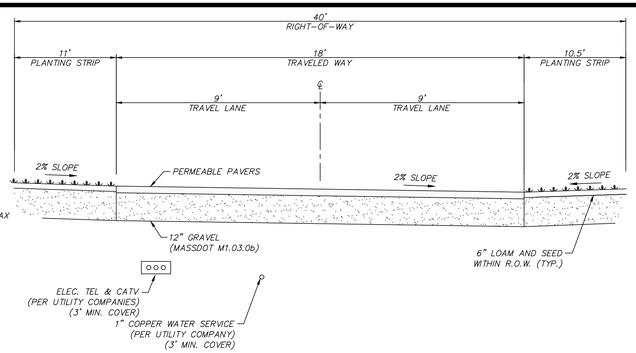
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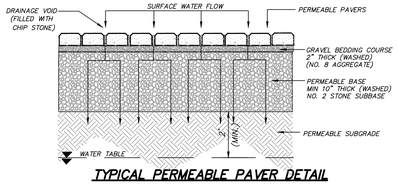
TYPICAL ROAD CROSS SECTION
(NOT TO SCALE)



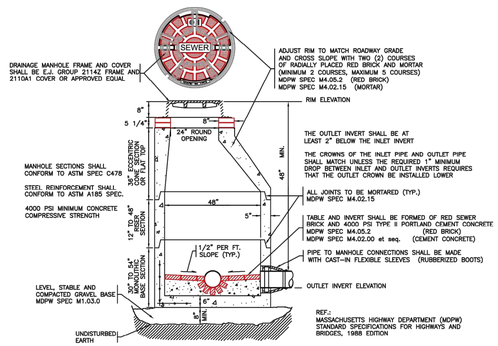
BITUMINOUS CONCRETE PAVEMENT SECTION
(NOT TO SCALE)



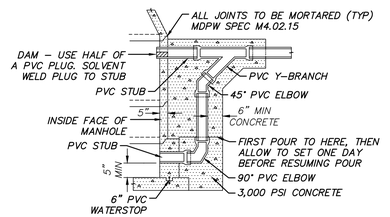
PERMEABLE PAVERS CROSS SECTION
(NOT TO SCALE)



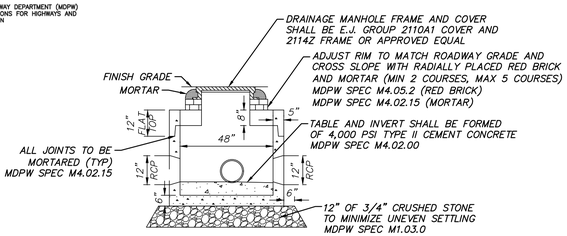
TYPICAL PERMEABLE PAVER DETAIL
(NOT TO SCALE)



TYPICAL SEWER MANHOLE DETAIL
(NOT TO SCALE)

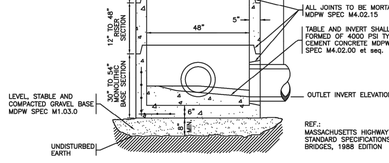


DROP CONNECTION DETAIL
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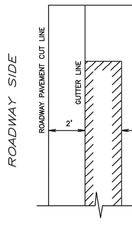


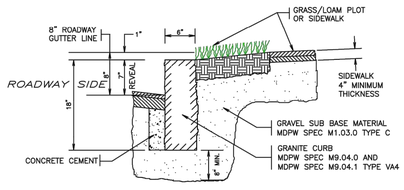
NOTES:
1. MANHOLE DESIGN TO LATEST TOWN OF NEEDHAM STANDARDS AND ASTM C478.
2. REINFORCING STEEL CONFORMS TO LATEST ASTM A185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. WHEN SPECIFIED, MANHOLES WATERPROOF COATED.
6. STEPS – STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTICS (PS2-PFSL M.A. INDUSTRIES, INC.) CONFORMS TO LATEST ASTM C478 PARA-12.
7. REFERENCE: LATEST MASSACHUSETTS HIGHWAY DEPARTMENT (MDPW) STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

FLAT TOP DRAIN MANHOLE DETAIL
(NOT TO SCALE)

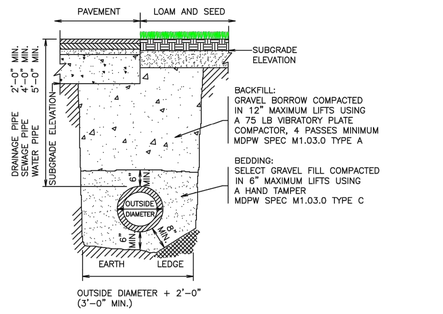


TYPICAL DRAINAGE MANHOLE DETAIL
(NOT TO SCALE)

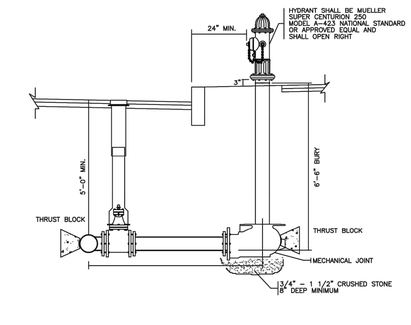




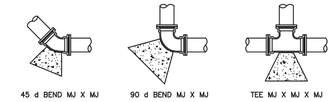
TYPICAL GRANITE CURB DETAIL
(NOT TO SCALE)



TYPICAL TRENCH DETAIL
(NOT TO SCALE)



TYPICAL FIRE HYDRANT DETAIL
(NOT TO SCALE)

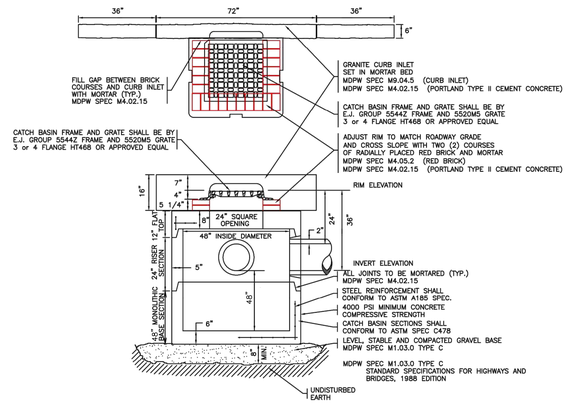


PIPE SIZE	MINIMUM SURFACE AREA (S.F.) OF CONCRETE AGAINST UNDISTURBED EARTH				
	11 1/4 d	22 1/2 d	45 d	90 d	TEE
6"	0.7	1.0	2.0	3.0	2.5
8"	1.0	1.5	3.0	3.5	3.0
10"	2.0	2.5	5.0	7.0	6.0
12"	3.0	3.5	7.0	10.0	9.0

NOTE: PIPE FITTINGS SHALL BE AS MANUFACTURED BY U.S. PIPE SPEC. U501, U503, U505, U507, U509 OR APPROVED EQUAL

CONCRETE SHALL BE 3000 PSI PORTLAND TYPE II CEMENT CONCRETE MEETING MDPW SPEC M4.02.00 et seq. AND SHALL BE PLACED SO AS TO NOT INTERFERE WITH THE JOINTS OF THE FITTING

TYPICAL THRUST BLOCK DETAIL
(NOT TO SCALE)



TYPICAL 24" CATCH BASIN DETAIL
(NOT TO SCALE)

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL NO. 49369
REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
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11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
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281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

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TELEPHONE: (978) 922-8031
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
WWW.MERIDIANASSOC.COM PHONE: (508) 871-7030
DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

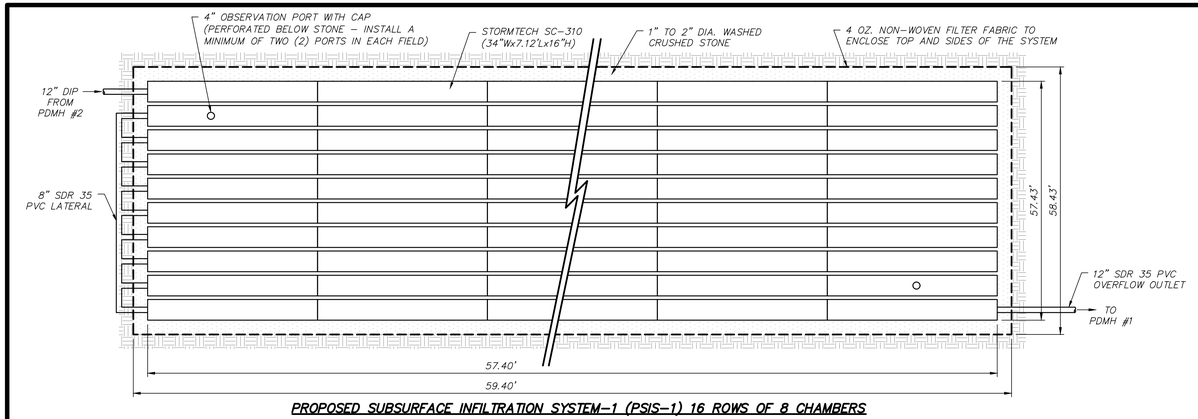
390 GROVE STREET

SITE DETAILS 1
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 9 OF 10
PROJECT No. 6036

6036-DET

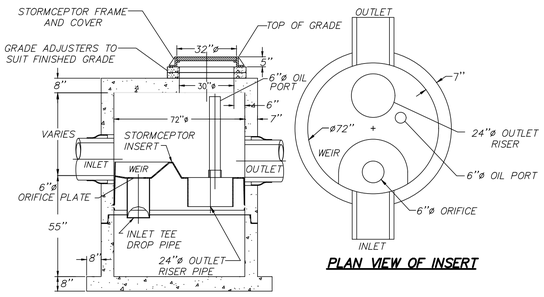
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PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) 16 ROWS OF 8 CHAMBERS

PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) – PLAN VIEW

(NOT TO SCALE)

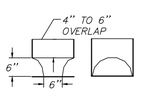


SECTION THRU CHAMBER

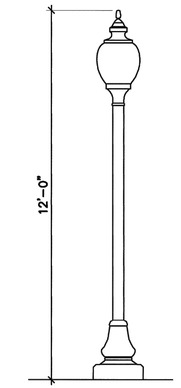
PLAN VIEW OF INSERT

NOTE:

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 24"ø OUTLET RISER PIPE AND THE 6"ø OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.



ENLARGED INLET TEE DROP PIPE



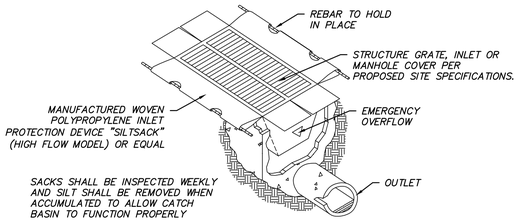
TYPICAL LIGHT POST DETAIL

(NOT TO SCALE)

WATER QUAITY UNIT

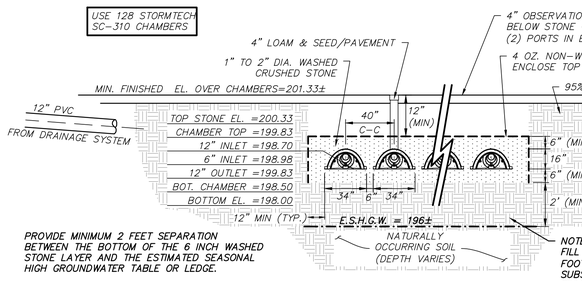
STC 900 Precast Concrete Stormceptor
(900 US Gallon Capacity)

(NOT TO SCALE)



SILTSACK DETAIL

(NOT TO SCALE)



PROVIDE MINIMUM 2 FEET SEPARATION BETWEEN THE BOTTOM OF THE 6 INCH WASHED STONE LAYER AND THE ESTIMATED SEASONAL HIGH GROUNDWATER TABLE OR LEDGE.

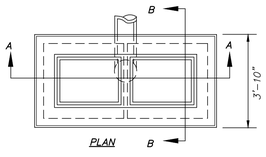
SECTION DETAIL

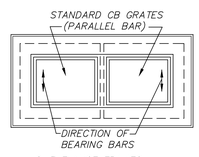
NOTE: CONTRACTOR SHALL REMOVE ALL TOPSOIL, SUBSOIL, FILL MATERIAL AND OTHER IMPERVIOUS LAYERS WITHIN THE FOOTPRINT (AND TWO (2) FEET BEYOND) OF THE PROPOSED SUBSURFACE INFILTRATION SYSTEM. EXCAVATION SHALL BE FILLED WITH MATERIAL SPECIFIED IN SECTION 15.255 (3) OF THE STATE ENVIRONMENTAL CODE, TITLE 5 UP TO THE PROPOSED ELEVATION OF THE WASHED STONE.

NOTES:
– C–C IS CENTER TO CENTER
– PROVIDE 6" MIN. SEPARATION BETWEEN ROWS OF CHAMBERS

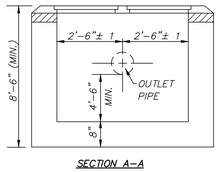
PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) – CROSS SECTION

(NOT TO SCALE)

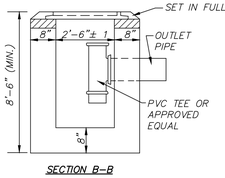




2–3 FLANGE FRAMES



SECTION A–A

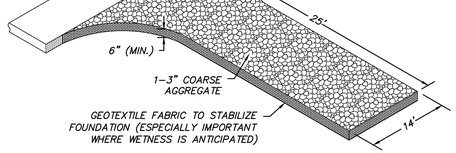


SECTION B–B

SPECIFICATIONS:
CONCRETE STRENGTH
4000 P.S.I. AT 28 DAYS
REINFORCING STEEL CONFORMS TO ASTM A185–79
MANHOLE DESIGN SPECIFICATIONS
CONFORM TO ASTM C 487–84
ONE POUR MONOLITHIC BASE
ADJUST GRADE WITH
COURSES OF BRICK
NOMINAL CONCRETE BLOCK SIZE:
HEIGHT, 4" TO 8"
WIDTH, 8"
LENGTH, 8" TO 16"

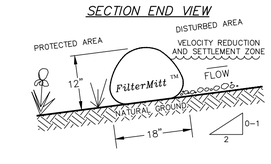
DOUBLE CATCH BASIN

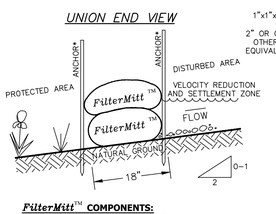
(NOT TO SCALE)



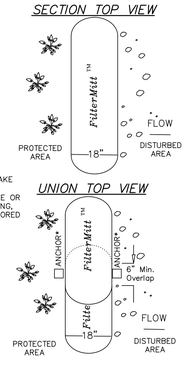
CONSTRUCTION TRACKING ENTRANCE/EXIT PAD

(NOT TO SCALE)





*ANCHOR
1"x1"x36" OAK STAKE
OR
2" OR GREATER TREE OR OTHER PRE–EXISTING, EQUIVALENTLY ANCHORED OBJECT.



FilterMitt™ COMPONENTS:

OUTSIDE CASING: 100% ORGANIC HESSIAN

FILLER INGREDIENT: *FiberRoot Mulch™*

- A BLEND OF COARSE AND FINE COMPOST AND SHREDDED WOOD.
- PARTICLE SIZES: 100% PASSING A 3" SCREEN; 90–100% PASSING A 1" SCREEN; 70–100% PASSING A 0.75" SCREEN; 30–75% PASSING A 0.25" SCREEN.
- WEIGHT: APPROX. 850 LBS./CU.YD. (AVE. 30 LBS./L.F.)

For more information visit:
www.groundscapesexpress.com
or contact us at:
Groundscapes Express, Inc.
P.O. Box 737
Wrentham, MA 02093
(508) 384–7140

FilterMitt™ INSTALLATION:

WITH THE NEWEST TECHNOLOGY AND EQUIPMENT, SECTIONS CAN BE CONSTRUCTED ON SITE IN LENGTHS FROM 1' TO 100'.

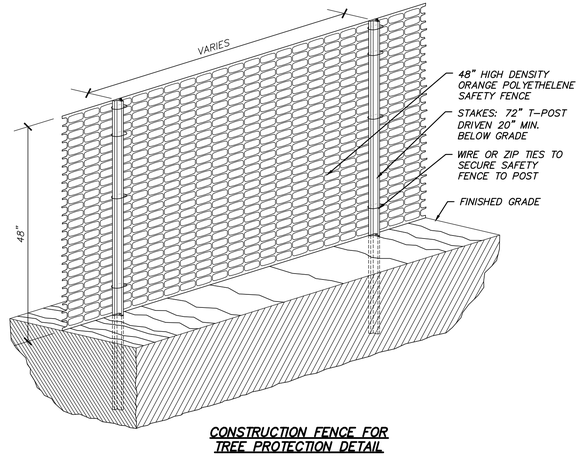
SECTIONS CAN ALSO BE DELIVERED TO THE SITE IN LENGTHS FROM 1' TO 8'.

THE FLEXIBILITY OF *FilterMitt™* ALLOWS IT TO CONFORM TO ANY CONTOUR OR TERRAIN WHILE HOLDING A SLIGHTLY OVAL SHAPE AT 12" HIGH BY 18" WIDE.

WHERE SECTION ENDS MEET, THERE SHALL BE AN OVERLAP OF 6" OR GREATER. BOTH SIDES SHALL BE ANCHORED (OAK STAKES, TREES, ETC.) TO STABILIZE THE UNION.

FILTERMITT DETAIL

(NOT TO SCALE)



CONSTRUCTION FENCE FOR TREE PROTECTION DETAIL

(NOT TO SCALE)

NOTE:

1. EXISTING TREES TO BE SAVED SHALL BE PROTECTED WITH ORANGE CONSTRUCTION FENCE (OFF–SET FROM THE TREE TRUNK BY PROFESSIONAL STANDARD BASED ON CANOPY) AND BURLAP AND STRAP BOARD TRUNK WRAP METHOD.

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

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RECORD OWNERS

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6036–DET

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11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
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P.O. BOX 324
AUBURN, MA.
281 CHESTNUT ST.
NEEDHAM, MA.
508 832 4532
781 444 5936
fieldresources@hotmail.com

390 GROVE STREET
SITE DETAILS 2
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

MERIDIAN ASSOCIATES
580 CUMMINGS CENTER, SUITE 3950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 922-1245
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 10 OF 10
PROJECT No. 6036

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BERNKOPF GOODMAN LLP

November 23, 2020

GARY P. LILIENTHAL
DIRECT DIAL: (617) 790-3360
E-MAIL: GLILIENTHAL@BG-LLP.COM

Via First Class Mail;
Email (aclee@needhamma.gov) and Hand Delivery

Needham Planning Board
Ms. Alexandra Clee, Assistant Town Planner
Ms. Lee Newman, Director of Planning and Community Development
Town of Needham
Planning and Community Development Department
500 Dedham Avenue
Public Services Administration Building, Suite 118
Needham, MA 02492

Re: Application (the "Application") to the Needham Planning Board (the "Board") by Elisabeth Schmidt-Scheuber (the "Applicant") to subdivide land into a two lot subdivision at 390 Grove Street, Needham, Massachusetts (the "Property")

Ladies and Gentlemen:

The abutters to the Property, James Curley, Domenic Colosacco and Robert Badavas (collectively, the "Neighbors") of Grove Street, Needham hereby submit this follow up letter to the Board in opposition to the Application.

As an initial matter, the Neighbors still have not received revised plans addressing the Application's deficiencies identified at the last hearing. Therefore, the Application remains incomplete and deficient in several ways under both the Town's Zoning Bylaws and the Subdivision Rules and Regulations. For example, the Application is missing: a) an "as of right" approvable plan; b) adequate acreage as to Lot 1; c) complete and accurate drainage calculations; d) a fully dimensioned plan; e) adequate road entry radius; and (f) width of Lot 1 that is compliant as a "corner lot" at the setback line.

Moreover, the Applicant cannot create an "as of right" plan because Lot 1 contains inadequate width to comply with Needham Zoning By-Law (the "Bylaws") Section 4.1.5 requiring 120 foot width for a "corner lot" at the setback line.

At the last hearing, Applicant's attorney admitted that Parcel A is being created for the purpose of avoidance of the Subdivision Regulations and Zoning Bylaws applicable to Lot 1 being a

"corner lot." While Applicant's attorney offered the Board other reasons to justify Parcel A such as allowing for a Home Owners Association ("HOA") to manage the drainage area and to provide an area for drainage, these justifications miss the mark entirely. The appropriate and commonly used method for dealing with such a drainage issue is to create a simple easement agreement which would provide for drainage, maintenance, and cost sharing. In fact, creating a HOA will still require the granting of an easement for the benefit of Lots 1 and 2. The sole reason for Parcel A and the HOA is to avoid the Bylaws' lot width requirements.

Parcel A will be in all material respects part of Lot 1 including partial ownership by Lot 1. If the Board approves this deception, the Applicant will be allowed to evade the By-Law requirement that a lot on a corner must have 120 feet of width at the appropriate measuring point, when Lot 1 has only 107 feet.

It has been brought to our attention that the Planning Board or Planning Department consulted with the Building Commissioner regarding his position on the concept of a "Parcel" being placed between Lot 1 and Grove Street. I personally reached out to Commissioner Roche and had a cordial telephone conversation with him. My understanding of Commissioner Roche's view of the creation of a parcel and resulting non-corner lot status position was that this action might be a "loophole" in the Zoning By-Law. He asked me why I thought this was inappropriate. I replied that Parcel A was designed to avoid the width requirement for Lot 1, and that no matter what it was labeled it was effectively a part of Lot 1 and calling it a parcel did not change that. When I asked the Commissioner if his feelings might change if the parcel was 18" wide along the entire frontage of Grove Street the conversation turned to it ultimately being in the province of the Planning Board to deal with the issue. We agree with the Building Commissioner that this is a determination to be made by the Planning Board. While it did not come up in the conversation, what is clear is that the Building Commissioner would NOT issue a Building Permit for Parcel A.

Just as the Planning Board would not be responsible for determining whether a building permit was appropriate, the Building Commissioner should not be the party determining compliance of a definitive subdivision for which approval is requested by the Planning Board. It is also worth reiterating that the subdivision control law (M.G.L. c. 41 §81M et. seq.) provides for the division of land into "Lots" not lots and parcels.

The Bylaws define a "corner lot" as a "lot at the point of intersection of, and abutting on, two or more intersecting streets…" The critical question is what constitutes a lot "abutting on" two or more intersecting streets?

"Abutting on" is not defined in the Bylaws. In the absence of an express statutory definition, the meaning of the word becomes a question of law, and ordinary rules of statutory construction are to be applied. Framingham Clinic, Inc. v. Zoning Board of Appeals of Framingham, 382 Mass. 283, 290 (1981). The term must be read in the context of the Bylaws as a whole, giving it its "common" "approved" and "usual" meanings "from sources presumably known to the [bylaw's] enactors, such as [its] ... use in other legal contexts and dictionary definitions". Id.

The term "abut" in this context means that there is no intervening land which may be put to private use. See City of Shreveport v. Selber, 21 So. 2d 738, 742 (La. Ct. App. 1945) ("In cases of this character to abut means that there intervenes no other land that may be put to private use"). To qualify as an abutter, the land in question does not need to touch upon or directly contact each other. People ex rel. Whittock v. Willison, 237 Ill. 584, 591 (1908), quoting Richards v. City of Cincinnati, 31 Ohio St. 506 ("[t]he word 'abutting' means joined to or adjoining, but does not necessarily imply that the things spoken of are in contact"). The critical question is whether the properties are separated by other property which could be put to a private use, such as a public street or public alley. Homac Corp. v. Sun Oil Co., 137 Misc. 551, 553, 244 N.Y.S. 51 (N.Y. Sup. Ct. 1930).

Under the Application the only use of Parcel A is for a drainage easement associated with Lot 1 and the Subdivision. Even then, the drainage system is only partially on Parcel A and depends on Lot 1 for drainage management as well. There is no distinct use for Parcel A. The created easement makes Parcel A subservient to Lot 1 and, therefore, part of Lot 1. Parcel A can never be sold to a third party or built upon or developed in any significant fashion. Under the well-established meaning of "abutting on," Parcel A does not create a true barrier and Lot 1, therefore, "abuts on" Grove Street.

At least one Massachusetts case addresses this issue and concluded that "abutting on" does not require that the subject properties touch. In Orcutt v. Bd. of Health for Town of Webster, 2007 WL 756595, *2 (Mass. Super. 2007), the court held that a property "abutted" a public way for purposes of requiring sewer connections because, even though the subject property did not technically adjoin the public way, the property benefitted from an easement which connected the two and, therefore, in substance, if not form, "abutted" the public way. The analogy to the Application is clear. Parcel A serves no independent purpose and, to the contrary, contains an irrigation system that will serve Lot 1. Again, Lot 1 will possess a beneficial ownership interest in Parcel A, thereby further diminishing the legal artifice designed by Applicant. Lot 1 "abuts" Grove Street even if it does not technically adjoin it.

Determining that Lot 1 is a "corner lot" is consistent with the intent of the Bylaws. See Duracraft Corp. v. Holmes Products Corp., 427 Mass. 156, 163 n. 11 (1998) (statutes should be interpreted "not alone according to their simple, literal or strict verbal meaning, but in accord with the spirit and intent of the legislation"). The purpose of the Bylaws' lot width requirements is to ensure to the greatest extent possible uniformity in lot size and shape on corner lots. Parcel A provides no barrier between Lot 1 and Grove Street and to all passersby the residence constructed on Lot 1 will appear to adjoin and will for all purposes adjoin Grove Street – just on a too-narrow parcel. See Aquino v. United Prop. & Cas. Co., 483 Mass. 820, 840 (2020) (holding, in the insurance context, that a structure abutted another where it "appears to have a seamless connection" thereto). This Application undermines the purpose, spirit and intent of the Bylaws' corner lot width requirements.

Interpreting Lot 1 as a "corner lot" would also avoid absurd results in this case and in the future. See Green v. Bd. of Appeal of Norwood, 358 Mass. 253, 258 (1970) (by-laws should not be so interpreted as to cause absurd or unreasonable results when the language is susceptible of a sensible meaning). If Applicant can avoid designation as a "corner lot" so easily, any property owner would be free to evade the "corner lot" designation, and the Bylaws' dimensional requirements, by adding a fictional sliver parcel as a buffer. This would defeat the entire purpose of the "corner lot" requirements and render the Bylaws' requirements in that regard entirely meaningless and ineffective. As a matter of statutory interpretation, such a result is legally impermissible. See Adamowicz v. Town of Ipswich, 395 Mass. 757, 760 (1985) (Nor do we interpret a statute to render it or any portion of it meaningless).

Additionally, Parcel A is a 2,500 sq. ft. non-buildable lot which serves no real purpose other than to evade the Bylaws. Again, Applicant admitted this fact at the July 21st hearing, but reasoned that this deliberate evasion was acceptable because it was not expressly prohibited by the Bylaws. Putting aside that it is, for the reasons explained above, expressly prohibited by the Bylaws, the intentional avoidance of a Bylaws' intent is also prohibited by law for public policy reasons. See Gifford v. Planning Bd. of Nantucket, 376 Mass. 801, 808 (1978) (rejecting ANR plan due to illusory frontage on applicable lots).

As Massachusetts native Justice Oliver Wendell Holmes stated on behalf of the United States Supreme Court more than 100 years ago: "When an act is condemned as an evasion, what is meant is that it is on the wrong side of the line indicated by the policy if not by the mere letter of the law." Bullen v. Wisconsin, 240 U.S. 625, 630-631 (1916) (Holmes, J.). That is precisely the case here, and it should not be countenanced by the Planning Board.

For the foregoing reasons, Lot 1 is, from a textual as well as a public policy perspective, a "corner lot" for purposes of the Bylaws. Therefore, Applicant cannot supply a "by right" plan which, by Applicant's own admission, is necessary for the Board to even entertain a Proposed Subdivision, and the Proposed Subdivision must be rejected.

What makes this even more egregious is the fact that the Bylaws already specifically provide a clear and readily available method for dealing with the issue of insufficient width of Lot 1. Under the current circumstances, rather than create a fictitious Parcel A to avoid corner lot status, the Applicant could and should apply to the Zoning Board of Appeals ("BOA") for a corner lot width variance for Lot 1. Should the Applicant be able to demonstrate to the BOA that a variance should be granted, then the Applicant could avoid the subterfuge of Parcel A and come to the Board with a straightforward and Bylaws' compliant plan. Of course, the Applicant would have to prove, as it should have to do, that she meets the standards for obtaining a variance. Instead, the Applicant is seeking to have the Board determine what the BOA should be reviewing and determining.

In addition to the foregoing, and as mentioned above in the Massachusetts case law analysis regarding precedent, the Board is strongly urged to consider the precedent which it will be setting in allowing the evasion by the Applicant of the Bylaws in the creation of Parcel A to avoid "corner lot" status. Approval of such a scheme would send a message to future applicants that creating false parcels, moving lot lines and other "creative' acts solely designed to avoid the spirit and letter of the Bylaws and the Subdivision Laws would be considered and likely approved and not held up for what it is.

We ask the Planning Board to consider what they would do if the next plan had a one (1) foot Parcel along a street which would make the proposed lot abutting the one (1) foot parcel not a corner lot? We would suggest that the depth of a parcel creates a distinction without a difference. It is the purpose of the By-Law and the result of avoidance which matter. In the case of 390 Grove Street, counsel for the Applicant acknowledged that the purpose is to avoid "Corner Lot" dimensional compliance requirements. The Planning Board should not endorse any scheme that is designed to circumvent the Zoning By-Law.

For all the foregoing reasons the Neighbors respectfully request that the Board deny the Applicant's Application.

We look forward to being before the Board again on December 15, 2020.

Sincerely,

Bernkopf Goodman LLP

Gary P. Lilienthal

By: Gary P. Lilienthal, of counsel

GPL/ljg
cc: James Curley, Esquire
Domenic Colasacco
Robert Badavas
Peter B. McGlynn, Esquire
Robert Stetson, Esquire
Karlis P. Skulte, P.E.
George Giunta, Jr., Esquire

BERNKOPF GOODMAN LLP

December 8, 2020

GARY P. LILIENTHAL
DIRECT DIAL: (617) 790-3360
E-MAIL: GLILIENTHAL@BG-LLP.COM

Via First Class Mail;
Email (aclee@needhamma.gov) and Hand Delivery

Needham Planning Board
Ms. Alexandra Clee, Assistant Town Planner
Ms. Lee Newman, Director of Planning and Community Development
Town of Needham
Planning and Community Development Department
500 Dedham Avenue
Public Services Administration Building, Suite 118
Needham, MA 02492

Re: Application (the "Application") to the Needham Planning Board (the "Board") by Elisabeth Schmidt-Scheuber (the "Applicant") to subdivide land into a two lot subdivision at 390 Grove Street, Needham, Massachusetts (the "Property")

Ladies and Gentlemen:

In follow-up to our letter dated November 23, 2020 (the "Objection Letter") on behalf of James Curley, Domenic Colasacco and Robert Badavas (the "Abutters"), a copy of which is attached hereto, this is a response to Applicant's revised plans submitted to the Board on November 25, 2020 (the "Revised Plans"). Also attached in support of this response is the engineering report of Karlis Skulte, P.E. dated December 8, 2020 (the "Engineering Report") which provides a complete itemization of the defects and deficiencies in the Revised Plans.

Despite having nearly five (5) months to provide a valid "by-right" plan and to address the defects and deficiencies in the original plans, Applicant has utterly failed in this endeavor. Applicant previously admitted that the Application must be rejected in the absence of a "by-right" plan; however, Applicant has not provided a "by-right" plan and, in fact, cannot present a "by-right" plan. Applicant has also introduced, in its Revised Plans, new defects and deficiencies into the proposed subdivision which the Board should reject in accordance with the Bylaws. Examples of the defects and deficiencies contained in the Revised Plans include, but are not limited to, the following:

1. As specified in the Objection Letter, Lot 1 is a "corner lot" under the Bylaws and must meet the 120-foot lot width requirements specified therein. Not only have the

Revised Plans failed to address this issue, Applicant further narrowed the lot width of Lot 1 by introducing a "reverse curve" into the private roadway, thereby exacerbating the lot width problem. Lot 1's lot width which is as narrow as 96 feet, further demonstrates that the Property is far too narrow to support the proposed subdivision.

2. Separate and apart from the lot width issue, the Revised Plans also fail to provide a "by-right" plan for another reason: the proposed roadway violates Needham's "Subdivision Regulations and Procedural Rules of the Planning Board" (the ("Rules"). Section 3.3.4 of the Rules states in pertinent part:

   ". . . Street jogs with centerline offsets of less than one hundred and twenty-five feet, streets of varying width and reverse curves shall be avoided." (underlining supplied).

   The purpose of Section 3.3.4 of the Rules is to prevent short street jogs with centerline offsets and reverse curves in roadways. The dictionary definitions support this interpretation with "shall" being defined as "must" and "avoid" being defined as "to refrain from." In other words, if a proposed subdivision roadway contains one of these prohibited features, it is not a "by-right" plan.

   As explained in the Engineering Letter, the roadway on the "by-right" plan contains inadequately distanced street jogs and an impermissible reverse curve. These features are prohibited by Section 3.3.4 and, therefore, Applicant has failed to present a "by right" plan.

   Additionally, as far as the Abutters are aware, Applicant failed to even request a waiver for this deficiency. Given the amount of time Applicant has had to prepare the Revised Plans and communicate with the Board, this was unlikely a simple oversight.

3. The alleged "by-right" plan also has other problems. For example, sidewalks identified on the "by-right" plan on the north side of the plan appear to be too close to Abutter, James Curley's property line and, given the sidewalk's proximity to the tree line, would likely kill the tree root systems and therefore the trees on the adjacent land.

4. The drainage plan also contains numerous deficiencies. For instance, Infiltration System 3 is depicted to extend below the groundwater table; Infiltration System 2 lacks sufficient vertical separation from the groundwater table; and Infiltration System 1 appears to lack adequate grading and coverage; and, therefore, the drainage

system overall does not appear feasible as currently depicted on the plans and modeled in the hydraulic analysis.

5. As explained further in the Engineering Letter, the Lotting Plan also contains numerous inconsistencies and inaccuracies and cannot be endorsed by the Board in its current form.

6. Applicant failed to provide a list of proposed waivers for the Board's, and Abutters', consideration. This is unacceptable under the circumstances. Abutters cannot understand why the Board should approve this plan without knowing what it is waiving.

7. The Revised Plans continue to identify the soils testing results as "unofficial." Given the prevalence of clay on the Abutters' properties and the potential impact such soil could have on Applicant's proposed drainage system, reliance on "unofficial" soil testing should be rejected by the Board.

In sum, Applicant took previously non-compliant and deficient subdivision plans and made them worse. Applicant has failed in two primary respects – lot width and roadway design – to provide a "by-right" plan and introduced new deficiencies into the plans as well. Applicant has repeatedly failed to present subdivision plans that comport with the purpose and text of the Bylaws and Rules. Rather, the Revised Plans demonstrate that the Property lacks the width and physical features to be subdivided in the manner proposed by Applicant and that the Application should be rejected by the Board in its entirety.

Sincerely,

Bernkopf Goodman LLP

Gary P. Lilienthal

By: Gary P. Lilienthal, of counsel

GPL/ljg
cc: James Curley, Esquire
Domenic Colasacco
Robert Badavas
Peter B. McGlynn, Esquire
Robert Stetson, Esquire

Karlis P. Skulte, P.E.
George Giunta, Jr., Esquire

TOWN OF NEEDHAM, MASSACHUSETTS
PUBLIC WORKS DEPARTMENT
500 Dedham Avenue, Needham, MA 02492
Telephone (781) 455-7550 FAX (781) 449-9023

December 14, 2020

Needham Planning Board
Public Service Administration Building
Needham, MA 02492

RE: Definitive Subdivision Application
390 Grove Street

Dear Members of the Board,

The Department of Public Works completed its review of a request from the applicant to construct a two-lot subdivision off Grove Street.

The documents submitted for review are as follows:

1. Letter of abutter response to subdivision plans directed to the Planning and Community Development, dated November 23, 2020 from Bernkopf Goodman, LLP.
2. Follow up Letter to subdivision plans directed to the Planning and Community Development, dated December 8, 2020 from Bernkopf Goodman, LLP
3. Peer review summary to Bernkopf Goodman LLP dated December 8, 2020 from Civil & Environmental Consultants, Inc
4. Plan entitled "390 Grove Street (assessor's Map 221 – Lot 9), Definitive Subdivision Plan," prepared by Meridian Associates, 500 Cummings Center, Suite 5950, Beverly, MA 01915, Field Resources, Inc., 281 Chestnut Street, Needham, MA, consisting of 10 sheets dated July 20, 2018 revised November 24, 202
5. Stormwater Analysis and Calculations Report for 390 Grove Street, Needham, MA, prepared by Meridian Associates, 500 Cummings Center, Suite 5950, Beverly, MA 01915, dated October 4, 2019 revised November 24, 2020.

The Engineering Division is still reviewing the plans and subsequent Peer Comments that were received recently. We respectfully request an additional week of time to complete the review.
If you have any questions regarding the above, please contact our office at 781-455-7538.

Truly yours,

Sincerely,

Thomas Ryder
Assistant Town Engineer

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2020 NOV -5 PM 1:04

PLANNING AND COMMUNITY
DEVELOPMENT DEPARTMENT

Theodora K. Eaton
Town Clerk
1471 Highland Avenue
Needham, MA 02492

November 5, 2020

RE: Application for Approval of Definitive Subdivision
Map No. 221, Parcel 9
390 Grove Street

Dear Ms. Eaton:

At its November 4, 2020 meeting, the Planning Board voted to accept the applicant's request to extend the action deadline for the 390 Grove Street Subdivision to January 31, 2021.

A copy of the applicant's request as outlined in a letter from George Giunta Jr. to Lee Newman and dated January 31, 2021 is attached to this memo.

Should you have any questions regarding this matter, please feel free to contact me directly.

Very truly yours,

NEEDHAM PLANNING BOARD

Lee Newman

Lee Newman
Director of Planning and Community Development

cc: George Giunta Jr. *via email*

George Giunta, Jr.

ATTORNEY AT LAW*
281 Chestnut Street
Needham, MASSACHUSETTS 02492
*Also admitted in Maryland

TELEPHONE (781) 449-4520 FAX (781) 449-8475

October 29, 2020

RECEIVED TOWN CLERK
NEEDHAM, MA 02492
2020 NOV -5 PM 1:04

Lee Newman
Planning Director
Town of Needham
1471 Highland Avenue
Needham, MA 02492

VIA EMAIL: LNewman@needhamma.gov

Re: Definitive Subdivision Application
Elisabeth Schmidt-Scheuber
390 Grove Street

Dear Lee,

Pursuant to our conversation yesterday, please accept this letter as a request to further continue the hearing on the Definitive Subdivision Application for 390 Grove Street until the second meeting of the Board in December, currently scheduled for December 15, 2020. It being understood that any revised plans shall be submitted no later than November 25, 2020, to provide ample time for review.

Furthermore, please also extend the applicable action deadline until January 31, 2021.

Sincerely,

George Giunta, Jr

December 8, 2020

Robert W. Stetson
Bernkopf Goodman, LLP
Two Seaport Lane, 9th Floor
Boston, MA 02210

Subject: Engineering Review No. 2
390 Grove Street, Needham, Massachusetts
CEC Project 301-700

Dear Mr. Stetson:

Civil & Environmental Consultants, Inc. (CEC) has prepared this summary of the engineering review of materials resubmitted by the applicant's team in support of the proposed Definitive Subdivision Application for the proposed residential subdivision located at 390 Grove Street in Needham, Massachusetts (the Site).

The materials were reviewed for compliance with the Town of Needham's Subdivision Regulations and Procedural Rules of the Planning Board (the Subdivision Regulations), the Zoning By-Law of the Town of Needham (the By-Law), Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards, and standard engineering practice. The following is a brief summary of the documentation reviewed, a brief project overview and our findings and recommendations.

In accordance with our scope of work, CEC has prepared this engineering review letter documenting our review, findings and recommendations.

PROJECT OVERVIEW

The Applicant (Moritz Schmidt) is proposing to construct a 2-lot residential subdivision on a 5.3-acre parcel of land owned by Elisabeth Schmidt-Scheuber (the Owner). The subdivision includes the construction of an approximately 450-foot (ft) long 18-ft wide roadway within a Private right-of-way with associated utility and stormwater improvements in order to create two (2) new single family house lots (the Project). The Applicant has requested a number of waivers from the Town of Needham Subdivision Regulations in order to construct the Private Way as proposed. Refer to the original review memorandum for additional detail.

PROJECT DOCUMENTS

The following is a list of Project documentation and materials included in our review:

- Site Plans entitled "390 Grove Street (assessor's Map 221 – Lot 9) Definitive Subdivision Plan", prepared by Meridian Associates, dated July 2018, revised November 24, 2020 (10 Pages);
- Stormwater Analysis and Calculations Report, prepared by Meridian Associates, dated October 4, 2019, revised November 24, 2020 (147 Pages).

FINDINGS & RECOMMENDATIONS

Based on our review of the above referenced documentation, CEC offers the following findings and recommendations relative to the documentation reviewed for compliance with the applicable aspects Town of Needham's Subdivision Regulations, the Zoning By-Law, MassDEP Stormwater Management Standards, and standard engineering practice. Comments raised in the original review memorandum dated July 14, 2020 that are still outstanding or have not been addressed have been restated or expanded upon in this memorandum.

Zoning By-Law and Subdivision Regulation Review

1. The Applicant should submit a revised waiver request to clearly identify the current waivers requested with the latest submission.

2. Per section 3.3.4 of the subdivision regulations, *"Street jogs with centerline offsets of less than 125-ft, streets with varying widths and reverse curves shall be avoided."*

   The By Right Subdivision Plan (sheet 3 of 10) and Proposed Site and Grading Plan depict a street centerline jog of approximately 30-ft at the intersection with Grove Street along with a reverse curve in order to achieve this jog both of which are in conflict with the subdivision requirements.

3. Per Sect. 4.1.5 of the Zoning By-Law (Minimum Required Lot Width), "*in the Single Residence A District such minimum required lot width shall be at least 120 feet. To measure lot width, start at a front corner (where a sideline meets the lot's line of frontage) and, at a right angle to that sideline, measure straight across the lot to the other sideline. This measurement need not be at a right angle from more than one sideline but it must cross the lot to meet the opposite sideline. Then take a series of measurements parallel to*

that first measured line, through the full depth of the primary building or structure on the lot. This measurement need not be at a right angle from more than one sideline but it must cross the lot to meet the opposite sideline… For corner lots, the measurement shall be taken from front corners along both frontage lines."

The Applicant provided a proposed By Right Subdivision Plan (Sheet 3 of 10) as part of the Definitive Plan Application. If the proposed non-buildable lot closest to Grove Street were to be considered a corner lot with frontage on both Grove Street and the new subdivision roadway, Lot 1 would not meet the minimum lot width requirement of 120-ft in accordance with Section 4.1.5 of the Zoning By-Law.

4. Per Section 3.3.1 of the subdivision regulations, "*The grade of a street within 50-feet of a street intersection shall not exceed 1% to provide a level area for traffic safety."*

   The Proposed Utilities & Profile Plan (Sheet 6 of 10) identifies that the road contains only a 20-foot long section of roadway that has a slope less than 1%, which is less than the 50-foot requirement.

5. The applicant also seeks a waiver minimum radius for the circular turn around at the end of the roadway; however, Section 3.3.5 authorizes a waiver of this requirement only in "unusual circumstances." The applicant has not pointed to any unusual circumstances which would justify a departure from the requisite standards.

6. Per section 3.3.16 of the subdivision regulations, where sidewalks are proposed along one side of the road, the typical 3.5-ft wide grass strip should be extended to a minimum width of 8-ft. The plans do not depict sidewalks on either side of the roadway, so we assume the Applicant is requesting relief from construction of sidewalks all together.

7. Per Section 3.3.8 of the subdivision regulations, granite or concrete bounds need to be set at all points of curvature. The plans don't show any proposed bounds.

8. Per Section 3.3.9 of the subdivision regulations, street name signs shall be erected at all street entrance in conformance with Town Standards. The plans don't identify any proposed street or traffic signs.

STORMWATER REPORT & DEFINITIVE PLAN COMMENTS

9. The By Right Subdivision Plan (Sheet 3 of 10) does not depict proposed grading or stormwater management features that would be required for the design as depicted on the by-right plan. Additionally, the proposed sidewalks depicted on this plan are very close to the existing trees to remain along 380 Grove Street property line to the north. This may not be constructible as proposed without impacting the existing tree root zones; therefore the viability of tree survival is unclear. Two of these trees are shown to be protected in place on the Site Plans, although details for tree protection are not included in the submission. If tree protection fencing is placed around the drip line of the trees, and a sidewalk were to be proposed along the north side of the roadway per the subdivision regulations, the roadway and associated right-of-way may need to be shifted to the south, further reducing the available lot width for the front lot.

   The By Right Subdivision Plan is incomplete as it relates to grading and how the design would tie into the adjacent properties. More information would be required to demonstrate this is a viable plan.

10. The By Right Subdivision Plan (Sheet 3 of 10) and most of the other plans identify both buildable parcels as Lot 1 and there is no Lot 2. This needs to be corrected.

11. The Lotting Plan (Sheet 4 of 10) has a number of significant inconsistencies with the remainder of the Definitive Plans. These include the following: identifying Parcel B as part of Lot 2 at the end of the proposed roadway, whereas the remainder of the Plans identify Parcel B as the remnant parcel north of the subdivision roadway parcel; identifying the remnant parcel south of the subdivision roadway as Parcel A, whereas the remainder of the Plans identify this as Parcel B; not labeling the remnant parcel north of the subdivision roadway. The Lotting Plan as presented is not complete or accurate and cannot be approved as currently presented.

12. The Post-Development Drainage Plan included in the Stormwater Report identifies a proposed infiltration system (Infiltration System 3) for the future buildings modeled as Subcatchment SC020 in the vicinity of Test Pit 1. Test Pit 1 identifies an Estimated Seasonal High Groundwater (ESHGW) elevation approximately 36" below grade at elevation 204.5 ft. The HydroCAD analysis models this infiltration system with the bottom elevation at elevation 200.0-ft which would place it below the groundwater table. If the system were constructed with a minimum vertical separation of 2-ft, the bottom of stone would be located at approximate elevation 206.5, with the top of stone located at

approximate elevation 208.3 with the finished surface at approximate elevation 209.3. This would appear to require significant regrading on this parcel in order to accommodate these elevations. Additionally Infiltration System 2 serving the second future building is also identified with a bottom elevation at elevation 200.0-ft, and the closest Test Pits (TP5 and TP6) have an ESHGW elevation of 199.7, which would not provide the required vertical separation from the ESHGW elevation. Based upon these discrepancies, the systems are not feasible to install as currently depicted on the plans and modeled in the hydraulic analysis. As the proposed HydroCAD analysis is modeled taking these systems into account, the design should be reviewed and revised to accurately depict the proposed design.

13. The stormwater report does not identify a description of SC 10 and SC 20 which are the proposed roof areas from the homes. This should be reviewed and included in the stormwater report for consistency with the Post-Development Drainage Plan.

14. A test pit was recently performed in the footprint of the proposed Infiltration System proposed near Grove Street (Infiltration System 1) to be constructed as part of the subdivision. The ESGHW elevation has been estimated to be 196.0, which is an increase from the previously assumed value of 193.0. Although a test pit was performed in the footprint of the proposed stormwater chambers, The MassDEP Stormwater Management Handbook identifies that a minimum of two (2) soil tests should be taken for each trench/system. Additionally, it is unclear why the test pits continue to be identified as "unofficial". The Applicant should identify if these were witnessed by the Town or any other party to verify the ESHGW and soil classification. Based on these factors, the Applicant has not provided the requisite soils testing.

15. The top of stone for Infiltration System 1 is proposed at elevation 200.3 per the details on Sheet 10 of 10. The minimum proposed finished grade above the chambers is identified to be elevation 201.33. The grading depicted on the Proposed Site & Grading Plan (Sheet 5 of 10) appears to indicate the top of chambers is slightly higher than elevation 200, but not above elevation 201 which would not provide the required amount of cover. The surface grades are proposed to slope down immediately adjacent to the proposed stormwater chambers with the surface grade less than the top of stone within approximately 5-ft of the chambers. Additionally, the bottom of chambers is proposed above the existing street grade along Grove Street. The Applicant should confirm there will not be breakout along Grove Street. The grading in the vicinity of the Infiltration System 1 and size of Parcel "B" should be reviewed to confirm this parcel has sufficient size and the drainage system is feasible as proposed.

16. Infiltration System 1 is proposed approximately 2-ft above the ESGW. The infiltration system is designed to attenuate stormwater flows for all storm events analyzed up to and including the 100-year storm event. Per the MassDEP Stormwater Management Handbook *"[m]ounding analysis is required when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm (e.g., 10-year,25-year, 50-year, or 100-year 24-hour storm)."* The applicant should submit a mounding analysis in addition to providing an analysis of breakout as noted in Comment 16 above.

17. The outlet from Infiltration System 1 is proposed with an invert at elevation 199.83 which would place the pipe above the top of the chambers which are also located with the top of chambers at 199.83. The system is not feasible as proposed. The HydroCAD analysis is also modeled with this condition. The stormwater from the 100-year storm rises to the top of the chambers to elevation 199.86. If the system were designed with the crown of a pipe located at the top of the infiltration chambers, the chambers would let out flow earlier and as a result the peak rate would increase at Design Point 1 – Grove Street. At a minimum, the design and analysis should be reviewed and revised to demonstrate that the system can be constructed and will function properly.

18. The outlet pipe from Infiltration System 1 to DMH-1 identifies a 38% slope and a 14% slope is identified on the pipe segment connecting to the existing catch basin in Grove Street. These slopes are steep and will result in high velocities of the stormwater within these segments of pipe. This may result in resuspension of sediment in the existing catch basins and/or hydraulic jumps as the high velocity flows confluence with the lower velocity flows in the existing drainage system. The proposed slopes of the stormwater system should be reviewed.

19. The Proposed Utilities & Profile Plan (Sheet 6 of 10) shows an 8x8x6 tee connection to the existing 8" water main for the proposed 8" water main. This connection is inaccurate as it does not appear that a 6-inch pipe is proposed in this location. Additionally, the waterline appears to have less than 5-ft of cover from station 10+50 to 11+50. This should be addressed.

20. The profile included on the Proposed Utilities & Profile Plan (Sheet 6 of 10) depicts a proposed grade of 3.3% presumably along the centerline of the roadway, although the profile line appears to have a number of grade breaks at approximate stations 10+20 and

11+40. There is no information included regarding these apparent grade breaks. Furthermore, a 20-ft vertical curve is identified from station 10+00 to 10+20, although the profile appears to indicate that the centerline grade at this location is set at a uniform slope of 0.5%. These inconsistencies should be addressed.

21. The Revision Block on the Record Conditions Plan of Land (Sheet 2 of 10) is unclear and has overlapping text. This should be corrected for the record.

CONCLUSION

The revised "by right" plan submitted by the Applicant is still not compliant with the bylaw, subdivision rules and regulations and applicable stormwater standards and regulations. The application lacks sufficient information and detail required in order to adequately demonstrate that the project will function as designed and will meet the appropriate regulations including traffic safety and stormwater drainage considerations and included a number of errors that need to be corrected. The application in its current form must be rejected.

Please feel free to contact us with any questions at kskulte@cecinc.com or via phone at (774) 501-2176.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Karlis P. Skulte, P.E.
Principal

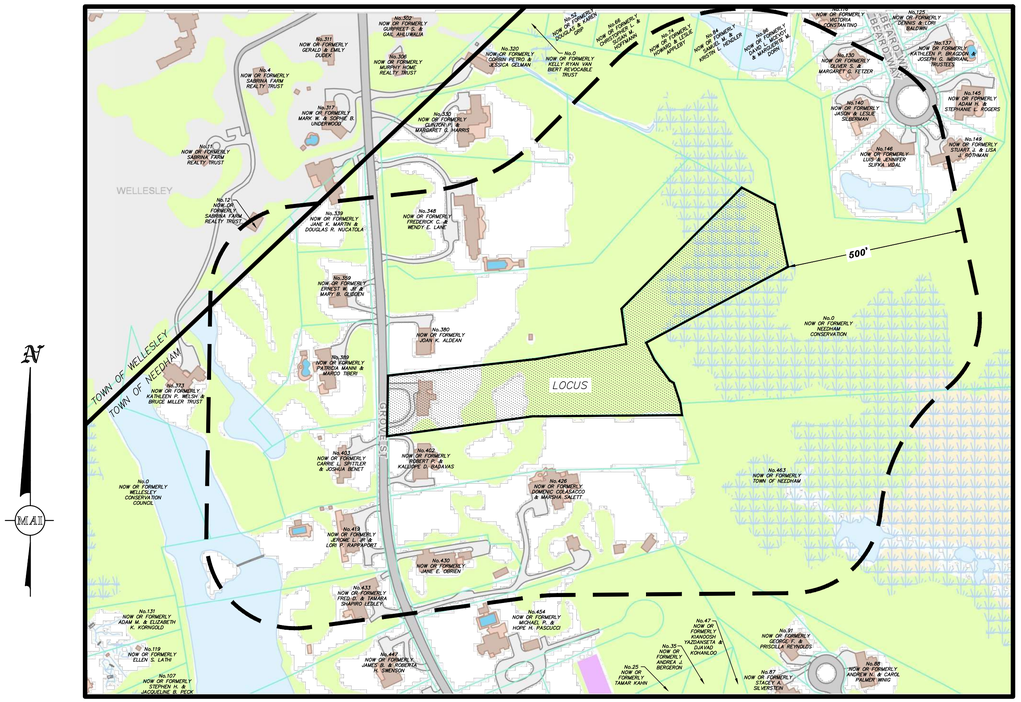
Amy Knight, P.E.
Principal

Attachment: Definitive Plans with CEC review notes

NOTES:

1. THE INFORMATION DEPICTED ON THIS PLAN HAS BEEN COMPILED FROM THE TOWN OF NEEDHAM GEOGRAPHIC INFORMATION SYSTEM.
2. LAND USE WITHIN 500 FEET OF THE SUBJECT PROPERTY IS PRIMARILY SINGLE AND TWO FAMILY DWELLINGS.

FOR REGISTRY USE ONLY



LOCUS CONTEXT MAP:

GRAPHIC SCALE
SCALE: 1"=200'

FEET 200 0 100 200 400 800
METERS 0 20 40 80 160 240

SCHEDULE OF DIMENSIONAL CONTROLS

ZONING DISTRICT: SINGLE RESIDENCE A

REQUIREMENT	REQUIRED
LOT AREA:	43,560
FRONTAGE:	150 FT.
FRONT SETBACK:	30 FT.
SIDE SETBACK:	25 FT.
REAR SETBACK:	15 FT.
MAX STORIES:	2-1/2
MAX HEIGHT:	35 FT.
STREET DESIGNATION:	MINOR

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
REVIEW NOTES
2020-12-07

390 GROVE STREET
(ASSESSOR'S MAP 221 – LOT 9)
DEFINITIVE SUBDIVISION PLAN

IN ACCORDANCE WITH SECTION 4.2 OF THE TOWN OF NEEDHAM ZONING BY-LAW

LOCATED IN

NEEDHAM, MASSACHUSETTS

DATE: JULY 20, 2018
REVISED: NOVEMBER 2, 2018
REVISED: MARCH 29, 2019
REVISED: JULY 12, 2019
REVISED: AUGUST 22, 2019
REVISED: OCTOBER 4, 2019
REVISED: FEBRUARY 7, 2020
REVISED: MARCH 2, 2020
REVISED: NOVEMBER 24, 2020

RECORD OWNER:

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

APPLICANT:

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

PREPARED BY:

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER SUITE 5950, BEVERLY, MASSACHUSETTS 01915, TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 302, WESTBOROUGH, MASSACHUSETTS 01581, TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

_____
DIRECTOR OF PUBLIC WORKS

DATE APPROVED _____

_____
TOWN ENGINEER

DATE APPROVED _____

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

_____
DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED

TOWN OF NEEDHAM PLANNING BOARD

BY: _____

_____

_____

_____

_____

_____

APPROVED:

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL
NO. 49389
REGISTERED PROFESSIONAL ENGINEER

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DRAWING INDEX:

SHEET 1	COVER SHEET & CONTEXT MAP
SHEET 2	RECORD CONDITIONS' PLAN
SHEET 3	(BY RIGHT) SUBDIVISION PLAN
SHEET 4	LOTTING PLAN
SHEET 5	PROPOSED SITE & GRADING PLAN
SHEET 6	PROPOSED UTILITIES & PROFILE
SHEET 7	PROPOSED LANDSCAPE PLAN
SHEET 8	PROPOSED LANDSCAPE DETAILS
SHEET 9	SITE DETAILS 1
SHEET 10	SITE DETAILS 2

DWG. No. 6036-CVR
(IMAGE: GIS Map 200scale)

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WHY IS THIS UNOFFICIAL? WERE THE TEST PITS WITTNESSED?

DIFFICULT TO READ

UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020 BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" ^C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E.S.H.G.W. @ 59"
NO WEEPING OBSERVED

UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
NO WEEPING OBSERVED

EST PIT: TP-2
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
NO WEEPING OBSERVED

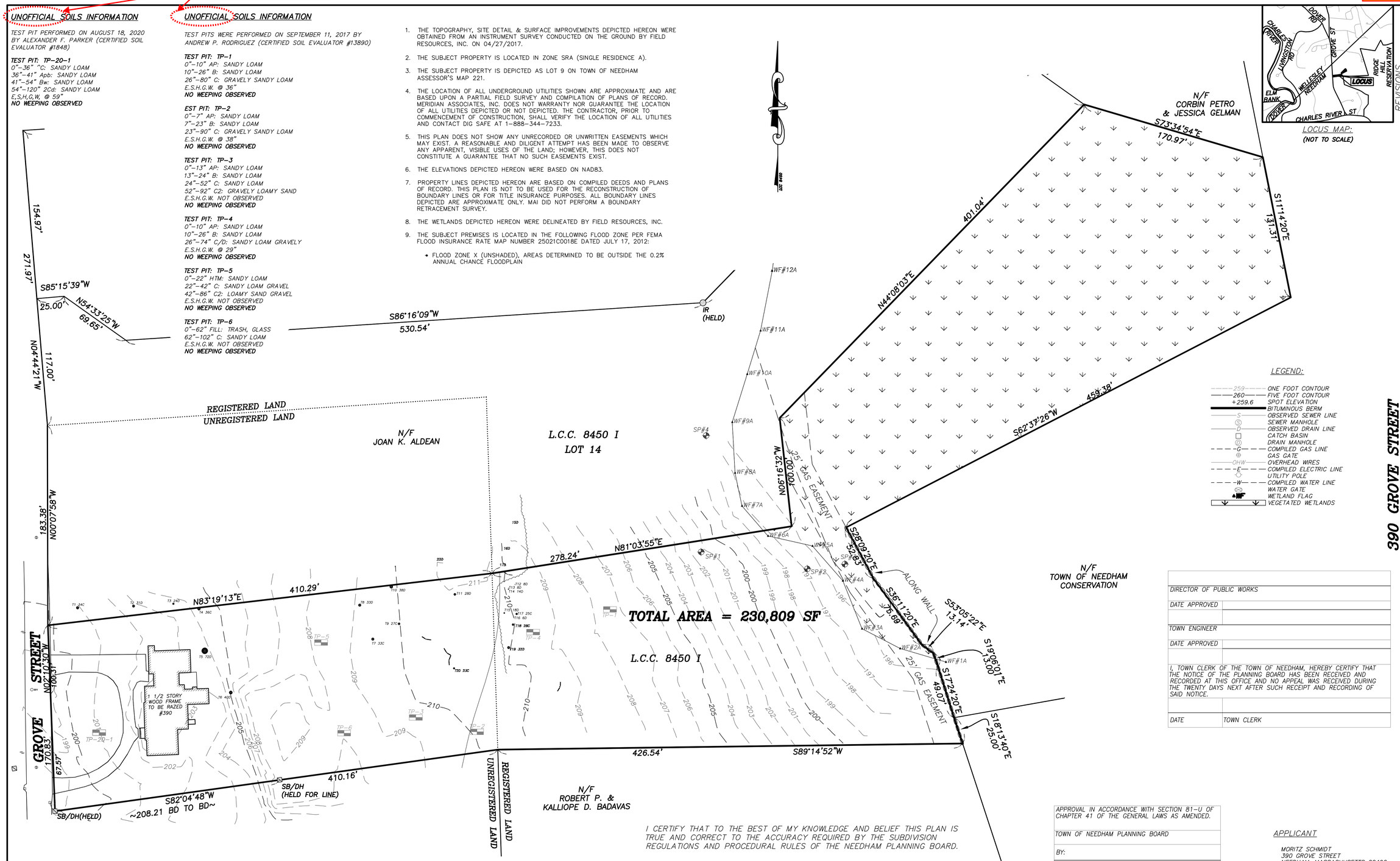
TEST PIT: TP-3
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

TEST PIT: TP-4
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
NO WEEPING OBSERVED

TEST PIT: TP-5
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

TEST PIT: TP-6
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
NO WEEPING OBSERVED

1. THE TOPOGRAPHY, SITE DETAIL & SURFACE IMPROVEMENTS DEPICTED HEREON WERE OBTAINED FROM AN INSTRUMENT SURVEY CONDUCTED ON THE GROUND BY FIELD RESOURCES, INC. ON 04/27/2017.
2. THE SUBJECT PROPERTY IS LOCATED IN ZONE SRA (SINGLE RESIDENCE A).
3. THE SUBJECT PROPERTY IS DEPICTED AS LOT 9 ON TOWN OF NEEDHAM ASSESSOR'S MAP 221.
4. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
5. THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT, VISIBLE USES OF THE LAND; HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
6. THE ELEVATIONS DEPICTED HEREON WERE BASED ON NAD83.
7. PROPERTY LINES DEPICTED HEREON ARE BASED ON COMPILED DEEDS AND PLANS OF RECORD. THIS PLAN IS NOT TO BE USED FOR THE RECONSTRUCTION OF BOUNDARY LINES OR FOR TITLE INSURANCE PURPOSES. ALL BOUNDARY LINES DEPICTED ARE APPROXIMATE ONLY. MAI DID NOT PERFORM A BOUNDARY RETRACEMENT SURVEY.
8. THE WETLANDS DEPICTED HEREON WERE DELINEATED BY FIELD RESOURCES, INC.
9. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONE PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN



LOCUS MAP:
(NOT TO SCALE)

LEGEND:

- 259 — ONE FOOT CONTOUR
- 260 — FIVE FOOT CONTOUR
- +259.6 — SPOT ELEVATION
- BITUMINOUS BERM
- S — OBSERVED SEWER LINE
- SEWER MANHOLE
- D — OBSERVED DRAIN LINE
- CATCH BASIN
- DRAIN MANHOLE
- G — COMPILED GAS LINE
- GAS GATE
- OHW — OVERHEAD WIRES
- E — COMPILED ELECTRIC LINE
- UTILITY POLE
- W — COMPILED WATER LINE
- WATER GATE
- WF — WETLAND FLAG
- VEGETATED WETLANDS

REVISIONS		
11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
10.21.19	REVISED PER TOWN COMMENTS	PHB
02.07.20	REVISED PER TOWN COMMENTS	PHB
03.02.20	REVISED PER TOWN COMMENTS	PHB
11.24.20	REVISED PER TOWN COMMENTS	PHB

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

390 GROVE STREET

RECORD CONDITIONS PLAN OF LAND

LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

DIRECTOR OF PUBLIC WORKS	
DATE APPROVED	
TOWN ENGINEER	
DATE APPROVED	
I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.	
DATE	TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

#47581 PROFESSIONAL LAND SURVEYOR

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

TEMPORARY BENCHMARK CHART:

T.B.M.#	DESCRIPTION	ELEVATION
1	CATCH BASIN RIM	197.62

ALL UNDERGROUND UTILITY DATA REPRESENTS RECORD INFORMATION RECOVERED THROUGH RESEARCH WITHOUT SURFACE DEMARCATION NOR SUBSURFACE VERIFICATION.

120-16

MERIDIAN ASSOCIATES
400 CUMMINGS CENTER, SUITE 404N
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0047
WWW.MERIDIANASSOC.COM
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 2 OF 10
PROJECT No. 6036

6036-TB

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WHY IS THIS UNOFFICIAL?

UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1 ELEV.=207.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
E.S.H.G.W. ELEV.=204.5
NO WEEPING OBSERVED

EST PIT: TP-2 ELEV.=210.1
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
E.S.H.G.W. ELEV.=206.9
NO WEEPING OBSERVED

TEST PIT: TP-3 ELEV.=209.5
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.8
NO WEEPING OBSERVED

TEST PIT: TP-4 ELEV.=209.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
E.S.H.G.W. ELEV.=207.1
NO WEEPING OBSERVED

TEST PIT: TP-5 ELEV.=208.2
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.2
NO WEEPING OBSERVED

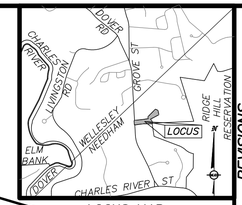
TEST PIT: TP-6 ELEV.=208.2
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=199.7
NO WEEPING OBSERVED

WHY IS THIS UNOFFICIAL?

UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020 BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" "C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E,S,H,G,W. @ 59"
NO WEEPING OBSERVED



LOCUS MAP:
(NOT TO SCALE)

SIDEWALKS ARE PROPOSED VERY NEAR TO EXISTING TREES IDENTIFIED TO REMAIN. UNCLEAR IF ROOT ZONE COULD BE MAINTAINED AND IMPACTS TO TREES AVOIDED.

SIDEWALKS VERY CLOSE TO THE PROPERTY LINE.

PARCEL A IS REMNANT "NON-BUILDABLE" PARCEL.

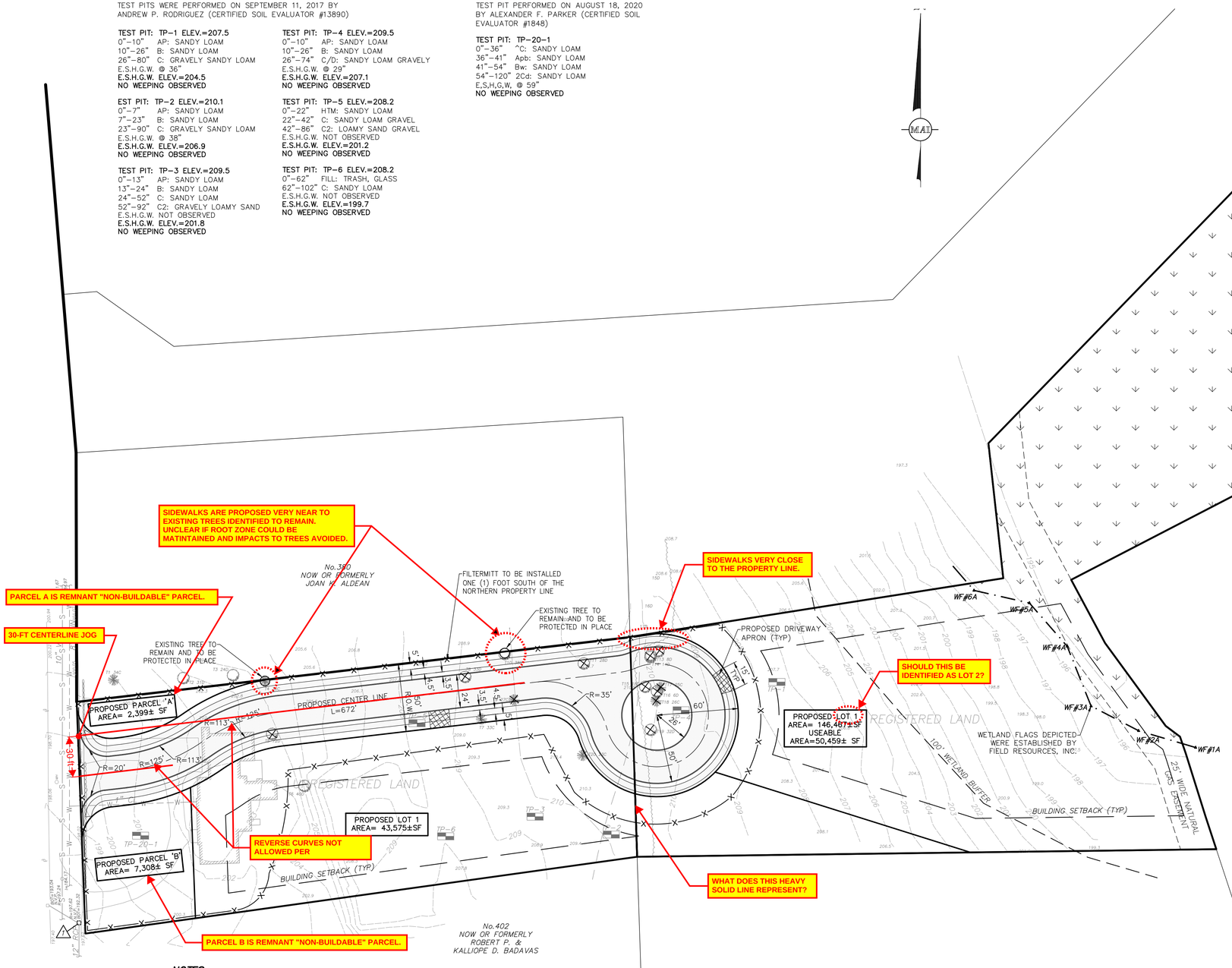
30-FT CENTERLINE JOG

SHOULD THIS BE IDENTIFIED AS LOT 2?

REVERSE CURVES NOT ALLOWED PER

WHAT DOES THIS HEAVY SOLID LINE REPRESENT?

PARCEL B IS REMNANT "NON-BUILDABLE" PARCEL.



NOTES

1. THE SUBJECT PROPERTY IS LOCATED IN ZONE SRA (SINGLE RESIDENCE A).
2. THE SUBJECT PROPERTY IS DEPICTED AS LOT 9 ON TOWN OF NEEDHAM ASSESSOR'S MAP 221.
3. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
4. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONES PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN
5. PER TOWN OF NEEDHAM 'TYPICAL PERMANENT TURNAROUND' DETAIL, PAGE 41 OF THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE PLANNING BOARD, DATED 1993, "WALK MAYBE OMITTED BEYOND LAST DRIVEWAY ON EACH SIDE."

GRAPHIC SCALE
SCALE: 1"=40

FEET 40 0 20 40 80 160
METERS 0 10 20 40 60

LEGEND

209	EXISTING CONTOUR
208	PROPOSED CONTOUR
	PROPOSED CONCRETE CURB
	BUILDING SETBACK
	WETLAND BUFFER
	FILTERMITT/LIMIT OF WORK
TP-1	TEST PIT
	APPROXIMATE EXISTING PROPERTY LINES
WF	WETLAND FLAG
	VEGETATED WETLANDS
	PROPOSED ROADWAY
	PROPOSED SIDEWALK
	PROPOSED DRIVEWAY APRON
	PROPOSED SUBSURFACE INFILTRATION SYSTEM
R=	RADIUS
ROW	RIGHT OF WAY
TYP	TYPICAL
L=	LENGTH
GB	GRADE BREAK
	TREE TO BE REMOVED

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL NO. 49369
REGISTERED PROFESSIONAL ENGINEER

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE — David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT
MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS
ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036-SITE BY-RIGHT

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
02.07.20	REVISED PER TOWN COMMENTS	DSK
03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324, AUBURN, MA. 508 832 4332
281 CHESTNUT ST. NEEDHAM, MA. 781 444 5936
fieldresources@hotmail.com

390 GROVE STREET
(BY RIGHT) SUBDIVISION PLAN
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950, BEVERLY, MASSACHUSETTS 01915, TELEPHONE: (978) 299-0447
40 WALL STREET, SUITE 302, WESTBOROUGH, MASSACHUSETTS 01581, TELEPHONE: (508) 871-7030, WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 3 OF 10
PROJECT No. 6036

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APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

N86°16'09"E 125.00'

S03°43'51"E 125.08'

154.97'

271.97'

S85°15'39"W 25.00'

N54°33'25"W 69.65'

117.00'

N04°44'21"W

N86°16'09"E 440.00'

N03°43'51"W 413.97'

SB/DH (HELD)

L.C.C. 8450 I
LOT 13

S86°16'09"W 530.54'

IR (HELD)

WF#16A
WF#15A
WF#14A
WF#13A
WF#12A
WF#11A
WF#10A
WF#9A
WF#8A
WF#7A
WF#6A
WF#5A
WF#4A
WF#3A
WF#2A
WF#1A

SP#5
SP#4
SP#3
SP#2
SP#1

S44°08'03"W 355.42'

IR (HELD)

N54°25'55"W 125.67'

N/F
CORBIN PETRO
& JESSICA GELMAN

S73°34'54"E 170.97'

S11°14'20"E 131.31'

PART OF LOT 2, NOT PARCEL B

401.04'

N44°08'03"E

PARCEL B
AREA = 91,374 SF

459.38'

S62°37'26"W

N06°16'32"W 100.00'

25' GAS EASEMENT

S28°09'20"E 52.83'

ALONG WALL

S36°11'20"E 75.69'

S53°05'22"E 13.14'

S19°05'01"E 13.00'

S17°24'20"E 49.07'

S18°13'40"E 25.00'

S89°14'52"W 180.99'

426.54'

245.55'

S72°32'41"E 197.18'

25' GAS EASEMENT

N/F
TOWN OF NEEDHAM
CONSERVATION

N/F
TOWN OF NEEDHAM

FOR REGISTRY USE ONLY

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

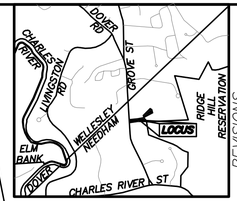
TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

LOCUS MAP:
(NOT TO SCALE)



REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
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11.24.20	REVISED PER TOWN COMMENTS	PHB

SURVEY INFORMATION PROVIDED BY:

Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

390 GROVE STREET

LOTTING PLAN

LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

MERIDIAN ASSOCIATES
400 COMMONS CENTER, SUITE 6490
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0407
69 ALLEN STREET, SUITE 302
WORCESTER, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOCCO.M

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE:
JULY 20, 2018

SCALE:
1"=40'

SHEET No.
4 OF 10

PROJECT No.
6036

6036-TB

PARCEL A?

PARCEL B?

PRIVATE WAY
AREA=31,061 SF

TOTAL AREA = 230,809 SF

LOT 1
AREA = 43,574 SF

PARCEL A
7,308 SF

LOT 2
AREA = 146,467 SF
3.3624± ACRES

L.C.C. 8450 I

N/F
JOAN K. ALDEAN

L.C.C. 8450 I
LOT 14

REGISTERED LAND
UNREGISTERED LAND

N/F
ROBERT P. &
KALLIOPE D. BADAVAS

SB/DH(HELD)

~208.21 BD TO BD~

S82°04'48"W 328.37'

410.16'

SB/DH
(HELD FOR LINE)

UNREGISTERED LAND

REGISTERED LAND

183.38'

N00°07'58"W

S02°10'30"E 2.95'

147.85'

N83°19'13"E 410.29'

262.44'

278.24'

N81°03'55"E 267.72'

10.52'

L=74.12'
R=150.00'

L=41.24'
R=25.00'

R=100.00'

4.58'

L=49.42'

N83°19'13"E

N02°10'30"W 100.31'

STREET

GROVE

170.83'

67.57'

N87°49'30"E 55.82'

81.79'

96.36'

N02°10'30"W

96.00'

N83°19'13"E 12.46'

R=150.00'

L=47.44'

L=37.30'
R=25.00'

TP-20-1

L=26.69'
R=150.00'

L=49.42'
R=100.00'

50.00'

N83°19'13"E 191.73'

L=34.70'
R=25.00'

R=60.00'

300.57'

R=60.00'

L=124.13'

L=150.00'
L=274.13'

123.85'

R=60.00'

90°

TP-1
TP-2
TP-3
TP-4
TP-5
TP-6

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120-16

UNOFFICIAL SOILS INFORMATION

TEST PIT PERFORMED ON AUGUST 18, 2020
BY ALEXANDER F. PARKER (CERTIFIED SOIL EVALUATOR #1848)

TEST PIT: TP-20-1
0"-36" ^C: SANDY LOAM
36"-41" Apb: SANDY LOAM
41"-54" Bw: SANDY LOAM
54"-120" 2Cd: SANDY LOAM
E.S.H.G.W. @ 59"
NO WEEPING OBSERVED

UNOFFICIAL SOILS INFORMATION

TEST PITS WERE PERFORMED ON SEPTEMBER 11, 2017 BY
ANDREW P. RODRIGUEZ (CERTIFIED SOIL EVALUATOR #13890)

TEST PIT: TP-1 ELEV.=207.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-80" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 36"
E.S.H.G.W. ELEV.=204.5
NO WEEPING OBSERVED

EST PIT: TP-2 ELEV.=210.1
0"-7" AP: SANDY LOAM
7"-23" B: SANDY LOAM
23"-90" C: GRAVELY SANDY LOAM
E.S.H.G.W. @ 38"
E.S.H.G.W. ELEV.=206.9
NO WEEPING OBSERVED

TEST PIT: TP-3 ELEV.=209.5
0"-13" AP: SANDY LOAM
13"-24" B: SANDY LOAM
24"-52" C: SANDY LOAM
52"-92" C2: GRAVELY LOAMY SAND
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.8
NO WEEPING OBSERVED

TEST PIT: TP-4 ELEV.=209.5
0"-10" AP: SANDY LOAM
10"-26" B: SANDY LOAM
26"-74" C/D: SANDY LOAM GRAVELY
E.S.H.G.W. @ 29"
E.S.H.G.W. ELEV.=207.1
NO WEEPING OBSERVED

TEST PIT: TP-5 ELEV.=208.2
0"-22" HTM: SANDY LOAM
22"-42" C: SANDY LOAM GRAVEL
42"-86" C2: LOAMY SAND GRAVEL
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=201.2
NO WEEPING OBSERVED

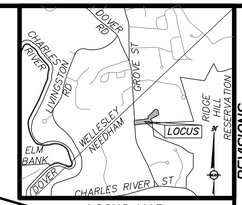
TEST PIT: TP-6 ELEV.=208.2
0"-62" FILL: TRASH, GLASS
62"-102" C: SANDY LOAM
E.S.H.G.W. NOT OBSERVED
E.S.H.G.W. ELEV.=199.7
NO WEEPING OBSERVED

LEGEND

- 209 — EXISTING CONTOUR
- 208 — PROPOSED CONTOUR
- PROPOSED CONCRETE CURB
- BUILDING SETBACK
- WETLAND BUFFER
- FILTERMITT/LIMIT OF WORK
- PROPOSED TREELINE
- TP-1 — TEST PIT
- EXISTING PROPERTY LINES
- WF — WETLAND FLAG
- VEGETATED WETLANDS
- PROPOSED ASPHALT ROADWAY
- PROPOSED PERMEABLE PAVERS
- PROPOSED DRIVEWAY APRON
- PROPOSED SUBSURFACE INFILTRATION SYSTEM
- R= RADIUS
- ROW RIGHT OF WAY
- TYP TYPICAL
- L= LENGTH
- GB GRADE BREAK
- PDMH PROPOSED DRAIN MANHOLE
- PCB PROPOSED CATCH BASIN
- PDCB PROPOSED DOUBLE CATCH BASIN
- HYD PROPOSED HYDRANT
- PSMH PROPOSED SEWER MANHOLE
- PROPOSED DECORATIVE LAMP POST
- PROPOSED WATER VALVE
- DBH 330 — TREE TO BE REMOVED
- DBH 330 — TREE TO BE PROTECTED AND TO REMAIN

N

MAP



LOCUS MAP:
(NOT TO SCALE)

PROPOSED PARCEL B
AREA= 91,374±SF

THIS SYSTEM WOULD REQUIRE SIGNIFICANT REGRADING IN ORDER TO ACCOMODATE THE REQUIRED SEPARATION FROM GROUNDWATER.

SHOW STREET SIGN? STOP SIGNS OR ANY OTHER SIGNAGE?

IS THIS A REMNANT FROM THE PREVIOUS SUBMISSION? PLANS SHOW A 50-FT ROW.

No.380
NOW OR FORMERLY
JOAN K. ALDEAN

FILTERMITT TO BE INSTALLED ONE (1) FOOT SOUTH OF THE NORTHERN PROPERTY LINE

EXISTING TREE TO REMAIN AND TO BE PROTECTED IN PLACE

PROPOSED 13' PARKWAY

EXISTING TREE TO REMAIN AND TO BE PROTECTED IN PLACE

PSMH-2

PROPOSED 40' WIDE ROW

PROPOSED PARCEL 'A'
AREA= 2,399± SF

PSMH-3

APPROXIMATE LOCATION OF INFILTRATION SYSTEM-3

WF#6A WF#5A WF#4A WF#3A WF#2A WF#1A

211x50

3,500±SF

FILTERMITT/LIMIT OF WORK

PROPOSED LOT 1
AREA= 146,467±SF
USEABLE
AREA=50,459± SF

100' WETLAND BUFFER

25' WIDE NATURAL GAS EASEMENT

BUILDING SETBACK (TYP.)

PSMH-1

PROPOSED CONSTRUCTION ENTRANCE (SEE DETAIL ON SHEET 9

R=20'

PDCB

PCB

WOU-2

1" CI

GROVE STREET
(PUBLIC - VARIABLE WIDTH)

PROPOSED LOT 1
AREA= 43,575±SF

3,500±SF

PROPOSED FILTERMITT/LIMIT OF WORK

BUILDING SETBACK (TYP.)

EXISTING TREELINE

210x50

SHOW PROPOSED BOUNDS? (TYP.)

10 ft

APPROXIMATE LOCATION OF INFILTRATION SYSTEM-2

FILTERMITT TO BE INSTALLED ONE (1) FOOT NORTH OF THE SOUTHERN PROPERTY LINE

LOCATION OF INFILTRATION SYSTEM-1

No.402
NOW OR FORMERLY
ROBERT P. &
KALLIOPE D. BADAVAS

SILT SACK WITH OVERFLOW TO BE INSTALLED IN BASIN (SEE DETAIL ON SHEET 10)

PROPOSED PARCEL 'B'
AREA= 7,308± SF

11 ft

PDMH-1

TOP OF STONE FOR CHAMBERS IS PROPOSED AT ELEVATION 200.3 PER THE DETAILS WITH THE MINIMUM FINISHED GRADE ABOVE THE CHAMBERS AT ELEVATION 201.33. THE GRADING APPEARS TO INDICATE THE TOP OF CHAMBERS IS SLIGHTLY HIGHER THAN ELEVATION 200, BUT NOT ABOVE ELEVATION 201. THE GRADING AND SIZE OF THE PARCEL "B" SHOULD BE REVIEWED TO CONFIRM THIS IS FEASIBLE AS DEPICTED.

ADDITIONALLY, BOTTOM OF STONE IS AT ELEVATION 198.0. THE APPLICANT SHOULD CONFIRM WE WILL NOT HAVE BREAKOUT.

NOTES

- SIDENCE A).
- NEEDHAM ASSESSOR'S MAP 221.
- ET FOR METES AND BOUNDS HT-OF-WAY.
- PPROXIMATE AND ARE BASED UPON A PARTIAL FIELD SURVEY AND COMPILATION OF PLANS OF RECORD. MERIDIAN ASSOCIATES, INC. DOES NOT WARRANTY NOR GUARANTEE THE LOCATION OF ALL UTILITIES DEPICTED OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO COMMENCEMENT OF CONSTRUCTION, SHALL VERIFY THE LOCATION OF ALL UTILITIES AND CONTACT DIG SAFE AT 1-888-344-7233.
5. THE SUBJECT PREMISES IS LOCATED IN THE FOLLOWING FLOOD ZONES PER FEMA FLOOD INSURANCE RATE MAP NUMBER 25021C0018E DATED JULY 17, 2012:
   - FLOOD ZONE X (UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN

POST CONSTRUCTION NOTES

1. STORMWATER MANAGEMENT POST CONSTRUCTION INSPECTION DOCUMENTS SHOULD INCLUDE A NOTE THAT IF EVIDENCE OF OVERFLOW INTO THE TOWN'S DRAINAGE SYSTEM HAS OCCURRED. INSPECTION DOCUMENTS SHOULD BE AVAILABLE FOR THE TOWN'S NPDES COORDINATOR TO RECEIVE COPIES UPON REQUEST.

TEMPORARY BENCHMARK CHART:

T.B.M.#	DESCRIPTION	ELEVATION
1	CATCH BASIN RIM	197.62

GRAPHIC SCALE
SCALE: 1"= 40

FEET 40 0 20 40 80 160
METERS 0 10 20 40 60

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL
NO. 49369
REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE — David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

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DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT
MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS
ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
02.07.20	REVISED PER TOWN COMMENTS	DSK
03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

PROPOSED SITE & GRADING PLAN
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

390 GROVE STREET

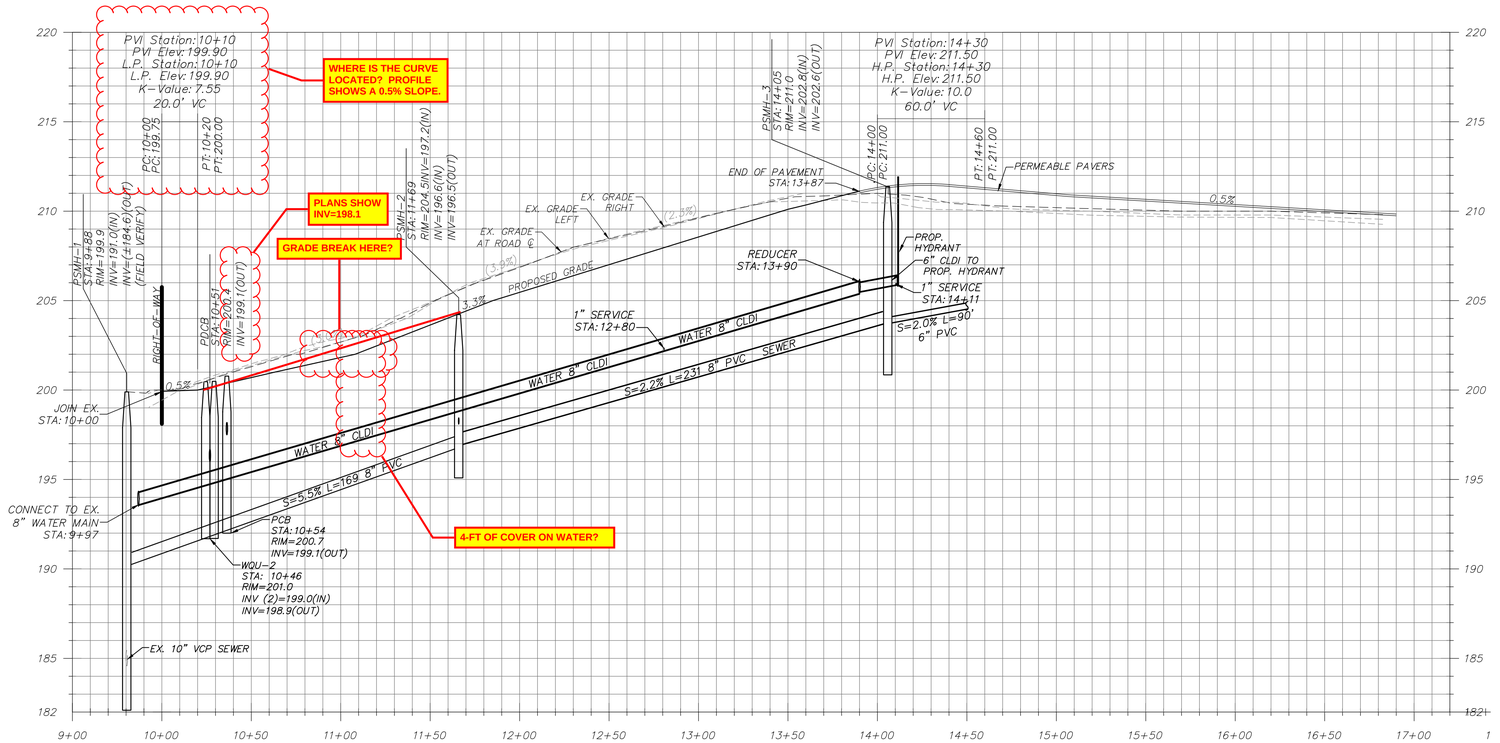
MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

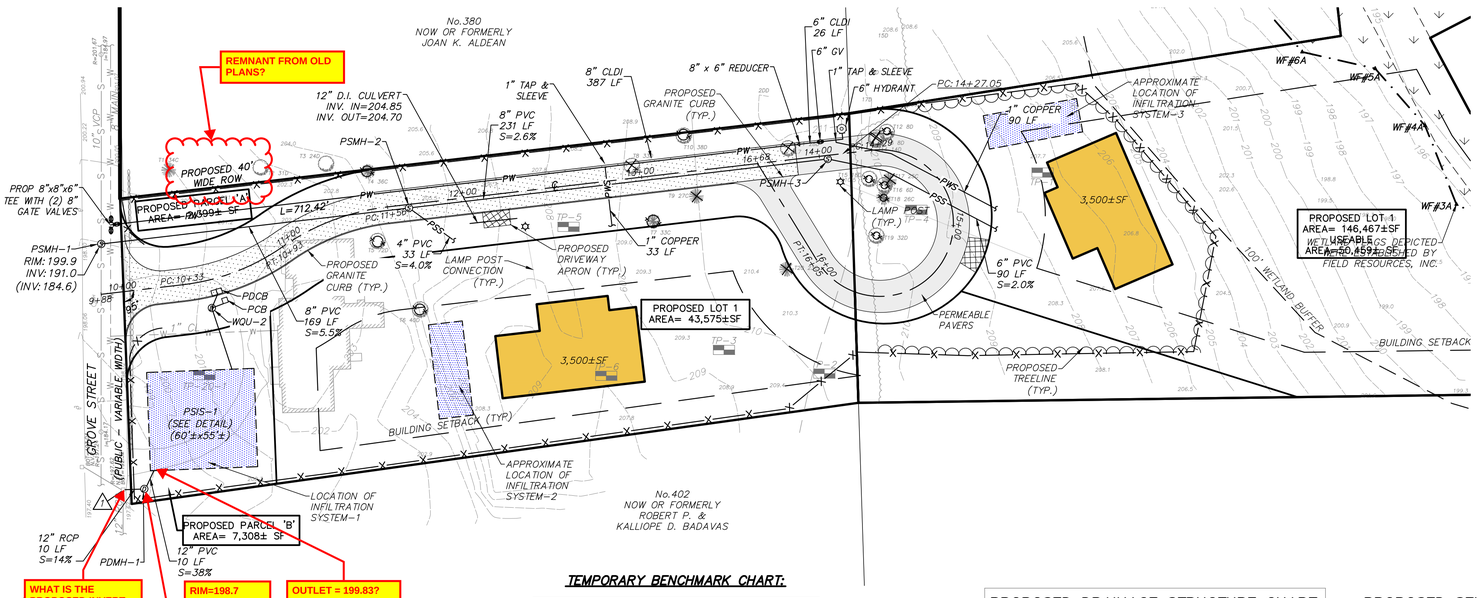
DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 5 OF 10
PROJECT No. 6036

6036-SITE

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NOTE: ALL PROPOSED SEWER SERVICES TO BUILDINGS SHALL BE 4" PVC (SDR 35) AND SHALL HAVE A MINIMUM SLOPE OF 2% FROM THE FOUNDATION TO THE SEWER MAIN.

NOTE: ALL PROPOSED ROOF DRAIN SHALL BE 6" PVC, SDR 35 UNLESS OTHERWISE NOTED.

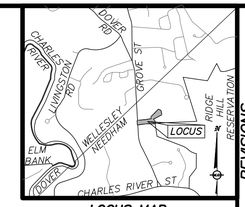
NOTE: ALL PROPOSED STORM DRAIN SHALL BE 12" RCP UNLESS OTHERWISE NOTED.

NOTE: ALL PROPOSED DOMESTIC WATER SERVICES TO BUILDINGS SHALL BE 1" COPPER, TYPE K.

NOTE: ALL UTILITY CONNECTION MADE WITHIN GROVE STREET SHALL MEET THE TOWN OF NEEDHAM STANDARDS AND REGULATIONS.

NOTE: CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES AND CONDITION AND ELEVATIONS PRIOR TO CONSTRUCTION. IF CONFLICTS ARE FOUND THE CONTRACTOR SHALL CONTACT THE DESIGN ENGINEER TO REVISE THE DESIGN.

NOTE: NO PORTION OF THIS SITE FALLS WITHIN THE 100 YEAR FLOOD PLAIN AS SHOWN ON PANEL 18 OF 430, THE NEEDHAM FLOOD INSURANCE RATE MAP #25021C0018E, DATED JULY 17, 2012.



LOCUS MAP:
(NOT TO SCALE)

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED CONCRETE CURB
- BUILDING SETBACK
- WETLAND BUFFER
- FILTERMITT/LIMIT OF WORK
- PROPOSED TREELINE
- TP-1 TEST PIT
- EXISTING PROPERTY LINES
- WF WETLAND FLAG
- VEGETATED WETLANDS
- PROPOSED ASPHALT ROADWAY
- PROPOSED PERMEABLE PAVERS
- PROPOSED DRIVEWAY APRON
- PROPOSED SUBSURFACE INFILTRATION SYSTEM
- R= RADIUS
- ROW RIGHT OF WAY
- TYP TYPICAL
- L= LENGTH
- GB GRADE BREAK
- PDMH PROPOSED DRAIN MANHOLE
- PCB PROPOSED CATCH BASIN
- PDCB PROPOSED DOUBLE CATCH BASIN
- HYD PROPOSED HYDRANT
- PSMH PROPOSED SEWER MANHOLE
- PROPOSED DECORATIVE LAMP POST
- PROPOSED WATER VALVE
- TREE TO BE REMOVED
- TREE TO BE PROTECTED AND TO REMAIN

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
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508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

PROPOSED UTILITIES & PROFILE
LOCATED IN
390 GROVE STREET
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 4500
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
6 VALLEY STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
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WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 6 OF 10
PROJECT No. 6036

TEMPORARY BENCHMARK CHART:

T.B.M.#	DESCRIPTION	ELEVATION
1	CATCH BASIN RIM	197.62

GRAPHIC SCALE
SCALE: 1"= 40

FEET 40 0 20 40 80 160
METERS 0 10 20 40 60

PROPOSED DRAINAGE STRUCTURE CHART

STRUCTURE	RIM ELEV.	INVERT(S)	PIPE
PDMH-1	198.7	196.0 (IN)	12" PVC
		195.9 (OUT)	12" RCP
WQU-2	201.0	198.1 (IN)	12" DIP
		198.0 (OUT)	12" DIP
PCDB	200.4	198.1	12" DIP
PCB	200.7	198.1	12" DIP

PROPOSED SEWER STRUCTURE CHART

STRUCTURE	RIM ELEV.	INVERT(S)	PIPE
PSMH-1	199.9	191.0 (IN)	8" PVC
		(±184.6) (OUT)	10" VCP
PSMH-2	204.5	197.2 (IN)	8" PVC
		196.6 (IN)	4" PVC
		196.5 (OUT)	8" PVC
PSMH-3	211.0	202.8 (IN)	4" PVC
		202.6 (OUT)	8" PVC

1. ALL UNDE... ARE BASED UPON A PARTIAL ...ANS OF RECORD. MERIDIAN A... ...Y NOR GUARANTEE THE LOC... ...OR NOT DEPICTED. THE CONTRACTOR, PRIOR TO ... CONSTRUCTION, SHALL VERIFY THE LOCATION OF ... CONTACT DIG SAFE AT 1-888-344-7233.
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COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL
NO. 49369
REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE — David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

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BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036-SITE

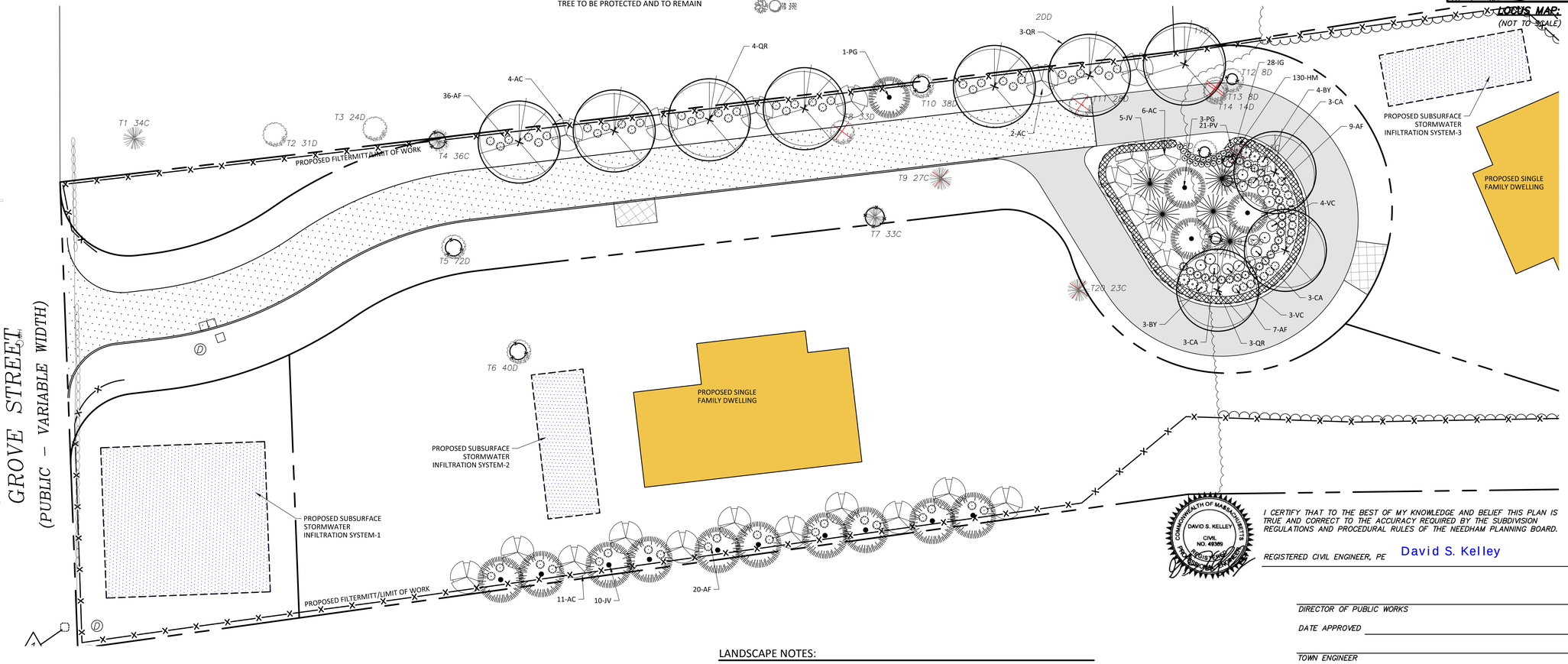
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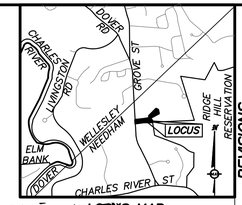
PROPOSED LEGEND

SHRUBS, PERENNIALS & GROUNDCOVERS

EVERGREEN, SHADE & ORNAMENTAL TREES

TREE TO BE REMOVED
TREE TO BE PROTECTED AND TO REMAIN





LOCUS MAP:
(NOT TO SCALE)

PLANT SCHEDULE

QTY	SYM	SCIENTIFIC NAME	COMMON NAME	SIZE	NOTES
TREES					
23	AC	Amelanchier Canadensis	Shadblow Serviceberry	6'-8' Ht. | B&B	BR | N | ST | White | Birds | Showy | Edible Fruit | Fall Color | April-May
15	JV	Juniperus virginiana	Eastern Red Cedar	10'-12' Ht. | B&B	DR | DT | N | ST | Blueish/Black Fruit | Wildlife | Evergreen
4	PG	Picea glauca	White Spruce	7'-8' Ht. | B&B	DR | N | Birds/Small Mammals | Evergreen | Winter Interest
10	QR	Quercus rubra	Red Oak	3"-3.5" Cal. | B&B	DR | DT | N | ST | Yellowish/Green | Fall interest | May
SHRUBS					
9	CA	Clethra alnifolia	Summersweet	24"-30" Ht. | #3 Pot	N | ST | 48" OC | White | Butterflies | Showy | Fragrant | Heavy Shade | July-August
7	BY	Cornus sericea 'Bud's Yellow'	Bud's Yellow Redosier Dogwood	24"-30" Ht. | #3 Pot	DR | N | ST | 48" OC | Yellow/White | Birds/Butterflies | Fall/Winter Interest | May-June
72	AF	Cornus sericea 'Farrow Artic Fire'	Artic Fire Redosier Dogwood	24"-30" Ht. | #3 Pot	DT | N | ST | 36" OC | White | Birds/Butterflies | Fall/Winter Interest | May-June
28	IG	Ilex glabra 'Shamrock'	Shamrock inkberry	24"-30" Ht. | B&B	DR | DT | N | ST | 36" OC | Greenish-White | Birds | Evergreen | May-June
7	VC	Vaccinium corymbosum 'Bluecrop'	Bluecrop Blueberry	24"-30" Ht. | #5 Pot	DT | N | 48" OC | White | Showy | Edible Fruit | Wildlife | Fall Color | May
ORNAMENTAL GRASSES					
21	PV	Panicum virgatum 'Heavy Metal'	Heavy Metal Switchgrass	#3 Pot	DR | DT | N | ST | 24" OC | Pink-Tinged |Winter Interest | July-February
PERENNIALS & GROUNDCOVER					
130	HM	Hemerocallis 'Apricot Sparkles'	Apricot Sparkles Daylily	#1 Pot	DR | DT | ST | 24" OC | Apricot | Butterflies | Showy | May-October

ABBREVIATIONS:
B&B: BALL AND BURLAP
CAL: CALIPER
DR: DEER RESISTANT
DT: DROUGHT TOLERANT
N: NATIVE
OC: ON CENTER
ST: SALT TOLERANT

LANDSCAPE NOTES:

1. REFER TO LANDSCAPE DETAILS FOR LANDSCAPE DETAILS.
2. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY AmericanHort 2014 AND AS AMENDED.
3. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL ACCEPTANCE.
4. VERIFY LOCATIONS OF ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND REPORT ANY CONFLICTS TO THE OWNER OR OWNER'S REPRESENTATIVE.
5. PROVIDE TREES, SHRUBS, AND GROUNDCOVERS AS SHOWN AND SPECIFIED. THE WORK INCLUDES: SOIL PREPARATION, INSTALLATION OF TREES, SHRUBS AND GROUNDCOVERS, PLANTING MIXES, MULCH AND PLANTING ACCESSORIES, WARRANTY, WATERING AND MAINTENANCE DURING CONSTRUCTION AND WARRANTY PERIODS.
6. BALLED AND BURLAPPED PLANTS MAY BE PLANTED IN THE SPRING FROM APRIL 1ST UNTIL JUNE 15TH AND IN THE FALL FROM AUGUST 15TH TO NOVEMBER 1ST.
7. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT OF PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
8. ALL SHADE TREES ALONG SIDEWALKS SHALL HAVE A MINIMUM SIX (6) FOOT BRANCHING HEIGHT.
9. PLANT MATERIALS DEPICTED IN ROWS SHALL CONTAIN MATCHING PLANT SPECIMENS SPACED EQUALLY ALONG INDICATED AREA.
10. ALL PLANT MATERIALS AND LAWN AREAS TO BE MAINTAINED BY LANDSCAPE CONTRACTOR UNTIL FINAL WRITTEN ACCEPTANCE PROVIDED TO CONTRACTOR BY OWNER OR OWNER'S REPRESENTATIVE.
11. ALL PLANT MATERIALS TO REMAIN ALIVE AND BE IN HEALTHY, VIGOROUS CONDITION AND SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL WRITTEN ACCEPTANCE FROM THE OWNER OR OWNER'S REPRESENTATIVE.
12. ALL PLANT MATERIALS ARE INTENDED TO BE DROUGHT TOLERANT ONCE ESTABLISHED. NO IRRIGATION SYSTEM IS PROPOSED.
13. LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE INDICATED ON PLAN. LOAM WITH TOPSOIL SPREAD TO A MINIMUM DEPTH OF (6) SIX INCHES.
14. SEED OR PROVIDE SOD FOR ALL TURFGRASS LAWN AREAS WITH A DROUGHT TOLERANT TURFGRASS SEED MIX (80% TALL FESCUE, 10% PERENNIAL RYEGRASS, 10% KENTUCKY BLUEGRASS).
15. PERENNIALS, BULBS AND ANNUALS ARE TO BE PLANTED IN A WELL PREPARED BED WHICH SHALL INCLUDE PEAT AND SLOW RELEASE FERTILIZER. BEDS SHALL BE SKIMMED WITH ONE AND ONE-HALF (1-1/2) INCH TO TWO (2) INCH MULCH (INCLUDING GROUNDCOVERS).

SCALE: 1" = 20'

20' 10' 0 20' 40' 60'

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

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TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

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RECORD OWNERS

ELISABETH SCHMIDT–SCHEUBER
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6036–LAND

REVISIONS		
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NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

PROPOSED LANDSCAPE PLAN

LOCATED IN

NEEDHAM, MASSACHUSETTS

(NORFOLK COUNTY)

PREPARED FOR

MORITZ SCHMIDT

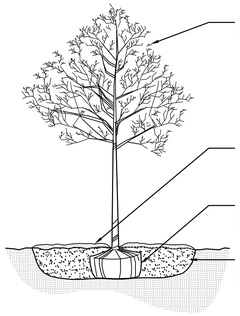
390 GROVE STREET

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WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=20'
SHEET No. 7 OF 10
PROJECT No. 6036

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NOTES:

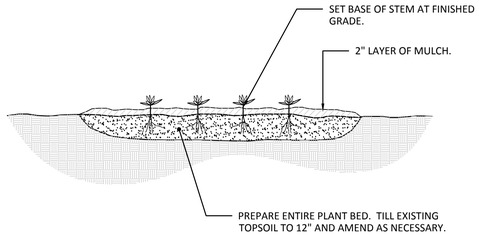
BACKFILL PLANTING HOLE WITH EXISTING SOIL AMENDED AS NECESSARY.

BACKFILL HALF THE SOIL AND WATER TO SETTLE OUT AIR POCKETS, COMPLETE BACKFILLING AND REPEAT WATERING.

IF ROOTS ARE CIRCLING THE ROOTBALL EXTERIOR, CUT ROOTS VERTICALLY IN SEVERAL PLACES PRIOR TO PLANTING.

ONLY STAKE TREES SITUATED ON WINDY SITES OR EXPOSED TO SUBSTANTIAL PEDESTRIAN TRAFFIC.

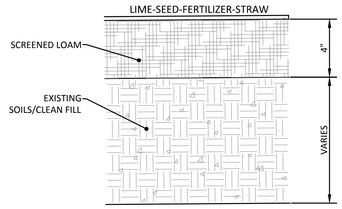
TREE PLANTING
NOT TO SCALE



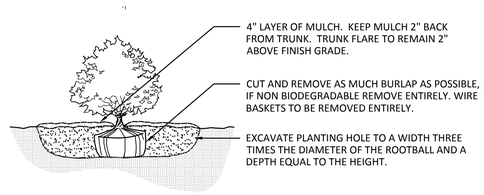
NOTE:

SPACE PLANTS EQUALLY TO PROVIDE CONSISTANT COVER OVER INDICATED PLANTING BED.

GROUNDCOVER PLANTING
(NOT TO SCALE)



TYPICAL LOAM & SEED CROSS - SECTION
NOT TO SCALE



NOTES:

BACKFILL PLANTING HOLE WITH EXISTING SOIL AMENDED AS NECESSARY.

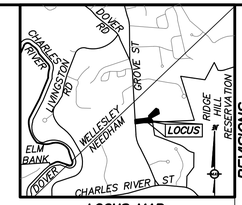
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IF ROOTS ARE CIRCLING THE ROOTBALL EXTERIOR, CUT ROOTS VERTICALLY IN SEVERAL PLACES PRIOR TO PLANTING.

SHRUB PLANTING
(NOT TO SCALE)

LANDSCAPE NOTES:

1. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY AmericanHort 2014 AND AS AMENDED.
2. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL ACCEPTANCE.
3. VERIFY LOCATIONS OF ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND REPORT ANY CONFLICTS TO THE OWNER OR OWNER'S REPRESENTATIVE.
4. PROVIDE TREES, SHRUBS, AND GROUNDCOVERS AS SHOWN AND SPECIFIED. THE WORK INCLUDES: SOIL PREPARATION, INSTALLATION OF TREES, SHRUBS AND GROUNDCOVERS, PLANTING MIXES, MULCH AND PLANTING ACCESSORIES, WARRANTY, WATERING AND MAINTENANCE DURING CONSTRUCTION AND WARRANTY PERIODS.
5. BALLED AND BURLAPPED PLANTS MAY BE PLANTED IN THE SPRING FROM APRIL 1ST UNTIL JUNE 15TH AND IN THE FALL FROM AUGUST 15TH TO NOVEMBER 1ST.
6. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT 0F PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
7. ALL SHADE TREES ALONG SIDEWALKS SHALL HAVE A MINIMUM SIX (6) FOOT BRANCHING HEIGHT.
8. PLANT MATERIALS DEPICTED IN ROWS SHALL CONTAIN MATCHING PLANT SPECIMENS SPACED EQUALLY ALONG INDICATED AREA.
9. ALL PLANT MATERIALS AND LAWN AREAS TO BE MAINTAINED BY LANDSCAPE CONTRACTOR UNTIL FINAL WRITTEN ACCEPTANCE PROVIDED TO CONTRACTOR BY OWNER OR OWNER'S REPRESENTATIVE.
10. ALL PLANT MATERIALS TO REMAIN ALIVE AND BE IN HEALTHY, VIGOROUS CONDITION AND SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL WRITTEN ACCEPTANCE FROM THE OWNER OR OWNER'S REPRESENTATIVE.
11. ALL PLANT MATERIALS ARE INTENDED TO BE DROUGHT TOLERANT ONCE ESTABLISHED. NO IRRIGATION SYSTEM IS PROPOSED.
12. LOAM AND SEED ALL DISTURBED AREAS UNLESS OTHERWISE INDICATED ON PLAN. LOAM WITH TOPSOIL SPREAD TO A MINIMUM DEPTH OF (6) SIX INCHES.
13. SEED OR PROVIDE SOD FOR ALL TURFGRASS LAWN AREAS WITH A DROUGHT TOLERANT TURFGRASS SEED MIX (80% TALL FESCUE, 10% PERENNIAL RYEGRASS, 10% KENTUCKY BLUEGRASS).
14. PERENNIALS, BULBS AND ANNUALS ARE TO BE PLANTED IN A WELL PREPARED BED WHICH SHALL INCLUDE PEAT AND SLOW RELEASE FERTILIZER. BEDS SHALL BE SKIMMED WITH ONE AND ONE-HALF (1-1/2) INCH TO TWO (2) INCH MULCH (INCLUDING GROUNDCOVERS).



LOCUS MAP:
(NOT TO SCALE)

REVISIONS

11.2.18	REVISED PER TOWN COMMENTS	CG
07.12.19	REVISED PER TOWN COMMENTS	CG
8.22.19	REVISED PER TOWN COMMENTS	CM
9.04.19	REVISED PER TOWN COMMENTS	DSK
02.07.20	REVISED PER TOWN COMMENTS	DSK
03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

COMMONWEALTH OF MASSACHUSETTS — DAVID S. KELLEY — CIVIL NO. 49369 — REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

I, TOWN CLERK OF THE TOWN OF NEEDHAM, HEREBY CERTIFY THAT THE NOTICE OF THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81–U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT–SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

6036–LAND

390 GROVE STREET

PROPOSED LANDSCAPE DETAILS
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

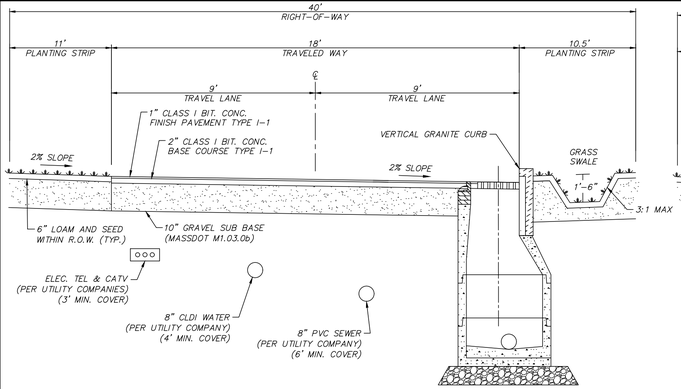
SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA
508 832 4332
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 299-0447
69 MILK STREET, SUITE 202
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

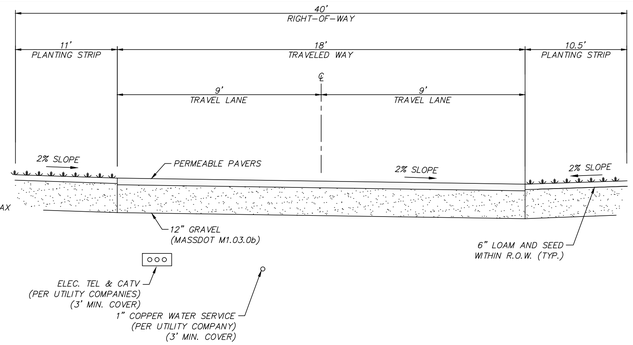
DATE: JULY 20, 2018
SCALE: AS NOTED
SHEET No. 8 OF 10
PROJECT No. 6036

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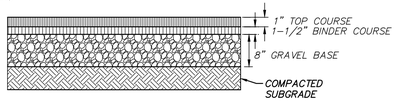
TYPICAL ROAD CROSS SECTION

(NOT TO SCALE)



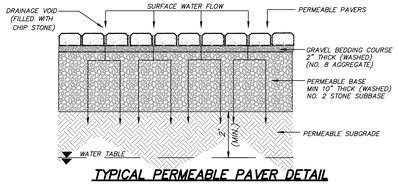
PERMEABLE PAVERS CROSS SECTION

(NOT TO SCALE)



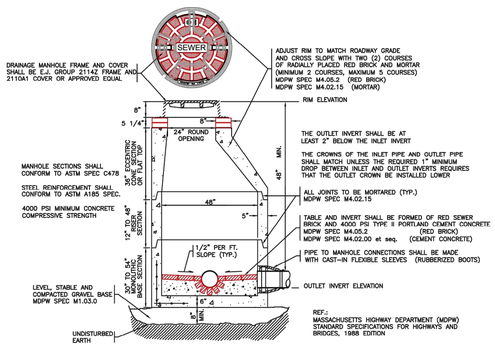
BITUMINOUS CONCRETE PAVEMENT SECTION

(NOT TO SCALE)



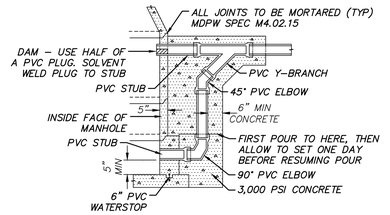
TYPICAL PERMEABLE PAVER DETAIL

(NOT TO SCALE)



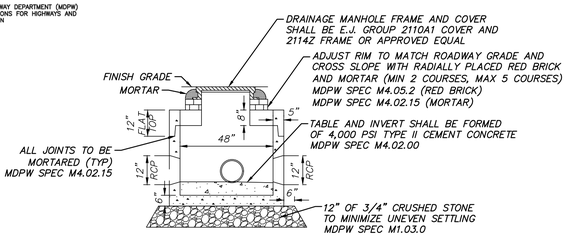
TYPICAL SEWER MANHOLE DETAIL

(NOT TO SCALE)



DROP CONNECTION DETAIL

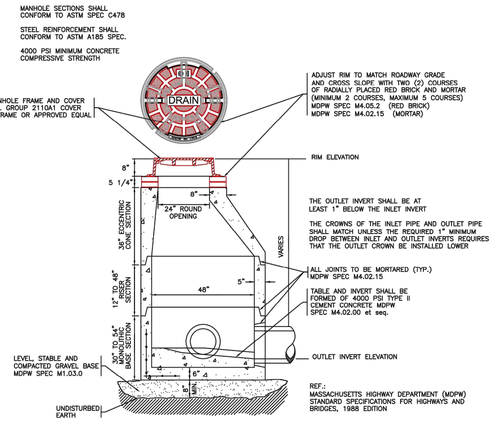
(NOT TO SCALE)



NOTES:
1. MANHOLE DESIGN TO LATEST TOWN OF NEEDHAM STANDARDS AND ASTM C478.
2. REINFORCING STEEL CONFORMS TO LATEST ASTM A185.
3. CONCRETE COMPRESSIVE STRENGTH – 4,000 PSI @ 28 DAYS.
4. ONE POUR MONOLITHIC BASE.
5. WHEN SPECIFIED, MANHOLES WATERPROOF COATED.
6. STEPS – STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTICS (PS2-PFSL M.A. INDUSTRIES, INC.) CONFORMS TO LATEST ASTM C478 PARA-12.
7. REFERENCE: LATEST MASSACHUSETTS HIGHWAY DEPARTMENT (MDPW) STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

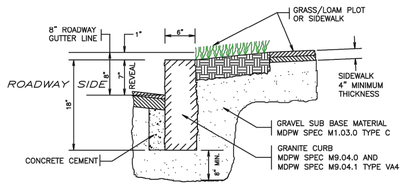
FLAT TOP DRAIN MANHOLE DETAIL

(NOT TO SCALE)



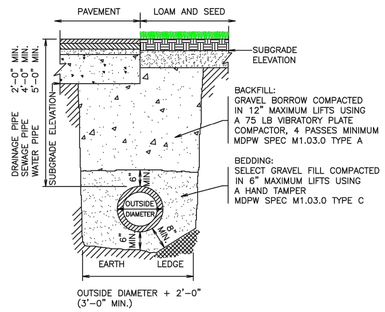
TYPICAL DRAINAGE MANHOLE DETAIL

(NOT TO SCALE)



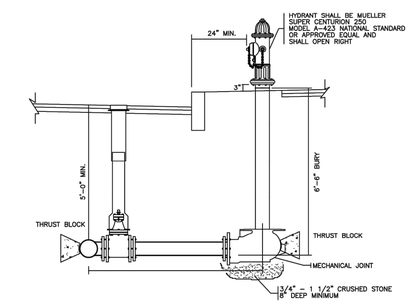
TYPICAL GRANITE CURB DETAIL

(NOT TO SCALE)



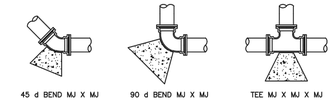
TYPICAL TRENCH DETAIL

(NOT TO SCALE)



TYPICAL FIRE HYDRANT DETAIL

(NOT TO SCALE)



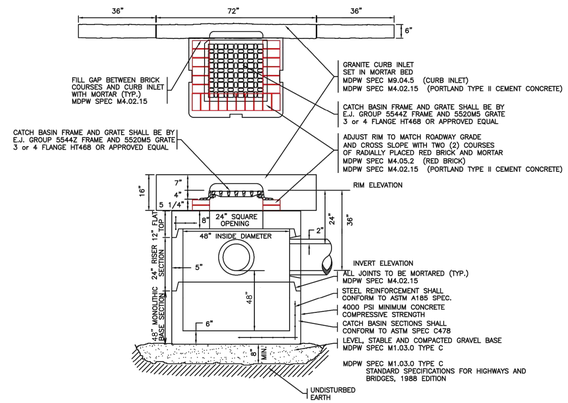
PIPE SIZE	MINIMUM SURFACE AREA (S.F.) OF CONCRETE AGAINST UNDISTURBED EARTH				
	11 1/4 d	22 1/2 d	45 d	90 d	TEE
6"	0.7	1.0	2.0	3.0	2.5
8"	1.0	1.5	3.0	3.5	3.0
10"	2.0	2.5	5.0	7.0	6.0
12"	3.0	3.5	7.0	10.0	9.0

NOTE: PIPE FITTINGS SHALL BE AS MANUFACTURED BY U.S. PIPE SPEC. U501, U503, U505, U507, U509 OR APPROVED EQUAL

CONCRETE SHALL BE 3000 PSI PORTLAND TYPE II CEMENT CONCRETE MEETING MDPW SPEC M4.02.00 et seq. AND SHALL BE PLACED SO AS TO NOT INTERFERE WITH THE JOINTS OF THE FITTING

TYPICAL THRUST BLOCK DETAIL

(NOT TO SCALE)



TYPICAL 24" CATCH BASIN DETAIL

(NOT TO SCALE)

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL NO. 49369
REGISTERED PROFESSIONAL ENGINEER

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

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BY:

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APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
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RECORD OWNERS

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REVISIONS

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03.02.20	REVISED PER TOWN COMMENTS	DSK
11.24.20	REVISED PER TOWN COMMENTS	DSK

SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
P.O. BOX 324
AUBURN, MA.
508 832 4532
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
fieldresources@hotmail.com

SITE DETAILS 1
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
MORITZ SCHMIDT

390 GROVE STREET

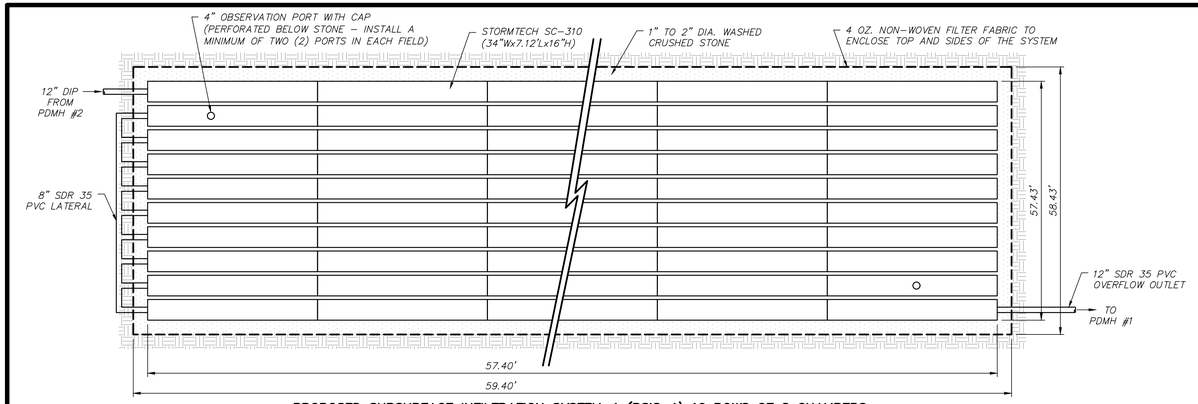
MERIDIAN ASSOCIATES
500 CUMMINGS CENTER, SUITE 5950
BEVERLY, MASSACHUSETTS 01915
TELEPHONE: (978) 922-8031
69 MILK STREET, SUITE 302
WESTBOROUGH, MASSACHUSETTS 01581
TELEPHONE: (508) 871-7030
WWW.MERIDIANASSOC.COM

DESIGNED BY: C. McCANN
CHECKED BY: M. NOVAK

DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 9 OF 10
PROJECT No. 6036

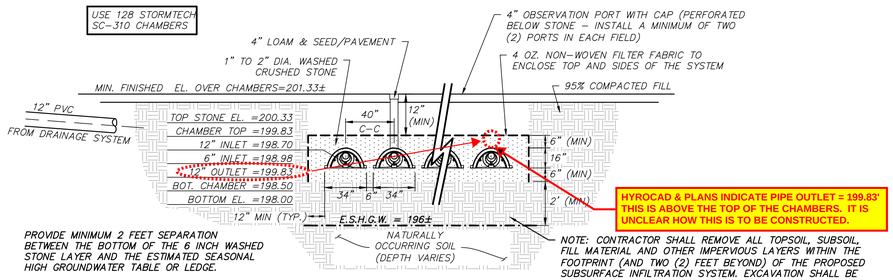
6036-DET

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PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) 16 ROWS OF 8 CHAMBERS

PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) – PLAN VIEW
(NOT TO SCALE)



HYROCAD & PLANS INDICATE PIPE OUTLET = 199.83' THIS IS ABOVE THE TOP OF THE CHAMBERS. IT IS UNCLEAR HOW THIS IS TO BE CONSTRUCTED.

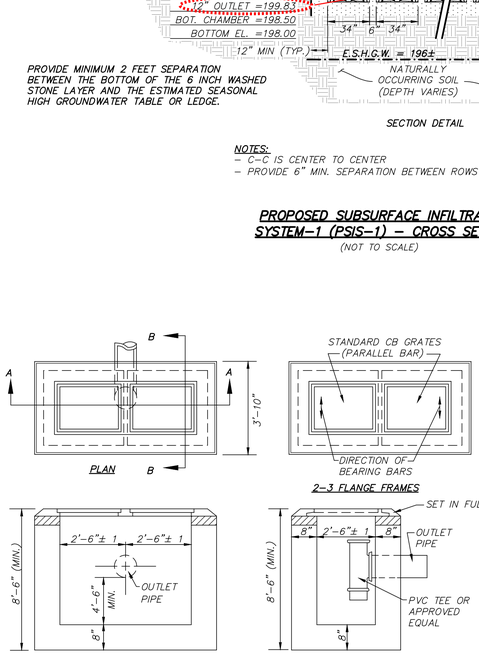
PROVIDE MINIMUM 2 FEET SEPARATION BETWEEN THE BOTTOM OF THE 6 INCH WASHED STONE LAYER AND THE ESTIMATED SEASONAL HIGH GROUNDWATER TABLE OR LEDGE.

NOTE: CONTRACTOR SHALL REMOVE ALL TOPSOIL, SUBSOIL, FILL MATERIAL AND OTHER IMPERVIOUS LAYERS WITHIN THE FOOTPRINT (AND TWO (2) FEET BEYOND) OF THE PROPOSED SUBSURFACE INFILTRATION SYSTEM. EXCAVATION SHALL BE FILLED WITH MATERIAL SPECIFIED IN SECTION 15.255 (3) OF THE STATE ENVIRONMENTAL CODE, TITLE 5 UP TO THE PROPOSED ELEVATION OF THE WASHED STONE.

SECTION DETAIL

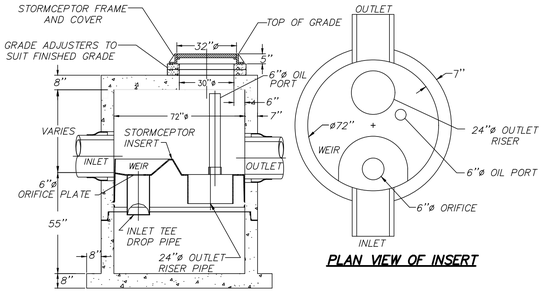
NOTES:
– C-C IS CENTER TO CENTER
– PROVIDE 6" MIN. SEPARATION BETWEEN ROWS OF CHAMBERS

PROPOSED SUBSURFACE INFILTRATION SYSTEM-1 (PSIS-1) – CROSS SECTION
(NOT TO SCALE)



SPECIFICATIONS:
CONCRETE STRENGTH
4000 P.S.I. AT 28 DAYS
REINFORCING STEEL CONFORMS TO ASTM A185-79
MANHOLE DESIGN SPECIFICATIONS
CONFORM TO ASTM C 487-84
ONE POUR MONOLITHIC BASE
ADJUST GRADE WITH
COURSES OF BRICK
NOMINAL CONCRETE BLOCK SIZE:
HEIGHT, 4" TO 8"
WIDTH, 8"
LENGTH, 8" TO 16"

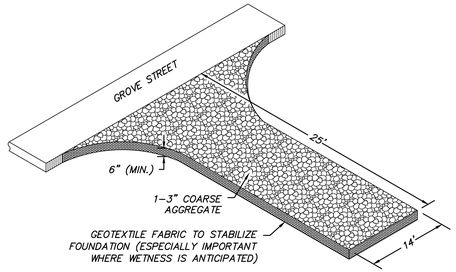
DOUBLE CATCH BASIN
(NOT TO SCALE)



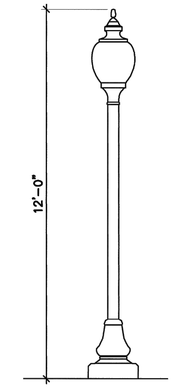
NOTE:

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 24"ø OUTLET RISER PIPE AND THE 6"ø OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.

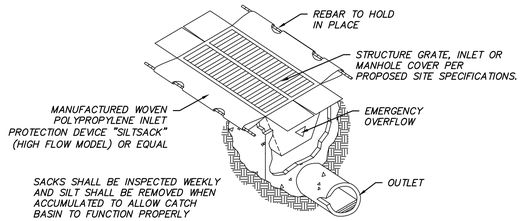
WATER QUAITY UNIT
STC 900 Precast Concrete Stormceptor (900 US Gallon Capacity)
(NOT TO SCALE)



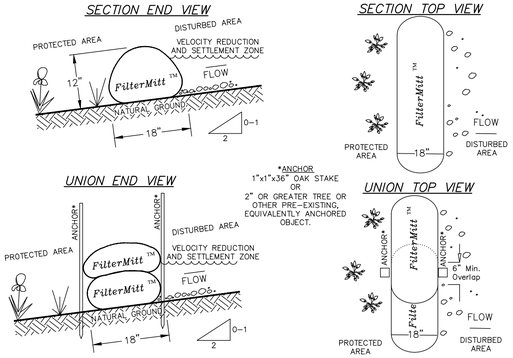
CONSTRUCTION TRACKING ENTRANCE/EXIT PAD
(NOT TO SCALE)



TYPICAL LIGHT POST DETAIL
(NOT TO SCALE)



SILTSACK DETAIL
(NOT TO SCALE)



FilterMitt™ COMPONENTS:
OUTSIDE CASING: 100% ORGANIC HESSIAN

FILLER INGREDIENT: *FiberRoot Mulch™*
- A BLEND OF COARSE AND FINE COMPOST AND SHREDDED WOOD.
- PARTICLE SIZES: 100% PASSING A 3" SCREEN; 90–100% PASSING A 1" SCREEN; 70–100% PASSING A 0.75" SCREEN; 30–75% PASSING A 0.25" SCREEN.
- WEIGHT: APPROX. 850 LBS./CU.YD. (AVE. 30 LBS./L.F.)

For more information visit:
www.groundscapesexpress.com
or contact us at:
Groundscapes Express, Inc.
P.O. Box 737
Wrentham, MA 02093
(508) 384-7140

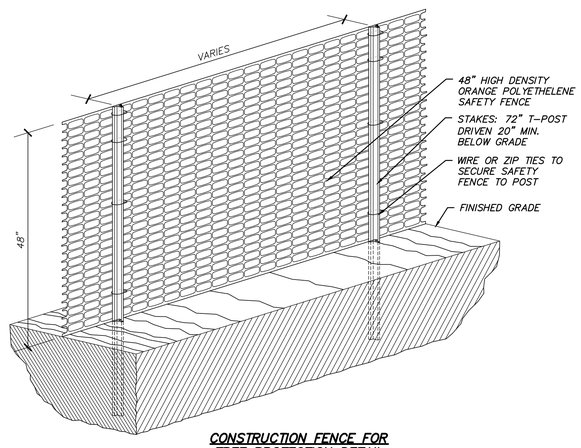
FilterMitt™ INSTALLATION:
WITH THE NEWEST TECHNOLOGY AND EQUIPMENT, SECTIONS CAN BE CONSTRUCTED ON SITE IN LENGTHS FROM 1' TO 100'.

SECTIONS CAN ALSO BE DELIVERED TO THE SITE IN LENGTHS FROM 1' TO 8'.

THE FLEXIBILITY OF *FilterMitt™* ALLOWS IT TO CONFORM TO ANY CONTOUR OR TERRAIN WHILE HOLDING A SLIGHTLY OVAL SHAPE AT 12" HIGH BY 18" WIDE.

WHERE SECTION ENDS MEET, THERE SHALL BE AN OVERLAP OF 6" OR GREATER. BOTH SIDES SHALL BE ANCHORED (OAK STAKES, TREES, ETC.) TO STABILIZE THE UNION.

FILTERMITT DETAIL
(NOT TO SCALE)



CONSTRUCTION FENCE FOR TREE PROTECTION DETAIL
(NOT TO SCALE)

NOTE:

1. *EXISTING TREES TO BE SAVED SHALL BE PROTECTED WITH ORANGE CONSTRUCTION FENCE (OFF-SET FROM THE TREE TRUNK BY PROFESSIONAL STANDARD BASED ON CANOPY) AND BURLAP AND STRAP BOARD TRUNK WRAP METHOD.*

COMMONWEALTH OF MASSACHUSETTS
DAVID S. KELLEY
CIVIL
NO. 49389
REGISTERED PROFESSIONAL ENGINEER

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THIS PLAN IS TRUE AND CORRECT TO THE ACCURACY REQUIRED BY THE SUBDIVISION REGULATIONS AND PROCEDURAL RULES OF THE NEEDHAM PLANNING BOARD.

REGISTERED CIVIL ENGINEER, PE David S. Kelley

DIRECTOR OF PUBLIC WORKS

DATE APPROVED

TOWN ENGINEER

DATE APPROVED

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DATE TOWN CLERK

APPROVAL IN ACCORDANCE WITH SECTION 81-U OF CHAPTER 41 OF THE GENERAL LAWS AS AMENDED.

TOWN OF NEEDHAM PLANNING BOARD

BY:

APPROVED:

APPLICANT

MORITZ SCHMIDT
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

RECORD OWNERS

ELISABETH SCHMIDT-SCHEUBER
390 GROVE STREET
NEEDHAM, MASSACHUSETTS 02492

REVISIONS

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SURVEY INFORMATION PROVIDED BY:
Field Resources, Inc.
LAND SURVEYORS
281 CHESTNUT ST.
NEEDHAM, MA.
781 444 5936
P.O. BOX 324
AUBURN, MA.
508 832 4532
fieldresources@hotmail.com

390 GROVE STREET
SITE DETAILS 2
LOCATED IN
NEEDHAM, MASSACHUSETTS
(NORFOLK COUNTY)
PREPARED FOR
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DATE: JULY 20, 2018
SCALE: 1"=40'
SHEET No. 10 OF 10
PROJECT No. 6036

6036-DET

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To: Lee Newman
Director of Community Planning and Development
Town of Needham, MA

Date: November 25, 2020

Project #: 14631.00

From: Sean Manning, PE, PTOE
Ryan White, PE
Samantha Lathrop

Re: Response to Traffic Peer Review – Boston Children's Hospital – Needham, MA dated November 10, 2020

Overview

Boston Children's Hospital has been working with the Town of Needham for over a year to facilitate the development of a 224,000 square-foot pediatric medical facility at 380 First Avenue (the "Project"). As a result of these collaborative efforts, the Town unanimously voted at its annual Town Meeting on June 8, 2020, to amend the New England Business Center zoning district to allow the Project, which is located at Center 128 West within the Founders Park development.

Transportation and other potential development impacts have been extensively reviewed in connection with the previous approval process for Center 128 West (and Founders Park generally). Boston Children's Hospital proposes to change only the use of the previously proposed office building at 380 First Avenue to pediatric medical facility and to reallocate 34,491 square feet from the approved 37 A Street office building to the proposed 380 First Avenue building. The overall gross square footage of Center 128 West and Founders Park will not change, nor will the number of parking spaces. Accordingly, the Transportation Impact Access Study (TIAS) was commissioned to determine whether any increased transportation impacts would result from this change of use and reallocation of square footage.

The purpose of this memorandum is to provide responses to questions and comments raised by the Town of Needham through their selected Transportation Peer Reviewer (BETA) regarding the Project. A TIAS was prepared by VHB and submitted to the Town on October 7, 2020. BETA's Peer Review, including questions and comments, are delineated in a detailed memorandum to the Town of Needham dated November 10, 2020 (and attached for reference). BETA has delineated and numbered specific questions and comments where they seek a response and/or supplemental information. The following sections reiterate those questions and comments, followed by applicant responses. Where necessary and applicable, revisions to the TIAS have been made and are provided in **Attachment A**.

1. Volume data was collected at seven intersections. Four of the intersection volumes were provided on the volume figures in the TIAS and analyzed. Explain why the remaining three intersection volumes, two of which are at site driveways, were not included on the future volume diagrams to show an understanding of the future activity at the proposed driveways.

   Applicant Response: Note that the purpose of the TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 1st Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and

Memorandum

approved previously. Those previously reviewed and approved filings focused primarily on those four identified gateway intersections to Founders Park. The study area for this TIA simply looks to be consistent with those previously-reviewed and approved efforts supporting the current Special Permit, MEPA Certificate, and Section 61 Findings. The counts collected at the other identified internal driveway locations were commissioned solely for the purposes of assessing and delineating actual trip generation for Founders Park only.

2. It is typical and recommended to collect ATR data for a longer period to accommodate the potential fluctuations in day to day traffic volumes to determine average daily volumes. Explain why 48-hour data was not collected.

Applicant Response: ATR data were collected for 24-hours specifically for the purposes of comparing actual trip generation to estimated trip generation. All of these count data were compared back to the TMC and ATR data collected by MassDOT and their consultant (McMahon) in connection with post-construction counts collected and compiled for the Route 128 Add-A-Lane Project – including new interchange ramps and roadway improvements along both Highland Avenue and Kendrick Street. We are confident that count information is consistent with that effort and accurately reflects recent, typical traffic conditions (pre-Covid-19 Pandemic).

3. Speed data was not collected via the ATR's. Explain why speed data was not included with the ATR data collection, particularly on Kendrick Street where travelling speeds are significant, as is standard practice for a TIAS.

Applicant Response: Collection and inclusion of detailed speed data is not generally provided in a typical TIA – unless specifically requested. As noted above, the primary purpose of TIAS was to determine whether a change in use from Office to Pediatric Medical Facility would yield increased traffic impact versus that previously studied and approved in the 2015 SDEIR, and reflected in the current Special Permit, MEPA Certificate, and Section 61 Finding.

DRAFT

Memorandum

4. Volume data was collected at 16 ATR locations and the raw data was provided in the Appendix. However, the data was not provided or summarized in the study itself. A summary of the ATR data is not only a standard part of the TIAS but would be helpful to understand the existing traffic volumes and patterns throughout the study area. In addition, it would provide a baseline for the post occupancy monitoring.

Applicant Response: Again, the purpose of the ATR data was to compare actual trip generation for Founders Park versus with the trip generation estimates quantified in the 2015 SDEIR. The ATR data is summarized at a high level in the TIAS. However, as requested, a more detailed ATR summary is provided in **R4 of Attachment A**.

5. Provide the TMC data sheets for the Kendrick Street and 3rd Avenue afternoon peak periods which are missing from the Appendix.

Applicant Response: The TMC data sheets were provided in the TIAS submission. See Pages 315-322 of the TIAS. For reference, we have also included those materials in **R5 of Attachment A**.

6. Due to a high percentage of people are working remotely, at least part time, it is not reasonable to collect new data at this time. However, occupancy after the October 2019 counts and prior to COVID-19 changes in traffic, and current and potential future traffic patterns and changes due to COVID-19 are important to note in the TIAS.

Applicant Response: The occupancy of 189 B Street was reflected in our previously-studied and reviewed Trip Generation analysis. That occupancy is included within the TIA based on the trip generating characteristics of that building per ITE Trip Generation and previous studies, reflective of how that building asset was accounted for in previous local and Commonwealth jurisdictional review.

As noted, it would be impossible to collect accurate traffic data that would reflect typical peak period conditions given the systemic change in travel behaviors that are currently being experienced due to the ongoing Covid-19 Pandemic. Traffic volumes are significantly lower than that experienced prior to March 2020. It is unclear when volumes might return to pre-March 2020 levels, even after the Pandemic ends.

Consequently, we have elected to use ITE data for that one occupied building consistent with how the impacts of that building were quantified previously. However, based on an extremely detailed study of trip generating characteristics of other occupied Founders Park buildings – and documented in our previously-reviewed and approved Trip Generation Memorandum, we know that this approach is a conservative assessment of the

DRAFT

Memorandum

impact of that building's actual occupancy (as all occupied Founders Park Buildings have been shown to have significantly lower trip generating characteristics than what ITE estimates suggest).

7. The review of the parking supply should be added in the future traffic and parking monitoring program of the mitigation.

   Applicant Response: Children's is committed to assessing the utilization of their allocated parking supply moving forward at Founder's Park. We recommend that this monitoring program commence one year after receipt of a Certificate of Occupancy (C of O) for 380 First Avenue and be conducted annually thereafter, as mutually agreed to by both Boston Children's Hospital and the Town of Needham.

8. Clarify the proposed pedestrian amenities for this project versus what exists today.

   Applicant Response: A site plan showing the pedestrian connections is provided in the TIA – and included herein for reference (see **R8 in Attachment A**). New crosswalks are proposed to connect the Project to the 380R First Avenue Garage (Garage B) and the future 400R Garage (Garage A), and across the proposed loading dock. Currently there are no crosswalks provided between these two sites. Sidewalks will be provided on site along First Avenue and New Way. These facilities also currently do not exist. The goal is to provide safe and complete pedestrian connectivity between the 380 1st Avenue site and the rest of the Founder's Park campus.

9. Consideration should be given to raising the crosswalk between Garage B to 380 1st Street as it is likely that this crossing would experience significant pedestrian activity.

   Applicant Response: We agree with this comment. The Project is currently under design, and this amenity has been discussed as being something to strongly consider. Its viability is being studied in the context of appropriately managing driveway stormwater and associated drainage needs.

10. Provide discussion on how the application of the stop sign on the one approach was determined for the full build layout.

    Applicant Response: The intention is to install all-way Stop control at New Way/Founders Drive. The goal is to recognize the multi-modal needs of the campus and look for ways to slow down vehicular traffic wherever reasonably feasible

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DRAFT

Memorandum

11. Confirm that the trip distributions from 2015 are still relevant/applicable in 2020. Revise the mode split and trip distribution if needed.

Applicant Response: Trip distribution and mode split assumptions are based those inputs used to support the approved 2015 SDEIR. There is no supporting data to ELICIT a change in trip distribution assumptions made previously. Most traffic is expected to interact, directly, with on- and off-ramps to and from Route 128. Mode split data used previously is very conservative (i.e., very high auto mode share assumption), and frankly, is a factor contributing to why actual, measured trip generation collected on-site is so much lower than that estimated previously. Class A office space on Route 128 is attracting a healthy percentage of reverse commuters from the urban core who use transit and connect to the site via shuttle. Alternative work schedules and remote working have also become a much more prevalent part of employee schedules – and those programs also drive estimated traffic volumes downward. This is likely also true of all of the unbuilt office space studied in the TIA – however our intention and goal was to be consistent with the 2015 SDEIR and be reasonably conservative. We believe the TIA does both of these things – and is likely conservative in the impacts that are delineated in it (i.e., actual future volumes and impacts will also likely be lower).

12. The pediatric medical office use was not included as part of the Founders Park Development back in 2015. Clarify how the pediatric medical office distribution percentages were determined as shown on Figure 10 – Trip Distribution in the TIAS.

Applicant Response: The trip distribution and assignment in the peak period analyses is driven primarily by employees travelling to and from the site. This distribution and mode split of that population over the long-term is most likely to be analogous to that of office employees. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA – although we believe the distributional characteristics of that population is also similar to that of the employees.

13. BCH patient data would be more reasonable to use in determining the trip assignment and distribution for the BCH pediatric medical use.

Applicant Response: The trip distribution and assignment in the peak period analysis is actually driven primarily by employees travelling to and from the site, which is likely to be similar to that of the office employees as previously studied in the 2015 SDEIR, and as discussed previously in Response 12. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA.

DRAFT

Memorandum

Further, it is not reasonable to simply re-allocate existing Children's patient data for the purposes of determining trip distribution for this facility. Over the long-term, the use of this facility will be driven by surrounding home-origin markets- and will more likely be reflective of those same home origin data points that drive journey-to-work statistics for workers.

14. Verify the trip distributions shown on Figure 10 – Trip Distribution. The distribution percentages from west of 1st Avenue do not add up with the percentages shown at the Highland Avenue and 1st Avenue intersection. This also applies to the percentages west of the intersection of 3rd Avenue and Kendrick Street.

Applicant Response: The distribution percentages from the I-95 north and south reflect vehicles using both the Highland Avenue and Kendrick Street exits (e.g. 25% of the traffic comes from I-95 NB, 20% uses the Kendrick Street exit and 5% uses the Highland Avenue exit). These are high level distributions and should not be confused with the assignment of those trips in the respective peak periods. Additionally, like many other methodology assumptions, these distribution patterns are reflective of those that supported the 2015 SDEIR review and approval.

15. Approximately 295 vehicle trips are anticipated to turn right onto 1st Avenue from Highland Avenue and 329 turning left from Kendrick Street during the morning peak hour during the proposed BCH condition. Clarify why the intersections to the west of these locations were not included in the analysis with the addition of 300 vehicle trips during the peak periods.

Applicant Response: The intersections west of First Avenue/Third Avenue are the I-95 interchange on- and off-ramps, where the majority of the Project traffic is expected to originate from. The free flow onto and off of the highway was not previously studied in the 2015 SDEIR and is therefore also not studied in the TIAS. The intersection of Kenrick Street at Hunting Road was previously studied in the SDEIR. However, the Children's Project is anticipated to have only very limited incremental impact west of the I-95 interchanges, as the majority of project trips will come from I-95.

16. A No-Build future condition was not included in the TIAS; however, a No-Build condition analysis was provided in the 2015 SDEIR. A No-Build analysis should be provided in order to determine the true projects impacts. Explain why the No-Build future condition was not analyzed in the TIAS.

Applicant Response: A No-Build analysis was provided in the 2015 SDEIR to assess the impact of Center 128 relative to the base condition (if that Project were not approved). That Project, however, was approved and

DRAFT

Memorandum

the base condition to compare impacts to is now a fully built Center 128. As such, the approved Build Condition from the SDEIR is, in a sense, the No-Build condition to compare the Children's Project to as a means to clearly quantify incremental impact over and above the approved project. As stated previously, the purpose of this TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 First Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. The most accurate way to do that is to compare this Project to what was previously approved. This will provide the basis to do the following:

1. Determine the changes in increment impact from that studied, reviewed and approved previously
2. Confirm that transportation improvements and mitigation committed to previously in the Special Permit, MEPA Certificate, and Section 61 Findings are still valid and hold true moving forward
3. Delineate updates to that committed mitigation, as needed, to reflect any quantified incremental impacts that are identified.

Inclusion of a No-Build Condition (assuming no Center 128) does none of these things – and represents a fictitious development scenario that can now longer exist. This is typically how TIA's supporting Notice of Project Changes are studied. It is also specifically how we are obligated to study this Project in support of MEPA and MassDOT review and approval – who have recognized that inclusion of a No-Build Condition is neither warranted nor necessary in this case.

17. ITE Trip Generation data was used to determine project trips for the above-mentioned projects, however, there are traffic studies for at least some of the projects which provide the number of anticipated trips. The available traffic study data should be provided instead of determining trips based on the ITE Trip Generation for the background projects where applicable.

Applicant Response: Project generated trips for the referenced background projects were accessed directly from their respective traffic studies. This language will be updated in the TIA to provide more clarity on this issue.

DRAFT

Memorandum

18. The backup calculations and distributions used to determine the various development vehicle trips was not provided for reference and review. This information is necessary to determine the appropriateness of future volumes.

Applicant Response: The specific project trips used to develop the traffic volumes in the future conditions are provided in **R18 in Attachment A**.

19. Provide all study area traffic signal timing and phasing plans for reference.

Applicant Response: This signal timing and phase plans are provided in **R19 in Attachment A**.

20. Describe any known reason for the significant difference in left-turn volumes between the two analyses.

Applicant Response: During the time that the 2015 SDEIR was prepared, the northbound left-turn moment from First Avenue onto Highland Avenue was a prohibited movement. The TIA made assumptions within the development of the 2022 No-Build/Build Conditions, including modifications to this intersection taking into consideration the anticipated future permitted northbound left movement. To account for this anticipated change at that time, count volumes were redistributed (approximately 60%) from Second Avenue to First Avenue to account for this permitted movement. In addition, redistribution was estimated to account for the Kendrick Street interchange.

This TIA is based on actual counts, which are indicative of both lower overall traffic activity in/out of Founder's Park from Highland Avenue and higher volumes in/out from Kendrick Street.

21. Some of the signal equipment was not updated as part of the recent roadway project along Highland Avenue. Consideration should be given to upgrading the equipment that was not updated.

Applicant Response: . The Proposed BCH Project has a minimal impact on traffic operations at the Second Avenue intersection compared to the Approved Project during both the morning and evening peak hours. While overall intersection operations have been documented to decrease from LOS C to LOS D, the overall intersection delay increases by only three seconds.

More importantly, the Newton-Needham Corridor Project, which is being led by MassDOT, includes significant improvement to Highland Avenue, including its intersection with Second Avenue. That location will be widened to support two lanes in each direction, including exclusive left-turn lanes, bicycle and pedestrian improvements, and complete traffic signal replacement. This information was shared recently at a Virtual

DRAFT

Memorandum

Public Meeting held on September 30, 2020. The presentation made at that meeting is provided for reference. Our understanding is that these improvements will be put in place in 2021 – well before BCH Project construction commences.

22. There are safety and operational issues at this intersection. A signal warrant analysis was not performed for the intersection. Provide a signal warrant analysis to determine if the intersection meets warrant criteria for signalization.

Applicant Response: A limited signal warrant analysis has been conducted for the intersection of Kendrick Street at Fourth Avenue based on the limited peak period traffic count data collected in October 2019. Note that only Warrant 2 – Four-Hour Vehicular Volume and Warrant 3 – Peak Hour were able to be assessed at this time. The other warrant conditions were unable to be reviewed due to the limited count data available. Based on this limited assessment, criteria was met on both Warrants 2 and 3, which relates to the amount of peak period volume wanting to turn from the side street (Fourth Ave) to the primary corridor (Kendrick Street). This partial signal warrant analysis is included in **R22 of Attachment A.** Note that due to the ongoing Covid-19 Pandemic, it would not be prudent to conduct the very detailed array of traffic counts that are necessary to support a proper, complete signal warrant analysis at this time or into the immediate future as traffic conditions are measurably lower than what one would expect under typical conditions. A full signal warrant could be conducted in the future when counts can be collected representing more typical weekday traffic conditions. Note that Children's is committed to studying safety issues and delineating paths for future improvement – this is a pre-existing condition location, however, that Children's does not generate any new, incremental future impact.

It should also be noted that in connection with Commonwealth of Massachusetts MEPA review, MassDOT has expressed desire to explore the appropriateness of conducting a Roadway Safety Audit (RSA) at this location in the future, as this intersection is Highway Safety Improvement Program (HSIP)-eligible. It is also our understanding that operational and safety concerns at this intersection have been raised at Needham's Traffic Management Advisory Committee.

The Children's Project does not result in any increased traffic volume at this location versus what was previously studied and approved. However, Children's is committed to working with the Town and MassDOT to conduct both a full Traffic Signal Warrant Analysis and Roadway Safety Audit to help comprehensively assess operational and safety issues at this location. Those studies will be conducted at an appropriate time in the future in a way that is mutually agreeable to the Town, MassDOT, and Children's.

DRAFT

Memorandum

23. Signal timing and phasing adjustment was not performed for the Kendrick Street and 3rd Avenue intersection to determine that timing and/or phase changes would benefit the intersection. Provide analysis to verify that this "mitigation measure" would reduce the project-related impacts to the intersection as indicate din the TIAS.

Applicant Response: Preliminary signal timing and phasing adjustments show that some of the impacts of the Project have the potential to be mitigated. Mitigation actions that would improve traffic operations include removing the northbound/southbound split phase and running concurrent pedestrian phases. With these in place, operations during the morning peak hour could result in improved LOS compared to the 2026 Approved Project Build Condition and similar operations during the evening peak hour. Preliminary results are summarized along with Synchro results in **R23 of Attachment A**.

Children's will commit to studying this issue and will retain a signal contractor to make appropriate signal timing and phasing adjustments, as needed, to improve peak period traffic operations at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

24. Currently there are two marked southbound travel lanes on 3rd Avenue approaching Kendrick Street. Although the outer lane is not marked with right-turn only lane markings, it operates as a right-turn only lane. Therefore, this mitigation already exists and would not improve operations at the intersection. However, right-turn only land markings and signage could be provided to better delineate the lanes.

Applicant Response: The 3rd Avenue approach to Kendrick Street is already striped as suggested with an exclusive right-turn lane on the westbound approach near the intersection. The entire street was recently resurfaced and new thermoplastic lane and crosswalk markings put in place this year. Signage also shows that the right lane is a right turn only lane. We agree that additional right turn only markings could be provided to make this more clear for motorists approaching the intersection. Children's will work with the Town to assess and implement supplemental striping implementation at this location as deemed appropriate and necessary. These improvements would be made within one year after the issuance of a Building Permit for the Project.

DRAFT

Memorandum

25. According to the TIAS, a traffic monitoring program is proposed post-development but not outlined in the mitigation section. Verify that a post-occupancy study to monitor realized development traffic will be included in the mitigation package and all intersections will be reviewed post occupancy to determine the need for signal timing and phasing improvements at that time.

Applicant Response: The Project is within, and a part of, the larger Founders Park/Center 128 development. As part of the previous approvals process and outlined in the Section 61 findings, the Proponent of Center 128 has already committed to conducting an annual Traffic Monitoring Program. The BCH buildings will be included in future Founders Park monitoring reporting.

As outlined in section 1.1.4, Proponent of Center 128 will conduct a transportation monitoring study of the project consisting of 24-hour continuous automatic traffic recorder (ATR) counts throughout the study area. The Proponent will also circulate employee surveys to buildings/tenants within the development to determine commuting modes, transit ridership, bicycle parking utilization, vanpool/carpool performance, and parking demands. The monitoring program was to begin three months after the opening of the Kendrick Street ramps and will continue for a period of five years after full occupancy.

A technical memorandum summarizing the results of the monitoring program, including a comparison to the trip generation and mode share estimated for the Founders Park development, is prepared annually by Proponent of Center 128 and provided to the Town of Needham, MassDOT and the 128 Business Council.

Additionally, as outlined in Response 7, Children's is committed to assessing the utilization of its portion of the parking supply at Founder's Park. This monitoring program is proposed to commence one year after receipt of a Certificate of Occupancy for 380 First Avenue and be conducted annually thereafter.

26. The 2026 BCH proposed analysis shows that the traffic operations at the intersections of 3rd Avenue and Kendrick Street would be significantly impacted by the project and mitigation was not proposed to improve the project's impact on the intersection. Consideration should be given to providing intersection improvements to mitigate the development's anticipated impact to the intersection.

Applicant Response: Children's is committed to supporting future improvements at this location and will provide a $30,000 contribution to the Town for the purposes of implementing signalization improvements at this location. This contribution would be made within one year after the issuance of a Building Permit for the Project.

DRAFT

Memorandum

27. Crash data was not collected, compiled nor analyzed for existing conditions at the study area intersections. This is a standard part of a TIAS. A crash analysis of the latest three years available should be provided to determine safety issues at the intersections, especially the intersections along Kendrick Street.

Applicant Response: A detailed crash analysis was performed and is included in **R27 of Attachment A.** Note that, Kendrick Street at Fourth Avenue has been identified as a Highway Safety Improvement Program (HSIP) intersection for the years 2015-2017. A total of 19 crashes occurred at this intersection during those three years, including one serious injury crash. Note that the HSIP website does make note of a crash that involved "non-fatal – incapacitating" injuries.

28. The overhead signal head alignment is offset from the travel lanes on Kendrick Street at 3rd Avenue and can be confusing to drivers. See photo. The signal heads should be realigned with the travel lanes to the extent possible. Consideration should be given to realigning the signal heads as part of the mitigation to improve safety at the intersection.

Applicant Response: Children's will commit to studying this issue and will retain a signal contractor to make signal head adjustments, as needed, to improve their visibility and overall safety at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

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Attachments

Response to Traffic Peer Review
Boston Children's Hospital
Needham, MA

ATR Summary									
Location	**Location Name**	**Daily**	**AM vol**	**AM K**	**AM Peak Dir**		**PM vol**	**PM K**	**PM Peak Dir**
A	1st Avenue south of Highland Avenue	6307	792	13%	86%		524	8%	73%
B	2nd Avenue south of Highland Avenue	8711	653	7%	58%		777	9%	67%
C	New Drive south of A Street	1207	170	14%	81%		197	16%	83%
D	89 A Street Driveway south of A Street	774	123	16%	89%		100	13%	96%
E	Park Drive south of A Street	1201	129	11%	65%		117	10%	69%
F	New Way east of 1st Street	395	67	17%	90%		36	9%	53%
G	Parking Garage Driveway east of New Drive	1427	257	18%	100%		266	19%	99%
H	Parking Garage Driveway west of 89 S Street	499	90	18%	99%		80	16%	100%
I	River Way south of 2nd Avenue	624	27	4%	63%		39	6%	56%
J	#2 B Street north of B Street	998	149	15%	92%		165	17%	93%
K	Hyatt Place Driveway north of B Street	598	56	9%	91%		46	8%	91%
L	#189 B Street Driveway east of B Street	152	17	11%	71%		6	4%	83%
M	3rd Avenue north of Kendrick Street	4471	477	11%	75%		482	11%	89%
N	4th Avenue north of Kendrick Street	5409	564	10%	77%		412	8%	58%
O	Residence Inn Parking Access north of B Street	161	11	7%	82%		18	11%	94%
P	Residence Inn East Access north of B Street	317	30	9%	80%		37	12%	70%

R5 - Kendrick St at Third Avenue Evening TMCs

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Response to Traffic Peer Review
Boston Children's Hospital
Needham, MA

Cars and Heavy Vehicles (Combined)

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	64	1	15	0	80	3	325	0	0	328	1	0	10	0	11	3	165	12	0	180	599
4:15 PM	59	0	19	0	78	4	317	1	0	322	1	0	7	0	8	3	229	14	1	247	655
4:30 PM	40	1	24	0	65	6	375	1	0	382	1	1	8	0	10	4	215	9	0	228	685
4:45 PM	85	0	16	0	101	5	330	1	0	336	1	1	17	0	19	0	226	7	0	233	689
Total	248	2	74	0	324	18	1347	3	0	1368	4	2	42	0	48	10	835	42	1	888	2628
5:00 PM	100	2	38	0	140	10	362	0	0	372	2	0	5	0	7	3	211	9	0	223	742
5:15 PM	72	0	34	0	106	6	359	3	0	368	3	0	6	0	9	0	236	6	0	242	725
5:30 PM	81	0	30	0	111	4	355	1	0	360	2	0	4	0	6	0	243	6	0	249	726
5:45 PM	59	0	10	0	69	3	350	0	0	353	2	0	5	0	7	1	232	11	0	244	673
Total	312	2	112	0	426	23	1426	4	0	1453	9	0	20	0	29	4	922	32	0	958	2866
Grand Total	560	4	186	0	750	41	2773	7	0	2821	13	2	62	0	77	14	1757	74	1	1846	5494
Approach %	74.7	0.5	24.8	0.0		1.5	98.3	0.2	0.0		16.9	2.6	80.5	0.0		0.8	95.2	4.0	0.1		
Total %	10.2	0.1	3.4	0.0	13.7	0.7	50.5	0.1	0.0	51.3	0.2	0.0	1.1	0.0	1.4	0.3	32.0	1.3	0.0	33.6	
Exiting Leg Total					117					1956					25					3396	5494
Cars	554	4	185	0	743	37	2753	4	0	2794	10	2	61	0	73	13	1745	68	1	1827	5437
% Cars	98.9	100.0	99.5	0.0	99.1	90.2	99.3	57.1	0.0	99.0	76.9	100.0	98.4	0.0	94.8	92.9	99.3	91.9	100.0	99.0	99.0
Exiting Leg Total					107					1940					21					3369	5437
Heavy Vehicles	6	0	1	0	7	4	20	3	0	27	3	0	1	0	4	1	12	6	0	19	57
% Heavy Vehicles	1.1	0.0	0.5	0.0	0.9	9.8	0.7	42.9	0.0	1.0	23.1	0.0	1.6	0.0	5.2	7.1	0.7	8.1	0.0	1.0	1.0
Exiting Leg Total					10					16					4					27	57

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	85	0	16	0	101	5	330	1	0	336	1	1	17	0	19	0	226	7	0	233	689
5:00 PM	100	2	38	0	140	10	362	0	0	372	2	0	5	0	7	3	211	9	0	223	742
5:15 PM	72	0	34	0	106	6	359	3	0	368	3	0	6	0	9	0	236	6	0	242	725
5:30 PM	81	0	30	0	111	4	355	1	0	360	2	0	4	0	6	0	243	6	0	249	726
Total Volume	338	2	118	0	458	25	1406	5	0	1436	8	1	32	0	41	3	916	28	0	947	2882
% Approach Total	73.8	0.4	25.8	0.0		1.7	97.9	0.3	0.0		19.5	2.4	78.0	0.0		0.3	96.7	3.0	0.0		
PHF	0.845	0.250	0.776	0.000	0.818	0.625	0.971	0.417	0.000	0.965	0.667	0.250	0.471	0.000	0.539	0.250	0.942	0.778	0.000	0.951	0.971
Cars	335	2	117	0	454	21	1401	3	0	1425	6	1	31	0	38	3	911	25	0	939	2856
Cars %	99.1	100.0	99.2	0.0	99.1	84.0	99.6	60.0	0.0	99.2	75.0	100.0	96.9	0.0	92.7	100.0	99.5	89.3	0.0	99.2	99.1
Heavy Vehicles	3	0	1	0	4	4	5	2	0	11	2	0	1	0	3	0	5	3	0	8	26
Heavy Vehicles %	0.9	0.0	0.8	0.0	0.9	16.0	0.4	40.0	0.0	0.8	25.0	0.0	3.1	0.0	7.3	0.0	0.5	10.7	0.0	0.8	0.9
Cars Enter Leg	335	2	117	0	454	21	1401	3	0	1425	6	1	31	0	38	3	911	25	0	939	2856
Heavy Enter Leg	3	0	1	0	4	4	5	2	0	11	2	0	1	0	3	0	5	3	0	8	26
Total Entering Leg	338	2	118	0	458	25	1406	5	0	1436	8	1	32	0	41	3	916	28	0	947	2882
Cars Exiting Leg					47					1034					8					1767	2856
Heavy Exiting Leg					7					8					2					9	26
Total Exiting Leg					54					1042					10					1776	2882

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Cars

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	63	1	15	0	79	3	319	0	0	322	1	0	10	0	11	3	165	11	0	179	591
4:15 PM	58	0	19	0	77	4	314	1	0	319	1	0	7	0	8	3	228	14	1	246	650
4:30 PM	39	1	24	0	64	6	372	0	0	378	1	1	8	0	10	3	212	8	0	223	675
4:45 PM	85	0	16	0	101	4	329	1	0	334	0	1	17	0	18	0	223	6	0	229	682
Total	245	2	74	0	321	17	1334	2	0	1353	3	2	42	0	47	9	828	39	1	877	2598
5:00 PM	100	2	37	0	139	8	360	0	0	368	2	0	5	0	7	3	210	9	0	222	736
5:15 PM	72	0	34	0	106	5	359	2	0	366	2	0	5	0	7	0	235	5	0	240	719
5:30 PM	78	0	30	0	108	4	353	0	0	357	2	0	4	0	6	0	243	5	0	248	719
5:45 PM	59	0	10	0	69	3	347	0	0	350	1	0	5	0	6	1	229	10	0	240	665
Total	309	2	111	0	422	20	1419	2	0	1441	7	0	19	0	26	4	917	29	0	950	2839
Grand Total	554	4	185	0	743	37	2753	4	0	2794	10	2	61	0	73	13	1745	68	1	1827	5437
Approach %	74.6	0.5	24.9	0.0		1.3	98.5	0.1	0.0		13.7	2.7	83.6	0.0		0.7	95.5	3.7	0.1		
Total %	10.2	0.1	3.4	0.0	13.7	0.7	50.6	0.1	0.0	51.4	0.2	0.0	1.1	0.0	1.3	0.2	32.1	1.3	0.0	33.6	
Exiting Leg Total					107					1940					21					3369	5437

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:45 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:45 PM	85	0	16	0	101	4	329	1	0	334	0	1	17	0	18	0	223	6	0	229	682
5:00 PM	100	2	37	0	139	8	360	0	0	368	2	0	5	0	7	3	210	9	0	222	736
5:15 PM	72	0	34	0	106	5	359	2	0	366	2	0	5	0	7	0	235	5	0	240	719
5:30 PM	78	0	30	0	108	4	353	0	0	357	2	0	4	0	6	0	243	5	0	248	719
Total Volume	335	2	117	0	454	21	1401	3	0	1425	6	1	31	0	38	3	911	25	0	939	2856
% Approach Total	73.8	0.4	25.8	0.0		1.5	98.3	0.2	0.0		15.8	2.6	81.6	0.0		0.3	97.0	2.7	0.0		
PHF	0.838	0.250	0.791	0.000	0.817	0.656	0.973	0.375	0.000	0.968	0.750	0.250	0.456	0.000	0.528	0.250	0.937	0.694	0.000	0.947	0.970
Entering Leg	335	2	117	0	454	21	1401	3	0	1425	6	1	31	0	38	3	911	25	0	939	2856
Exiting Leg					47					1034					8					1767	2856
Total					501					2459					46					2706	5712

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	0	0	1	0	1	8
4:15 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	5
4:30 PM	1	0	0	0	1	0	3	1	0	4	0	0	0	0	0	1	3	1	0	5	10
4:45 PM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	3	1	0	4	7
Total	3	0	0	0	3	1	13	1	0	15	1	0	0	0	1	1	7	3	0	11	30
5:00 PM	0	0	1	0	1	2	2	0	0	4	0	0	0	0	0	0	1	0	0	1	6
5:15 PM	0	0	0	0	0	1	0	1	0	2	1	0	1	0	2	0	1	1	0	2	6
5:30 PM	3	0	0	0	3	0	2	1	0	3	0	0	0	0	0	0	0	1	0	1	7
5:45 PM	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	0	3	1	0	4	8
Total	3	0	1	0	4	3	7	2	0	12	2	0	1	0	3	0	5	3	0	8	27
Grand Total	6	0	1	0	7	4	20	3	0	27	3	0	1	0	4	1	12	6	0	19	57
Approach %	85.7	0.0	14.3	0.0		14.8	74.1	11.1	0.0		75.0	0.0	25.0	0.0		5.3	63.2	31.6	0.0		
Total %	10.5	0.0	1.8	0.0	12.3	7.0	35.1	5.3	0.0	47.4	5.3	0.0	1.8	0.0	7.0	1.8	21.1	10.5	0.0	33.3	
Exiting Leg Total					10					16					4					27	57
Buses	0	0	0	0	0	0	6	3	0	9	3	0	1	0	4	1	2	0	0	3	16
% Buses	0.0	0.0	0.0	0.0	0.0	0.0	30.0	100.0	0.0	33.3	100.0	0.0	100.0	0.0	100.0	100.0	16.7	0.0	0.0	15.8	28.1
Exiting Leg Total					0					5					4					7	16
Single-Unit Trucks	2	0	1	0	3	2	12	0	0	14	0	0	0	0	0	0	8	2	0	10	27
% Single-Unit	33.3	0.0	100.0	0.0	42.9	50.0	60.0	0.0	0.0	51.9	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	52.6	47.4
Exiting Leg Total					4					9					0					14	27
Articulated Trucks	4	0	0	0	4	2	2	0	0	4	0	0	0	0	0	0	2	4	0	6	14
% Articulated	66.7	0.0	0.0	0.0	57.1	50.0	10.0	0.0	0.0	14.8	0.0	0.0	0.0	0.0	0.0	0.0	16.7	66.7	0.0	31.6	24.6
Exiting Leg Total					6					2					0					6	14

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	0	0	1	0	1	8
4:15 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	5
4:30 PM	1	0	0	0	1	0	3	1	0	4	0	0	0	0	0	1	3	1	0	5	10
4:45 PM	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	3	1	0	4	7
Total Volume	3	0	0	0	3	1	13	1	0	15	1	0	0	0	1	1	7	3	0	11	30
% Approach Total	100.0	0.0	0.0	0.0		6.7	86.7	6.7	0.0		100.0	0.0	0.0	0.0		9.1	63.6	27.3	0.0		
PHF	0.750	0.000	0.000	0.000	0.750	0.250	0.542	0.250	0.000	0.625	0.250	0.000	0.000	0.000	0.250	0.250	0.583	0.750	0.000	0.550	0.750
Buses	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	1	1	0	0	2	9
Buses %	0.0	0.0	0.0	0.0	0.0	0.0	38.5	100.0	0.0	40.0	100.0	0.0	0.0	0.0	100.0	100.0	14.3	0.0	0.0	18.2	30.0
Single-Unit Trucks	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	0	5	2	0	7	16
Single-Unit %	33.3	0.0	0.0	0.0	33.3	100.0	53.8	0.0	0.0	53.3	0.0	0.0	0.0	0.0	0.0	0.0	71.4	66.7	0.0	63.6	53.3
Articulated Trucks	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	5
Articulated %	66.7	0.0	0.0	0.0	66.7	0.0	7.7	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	33.3	0.0	18.2	16.7
Buses	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	1	1	0	0	2	9
Single-Unit Trucks	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	0	5	2	0	7	16
Articulated Trucks	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	5
Total Entering Leg	3	0	0	0	3	1	13	1	0	15	1	0	0	0	1	1	7	3	0	11	30
Buses					0					2					2					5	9
Single-Unit Trucks					3					5					0					8	16
Articulated Trucks					1					1					0					3	5
Total Exiting Leg					4					8					2					16	30

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Buses

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	2	3
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	1	1	0	0	2	9
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	1	0	1	1	0	1	0	2	0	0	0	0	0	3
5:30 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	1	0	0	1	3
Total	0	0	0	0	0	0	1	2	0	3	2	0	1	0	3	0	1	0	0	1	7
Grand Total	0	0	0	0	0	0	6	3	0	9	3	0	1	0	4	1	2	0	0	3	16
Approach %	0.0	0.0	0.0	0.0		0.0	66.7	33.3	0.0		75.0	0.0	25.0	0.0		33.3	66.7	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	37.5	18.8	0.0	56.3	18.8	0.0	6.3	0.0	25.0	6.3	12.5	0.0	0.0	18.8	
Exiting Leg Total					0					5					4					7	16

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	3
4:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	2	3
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	1	1	0	0	2	9
% Approach Total	0.0	0.0	0.0	0.0		0.0	83.3	16.7	0.0		100.0	0.0	0.0	0.0		50.0	50.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.417	0.250	0.000	0.500	0.250	0.000	0.000	0.000	0.250	0.250	0.250	0.000	0.000	0.250	0.750
Entering Leg	0	0	0	0	0	0	5	1	0	6	1	0	0	0	1	1	1	0	0	2	9
Exiting Leg					0					2					2					5	9
Total					0					8					3					7	18

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Class: **Single-Unit Trucks**

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	4
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	5
4:45 PM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	3	1	0	4	6
Total	1	0	0	0	1	1	7	0	0	8	0	0	0	0	0	0	5	2	0	7	16
5:00 PM	0	0	1	0	1	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	5
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
5:30 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
5:45 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	3
Total	1	0	1	0	2	1	5	0	0	6	0	0	0	0	0	0	3	0	0	3	11
Grand Total	2	0	1	0	3	2	12	0	0	14	0	0	0	0	0	0	8	2	0	10	27
Approach %	66.7	0.0	33.3	0.0		14.3	85.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	80.0	20.0	0.0		
Total %	7.4	0.0	3.7	0.0	11.1	7.4	44.4	0.0	0.0	51.9	0.0	0.0	0.0	0.0	0.0	0.0	29.6	7.4	0.0	37.0	
Exiting Leg Total					4					9					0					14	27

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
4:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	5
4:45 PM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	3	1	0	4	6
5:00 PM	0	0	1	0	1	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	5
Total Volume	0	0	1	0	1	2	6	0	0	8	0	0	0	0	0	0	6	2	0	8	17
% Approach Total	0.0	0.0	100.0	0.0		25.0	75.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	75.0	25.0	0.0		
PHF	0.000	0.000	0.250	0.000	0.250	0.500	0.500	0.000	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.500	0.000	0.500	0.708
Entering Leg	0	0	1	0	1	2	6	0	0	8	0	0	0	0	0	0	6	2	0	8	17
Exiting Leg					4					7					0					6	17
Total					5					15					0					14	34

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Articulated Trucks

	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
4:15 PM	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	1	1	0	2	5
5:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
5:30 PM	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	4
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
Total	2	0	0	0	2	2	1	0	0	3	0	0	0	0	0	0	1	3	0	4	9
Grand Total	4	0	0	0	4	2	2	0	0	4	0	0	0	0	0	0	2	4	0	6	14
Approach %	100.0	0.0	0.0	0.0		50.0	50.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	33.3	66.7	0.0		
Total %	28.6	0.0	0.0	0.0	28.6	14.3	14.3	0.0	0.0	28.6	0.0	0.0	0.0	0.0	0.0	0.0	14.3	28.6	0.0	42.9	
Exiting Leg Total					6					2					0					6	14

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

5:00 PM	3rd Avenue from North					Kendrick Street from East					PTC Driveway from South					Kendrick Street from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
5:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2
5:30 PM	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	4
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
Total Volume	2	0	0	0	2	2	1	0	0	3	0	0	0	0	0	0	1	3	0	4	9
% Approach Total	100.0	0.0	0.0	0.0		66.7	33.3	0.0	0.0		0.0	0.0	0.0	0.0		0.0	25.0	75.0	0.0		
PHF	0.250	0.000	0.000	0.000	0.250	0.500	0.250	0.000	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.750	0.000	0.500	0.563
Entering Leg	2	0	0	0	2	2	1	0	0	3	0	0	0	0	0	0	1	3	0	4	9
Exiting Leg					5					1					0					3	9
Total					7					4					0					7	18

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

Bicycles (on Roadway and Crosswalks)

	3rd Avenue from North							Kendrick Street from East							PTC Driveway from South							Kendrick Street from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
5:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
Approach %	0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	
Exiting Leg Total							0							1							0							1	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	3rd Avenue from North							Kendrick Street from East							PTC Driveway from South							Kendrick Street from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.500
Entering Leg	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
Exiting Leg							0							1							0							1	2
Total							0							2							0							2	4

PDI File #: **197237 FF**
Location: **N: 3rd Avenue S: PTC Driveway**
Location: **E: Kendrick Street W: Kendrick Street**
City, State: **Needham, MA**
Client: **VHB/S.Lathrop**
Site Code: **14631.00**
Count Date: **Thursday, October 10, 2019**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

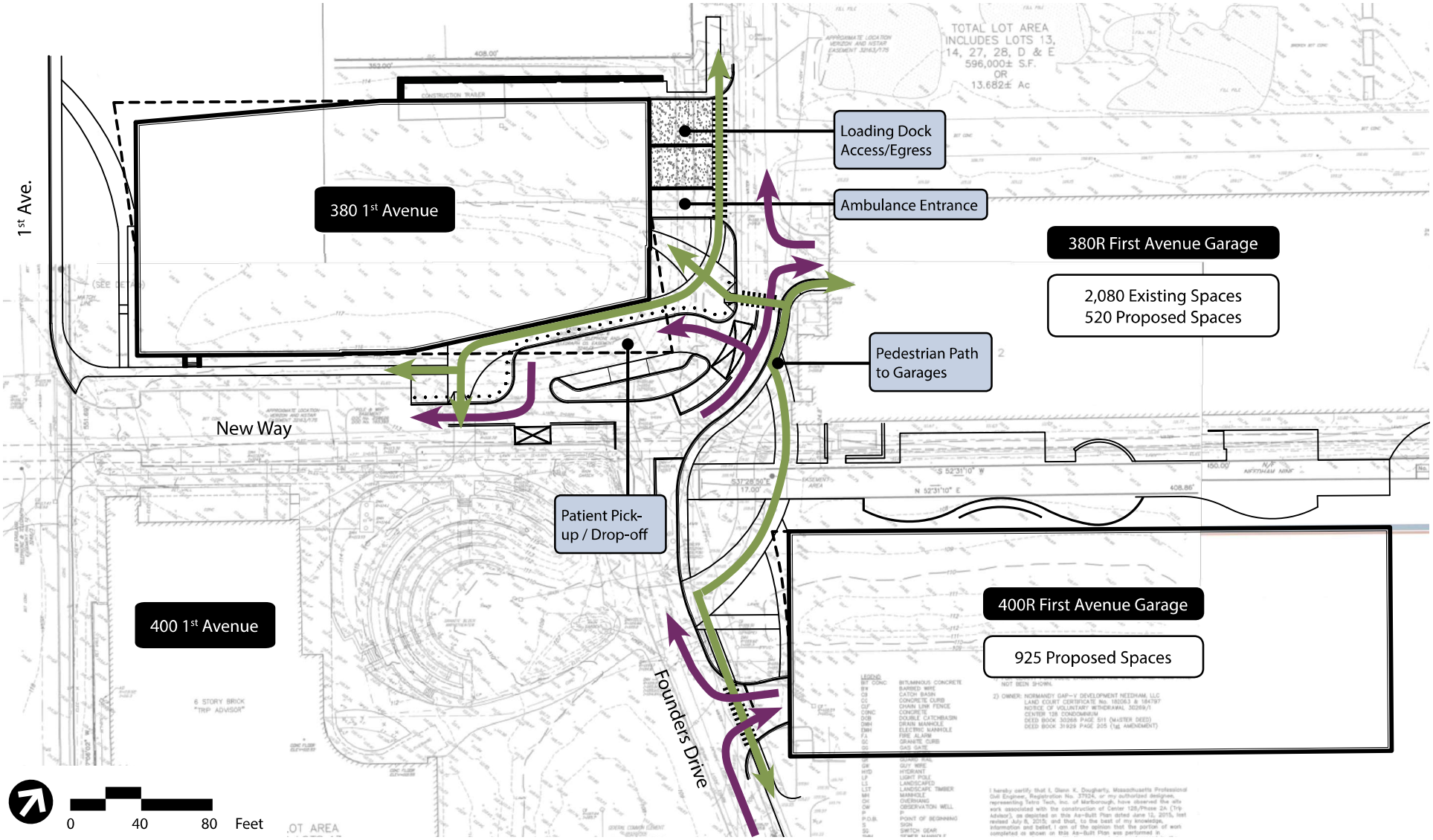
Pedestrians

	3rd Avenue from North							Kendrick Street from East							PTC Driveway from South							Kendrick Street from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
Approach %	0	0	0	0	0	100		0	0	0	0	0	100		0	0	0	0	0	0		0	0	0	0	100	0		
Total %	0	0	0	0	0	25	25	0	0	0	0	0	25	25	0	0	0	0	0	0	0	0	0	0	0	50	0	50	
Exiting Leg Total							1							1							0							2	4

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	3rd Avenue from North							Kendrick Street from East							PTC Driveway from South							Kendrick Street from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
% Approach Total	0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	100.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.250	0.500
Entering Leg	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
Exiting Leg							1							1							0							2	4
Total							2							2							0							4	8

\\vhb\gbl\proj\Boston\14631.00 BCH Needham\Graphics\FIGURES\TIS_Figures.indd p4 08/12/20



Source: Founders Park/CBRE

Garage Access Path

Pedestrian Access Path

Figure 6

380 1st Avenue Site and Access Plan

BCH Needham at Founders Park
Needham, Massachusetts

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

PRINCIPALS
Robert J. Michaud, P.E.
Ronald D. Desrosiers, P.E., PTOE
Daniel J. Mills, P.E., PTOE

MEMORANDUM

DATE: May 7, 2015

TO: Mr. Bruce Levine
Equity Industrial Partners
145 Rosemary Street, Suite E
Needham, MA 02194

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

RE: **Proposed Office Expansion**
2 Wells Avenue – Newton, Massachusetts

MDM Transportation Consultants, Inc. (MDM) has prepared this traffic impact assessment (TIA) for a proposed office expansion at 2 Wells Avenue in Newton, Massachusetts. This memorandum describes existing (baseline) traffic conditions for adjacent roadways, trip generation characteristics of the proposed development, quantifies incremental traffic impacts of the Site development on area roadways, provides a parking assessment, and evaluates safety-related conditions at key study locations that provide access to the Site.

Key findings of the traffic assessment are as follows:

- *Baseline Traffic Volumes.* Wells Avenue just north of the Site carries approximately 12,376 vehicles per day (vpd) on weekdays. Peak hour traffic flow on Wells Avenue is approximately 8 to 10 percent of the daily flow with directional flow heavily skewed southbound during the weekday morning peak traffic hour (85% SB) and heavily skewed northbound during the weekday evening peak hour (75% NB). The travel patterns are highly consistent commuter travel patterns for an office park.

- *Safety Characteristics.* Study intersections exhibit below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. Likewise, the available sight lines at the site driveway intersections Wells Avenue exceed the recommended sight line requirements from AASHTO for the posted speed limit and observed travel speeds.

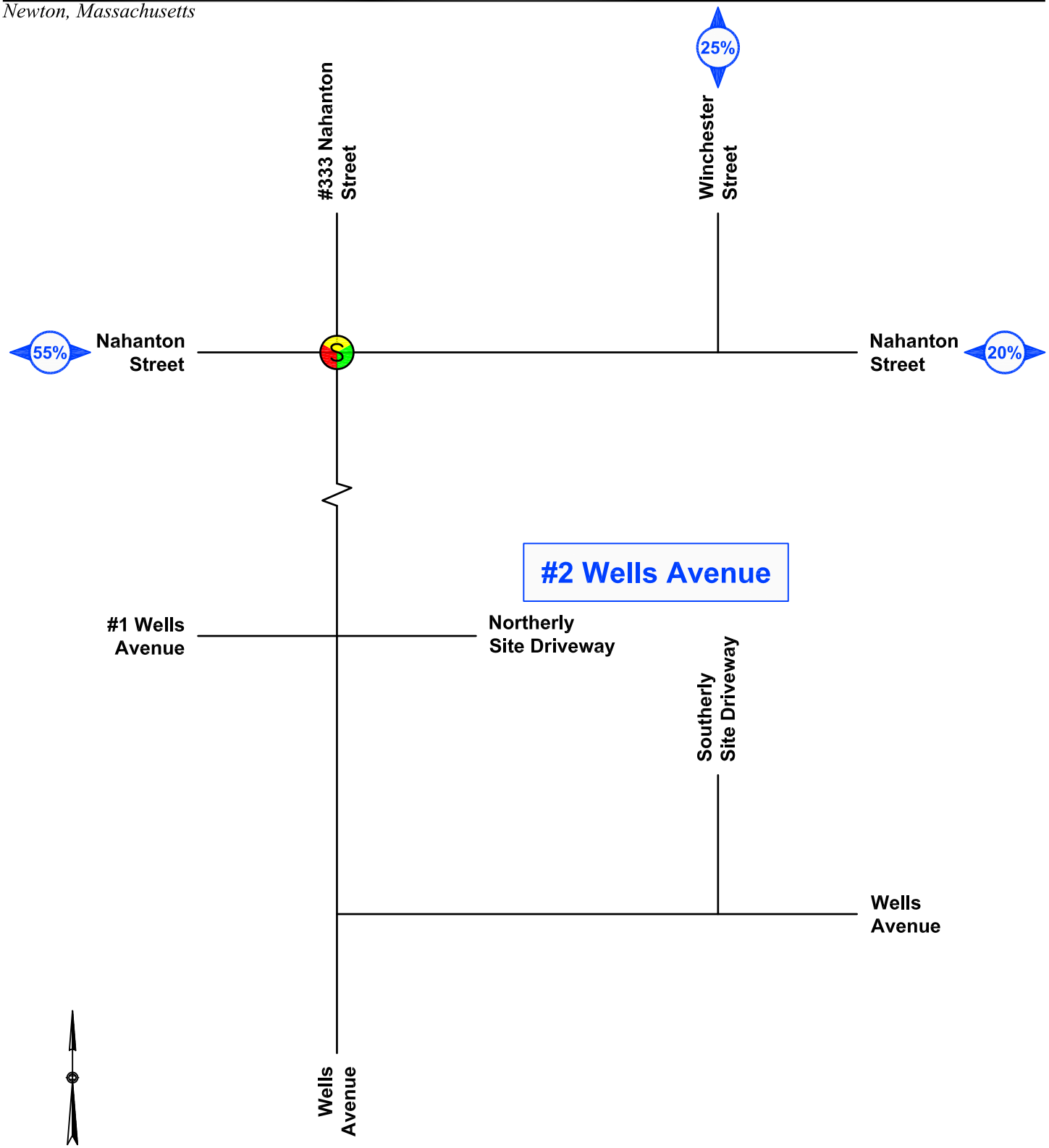


Figure 7

Trip Distribution

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2015
Dwg No. 770 MR02.dwg
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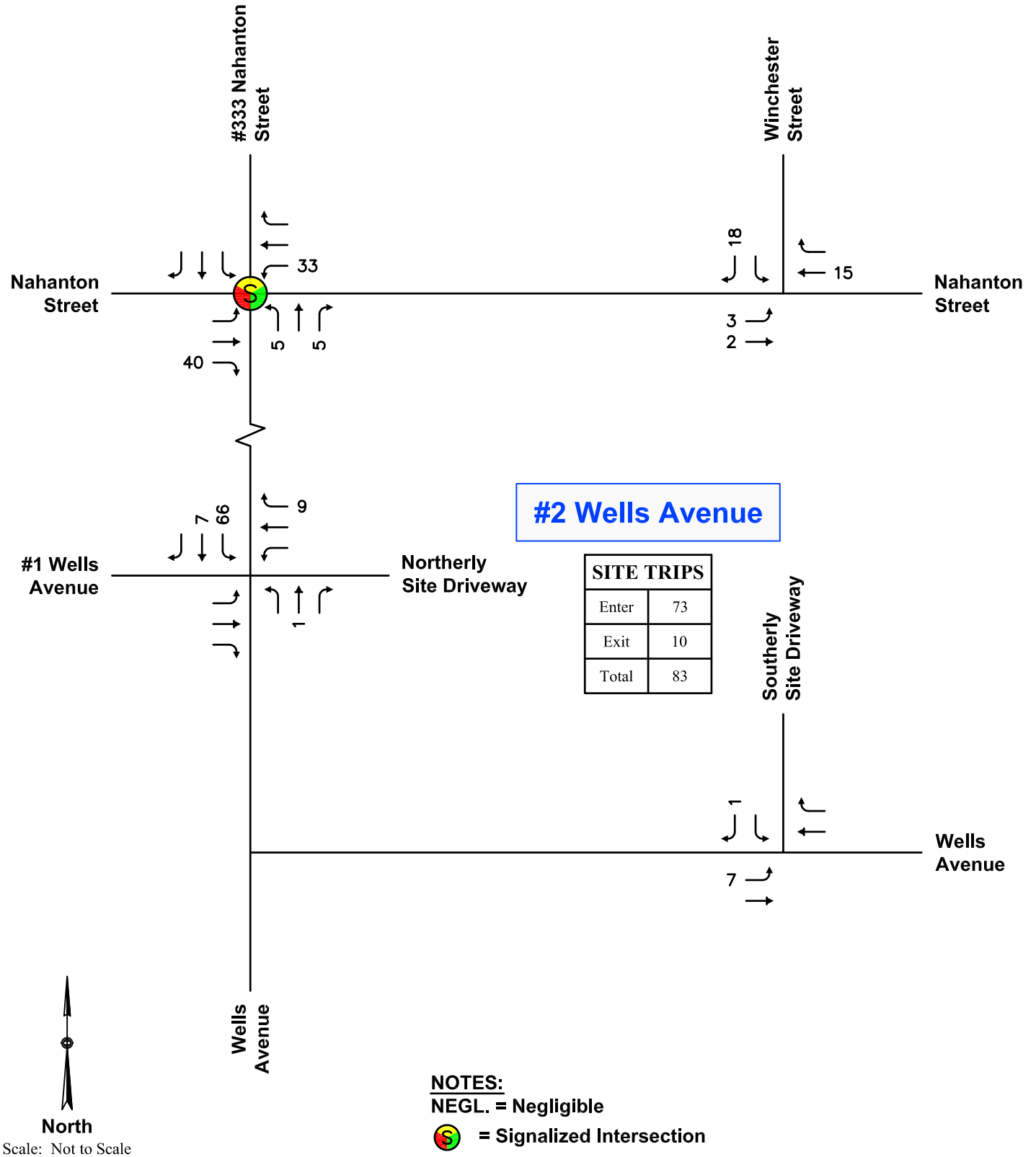


Figure 8

Site-Generated Trips
Weekday Morning Peak Hour

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2015
Dwg No. 770 MR02.dwg
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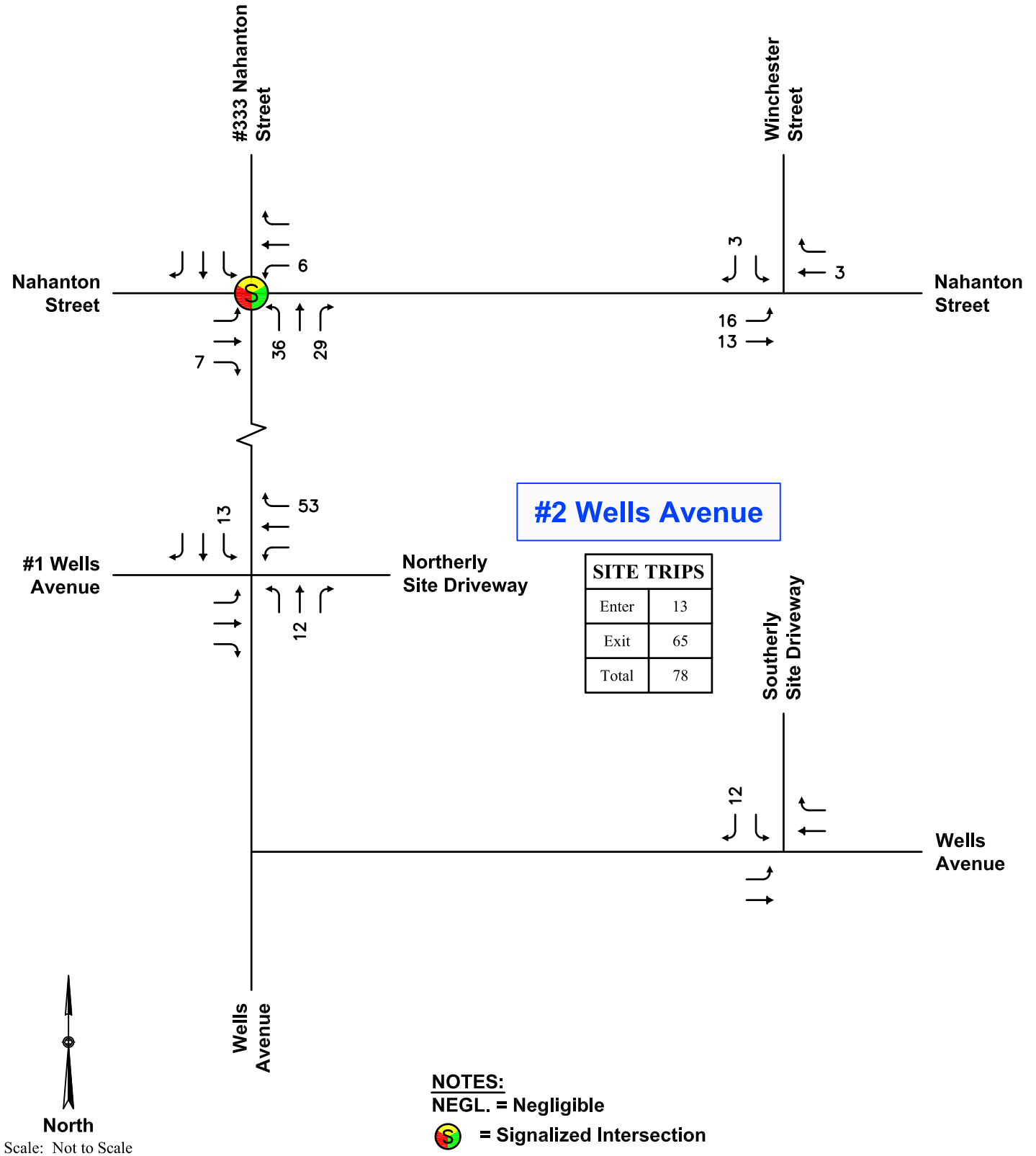


Figure 9

Site-Generated Trips
Weekday Evening Peak Hour

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: May 2015
Dwg No. 770 MR02.dwg
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180 Wells Avenue

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

PRINCIPALS
Robert J. Michaud, P.E.
Ronald D. Desrosiers, P.E., PTOE
Daniel J. Mills, P.E., PTOE

MEMORANDUM

DATE: August 6, 2015

TO: Mr. Randy A. Goldberg
180 Wells Realty LLC
60 Wells Avenue, Suite 100
Newton, MA 02459

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

RE: **Proposed Office Expansion**
180 Wells Avenue – Newton, Massachusetts

MDM Transportation Consultants, Inc. (MDM) has prepared this traffic impact assessment (TIA) for a proposed office expansion at 180 Wells Avenue in Newton, Massachusetts. This memorandum describes existing (baseline) traffic conditions for adjacent roadways, trip generation characteristics of the proposed development, 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.

This TIA builds upon prior analysis of the Wells Avenue office park as documented by MDM for the proposed expansion of the 2 Wells Avenue site[1], augmenting prior data and analysis to reflect empirical (observed) traffic flow characteristics at the traffic signal at Wells Avenue/Nahanton Street. This intersection currently provides a sole means of access/egress for the park. These observed data indicate that actual operations at the signal are up to 35 percent more efficient for critical intersection movements than otherwise calculated using standard traffic models, providing sufficient capacity to accommodate the modest traffic increases for planned development (2 Wells Avenue) and the proposed expansion at 180 Wells Avenue. Notwithstanding the modest traffic increases associated with office expansion at 180 Wells Avenue, planned improvements by the City at the Wells Avenue signal and nearby intersection of Winchester Street/Nahanton Street will provide further capacity enhancements to support future development within the park.

[1] *Traffic Impact Assessment, 2 Wells Avenue Office Expansion*, prepared by MDM Transportation Consultants, Inc. dated May 7, 2015

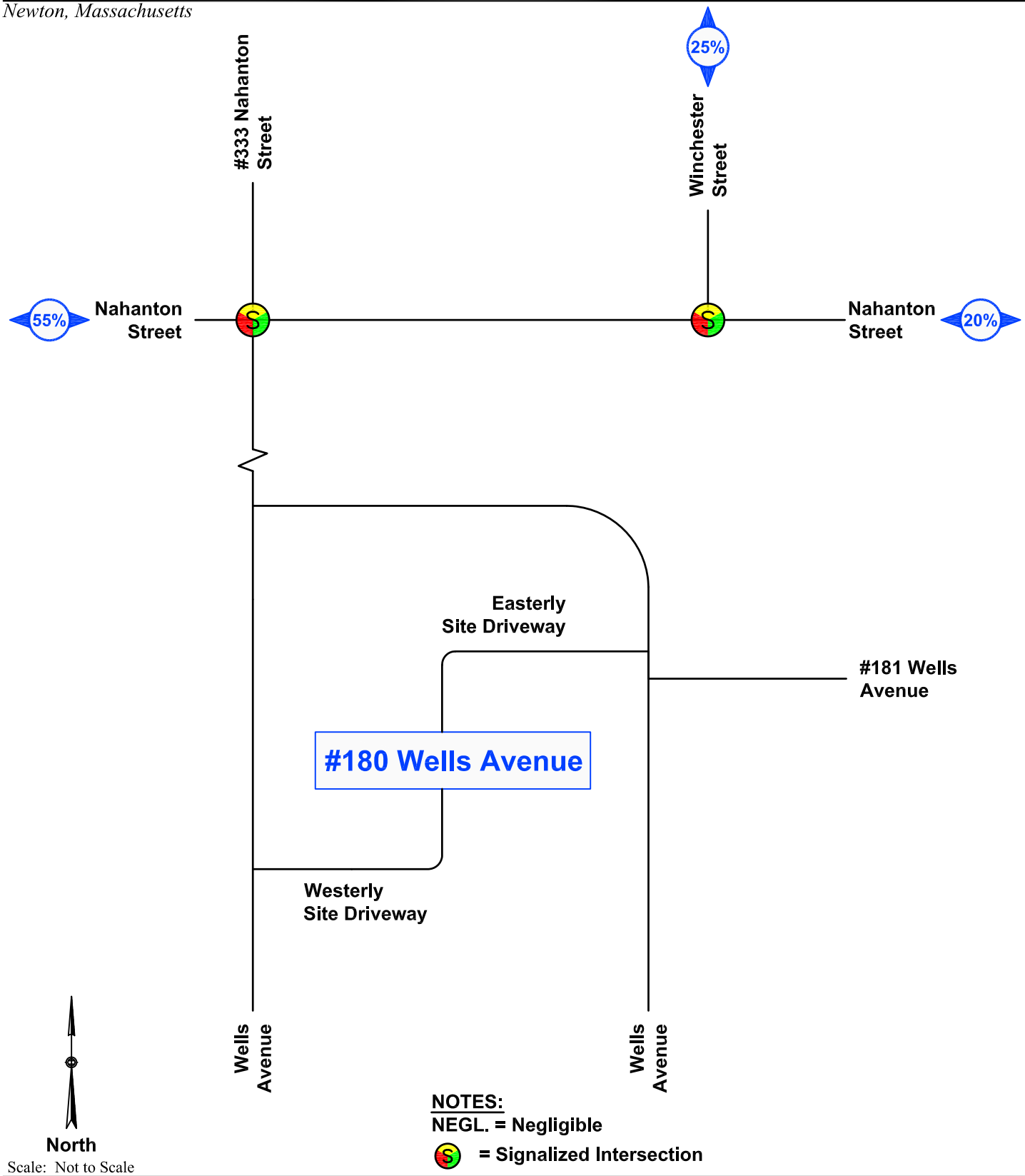


Figure 8

Trip Distribution

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: July 2015
Dwg No. 840 MR01.dwg
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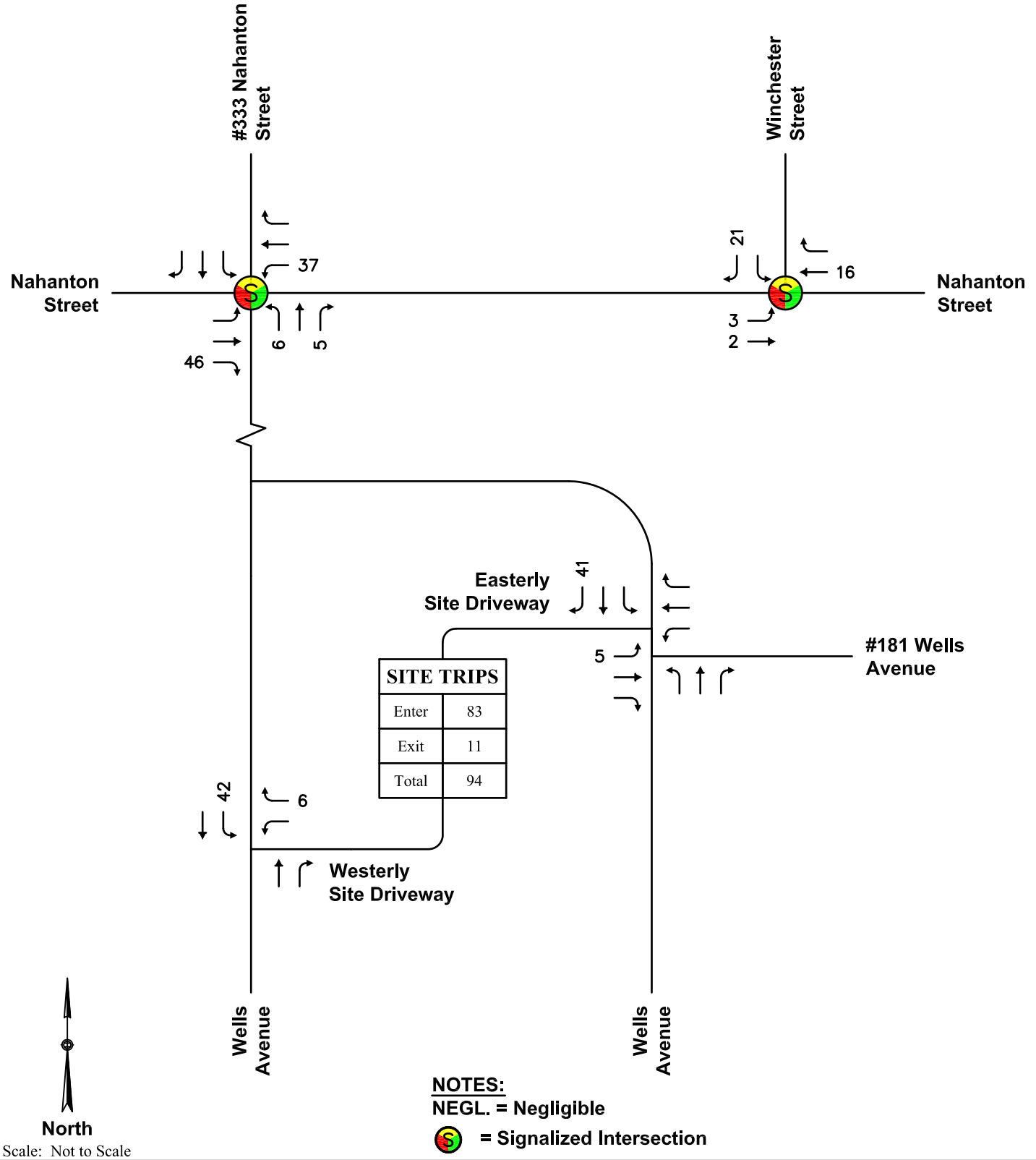


Figure 9

Site-Generated Trips
Weekday Morning Peak Hour

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: July 2015
Dwg No. 840 MR01.dwg
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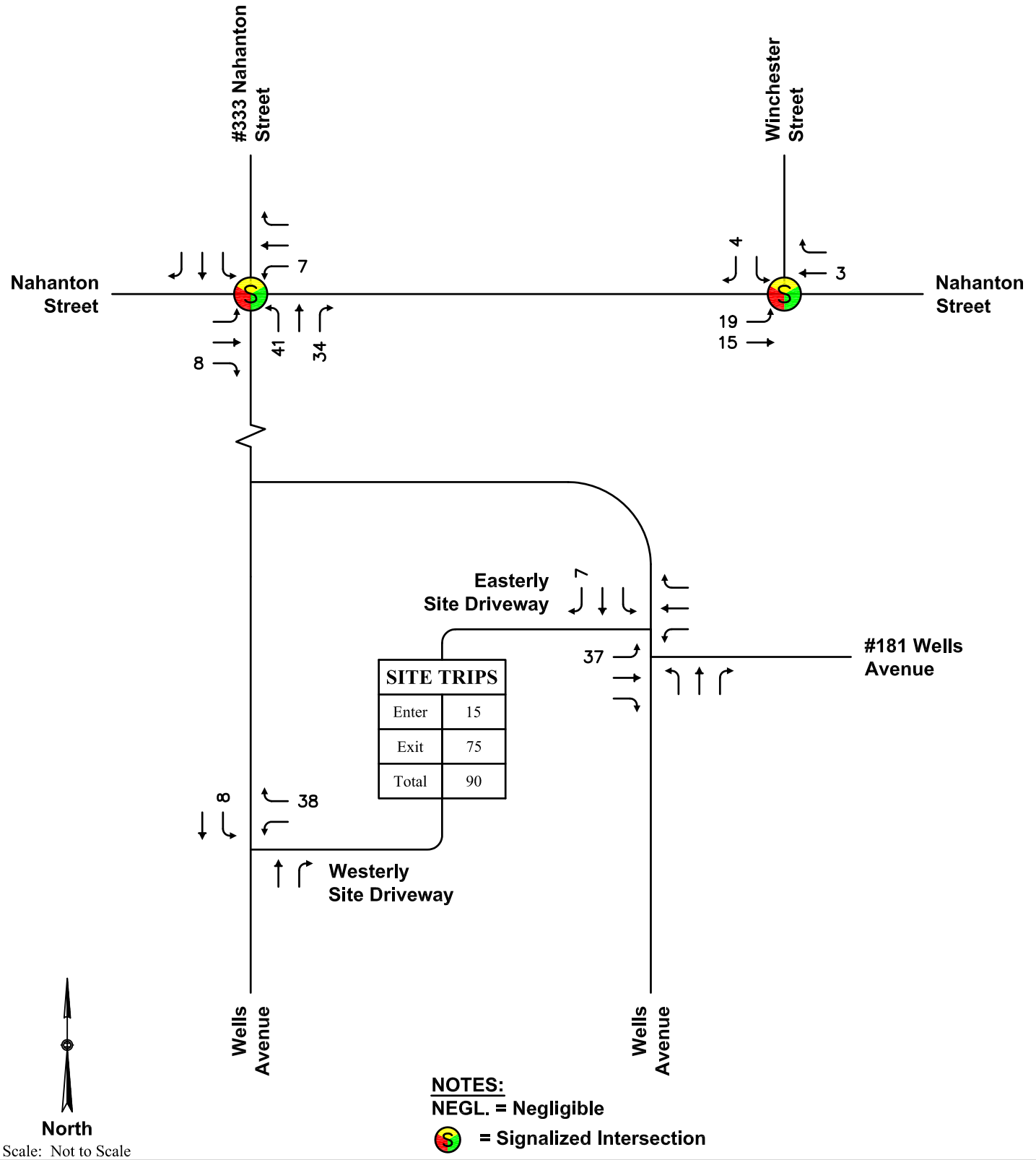


Figure 10

Site-Generated Trips
Weekday Evening Peak Hour

MDM TRANSPORTATION CONSULTANTS, INC.
Planners & Engineers

Date: July 2015
Dwg No. 840 MR01.dwg
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Newton Nexus

Traffic Impact Study

Proposed Redevelopment at
Newton Technology Park –
Needham Street, Newton,
Massachusetts

Prepared for:
Crosspoint Associates, Inc.

Prepared by:
Stantec Consulting Services, Inc.

January 13, 2015

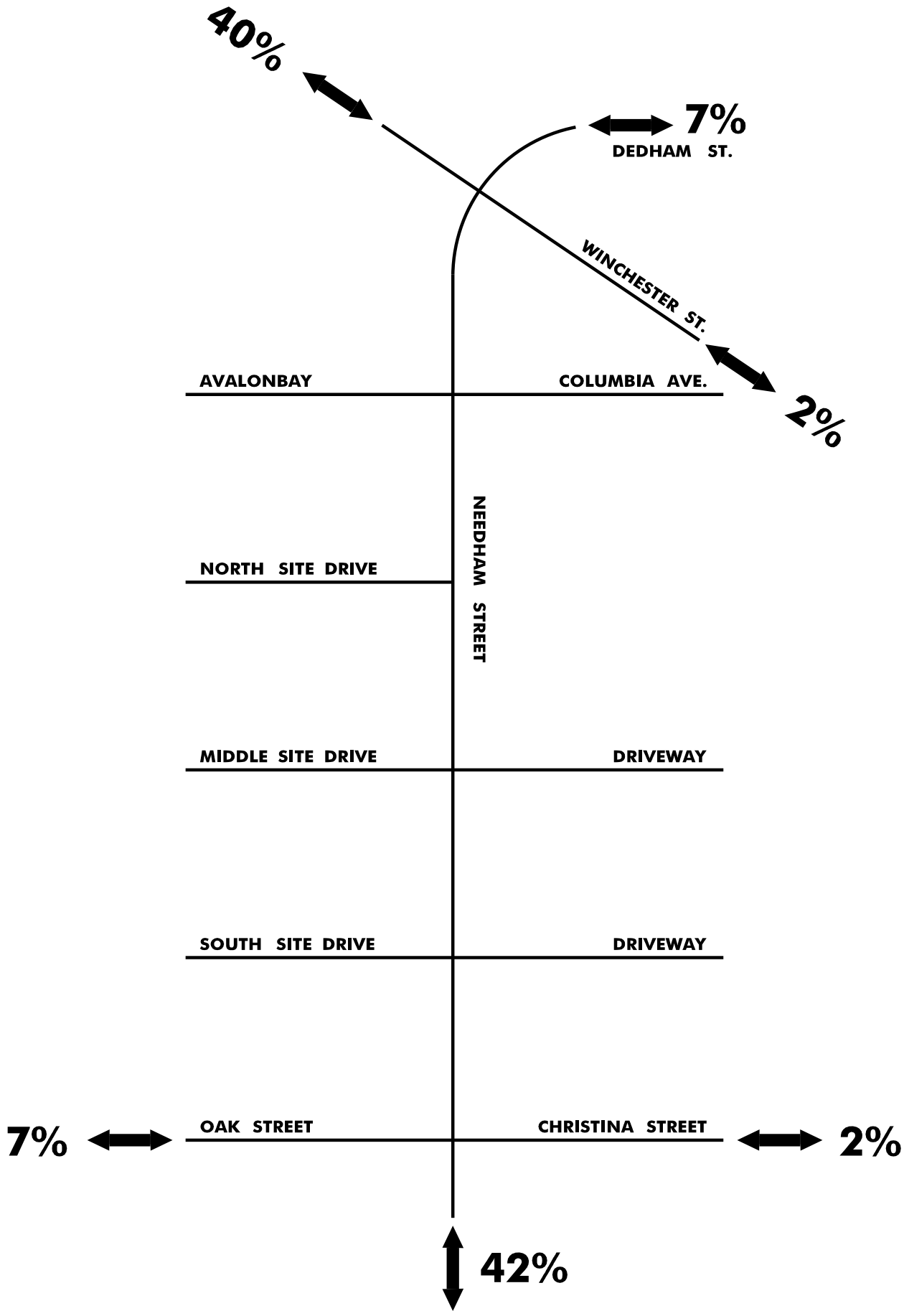
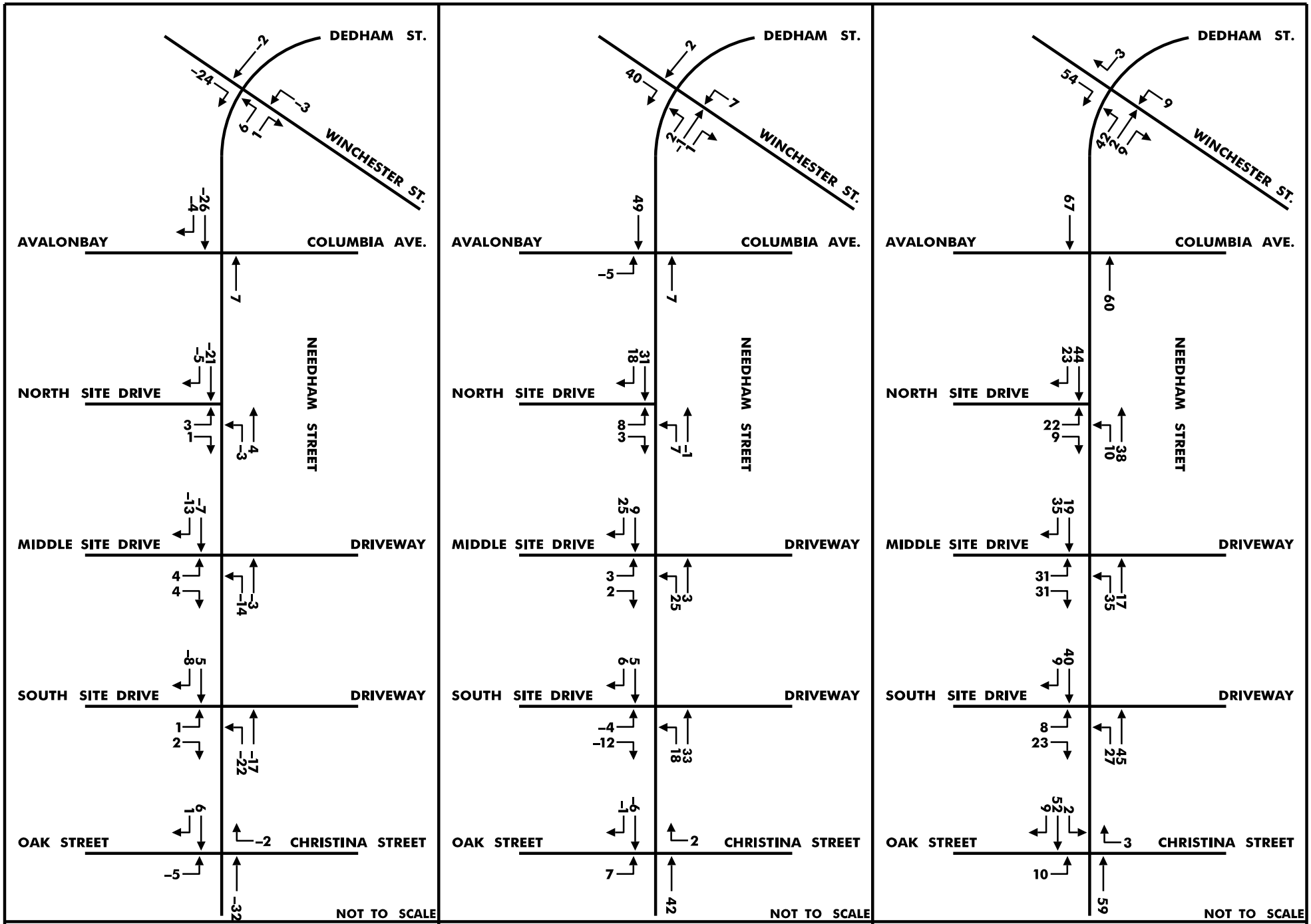


FIGURE 5 – TRIP DISTRIBUTION

PROPOSED REDEVELOPMENT – NEWTON TECHNOLOGY PARK
NEEDHAM STREET, NEWTON, MASSACHUSETTS

NORTH

Stantec



WEEKDAY AM PEAK HOUR | WEEKDAY PM PEAK HOUR | SATURDAY MIDDAY PEAK HOUR

PROPOSED REDEVELOPMENT – NEWTON TECHNOLOGY PARK
NEEDHAM STREET, NEWTON, MASSACHUSETTS

FIGURE 6 – NEW PROJECT TRIPS

NORTH

Stantec

Northland Industrial (130 Charlemont)
Trip Distribution (follows Northland
Newton Development)

XX% Residential Distribution
XX% Office Distribution
XX% Retail Distribution

3% 5% 4%
9% 9% 13%
10% 7% 7%
15% 15% 16%
10% 8% 8%
1% 1% 6%
44% 35% 8%
2% 4% 17%
3% 11% 5%
0% 0% 3%
6% 5% 10%

Chestnut Street
Route 9
Elliot Street
Walnut Street
Centre Street
Route 9
Needham Street
Dedham Street
Winchester Street
Columbia Avenue
Rockland Street
Jaconnet Street
Tower Road
SITE
Oak Street
Industrial Place
Charlemont Street
Christina Street
Riverside Street
Highland Terrace
2nd Avenue
Charles River
Charles Street
Wexford Street
I-95
Highland Avenue
1st Avenue
Needham
Newton
Winchester Street
Nahanton Street
Wells Avenue

0 350 700 Feet

Figure 11
Trip Distribution
The Northland Newton Development
Newton, Massachusetts

Northland Industrial (130 Charlemont)
Trip Generation

ITE TRIP GENERATION WORKSHEET **EXISTING - EAST SIDE**

(10th Edition, Updated 2017)

LANDUSE: General Light Industrial
LANDUSE CODE: 110 Independent Variable ---1000 Sq. Feet Gross Floor Area

JOB NAME: **1000 SQ. FEET GROSS FLOOR AREA** 91
JOB NUMBER:

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	40	0.54	4.96	0.34	43.86	49	1	328	50%	50%
AM PEAK (ADJACENT ST) 7-9am	45	0.52	0.70	0.02	4.46	73	1	328	88%	12%
PM PEAK (ADJACENT ST) 4-6pm	44	0.52	0.63	0.07	7.02	67	1	328	13%	87%
PEAK OF GENERATOR AM	43	0.57	0.92	0.09	11.40	59	1	328	87%	13%
PEAK OF GENERATOR PM	44	0.61	0.83	0.09	8.77	64	1	328	18%	82%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	451	226	226	403	201	201
AM PEAK (ADJACENT ST)	64	56	8	42	37	5
PM PEAK (ADJACENT ST)	57	7	50	35	4	30

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	2	--	1.99	0.69	2.76	78	58	98	50%	50%
PEAK OF GENERATOR	1	--	0.41	0.41	0.41	98	98	98	47%	53%
									Distribution Not Available	

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	181	91	91	--	--	--
PEAK OF GENERATOR	37	18	20	--	--	--

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	1	--	5.00	5.00	5.00	58	58	58	50%	50%
PEAK OF GENERATOR	1	--	0.69	0.69	0.69	58	58	58	48%	52%
									Distribution Not Available	

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	455	228	228	--	--	--
PEAK OF GENERATOR	63	30	33	--	--	--

TRANSPORTATION IMPACT AND ACCESS STUDY

The Northland Newton Development

Newton, Massachusetts

PREPARED FOR

Northland Investment Corporation
2150 Washington Street
Newton, MA 02462

PREPARED BY

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

October 2018

\\vhb\proj\Wat-LD\12239.00\graphics\FIGURES\TIA_2018\LOCUS.dwg



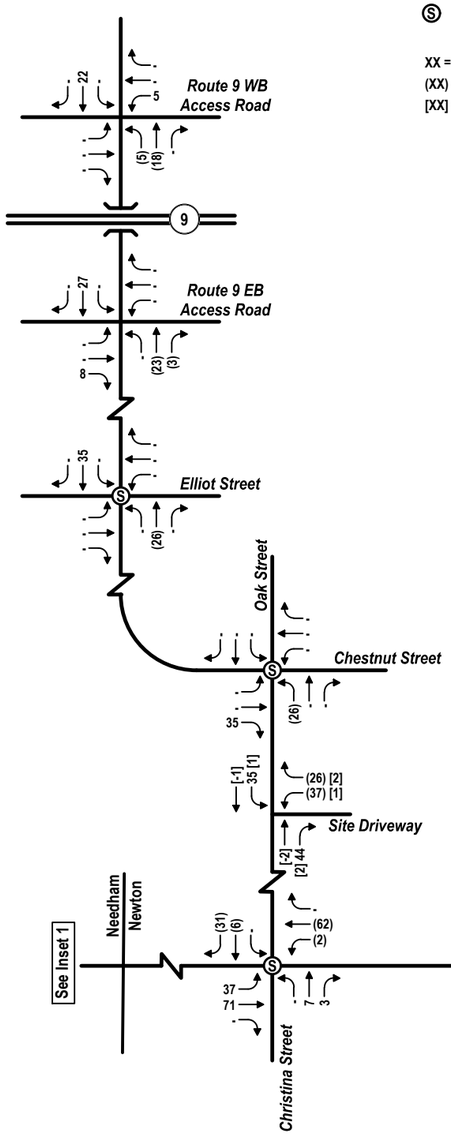
0 350 700 Feet

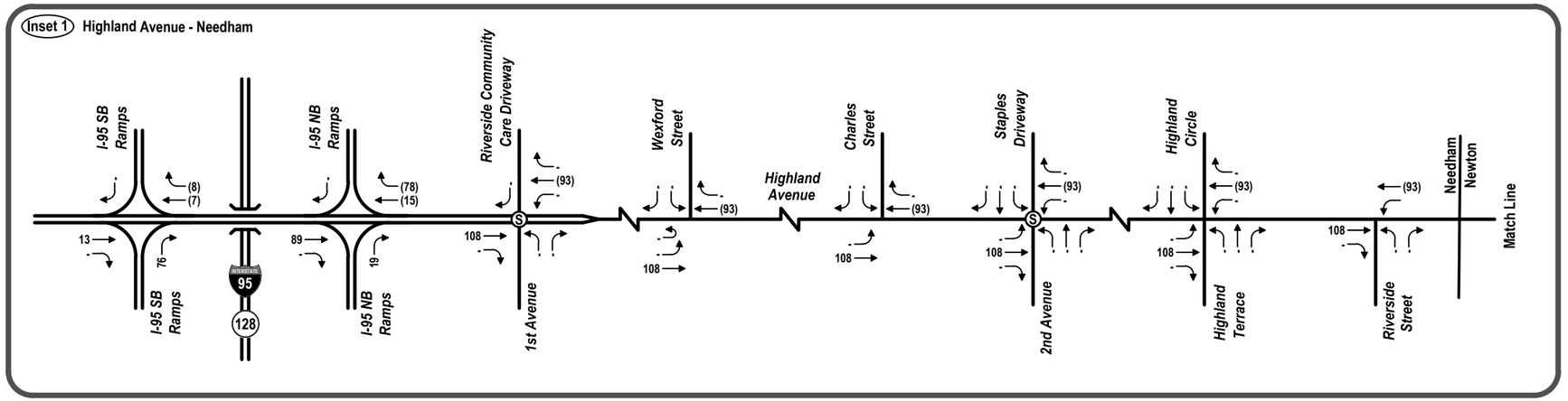
Figure 11

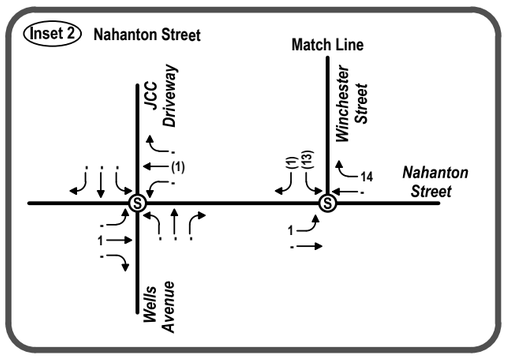
Trip Distribution
The Northland Newton Development
Newton, Massachusetts

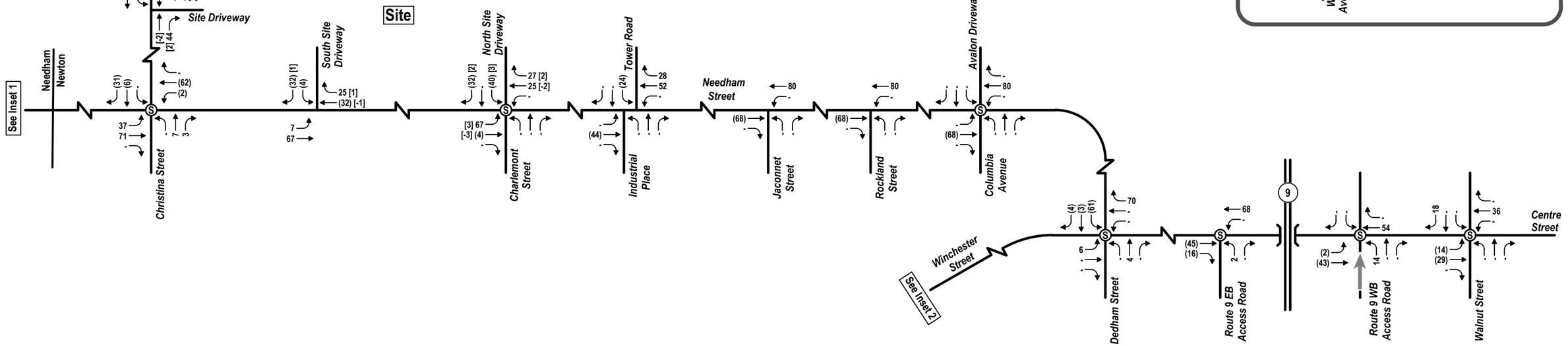
Ⓢ Signalized Intersection

XX = Entering Trips
(XX) = Exiting Trips
[XX] = Pass-By Trips







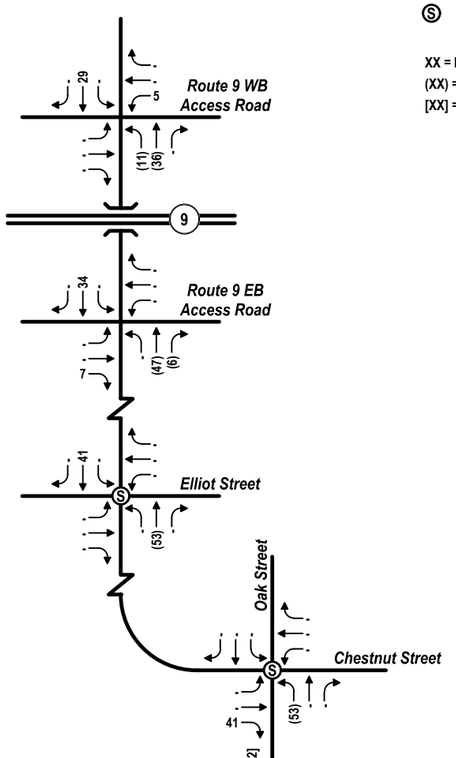


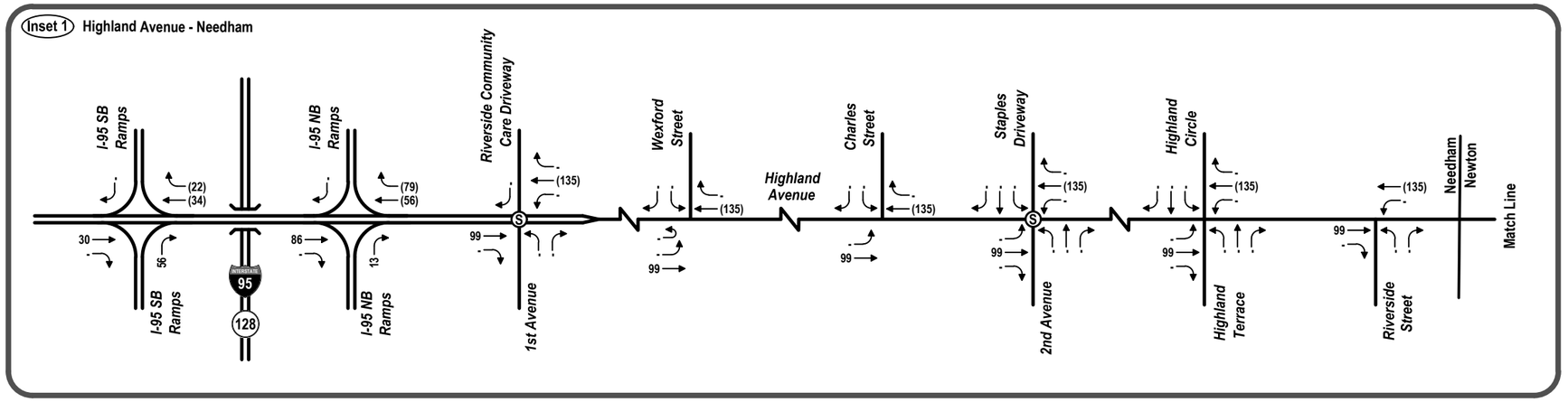
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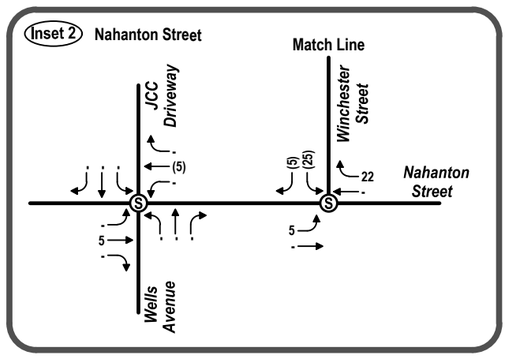
Site-Generated Traffic Volumes
With Existing Mode Share
Weekday Morning Peak Hour
The Northland Newton Development

Signalized Intersection

XX = Entering Trips
(XX) = Exiting Trips
[XX] = Pass-By Trips







Not to Scale

vhb

Site-Generated Trafic Volumes
With Existing Mode Share
Weekday Evening Peak Hour
The Northland Newton Development

R19 Signal Timings

Highland Avenue at First Avenue

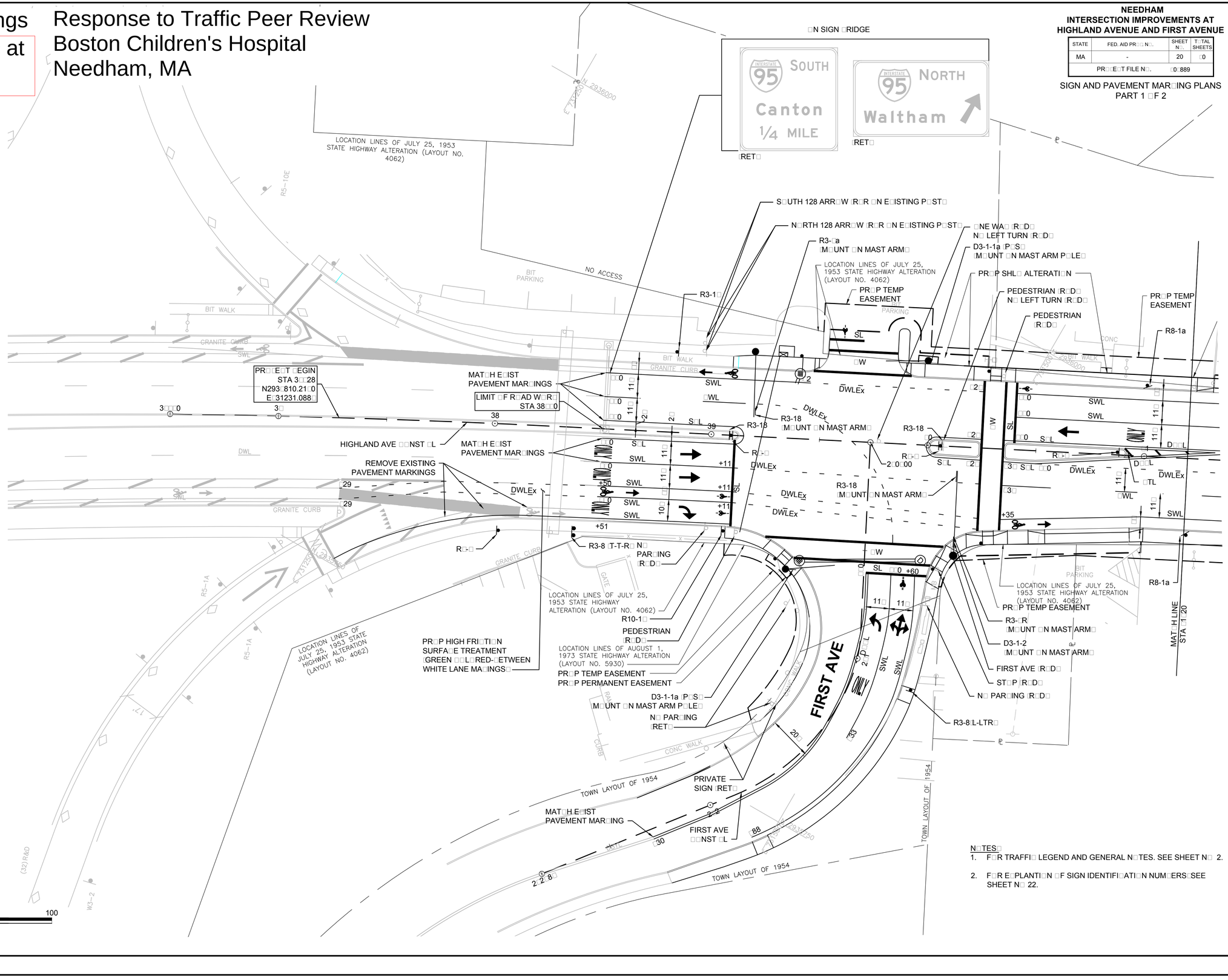
Response to Traffic Peer Review
Boston Children's Hospital
Needham, MA

NEEDHAM
INTERSECTION IMPROVEMENTS AT HIGHLAND AVENUE AND FIRST AVENUE

STATE	FED. AID PR□□ N□.	SHEET N□.	T□TAL SHEETS
MA	-	20	□0
PR□□E□T FILE N□.	□0889		

SIGN AND PAVEMENT MAR□ING PLANS
PART 1 □F 2

□0889_TR PAVE MAR□.DWG Plotted on 13-Nov-201□ 2:29 PM



CONTINUED ON SHEET NO. 21

N□TES□

1. F□R TRAFFI□ LEGEND AND GENERAL N□TES. SEE SHEET N□ 2.
2. F□R E□PLANTI□N □F SIGN IDENTIFI□ATI□N NUM□ERS□SEE SHEET N□ 22.

NEEDHAM
INTERSECTION IMPROVEMENTS AT
HIGHLAND AVENUE AND FIRST AVENUE

STATE	FED. AID PR□□□ N□.	SHEET N□.	T□TAL SHEETS
MA	-	23	□0
PR□□E□T FILE N□.	□0□889		

TRAFFI□ SIGNAL PLANS
HIGHLAND AVENUE□FIRST AVENUE
L□□ATI□N 1
SHEET 1 □F 2

□0□889_TR□SIGNAL PLANS□DWG Plotted on 13-Nov-201□ 2:32 PM

N

NO ACCESS

LOCATION LINES OF JULY 25, 1953 STATE HIGHWAY ALTERATION (LAYOUT NO. 4062)

E 731250 N 2936000

I-95 NB ON-RAMP

PRIVATE DRIVEWAY

PR□P 30□MAST ARM AND F□UNDATI□N

PR□P □PTI□AL EMERGEN□□ VEHI□LE PRE-EMPTI□N DETE□T□R □T□P□

PR□P TRAFFI□ SIGNAL □□NTR□LLER □TS2□T□PE 1□□A□INET AND F□UNDATI□N □MASTER□

PR□P 3□WIDE □□N□RETE PAD □ WAL□WA□

PR□P 8□TRAFFI□ SIGNAL P□ST AND F□UNDATI□N

PR□P 20□MAST ARM AND F□UNDATI□N

PR□P EMERGEN□□ VEHI□LE PRE-EMPTI□N □□NFIRMATI□N STR□□E

LOCATION LINES OF JULY 25, 1953 STATE HIGHWAY ALTERATION (LAYOUT NO. 4062)

PR□P VIDE□ DETE□TI□N □□NE

PR□P 8□TRAFFI□ SIGNAL P□ST AND F□UNDATI□N

PR□P DETE□T□R T□PE D-□ □T□P□

PR□□E□T □EGIN STA 3□□28 N293□810.21□0 E□31231.088□

HIGHLAND AVENUE

HIGHLAND AVE □□NST □L

PR□P VEHI□LE L□□P DETE□T□R□T□PE □ □T□P□

UP#1/17 W/GND WIRE

UP#1/17 W/WIRE & GND WIRE

UP W/ □□ RISERS (3)

LOCATION LINES OF JULY 25, 1953 STATE HIGHWAY ALTERATION (LAYOUT NO. 4062)

PROP SERVICE CONNECTION FROM UP#15

LOCATION LINES OF AUGUST 1, 1973 STATE HIGHWAY ALTERATION (LAYOUT NO. 5930)

PR□P 8□TRAFFI□ SIGNAL P□ST AND F□UNDATI□N

PR□P 2□□MAST ARM AND F□UNDATI□N

PR□P VIDE□ DETE□TI□N □AMERA

I-95 NB OFF-RAMP

LOCATION LINES OF JULY 25, 1953 STATE HIGHWAY ALTERATION (LAYOUT NO. 4062)

RAMP

CONC WALK

TOWN LAYOUT OF 1954

FIRST AVENUE

FIRST AVE □□NST □L

TOWN LAYOUT OF 1954

HIGHLAND AVENUE

CONTINUED ON SHEET NO. 24

PR□P 8□TRAFFI□ SIGNAL P□ST AND F□UNDATI□N

LOCATION LINES OF JULY 25, 1953 STATE HIGHWAY ALTERATION (LAYOUT NO. 4062)

PR□P □0□MAST ARM AND F□UNDATI□N

PR□P 10□TRAFFI□ SIGNAL P□ST AND F□UNDATI□N

N□TES□

1. EMERGEN□□ PRE-EMPTI□N DETE□TI□N T□ □E IN□LUDED IN SIGNAL S□STEM.
2. F□R ADDITI□NAL SIGNS AND PAVEMENT MAR□INGS□SEE SHEETS 20-21.
3. F□R TRAFFI□ SIGNAL TIMING□SEE SHEET 2□.

□. INTERSE□TI□N □F HIGHLAND AVENUE□FIRST AVENUE T□ □E □□□RDINATED WITH HIGHLAND AVENUE□SE□□ND AVENUE.

□. TRAFFI□ SIGNAL □□□RDINATI□N TIMING M□DIFI□ATI□NS AT THE SIGNAL □□NTR□LLER AT THE INTERSE□TI□N □F HIGHLAND AVENUE□ SE□□ND AVENUE SHALL □E PAID F□R UNDER ITEM 81□.1 IN□LUDING THE INSTALLATI□N □F AN□ NE□ESSAR□ E□UIPMENT.

0 20 □0 100

S□ALE□1" □ 20□

SE□UEN□E AND TIMING F□R FULL□-A□TUATED TRAFFI□ SIGNAL □□NTR□L

STREET	DIR	H□USING	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	FLASHING □PERATI□N
			N□T USED		N□T USED		N□T USED		N□T USED	□L N□T USED		
HIGHLAND AVE	S□	A		R GV □ R		R R R		R R R R		R R R		1
HIGHLAND AVE	S□	□(2)		R G □ R		R R R		R R R R		R R R		1
HIGHLAND AVE	N□	D		R R R R		R R R		R GV □ R		R R R		1
HIGHLAND AVE	N□	E		R R R R		R R R		R G □ R		R R R		1
HIGHLAND AVE	N□	F□G		R R R R		R R R		R G □ R		R□GR R□R R		1
FIRST AVE	W□	H		R RL RL RL		RL RL RL		R RL RL RL		GL □L RL		1
FIRST AVE	W□	□		R R R R		R R R		R R R R		GL□G □ R		(R)
FIRST AVE	W□	□		R R R R		R R R		R R R R		G □ R		(R)
DRIVEWA□	E□	M□N		R R R R		G □ R		R R R R		R R R		R
PEDESTRIAN		P1-P2		DW DW DW DW		W□ FDW DW DW		DW DW DW DW		DW DW DW		□UT
PEDESTRIAN		P3-P□		DW DW DW DW		DW DW DW		W W□ FDW DW DW		DW DW DW		□UT
PEDESTRIAN		P□-P□		W W□ FDW DW DW		DW DW DW		DW DW DW DW		DW DW DW		□UT
INTERVALS □N SE□□NDS□ MINIMUM GREEN				10□		□□		10□		8		EMERGEN□□ □NL□ □
INTERVALS □N SE□□NDS□ E□TENSI□N INTERVAL				2		2		2		2		
INTERVALS □N SE□□NDS□ MA□IMUM I				□0		2□		□0		20		
INTERVALS □N SE□□NDS□ MA□IMUM II				□□		2□		□□		23		
INTERVALS □N SE□□NDS□ □LEARAN□E INTERVAL				□.0 1.0		□.0 2.0		□.0 1.0		□.0 2.0		□.0 1.0
INTERVALS □N SE□□NDS□ "WAL□" INTERVAL			3 □	□		□		3 □ □				
INTERVALS □N SE□□NDS□ PED □LEARAN□E INTERVAL				8 3.0		1□ 3.0		1□ 3.0				
DETE□T□R MEM□R□				N□N-L□□□		N□N-L□□□		N□N-L□□□		N□N-L□□□		
RE□ALL SWIT□H				S□FT		□FF		S□FT		□FF		

EMERGEN□□ PRE-EMPTI□N

	ØF1		ØF2		ØF3	
		N□T USED		N□T USED		N□T USED
	GV □ R		R R R		R R R	
	G □ R		R R R		R R R	
	R R R		GV □ R		R R R	
	R R R		G □ R		R R R	
	R R R		G □ R		R R R	
	RL RL RL		RL RL RL		GL □L RL	
	R R R		R R R		GL□G □ R	
	R R R		R R R		G □ R	
	R R R		R R R		R R R	
	DW DW DW		DW DW DW		DW DW DW	
	DW DW DW		DW DW DW		DW DW DW	
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PR□GRAM□□□RDINATI□N

□□□LE N□.	□□□LE LENGTH	□FFSET □SE□.□	PHASE SPLITS IN SE□□NDS Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	H□URS □F □PERATI□N
1	90	0		□8		12		□□		23		□00 AM - 11□00 AM M□N-FRI AND 11□00 AM - □00 PM SAT-SUN
2	90	0		□2		12		□9		29		11□00 AM - □00 PM M□N-FRI

□FFSET REFEREN□ED T□ PHASE 2□□EGINNING □F GREEN

□E□TEND MINIMUM GREEN TIME IF PED PHASE IS □ALLED

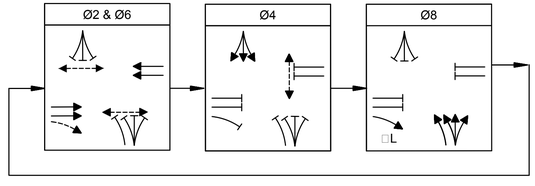
L□□P DETE□T□R □PERATI□N

DETE□T□R N□.	N□. □F SEGMENTS	L□□P SI□E □FT□	AMPLIFIER N□.	□HANNEL N□.	SPLI□E PATTERN (S□□SERIES□ P□PARALLEL□)	N□. □F TURNS	Ø □ALLED	Ø E□TENSI□N	M□DE□ A□PULSE □□PRES. □□□ALLING	DELA□ (SE□□NDS□	E□TENSI□N (SE□□NDS□
1	□	20 □ □ □UADRUPLE	1	1	S	2-□-2	□	□	□	0	0
2	1	3 □ 3 D-□	1	2	S	□-8-□	□	□	□	0	0
3	2	20 □ □ □UADRUPLE	2	1	S	2-□-2	□	□	□	0	0
4	□	20 □ □ □UADRUPLE	2	2	S	2-□-2	2	2	□	0	0
5	1	3 □ 3 D-□	3	1	S	□-8-□	2	2	□	0	0
6	□	20 □ □ □UADRUPLE	3	2	S	2-□-2	8	8	□	0	0
7		□□NE □ □ 1□		1	VIDE□		□	□	□	□	0

MA□□R ITEM LIST

□T□.	DES□RIPTI□N
1	TRAFFI□ SIGNAL □□NTR□LLER □TS-2□T□PE 1□□A□INET F□UNDATI□N AND PAD □MASTER□
1	20□MAST ARM AND F□UNDATI□N
1	2□□MAST ARM AND F□UNDATI□N
1	30□MAST ARM AND F□UNDATI□N
1	□0□MAST ARM AND F□UNDATI□N
2	10□TRAFFI□ SIGNAL P□ST□□ASE AND F□UNDATI□N
3	8□TRAFFI□ SIGNAL P□ST□□ASE AND F□UNDATI□N
9	1-WA□ 3 SE□TI□N SIGNAL HEAD□12" LED LENS □W□VIS□RS□
1	1-WA□ □ SE□TI□N SIGNAL HEAD□12" LED LENS □W□VIS□RS□
2	1-WA□ □ SE□TI□N SIGNAL HEAD□12" LED LENS □W□VIS□RS□
12	□" N□N-L□UVERED □A□□PLATES WITH 3" REFLE□TIVE □□RDER □□ELL□W□
1□	12" □ 12" PULL □□□
1	PRE-EMPTI□N □□NFIRMATI□N STR□□E
3	1-□HANNEL 1 DIRE□TI□N □PTI□AL DETE□T□R
1	PRE-EMPTI□N PHASE SELE□T□R
1	VIDE□ DETE□T□R □AMERA AND PR□□ESS□R
□	PEDESTRIAN SIGNAL HEAD □□□UNTD□WN□
□	APS PEDESTRIAN PUSH □UTT□N □IN□LUDING SIGN AND SADDLE□ADA □□MPLIANT□
1□	WIRE L□□P DETE□T□RS
3	L□□P DETE□T□R AMPLIFIERS □DUAL □HANNEL□
1	ELE□TRI□AL SERVI□E □□NNE□TI□N □□VERHEAD□

PREFERENTIAL PHASING DIAGRAM



VEHI□LE M□VEMENT

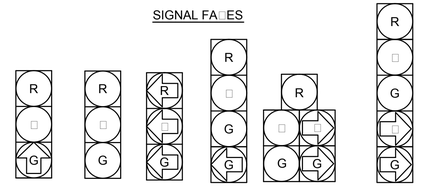
PEDESTRIAN M□VEMENT - □N PED A□TUATI□N

NEEDHAM
INTERSECTION IMPROVEMENTS AT
HIGHLAND AVENUE AND FIRST AVENUE

STATE	FED. AID PR□□□ N□.	SHEET N□.	T□TAL SHEETS
MA	-	2□	□0
PR□□E□T FILE N□.	□0□889		

TRAFFI□ SIGNAL PLANS
HIGHLAND AVENUE□FIRST AVENUE
L□□ATI□N 1
SHEET 2 □F 2

SIGNAL FA□ES



DUAL DISPLA□ □NE SE□TI□N □□UNTD□WN□



P1 - P□

1. ALL TRAFFI□ SIGNAL HEADS SHALL □E E□UIPPED WITH ±5" NON-LOUVERED BACKPLATES WITH 3" RETROREFLECTIVE □□RDER □ELL□W□
2. ALL SIGNAL HEADS SHALL □E E□UIPPED WITH L.E.D. M□DULES WITH 12" LENSES AND □E E□UIPPED WITH □AP VIS□RS.
3. ALL PEDESTRIAN INDI□ATI□NS SHALL □E 1□" □□UNTD□WN L.E.D. AND □E E□UIPPED WITH SUN □AP VIS□RS.

TE□HNI□AL N□TES

1. AN□ PHASE N□T □ALLED WILL □E S□IPPED. SIGNAL INDI□ATI□N WILL N□T □HANGE IF THE ASSIGNED RIGHT-□F-WA□ D□ES N□T □HANGE DURING THE NE□T PHASE □ALLED.
2. THE RIGHT-□F-WA□ MA□□E ASSIGNED T□ AN□ PHASE □R AN□ □□M□INATI□N □F N□N-□□NFLI□TING PHASES. IF □ALLS E□IST □N ALL PHASES□THE RIGHT-□F-WA□ SHALL □E ASSIGNED IN A□□□RDAN□E WITH THE PREFERENTIAL PHASING SE□UEN□E.
3. FLASHING □PERATI□N PER M.U.T.□.D. SE□TI□N □D.28 THR□UGH SE□TI□N □D.31.
□. MA□ I □ALL □THER TIMES
MA□ II □11 AM - □PM M-F
MA□ III □11 AM - □PM M-F
□. Ø2 AND Ø6 DUAL ENTRY
□. INHI□IT MA□ DURING □□□RDINATI□N
□. PEDESTRIAN WAL□ □ □LEARAN□E TIMES DEPI□TED □N THIS PLAN ARE THE MINIMUM INTERVALS T□ □E PR□VIDED. PEDESTRIAN WAL□ □ □LEARAN□E TIMES SHALL □E E□TENDED T□ □□IN□IDE WITH THE ENTIRE LENGTH □F THE □□N□URRENT VEHI□ULAR PHASE
8. □□LEADING PEDESTRIAN INTERVAL

PRE-EMPTI□N N□TES

1. IN RESP□NSE T□ A PRE-EMPTI□N SIGNAL RE□EIVED □□ □NE □F THE □PTI□AL DETE□T□RS□THE □□NTR□LLER SHALL H□LD □R ADVAN□E T□ AND H□LD IN EMERGEN□□ PRE-EMPTI□N PHASE F1 □□R F2 AND F3□ GREEN INTERVAL UNTIL THE PRE-EMPTI□N SIGNAL □EASES□THE □□NTR□LLER SHALL THEN TIME THE PRE-EMPTI□N □LEARAN□E INTERVAL AND SERVE EMERGEN□□ PRE-EMPTI□N PHASE F2 □□R F3□ AND F1□IF NE□ESSAR□□THEN TIME THE PRE-EMPTI□N □LEARAN□E INTERVAL AND RESUME N□RMAL □PERATI□N.
2. THE MINIMUM GREEN TIME AND FULL □LEARAN□E INTERVAL SHALL □E PR□VIDED □N AN□ PHASE THAT IS TERMINATED □□ EMERGEN□□ PRE-EMPTI□N.

F□UNDATI□N L□□ATI□NS

F□UNDATI□N L□□ATI□N	F□UNDATI□N T□PE	□ASELINE	STATI□N	□FFSET	N□TES
1	□A□	HIGHLAND	39□31	38.01 L	D□□R FA□ES N□RTHWEST
2	MA	HIGHLAND	39□18	39.1□L	30-FT T□PE II STEEL
3	MA	HIGHLAND	39□98	39.00 L	20-FT T□PE II STEEL
□	MA	FIRST	2□0□□0	□0.81 L	□0-FT T□PE II STEEL
□	MA	FIRST	2□0□□0	3□.22 R	2□-FT T□PE II STEEL
□	SP	HIGHLAND	39□□0	3□.□3 L	8-FT SIGNAL P□ST
□	SP	HIGHLAND	□0□2□	3□.□9 L	8-FT SIGNAL P□ST
8	SP	HIGHLAND	□0□2□	□3.90 R	8-FT SIGNAL P□ST
9	SP	FIRST	2□0□□□	31.□0 L	10-FT SIGNAL P□ST
10	SP	HIGHLAND	39□32	□□.91 R	8-FT SIGNAL P□ST

□:\889_TR\SIGNAL PLANS.DWG Plotted on 13-Nov-201□ 2:32 PM

Highland Avenue at Second Avenue

NEEDHAM
HIGHLAND AVE. AT SECOND AVE.
TRAFFIC PLANS
SHEET 07 OF 21

1257002-AS-BUILT.DWG Plotted on 23-Oct-2017 7:49 AM

N

STAPLES DRIVEWAY

HIGHLAND AVENUE

SECOND AVENUE

10' TS POST
W/PED SIGNAL HEAD P1
W/APS PED PUSH BUTTON
W/R10-3e(L) & SIGN SADDLE

TS POST
W/PED SIGNAL HEAD P3
W/APS PED PUSH BUTTON
W/R10-3e(L) & SIGN SADDLE

TS POLE
W/MAST ARM & FOUNDATION

10' TS POST

8' TS POST
W/PED SIGNAL HEAD P2
W/APS PED PUSH BUTTON
W/R10-3e(L) & SIGN SADDLE

8' TS POST
W/PED SIGNAL HEAD P5
W/APS PED PUSH BUTTON
W/R10-3e(R) & SIGN SADDLE

BREAK INTO
EXIST PB

12" SWCHL

PC +03.37

10' TS POST
PROP PED SIGNAL HEADS P4 & P7
W/APS PED PUSH BUTTONS
W/2-R10-3e(R) & SIGN SADDLES

2' DWLex
W/4' GAPS (TYP)

TS POLE
W/MAST ARM & FOUNDATION
W/PED SIGNAL HEAD P6
W/APS PED PUSH BUTTON
W/R10-3e(L) & SIGN SADDLE

8' TS POST
W/PED SIGNAL HEAD P8
W/APS PED PUSH BUTTON
W/R10-3e(R) & SIGN SADDLE

10' TS POST

TS CONTROLLER & CABINET
W/GPS TIMING UNIT

TOWN LAYOUT LINE

2' DWLex
W/6' GAPS (TYP)

R3-8a

PC +77.00

+62

+63.5

PT +41.16

PC +58.16

PT +06.5

SWL

SWL-125'

SWL-200'

DBYL

0 20 50 100

SCALE: 1" = 20'

1257002-AS-BUILT.DWG Plotted on 23-Oct-2017 7:49 AM

ø1	ø2	ø3	ø4	ø5	ø6	ø7	ø8	
	PERM							

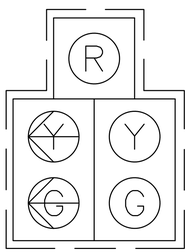
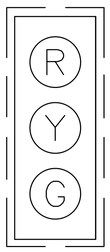
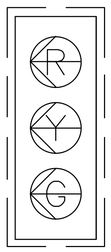
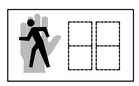
SEQUENCE AND TIMING FOR FULLY ACTUATED CONTROL

APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	FLASH
HIGHLAND AVENUE	WB	A,B				G	Y	R				R	R	R	G	Y	R	R	R	R				R	R	R	FY
HIGHLAND AVENUE	WB	C				G	Y	R				R	R	R	G	Y	R	R	R	R				R	R	R	FY
HIGHLAND AVENUE	EB	D,E				R	R	R				R	R	R	R	R	R	G	Y	R				R	R	R	FY
SECOND AVENUE	NB	F,G				R	R	R				R	R	R	R	R	R	R	R	R				G	Y	R	FR
SECOND AVENUE	NB	H,J				R	R	R				R	R	R	R	R	R	R	R	R				G	Y	R	FR
STAPLES DRIVEWAY	SB	K				R	R	R				G	Y	R	R	R	R	R	R	R				R	R	R	FR
STAPLES DRIVEWAY	SB	L				R	R	R				G	Y	R	R	R	R	R	R	R				R	R	R	FR
PEDESTRIAN X-ING	EB-WB	P1-P2				DW	DW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW				**	DW	DW	OUT
PEDESTRIAN X-ING	NB-SB	P3-P4				**	DW	DW				DW	DW	DW	DW	DW	DW	DW	DW	DW				DW	DW	DW	OUT
PEDESTRIAN X-ING	NB-SB	P5-P6				DW	DW	DW				DW	DW	DW	DW	DW	DW	**	DW	DW				DW	DW	DW	OUT
PEDESTRIAN X-ING	EB-WB	P7-P8				DW	DW	DW				**	DW	DW	DW	DW	DW	DW	DW	DW				DW	DW	DW	OUT
TIMING IN SECONDS																											
MINIMUM GREEN (INITIAL)						15						6			4			15						6			CONFLICT FLASH OPERATION ONLY
PASSAGE TIME (VEHICLE)						2						2			2			2						3			
MAXIMUM 1						25						17			10			35						18			
MAXIMUM 2						42						17			7			35						30			
MAXIMUM 3						32						17			6			30						18			
YELLOW CLEARANCE							4						4			3			4						4		
RED CLEARANCE								3						1			3			3							1
PEDESTRIAN WALK						7						7						7						7			
PEDESTRIAN CLEARANCE						17	83'=24s					15	70'=20s					19	91'=26s					11	56'=16s		
DETECTOR MEMORY						NON-LOCK						NON-LOCK			NON-LOCK			NON-LOCK						NON-LOCK			
RECALL						MIN						OFF			OFF			MIN						OFF			

COORDINATION DATA				COORDINATION PHASE SPLIT TIMES							
CYCLE NO.	PATTERN	CYCLE	OFFSET	ø1	ø2	ø3	ø4	ø5	ø6	ø7	ø8
MODE				COORD ø							

NOTES:
1. AUTOMATIC FLASHING OPERATION PER 2009 M.U.T.C.D., AS AMENDED.
2. ** NORMALLY DW, W/FDW UPON PEDESTRIAN PUSH BUTTON ACTUATION
3. MAXIMUM 1 = NORMAL OPERATION
4. MAXIMUM 2 = 4:00 PM - 6:00 PM, MON-FRI
5. MAXIMUM 3 = 11:00 AM - 1:00 PM, SAT-SUN
6. STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
7. DURING THE PEDESTRIAN INTERVAL FDW THROUGH YELLOW OPERATION SHALL NOT BE IN EFFECT.

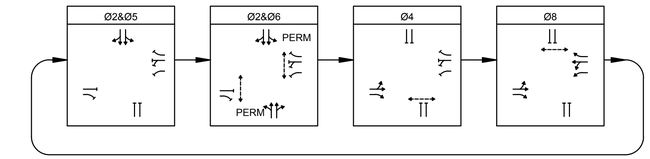
SIGNAL HEAD DATA

A,B,K	C,D,E,H,J,L	F,G	P1,P2,P3,P4,P5,P6,P7,P8
			 W/COUNTDOWN TIMER (L.E.D.)

SEQUENCE & TIMING NOTES:

1. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
2. THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
3. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
4. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

PREFERENTIAL PHASE SEQUENCE



LOOP DETECTOR DATA

DETECTOR NO.	NO. SECTION/ SIZE	NO. OF TURNS	OPERATIONS	DELAY /EXT	CALL PHASE	LOOP CONNECTION
1	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	5 SEC DELAY	Ø8	SERIES
2	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø8	SERIES
3	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø8	SERIES
4	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES
5	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES

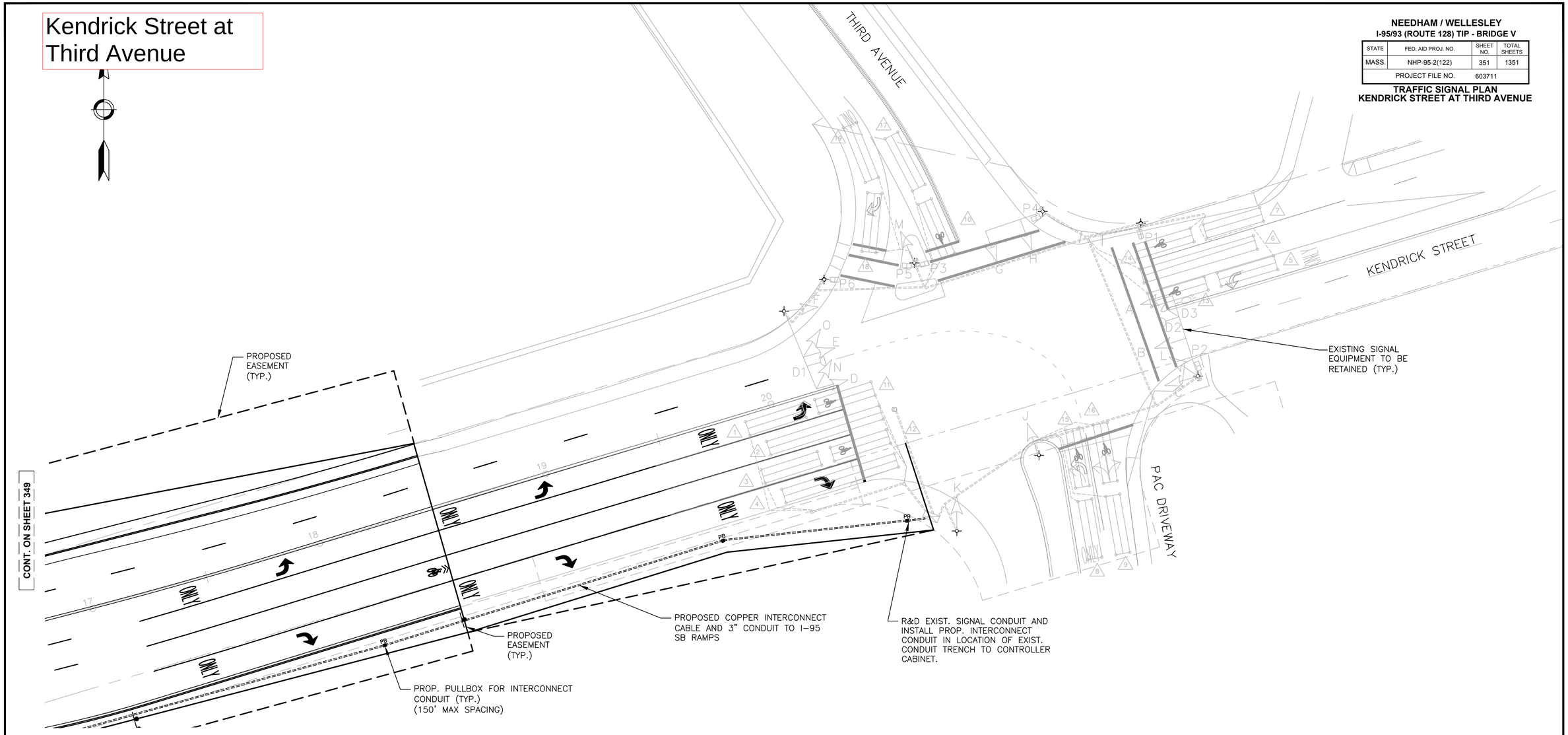
NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE LOOP DETECTOR

Kendrick Street at Third Avenue

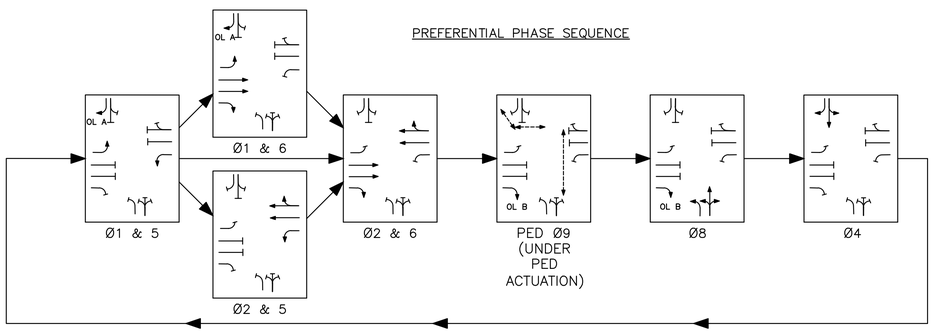
NEEDHAM / WELLESLEY
I-95/93 (ROUTE 128) TIP - BRIDGE V

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	NHP-95-2(122)	351	1351
PROJECT FILE NO.	603711		

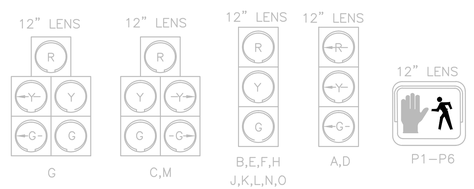
TRAFFIC SIGNAL PLAN
KENDRICK STREET AT THIRD AVENUE



PREFERENTIAL PHASE SEQUENCE



EXISTING SIGNAL HEAD DATA



20 0 20 40
SCALE IN FEET

Jacobs - I:\engY\04510.11-Rt 128\PS&E\Plots\0347-0356 Signals.dwg, January 09, 2014

SEQUENCE AND TIMING

			OL A														OL B			OL B				PREEMPT ØA–D1			PREEMPT ØB–D2			PREEMPT ØC–D3		
			ø1			ø2			ø4			ø5			ø6			ø8			ø9												
STREET	DIRECTION	HOUSINGS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	FLASH OPER.	1	2	3	4	5	6	7	8	9
KENDRICK STREET	E.B.	A	~~G~~	~~Y~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~FR~~	R	R	R	~~G~~	~~Y~~	~~R~~	R	R	R
KENDRICK STREET	E.B.	B	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	FY	R	R	R	G	Y	R	R	R	R
KENDRICK STREET	E.B.	C	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R/~~G~~	R/~~Y~~	R	R/~~G~~	R/~~Y~~	R	FY	R	R	R	G/~~G~~	Y/~~Y~~	R	R	R	R
KENDRICK STREET	W.B.	D	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~G~~	~~Y~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~FR~~	~~G~~	~~Y~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~	~~R~~
KENDRICK STREET	W.B.	E,F	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY	G	Y	R	R	R	R	R	R	R
PAC DRIVEWAY	N.B.	G	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	~~G~~/G	~~Y~~/Y	R	R	R	R	FR	R	R	R	R	R	R	R	R	R
PAC DRIVEWAY	N.B.	H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FR	R	R	R	R	R	R	R	R	R
THIRD AVENUE	S.B.	J,K,L	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR	R	R	R	R	R	R	G	Y	R
THIRD AVENUE	S.B.	M	R/~~G~~	R/~~Y~~	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR	R	R	R	R	R	R	G/~~G~~	Y/~~Y~~	R
THIRD AVENUE	S.B.	N,O	G	Y	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	FR	R	R	R	R	R	R	G	Y	R
PEDESTRIAN	ALL	P1 – P6	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W/FDW	DW	DW	OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW
TIMING IN SECONDS																																	
MINIMUM INTERVAL			7			10			10			7			10			7			28												
VEHICLE EXTENSION			2			2			2			2			2			2			0												
MAXIMUM I		FREE	40			20			15			15			49			16			28												
MAXIMUM II		COORDINATED	46			42			11			8			62			10			28												
YELLOW AND RED CLEARANCE				4	1		4	1		4	1		4	1		4	1		4	1		4	1			4	1		4	1		4	1
WALK																					7/21	22											
PEDESTRIAN CLEARANCE																							4										
RECALL				OFF			SOFT			OFF			OFF			SOFT			OFF			OFF					–			–			–	
MEMORY				NON–LOCK			NON–LOCK			NON–LOCK			NON–LOCK			NON–LOCK			NON–LOCK			LOCK					–			–			–	

NOTE: FLASHING OPERATION PER MUTCD SECTION 4D.28–4D.31.

* HOLD ON INPUT PLUS 10 SECONDS (20 SEC MINIMUM/120 SEC MAXIMUM)

EMERGENCY ONLY

NEEDHAM / WELLESLEY
I-95/93 (ROUTE 128) TIP - BRIDGE V

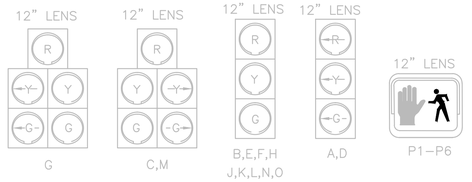
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.	NHP-95-2(122)	352	1351
PROJECT FILE NO.	603711		

TRAFFIC SIGNAL DATA
KENDRICK STREET AT THIRD AVENUE

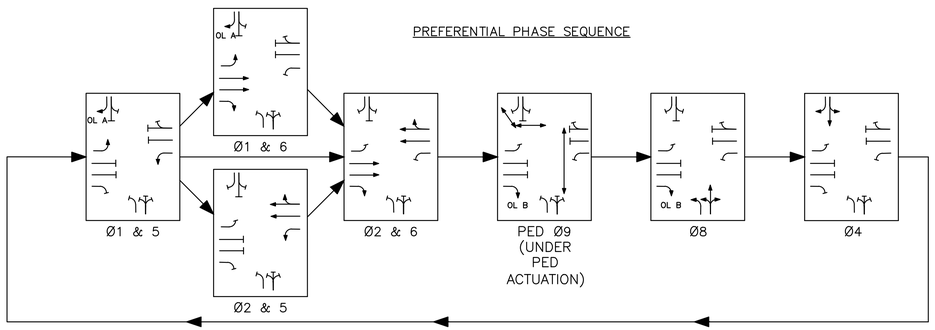
DAILY AND WEEKLY PROGRAM

	MONDAY THRU FRIDAY	SATURDAY	SUNDAY
PLAN 1	5:30 AM– 10:00 AM	–	–
PLAN 2	3:00 PM– 7:00 PM	–	–
PLAN 3	10:00 AM– 3:00 PM	9:00 AM– 9:00 PM	10:00 AM– 7:00 PM
FREE OPERATION	ALL OTHER TIMES	ALL OTHER TIMES	ALL OTHER TIMES

EXISTING SIGNAL HEAD DATA



PREFERENTIAL PHASE SEQUENCE



LIST OF MAJOR ITEMS REQUIRED

PAY ITEM	QUANTITY	DESCRIPTION
816.02	1	CONNECTION TO INTERCONNECT SYSTEM

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AND OPERATING TRAFFIC CONTROL SYSTEM

COORDINATION DATA
(ALL ENTRIES IN SECONDS)

	PLAN 1	PLAN 2	PLAN 3
CYCLE LENGTH	130 SEC	125 SEC	100 SEC
OFFSET	67	55	39
ø1 & ø5	13	12	12
ø1 & ø6	29	9	6
ø2 & ø6	28	42	22
PED ø9	33	33	33
ø8	12	14	12
ø4	15	15	15
COORDINATED PHASE	ø2 & ø6	ø2 & ø6	ø2 & ø6

DETECTOR DATA

DETECTOR NO.	NO. SECTION/ SIZE	NO. OF TURNS	CALL DELAY (SEC)	CALL PHASE	SWITCH+EXTEND PHASE	MODE	LOOP CONNECTION
1	1–6'x25'	Q	0	ø1	–	PRESENCE/ BICYCLE	–
2	1–6'x50'	Q	0	ø6	–	PRESENCE/ BICYCLE	–
3	1–6'x25'	Q	0	ø6	–	PRESENCE/ BICYCLE	–
4	1–6'x50'	Q	5	ø6	ø8	PRESENCE/ BICYCLE	–
5	1–6'x25'	Q	0	ø5	–	PRESENCE/ BICYCLE	–
6	1–6'x50'	Q	0	ø2	–	PRESENCE/ BICYCLE	–
7	1–6'x25'	Q	5	ø2	–	PRESENCE/ BICYCLE	–
8	1–6'x25'	Q	0	ø8	–	PRESENCE/ BICYCLE	–
9	1–6'x25'	Q	5	ø8	–	PRESENCE/ BICYCLE	–
10	1–6'x25'	Q	0	ø4	–	PRESENCE/ BICYCLE	–
11	1–6'x25'	Q	0	ø1	–	PRESENCE/ BICYCLE	–
12	1–6'x25'	Q	0	ø6	–	PRESENCE/ BICYCLE	–
13	1–6'x25'	Q	0	ø5	–	PRESENCE/ BICYCLE	–
14	1–6'x25'	Q	5	ø2	–	PRESENCE/ BICYCLE	–
15	1–6'x25'	Q	0	ø8	–	PRESENCE/ BICYCLE	–
16	1–6'x25'	Q	5	ø8	–	PRESENCE/ BICYCLE	–
17	1–6'x25'	Q	0	ø4	–	PRESENCE/ BICYCLE	–
18	1–6'x25'	Q	5	ø4	ø1	PRESENCE/ BICYCLE	–
19	1–6'x25'	Q	5	ø4	ø1	PRESENCE/ BICYCLE	–

SIGNAL NOTES:

1. EXISTING SIGNAL EQUIPMENT AT THIS LOCATION SHALL BE RETAINED, UNLESS OTHERWISE NOTED.
2. STANDARD NEMA PHASING IN A DUAL RING CONFIGURATION SHALL BE USED.
3. SIGNAL TO OPERATE IN COORDINATION WITH PROPOSED SIGNAL AT I–95 SB RAMPS AND EXISTING SIGNAL AT HUNTING ROAD.
4. ONLY SIGNS TO BE MOUNTED ON SIGNAL EQUIPMENT ARE SHOWN ON THIS PLAN. SEE SIGN AND PAVEMENT MARKING PLANS FOR ALL OTHER SIGNS.
5. EACH LOOP DETECTOR GROUP SHALL BE CONNECTED TO A SINGLE LOOP AMPLIFIER CHANNEL.
6. ALL DETECTOR SETTINGS TO BE IMPLEMENTED AT THE CONTROLLER ONLY.
7. UNLESS OTHERWISE NOTED, LOOP DETECTORS SHALL BE PLACED IN THE CENTER OF THE LANE.
8. EXCLUSIVE PEDESTRIAN PHASE IS TO BE ACTIVATED BY PUSH BUTTON ONLY.

SEQUENCE & TIMING NOTES:

1. IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
2. IF THE ASSIGNED RIGHT–OF–WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT TRAFFIC MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.
3. THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON–CONFLICTING PHASES.
4. IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
5. FLASHING OPERATION IS FOR EMERGENCY ONLY. THE SIGNAL SHALL PROVIDE STOP AND GO OPERATION 24 HOURS DAILY.
6. Ø3 AND Ø7 SHALL NOT BE USED.
7. THE CONTRACTOR SHALL MONITOR TRAFFIC CONDITIONS DURING CONSTRUCTION AND ADJUST SIGNAL TIMINGS AT STUDY AREA INTERSECTIONS AS NECESSARY AND AS DIRECTED BY THE ENGINEER.

EMERGENCY PRE–EMPTION NOTES:

1. THE EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE STROBE AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION.
2. WHEN ACTIVATED BY AN EMERGENCY VEHICLE, THE SIGNAL SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY, FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THE GREEN INTERVAL FOR THE PRE–EMPTED PHASE SHALL THEN FOLLOW.
3. IF ADDITIONAL PRE–EMPTION PHASES ARE ACTIVATED WHILE IN PRE–EMPTION, THE ORIGINAL PRE–EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE–EMPTION PHASE.
4. UPON COMPLETION OF PRE–EMPTION, IN RETURNING TO NORMAL OPERATION, ϕ2 AND ϕ6 SHALL FOLLOW.
5. IN EMERGENCY PRE–EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE–EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.
6. EMERGENCY PRE–EMPTION SHALL OVERRIDE COORDINATION.

Jacobs - I:\eng\Y0451011=Rt 128PSE\Port\0347-0358 Signals.dwg January 08, 2014

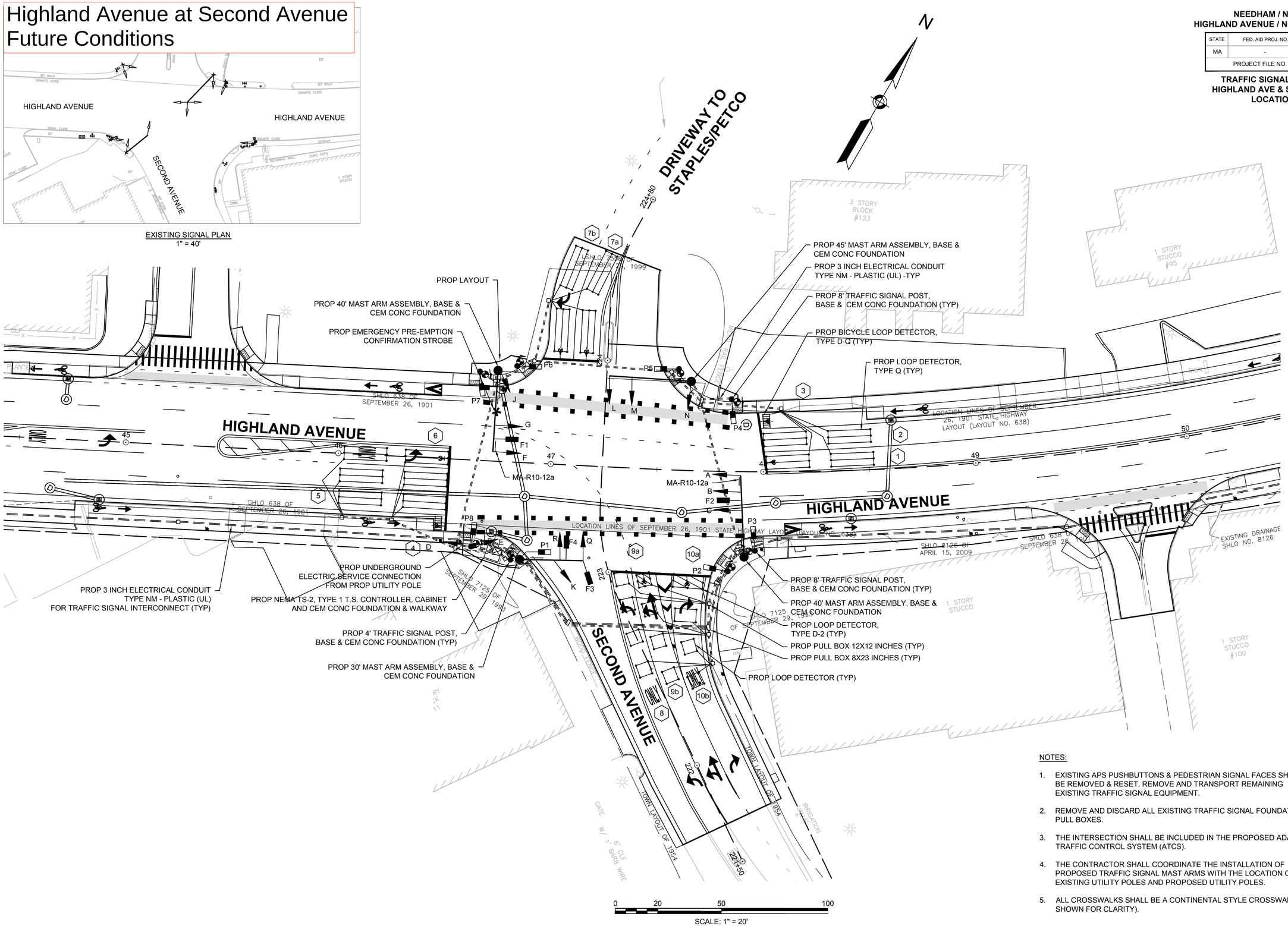
Highland Avenue at Second Avenue
Future Conditions

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	176	364
PROJECT FILE NO.	606635		

TRAFFIC SIGNAL LAYOUT -
HIGHLAND AVE & SECOND AVE
LOCATION 4

EXISTING SIGNAL PLAN
1" = 40'



NOTES:

1. EXISTING APS PUSHBUTTONS & PEDESTRIAN SIGNAL FACES SHOULD BE REMOVED & RESET. REMOVE AND TRANSPORT REMAINING EXISTING TRAFFIC SIGNAL EQUIPMENT.
2. REMOVE AND DISCARD ALL EXISTING TRAFFIC SIGNAL FOUNDATIONS & PULL BOXES.
3. THE INTERSECTION SHALL BE INCLUDED IN THE PROPOSED ADAPTIVE TRAFFIC CONTROL SYSTEM (ATCS).
4. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF PROPOSED TRAFFIC SIGNAL MAST ARMS WITH THE LOCATION OF EXISTING UTILITY POLES AND PROPOSED UTILITY POLES.
5. ALL CROSSWALKS SHALL BE A CONTINENTAL STYLE CROSSWALK (NOT SHOWN FOR CLARITY).

606635_TR(SIGNAL).DWG Plotted on 4-May-2018 5:35 PM

SEQUENCE AND TIMING FOR FULLY-ACTUATED TRAFFIC SIGNAL CONTROL

STREET	DIR	HOUSING	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7	Ø8	Ø9	FLASHING OPERATION	ØF1	ØF2	ØF3	ØF4
HIGHLAND AVE	NB	A		<R	<R	<R	<R	<R	<R	<R	<R	(R)	<R	<R	<R	<R	<R	<R	<FY	<Y	<R	<R	<R	<R	<R	<R
HIGHLAND AVE	NB	B,C,D		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R
HIGHLAND AVE	SB	E,F		<R	<FY	<Y	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<G	<Y	<R	<R	<R	<R	<R	<R
HIGHLAND AVE	SB	G		R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R
SECOND AVE	WB	J,K		<R	<R	<R	<R	<R	<G	<Y	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<R	<G	<Y	<R	<R	<R	<R
SECOND AVE	WB	L,M		R	R	R	R	R	<G/G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	<G/G	Y	R	R	R	R	R	R
SECOND AVE	WB	N		R	R	R	R	R	G	Y	R	R	R	R	R	R/G>	R/Y>	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R
STAPLES DRWY	EB	Q		R	R	R	R	R	R	R	R	R	<G/G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	<G/G	Y	R	R	R	R
STAPLES DRWY	EB	R		R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R
												(R)																									
PEDESTRIAN		P1-P2		DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	W	W/FDW	DW	DW							OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
PEDESTRIAN		P3-P4		DW	DW	DW	DW	W	W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW							OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
PEDESTRIAN		P5-P6		W	W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW							OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
PEDESTRIAN		P7-P8		DW	DW	DW	DW	DW	DW	DW	DW	W	W/FDW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW							OUT	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW	DW
INTERVALS (IN SECONDS)	MINIMUM GREEN				15			10			4			4			15											EMERGENCY ONLY	6			6			6			6		
	EXTENSION INTERVAL				2			2			2			2			2																				
	MAXIMUM I				50			30			10			20			40																				
	MAXIMUM II				50			30			10			10			40																				
	CLEARANCE INTERVAL					4	2			3	2				3	2						4	2								4	2		4	2		3	2		3	2
	"WALK" INTERVAL			3 #	4			3 #	4			3 #	4						3 #	4																	
	PED CLEARANCE INTERVAL					17			14	3			17	3							25																	
DETECTOR MEMORY				NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK			NON-LOCK																					
RECALL SWITCH				SOFT			OFF			OFF			OFF			SOFT																					

TECHNICAL NOTES

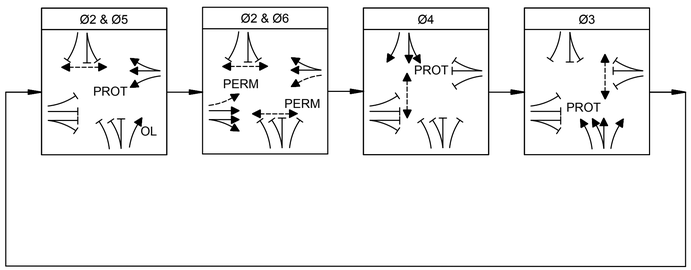
1. ANY PHASE NOT CALLED WILL BE SKIPPED. SIGNAL INDICATION WILL NOT CHANGE IF THE ASSIGNED RIGHT OF WAY DOES NOT CHANGE DURING THE NEXT PHASE CALLED.
2. THE RIGHT-OF-WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES. IF CALLS EXIST ON ALL PHASES, THE RIGHT-OF-WAY SHALL BE ASSIGNED IN ACCORDANCE WITH THE PREFERENTIAL PHASING SEQUENCE.
3. FLASHING OPERATION PER M.U.T.C.D. SECTION 4D.28 THROUGH SECTION 4D.31
4. MAX I = NORMAL OPERATION
   MAX II = MON-FRI, 3PM - 7PM
5. PHASES Ø2 & Ø6 SHALL BE DUAL ENTRY.

PRE-EMPTION NOTES

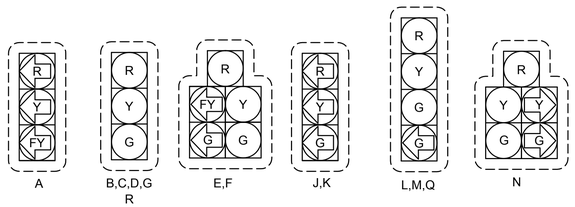
1. IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED BY ONE OF THE OPTICAL DETECTORS, THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY PRE-EMPTION PHASE F1 (OR F2, F3 AND F4) GREEN INTERVAL UNTIL THE PRE-EMPTION SIGNAL CEASES, THE CONTROLLER SHALL THEN TIME THE PRE-EMPTION CLEARANCE INTERVAL AND SERVE EMERGENCY PRE-EMPTION PHASE F2 (OR F3, F4 AND F1) IF NECESSARY, THEN TIME THE PRE-EMPTION CLEARANCE INTERVAL AND RESUME NORMAL OPERATION. IF MORE THAN ONE PHASE IS CALLED, PRIORITY SHALL BE GIVEN TO F2, THEN F1, THEN F3, FOLLOWED BY F4.
2. THE MINIMUM GREEN TIME AND FULL CHANGE AND CLEARANCE INTERVAL SHALL BE PROVIDED ON ANY PHASE THAT IS TERMINATED BY EMERGENCY PRE-EMPTION.

LEADING PEDESTRIAN INTERVAL

PREFERENTIAL PHASING DIAGRAM



SIGNAL IDENTIFICATION



1. ALL PROPOSED TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH ±5" NON-LOUVERED BACKPLATES WITH 3" RETROREFLECTIVE BORDER (YELLOW).
2. ALL PROPOSED TRAFFIC SIGNAL HEADS SHALL BE EQUIPPED WITH L.E.D. MODULES WITH 12" LENSES AND BE EQUIPPED WITH TUNNEL VISORS.
3. ALL PEDESTRIAN INDICATIONS SHALL BE 16" COUNTDOWN L.E.D. AND BE EQUIPPED WITH SUN CAP VISORS.

LOOP DETECTOR OPERATION

DETECTOR NO.	NO. OF SEGMENTS	LOOP SIZE (FT)	AMPLIFIER NO.	CHANNEL NO.	SPLICE PATTERN*	NO. OF TURNS	Ø CALLED	Ø EXTENSION	MODE: A=PULSE B=PRES. C=CALLING	DELAY (SEC)	EXTENSION (SEC)
1	2	6X20	1	1	S	2-4-2	5	5	B	0	0
2	2	6X20	1	2	S	2-4-2	2	2	B	0	0
3	1	3X6	2	1	BL	4-8-4	2	2	B	0	0
4	1	3x6	2	2	BL	4-8-4	6	6	B	0	0
5	4	6X20	3	1	S	2-4-2	6	6	B	0	0
6	2	6X20	3	1	S	2-4-2	6	6	B	0	0
7a	2	6X20	3	2	S	2-4-2	4	4	B	0	0
7b	2	6X20	3	2	S	2-4-2	4	4	B	5	0
8	4	6x6	4	1	S	3	3	3	B	0	0
9a	1	6x6	5	1	BL	4	3	3	B	0	0
9b	3	6x6	5	2	S	3	3	3	B	0	0
10a	1	14x6	6	1	BL	4	3	3	B	0	0
10b	3	1-10x6 2-6x6	6	2	S	3	3	3	B	0	0

* S=SERIES, P=SERIES/PARALLEL, BL=BICYCLE LOOPS

LOOP DETECTOR NOTES:

1. SEE LOOP DETECTOR DETAIL SHEETS FOR SPLICE PATTERN AND OTHER INFORMATION.

NEEDHAM / NEWTON
HIGHLAND AVENUE / NEEDHAM STREET

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	177	364
PROJECT FILE NO.	606635		

TRAFFIC SIGNAL DATA -
HIGHLAND AVE & SECOND AVE
LOCATION 4

MAJOR ITEM LIST

QTY.	DESCRIPTION
1	TRAFFIC SIGNAL CONTROLLER (TS-2, TYPE 1) TYPE 8DW W/ 8DW CABINET, & CEM CONC FOUNDATION & PAD
1	30 FT MAST ARM (STEEL) INCLUDE BASE AND CEM CONCRETE FOUNDATION
2	40 FT MAST ARM (STEEL), INCLUDE BASE AND CEM CONCRETE FOUNDATION
1	45 FT MAST ARM (STEEL) INCLUDE BASE AND CEM CONCRETE FOUNDATION
1	4 FT TRAFFIC SIGNAL POST, BASE & CEM CONC FOUNDATION
6	8 FT TRAFFIC SIGNAL POST, BASE & CEM CONC FOUNDATION
1	10 FT TRAFFIC SIGNAL POST, BASE & CEM CONC FOUNDATION
8	1-WAY, 3 SECTION SIGNAL HEAD, 12" L.E.D. LENS (W/ VISORS)
5	1-WAY, 4 SECTION SIGNAL HEAD, 12" L.E.D. LENS (W/ VISORS)
1	1-WAY, 5 SECTION SIGNAL HEAD, 12" L.E.D. LENS (W/ VISORS)
1	2-WAY, 3/4 SECTION SIGNAL HEAD, 12" L.E.D. LENS (W/ VISORS)
15	5" NON-LOUVERED BACKPLATES WITH 3" RETROREFLECTIVE (YELLOW) BORDER
28	WIRE LOOP DETECTORS
6	LOOP DETECTORS AMPLIFIERS (DUAL CHANNEL)
8	PEDESTRIAN SIGNAL HEAD (L.E.D.), WITH COUNTDOWN DISPLAY
8	ACCESSIBLE PEDESTRIAN SIGNAL PUSH BUTTON ASSEMBLY (INCL. SIGN & SADDLE)
1	PRE-EMPTION PHASE SELECTOR
1	EMERGENCY PRE-EMPTION CONFIRMATION STROBE
4	EMERGENCY PRE-EMPTION RECEIVERS
1	SERVICE CONNECTION (ELECTRIC)
1	ADAPTIVE SIGNAL CONTROL (ITEM 815.925)
9	12"x12" PULL BOX -SD2.031 (PAID UNDER ITEM 811.31)
9	8"x23" PULL BOX -SD2.030 (PAID UNDER ITEM 811.30)

PLUS ALL NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIALS AND EQUIPMENT TO COMPLETE THE INSTALLATION.

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R.21 Signal Equipment Status
Highland Avenue at Second Avenue

Response to Traffic Peer Review
Boston Children's Hospital
Needham, MA

MassDOT
Massachusetts Department of Transportation
Highway Division

Needham-Newton Corridor Project

VIRTUAL PUBLIC INFORMATION MEETING PRESENTATION

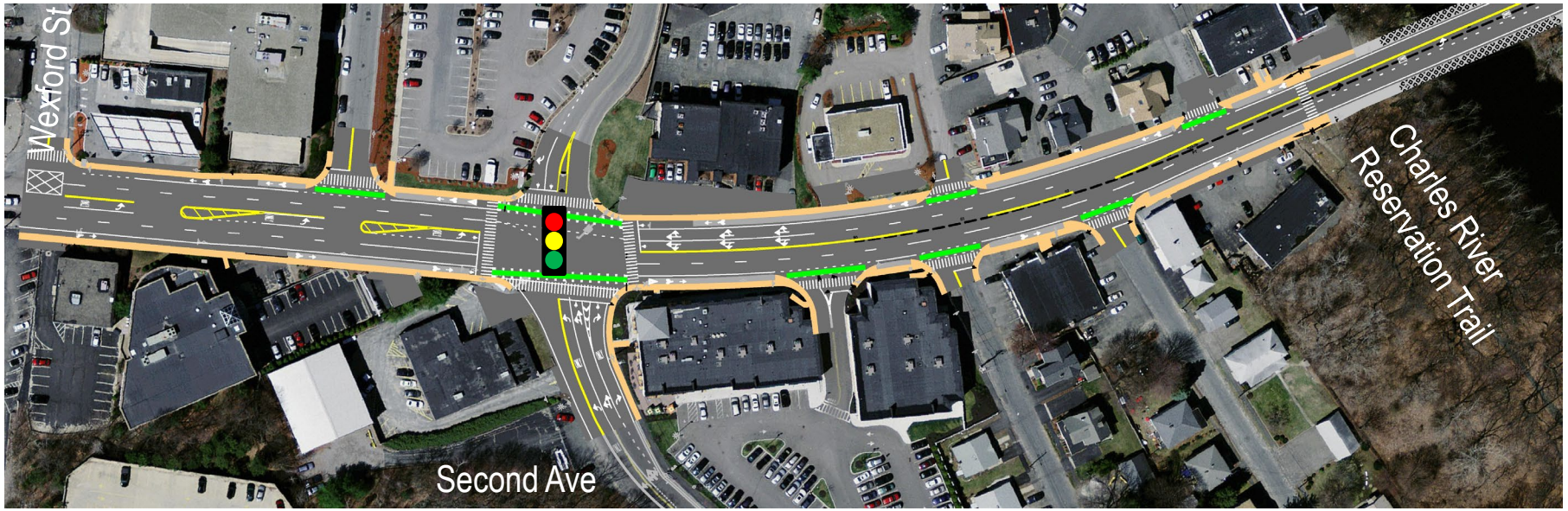
September 30, 2020 | 6:30 PM

Related Projects



Highland Avenue - Wexford to Charles River

- Roadway widening
- Two lanes in each direction – exclusive left turn lanes
- Raised bike lane/sidewalk installation
- Signal replacement at Second Ave
- Connection to Charles River Reservation Trail
- Work to begin in this area late Winter 2021



What You Will See – Fall 2020

Construction will commence in November 2020. Sequencing and durations are subject to change and are weather dependent.

Utility Work

- Installation of new utility poles and wires at back of sidewalk
- Includes tree trimming and removal for utility relocation – a final plan will be developed in coordination with each community and arborists. No trees will be removed before a final plan is approved.
- This work will be done throughout the entire corridor
- Will continue through 2021

Roadway Work

Highland Ave from Webster Street to Hunting Road/Gould Street

- Drainage installation and water work
- Underground traffic signal infrastructure installation
- Installation of retaining walls at various locations

Highland Ave from Wexford Street to Charles River Bridge

- Retaining wall installation

What You Will See – Winter 2020/2021

Roadway Work

Highland Ave from Webster Street to Hunting Road/Gould Street

- Continue drainage installation and water work
- Continue underground traffic signal infrastructure installation

Highland Ave from Wexford Street to Charles River Bridge

- Drainage installation and water work
- Underground traffic signal infrastructure installation

What You Will See – Spring 2021

Roadway Work

Highland Ave from Webster Street to Hunting Road/Gould Street

- Pavement milling and placement of hot mix asphalt
- Commence curb & sidewalk reconstruction
- Installation of temporary pavement markings
- Installation of traffic signal foundations

Highland Ave from Wexford Street to Charles River Bridge

- Continue drainage installation and water work
- Continue underground traffic signal infrastructure installation

Roadway work is expected to begin in Newton on Needham Street between Oak Street and Tower Road in the summer of 2021. A public meeting will be scheduled in early spring 2021 before this work begins.

R22 Signal Warrant Analysis

MUTCD 2000 (Millennium Edition)

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: Kendrick Street at Fourth Avenue

Major Street Direction: Eastbound-Westbound

Year: 2019 **Condition:** Existing

Operating speed on major roadway: 35 mph

Number of approaches: 4

Warrant 1	EIGHT-HOUR VEHICULAR VOLUME	Required approach volumes: Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	600	600
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 2 Lane(s) on each approach	900	900
	Minor Street : 1 Lane(s) on each approach	75	75
	80 PERCENT SATISFACTION OF WARRANT 1A **AND** WARRANT 1B	Warrant 1A	Warrant 1B
	Major Street : 2 Lane(s) on each approach	480	720
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2	FOUR HOUR VEHICULAR VOLUME	
	Major Street : 2 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street : 1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	PEAK HOUR VOLUME	
	Major Street : 2 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street : 1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road: Eastbound	Entering Vol. on Major Road: Westbound	Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants? 1A	1B	80%(1A&1B)	2	3
	Fourth Avenue/Driveway	Kendrick Stree	Kendrick Street						
6:00 - 7:00 AM				0	No	No	No	No	No
7:00 - 8:00 AM	117	1588	808	2396	No	Yes	No	Yes	Verify
8:00 - 9:00 AM	126	1762	874	2636	No	Yes	Yes	Yes	Yes
9:00 - 10:00 AM				0	No	No	No	No	No
10:00 - 11:00 AM				0	No	No	No	No	No
11:00 - 12:00 AM				0	No	No	No	No	No
12:00 - 1:00 PM				0	No	No	No	No	No
1:00 - 2:00 PM				0	No	No	No	No	No
2:00 - 3:00 PM				0	No	No	No	No	No
3:00 - 4:00 PM				0	No	No	No	No	No
4:00 - 5:00 PM	282	924	1231	2155	Yes	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	278	1059	1319	2378	Yes	Yes	Yes	Yes	Yes
6:00 - 7:00 PM				0	No	No	No	No	No
					No	**No**	**No**	**Yes**	**Yes**
				Warrants Met?	**1**			**2**	**3**
					NO			**Yes**	**Yes**

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No

Peak Four Hour Pedestrian Volumes: (non-concurrent)

Warrant 5, School Crossing:
See MUTCD for details.

Warrant 6, Coordinated Signal System:
See MUTCD for details.

Warrant 7, Crash Experience: No

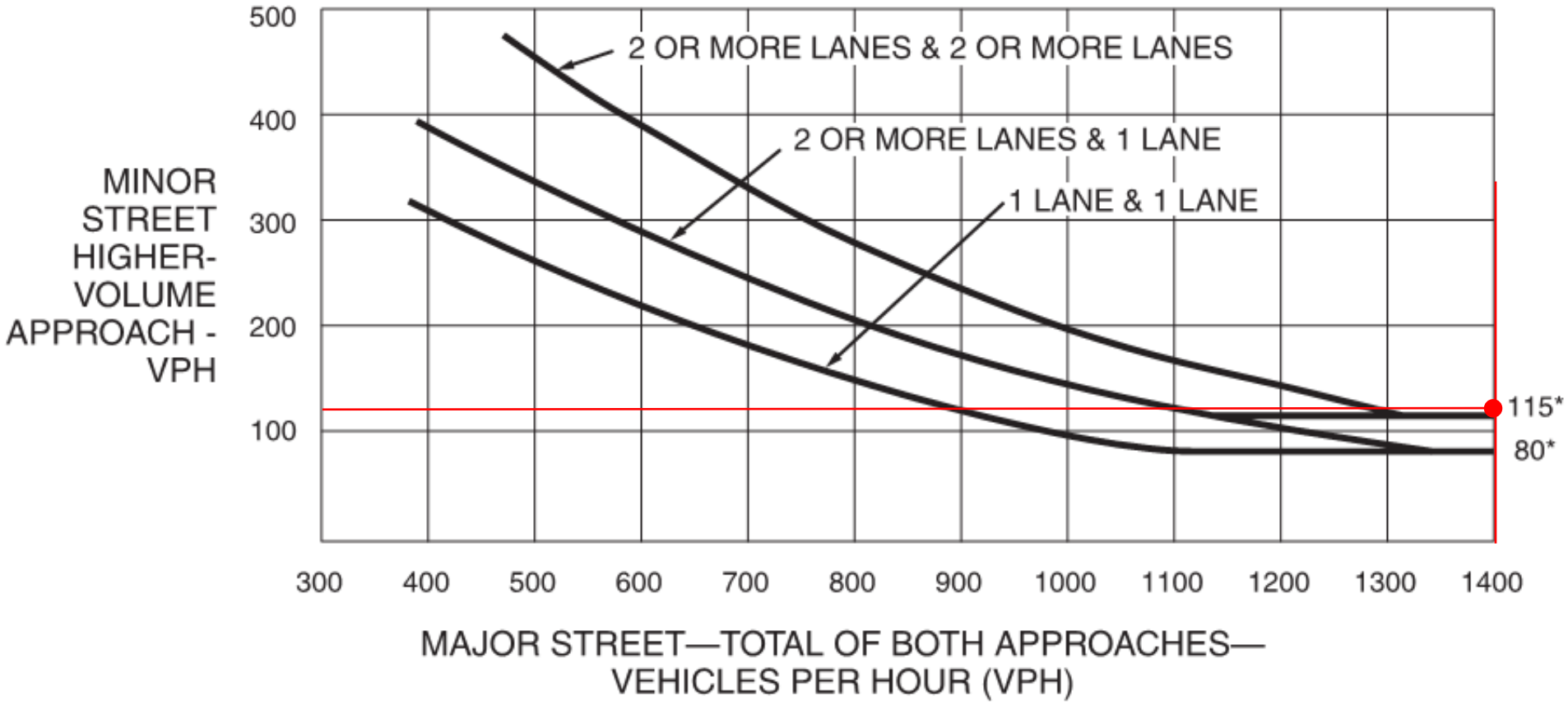
of accidents "correctable by signalization" occuring in the last 12 months:

Warrant 8, Roadway Network:
See MUTCD for details.

Source: *Manual on Uniform Traffic Control Devices* (MUTCD); Millenium Edition, December 2000

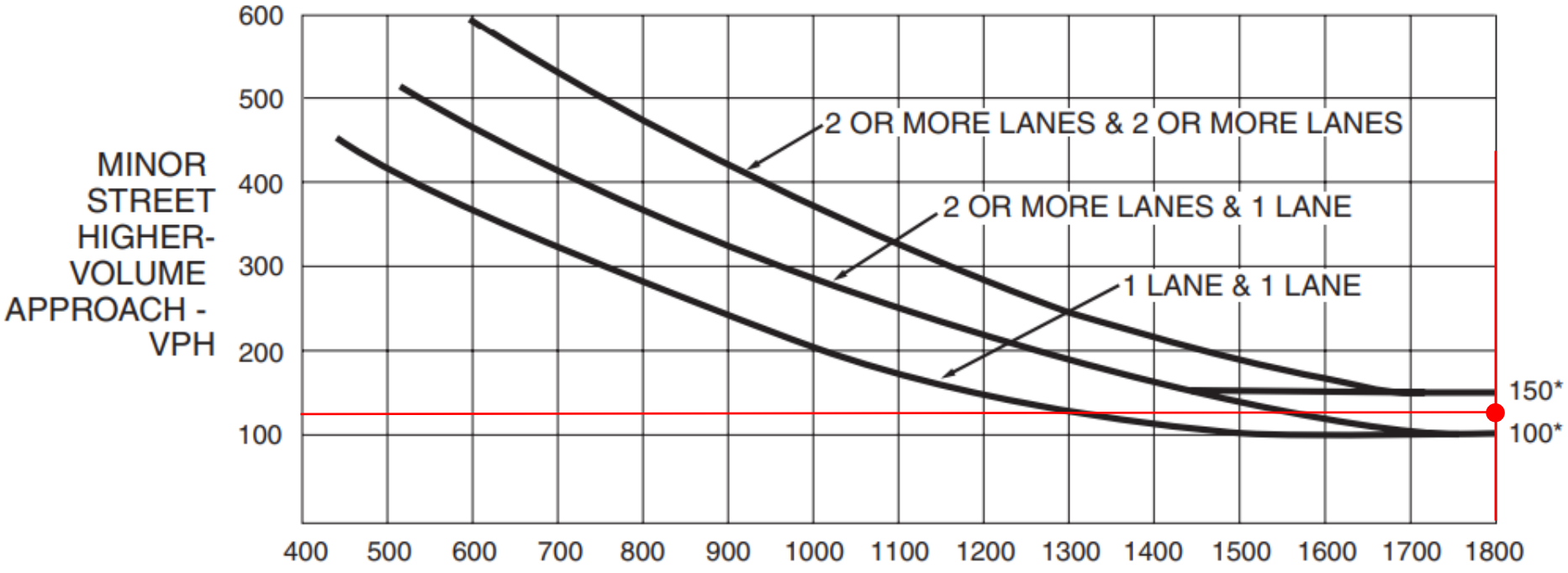
last updated: 12/12/01

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

	Highland Avenue / First Street	Highland Avenue / Second Avenue	Kendrick Street / Third Avenue	Kendrick Street / Fourth Avenue
Signalized?	Yes	Yes	Yes	No
MassDOT Average Crash Rate	0.71	0.71	0.71	0.52
Calculated Crash Rate	0.52	0.44	0.05	0.47
Exceeds Average?	No	No	No	No
Year				
2013	5	6	0	4
2014	9	1	1	2
2015	1	4	2	5
2016	8	6	0	10
2017	4	3	0	4
Total	27	20	3	25
Collision Type				
Angle	7	4	1	17
Head-on	0	1	0	1
Front to front	0	0	0	0
Rear-end	11	4	1	3
Rear-to-Rear	0	1	0	0
Sideswipe, opposite direction	0	1	0	0
Sideswipe, same direction	7	5	1	0
Single vehicle crash	1	3	0	2
Unknown	1	1	0	2
Not reported	0	0	0	0
Severity				
Fatal Injury	0	0	0	0
Non-Fatal Injury	5	1	0	11
Property damage only (none injured)	22	19	3	13
Unknown	0	0	0	0
Not Reported	0	0	0	1
Time of Day				
Weekday, 7 AM - 9 AM	0	1	0	6
Weekday, 4 PM - 6 PM	0	1	0	6
Saturday, 11 AM - 2 PM	0	1	0	2
Weekday, other time	26	14	3	9
Weekend, other time	1	3	0	2
Pavement Conditions				
Dry	21	15	3	16
Wet	5	4	0	9
Snow	1	0	0	0
Ice	0	0	0	0
Not reported	0	0	0	0
Other	0	1	0	0
Unknown	0	0	0	0
Non-Motorist (Bicycle, Pedestrian)	0	1	0	0

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : Oct-19

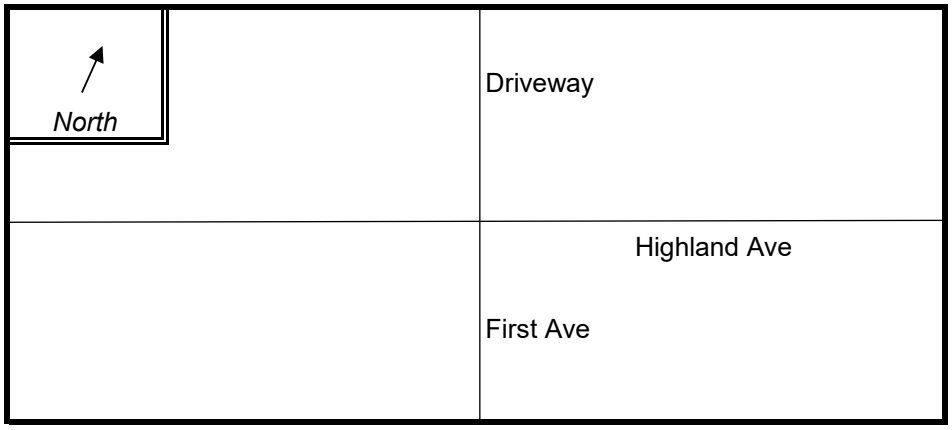
DISTRICT : 6 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : First Avenue

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

approach:	NB	SB	EB	WB		Total Peak Hourly Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	387	15	897	1,277		**2,576**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **28,622**

TOTAL # OF CRASHES : 27

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **5.40**

CRASH RATE CALCULATION : **0.52**

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : PM Peak

Project Title & Date: BCH Needham, October 2020

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : Oct-19

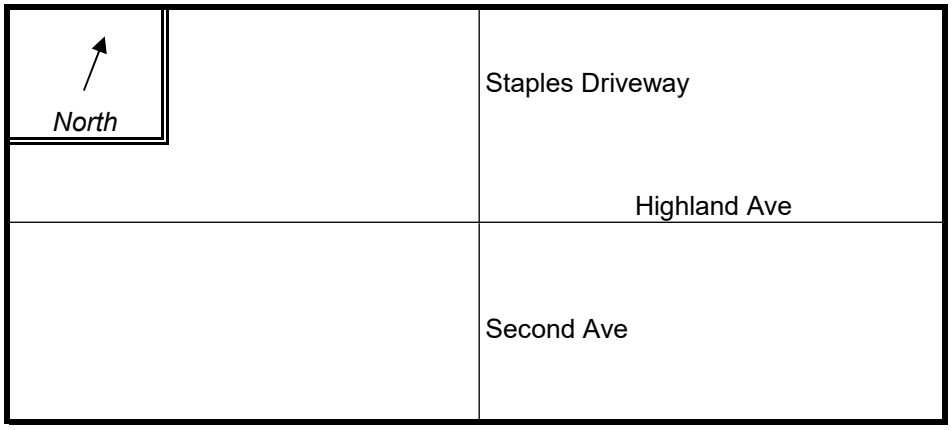
DISTRICT : 6 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Highland Avenue

MINOR STREET(S) : Second Avenue

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

approach:	NB	SB	EB	WB		Total Peak Hourly Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	531	70	712	919		**2,232**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **24,800**

TOTAL # OF CRASHES : 20

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **4.00**

CRASH RATE CALCULATION : **0.44**

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : PM Peak

Project Title & Date: BCH Needham, October 2020

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : Oct-19

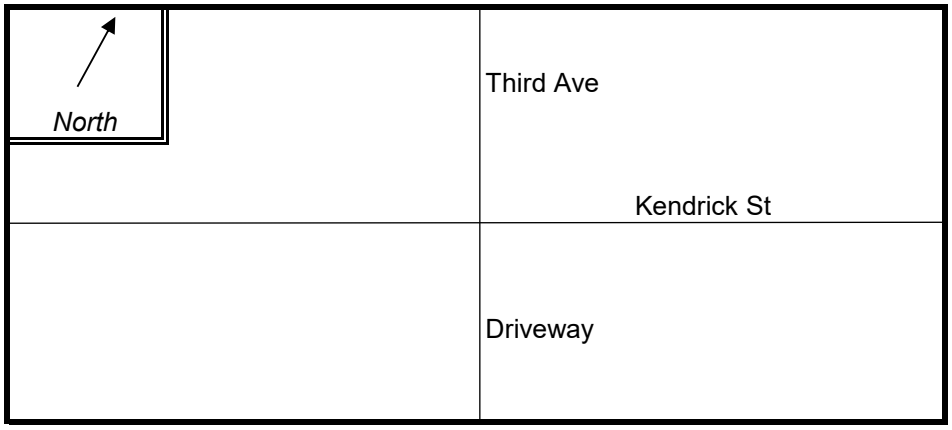
DISTRICT : 6 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : Kendrick Street

MINOR STREET(S) : Third Avenue

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

approach:	NB	SB	EB	WB		Total Peak Hourly Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	41	458	947	1,436		**2,882**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **32,022**

TOTAL # OF CRASHES : 3 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **0.60**

CRASH RATE CALCULATION : **0.05** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : PM Peak

Project Title & Date: BCH Needham, October 2020

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Needham, MA COUNT DATE : Oct-19

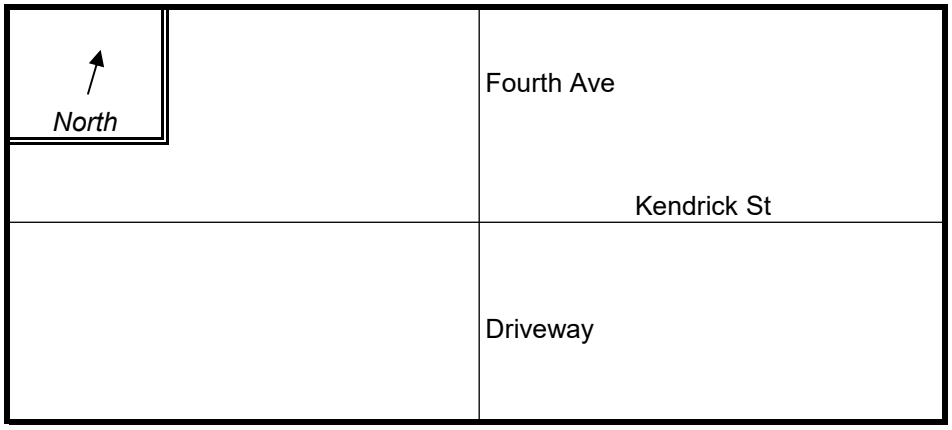
DISTRICT : 6 UNSIGNALIZED : [X] SIGNALIZED : [ ]

~ INTERSECTION DATA ~

MAJOR STREET : Kendrick Street

MINOR STREET(S) : Fourth Avenue

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

approach:	NB	SB	EB	WB		Total Peak Hourly Approach Volume
PEAK HOURLY VOLUMES (AM/PM) :	2	290	1,057	1,294		**2,643**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **29,367**

TOTAL # OF CRASHES : 25

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **5.00**

CRASH RATE CALCULATION : **0.47**

RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments : PM Peak

Project Title & Date: BCH Needham, October 2020

MEMORANDUM

Date:	December 7, 2020	Job No.:	7363
To:	Lee Newman, Director of Planning and Community Development		
Cc:	Anthony Del Gaizo, PE, Town Engineer		
From:	Jaklyn Centracchio, PE, PTOE		
Subject:	Traffic Peer Response Review – Boston Children's Hospital – Needham, MA		

Responses to peer review comments of *the Traffic Peer Review - Boston Children's Hospital – Needham, MA Memorandum*, prepared by BETA Group, Inc., dated November 10, 2020 were received from the Applicant on November 24, 2020. BETA Group, (BETA) reviewed the submitted response documents.

BASIS OF REVIEW

The following response documents were received by BETA and will form the basis of the review:

- *Response to Traffic Peer Review – Boston Children's Hospital – Needham, MA* dated November 10, 2020 and Attachments, prepared by Vanasse Hangen Brustlin, Inc (VHB) dated November 24, 2020
- *Transportation Impact and Access Study (TIAS)*, Boston Children's Hospital New Pediatric Medical Facility at Founders Park, VHB, October 7, 2020
- Boston Children's Hospital Needham Satellite Project, Needham Special Permit Submission, Plan Set, Payette, October 7, 2020
- Supplemental Draft Environmental Impact Report (SDEIR), prepared by Epsilon Associates, Inc., submitted to the Massachusetts Environmental Policy Act on August 31, 2015

COMPILED REVIEW KEY

BETA's original comments are in standard text, the Applicant provided responses (responses in *italic text*), and BETA has provided comments on the status of each (status in standard bold text).

PROJECT OVERVIEW

The project site is located within Founder's Park in Needham, Massachusetts and proposes phased construction of three new buildings located at 380 1st Avenue, 37 A Street and 2 B Street. Access to the three buildings would be provided from 1st Avenue, A Street and B Street. As proposed, the buildings would consist of a mix of Pediatric Ambulatory Center and General Office Space land uses, totaling approximately 452,000 square feet (SF):

- 380 1st Avenue – Pediatric Ambulatory Center (224,000 SF)
- 37 A Street – Office (101,000 SF)
- 2 B Street – Office (127,000 SF)
- Total = 452,000 SF

Prior to this TIAS, BETA reviewed in depth several documents prepared by the proponent's traffic consultant involving the proposed parking demand and trip generation. It should be noted that while the

estimated usage and total square footage of the three new buildings was equal to 452,000 SF, the sizes of two of the buildings were different. The proposed building sizes as of April 2020 were as follows:

- 380 1st Avenue – Pediatric Ambulatory Center (245,000 SF)
- 37 A Street – Office (80,000 SF)
- 2 B Street – Office (127,000 SF)
- Total = 452,000 SF

The building square footage differences slightly alter the individual trip generation and parking generation numbers but overall are comparable to those reviewed in April 2020.

The TIAS included an evaluation and summary of the proposed transportation elements and impacts of the project using actual collected vehicle trips based on traffic counts conducted on October 10, 2019 and comparison to previously approved development (based upon the SDEIR, dated August 31, 2015). Again, this data was previously reviewed by BETA in April 2020 and the data provided in the TIAS are similar, therefore, minimal discussion on these topics is provided within this memorandum for these topics.

2019 Baseline Conditions/Existing Conditions

Manual turning movement counts (TMCs) were collected at seven (7) intersections on Thursday, October 10, 2019 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Traffic volume data were also collected via automatic traffic recorder (ATR) at 16 locations over a 24-hour period on Thursday, October 10, 2019. The weekday morning and afternoon peak hours were determined to be 8:00-9:00 AM and 4:45-5:45 PM, respectively. The raw volume data is provided in the Appendix of the TIAS.

The following four intersections were analyzed within the TIAS and noted as the key project area intersections:

- Highland Avenue at 1st Avenue
- Highland Avenue at 2nd Avenue
- Kendrick Street at 3rd Avenue
- Kendrick Street at 4th Avenue

1. Volume data was collected at seven intersections. Four of the intersection volumes were provided on the volume figures in the TIAS and analyzed. Explain why the remaining three intersection volumes, two of which are at site driveways, were not included on the future volume diagrams to show an understanding of the future activity at the proposed driveways.

   Applicant: Note that the purpose of the TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 1st Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. Those previously reviewed and approved filings focused primarily on those four identified gateway intersections to Founders Park. The study area for this TIA simply looks to be consistent with those previously-reviewed and approved efforts supporting the current Special Permit, MEPA Certificate, and Section 61 Findings. The counts collected at the other identified internal driveway locations were commissioned solely for the purposes of assessing and delineating actual trip generation for Founders Park only.

BETA: Explanation provided. It is noted that the intersections surrounding the site were included on the volume diagrams in the SDEIR. The three remaining intersections should be included in the post occupancy study to determine the realized impacts to the intersections.

2. It is typical and recommended to collect ATR data for a longer period to accommodate the potential fluctuations in day to day traffic volumes to determine average daily volumes. Explain why 48-hour data was not collected.

   Applicant: ATR data were collected for 24-hours specifically for the purposes of comparing actual trip generation to estimated trip generation. All of these count data were compared back to the TMC and ATR data collected by MassDOT and their consultant (McMahon) in connection with post-construction counts collected and compiled for the Route 128 Add-A-Lane Project – including new interchange ramps and roadway improvements along both Highland Avenue and Kendrick Street. We are confident that count information is consistent with that effort and accurately reflects recent, typical traffic conditions (pre-Covid-19 Pandemic).

   BETA: Explanation provided – issue resolved.

3. Speed data was not collected via the ATR's. Explain why speed data was not included with the ATR data collection, particularly on Kendrick Street where travelling speeds are significant, as is standard practice for a TIAS.

   Applicant: Collection and inclusion of detailed speed data is not generally provided in a typical TIA – unless specifically requested. As noted above, the primary purpose of TIAS was to determine whether a change in use from Office to Pediatric Medical Facility would yield increased traffic impact versus that previously studied and approved in the 2015 SDEIR, and reflected in the current Special Permit, MEPA Certificate, and Section 61 Finding.

   BETA: Explanation provided – issue resolved.

4. Volume data was collected at 16 ATR locations and the raw data was provided in the Appendix. However, the data was not provided or summarized in the study itself. A summary of the ATR data is not only a standard part of a TIAS but would be helpful to understand the existing traffic volumes and patterns throughout the study area. In addition, it would provide a baseline for the post occupancy monitoring.

   Applicant: Again, the purpose of the ATR data was to compare actual trip generation for Founders Park versus with the trip generation estimates quantified in the 2015 SDEIR. The ATR data is summarized at a high level in the TIAS. However, as requested, a more detailed ATR summary is provided in R4 of Attachment A.

   BETA: Summary table provided – issue resolved.

5. Provide the TMC data sheets for the Kendrick Street and 3rd Avenue afternoon peak periods which are missing from the Appendix.

Applicant: The TMC data sheets were provided in the TIAS submission. See Pages 315-322 of the TIAS. For reference, we have also included those materials in R5 of Attachment A.

BETA: Information provided – issue resolved.

The proponent reviewed the need for a seasonal adjustment. Since the proponent found the traffic volumes in October were found to be average-month conditions the volumes were not adjusted. The source of the seasonal adjustment information was not provided in the TIAS. Based on historical data for from MassDOT, BETA found the volumes to be higher than average in the month of October and therefore finds not adjusting the volumes to be a conservative approach and acceptable.

The traffic volumes were collected in October 2019. Since then a few changes have occurred relative to traffic volumes. One of which is that the 189 B Street building received its occupancy permit on November 1, 2019 after the original counts were conducted. The building occupancy trips are considered "estimated" although at some point after October 2019 the trips generated by the building would have been "actual" and realized. The second change relative to traffic volumes is the COVID-19 impact on traffic volumes. The TIAS did not mention COVID-19 related impacts.

6. Due to a high percentage of people are working remotely, at least part time, it is not reasonable to collect new data at this time. However, occupancy after the October 2019 counts and prior to COVID-19 changes in traffic, and current and potential future traffic patterns and changes due to COVID-19 are important to note in the TIAS.

   Applicant: The occupancy of 189 B Street was reflected in our previously studied and reviewed Trip Generation analysis. That occupancy is included within the TIA based on the trip generating characteristics of that building per ITE Trip Generation and previous studies, reflective of how that building asset was accounted for in previous local and Commonwealth jurisdictional review.
   As noted, it would be impossible to collect accurate traffic data that would reflect typical peak period conditions given the systemic change in travel behaviors that are currently being experienced due to the ongoing Covid-19 Pandemic. Traffic volumes are significantly lower than that experienced prior to March 2020. It is unclear when volumes might return to pre-March 2020 levels, even after the Pandemic ends.

   Consequently, we have elected to use ITE data for that one occupied building consistent with how the impacts of that building were quantified previously. However, based on an extremely detailed study of trip generating characteristics of other occupied Founders Park buildings – and documented in our previously-reviewed and approved Trip Generation Memorandum, we know that this approach is a conservative assessment of the impact of that building's actual occupancy (as all occupied Founders Park Buildings have been shown to have significantly lower trip generating characteristics than what ITE estimates suggest).

   BETA: Information provided – issue resolved.

PROJECT CHANGE DESCRIPTION

LAND USE AND BUILDING SIZES

The changes to the permitted Founders Park development are similar to the BCH Proposed Project in terms of total building square footage, however one of the uses are different and the building sizes vary. The following table outlines the comparison of the permitted and proposed projects.

Table 1: Comparison of Permitted and Revised Proposed Use

Location	Permitted		Proposed	
	Use	SF	Use	SF
380 1st Avenue	Office	189,509	Pediatric Ambulatory Center	224,000
37 A Street	Office	135,000	Office	101,000
2 B Street	Office	127,145	Office	127,000
Total		451,654		452,000

PROPOSED SITE PARKING

The first phase of construction consists of the 380 1st Avenue building. The interim parking plan to support this will consist of expanding the existing parking garage at 380R 1st Street (Garage B) by 530 parking spaces as currently approved. BCH will utilize 138 of the 264 existing surplus parking spaces in the existing Garage B. In addition, a temporary surface lot at 37A Street will be constructed with 105 spaces for a total of 773 spaces for interim parking.

The full build parking plan will include the previously approved 530 space addition to Garage B, and a new 925 space parking garage located at 400R 1st Avenue (Garage A) for a total of 1,455 spaces.

An extensive review of the Parking Generation Evaluation was performed by BETA in April 2020. It was noted by BETA that while 138 existing surplus parking spaces were observed to be currently unused, many of them are allocated for existing uses and could be utilized in the future if tenants change or a reduction in mode shares is seen. The proponent agreed that a review of the parking supply and utilization should be considered as part of the future traffic and parking monitoring program for the site.

7. The review of the parking supply should be added in the future traffic and parking monitoring program as part of the mitigation.

   Applicant: Children's is committed to assessing the utilization of their allocated parking supply moving forward at Founder's Park. We recommend that this monitoring program commence one year after receipt of a Certificate of Occupancy (C of O) for 380 First Avenue and be conducted annually thereafter, as mutually agreed to by both Boston Children's Hospital and the Town of Needham.

   BETA: BCH stated they will assess the parking supply post occupancy. Issue resolved.

As mentioned earlier in the memorandum, this TIAS proposes slightly different building sizes than as indicated in the previous review which slightly alters the individual parking generation numbers, but the total required spaces is comparable to those reviewed in April 2020. The table below summarizes the revised parking demand per the zoning amendment to include the Pediatric Medical Facility land use.

Table 2: Revised Parking Demand

Location	Zoning By-Law Use	Program Size (KSF)	Required Parking (spaces/KSF)	Parking Demand (spaces)
380 1st Avenue	Medical Facility, Pediatric	224	3.45	773
37 A Street	Office Building	101	3.33	337
2 B Street	Office Building	127	3.33	423
Total		452	3.39	1,533

PROPOSED SITE ACCESS & CIRCULATION

Access to the three new buildings would be provided from 1st Avenue, A Street and B Street. Patient drop off for 380 1st Avenue will be via Founders Drive and egress via a driveway along New Way. Access to 37A Street will be via A Street.

A revised walking path network has been proposed to and from the site buildings and parking garages. A raised crosswalk exists for the crossing between the amphitheater and 380 1st Avenue and a speed table exists between the amphitheater and Garage A. The proposed connection from Garage B to 380 1st Street is marked but not raised.

8. Clarify the proposed pedestrian amenities for this project versus what exists today.

   Applicant: A site plan showing the pedestrian connections is provided in the TIA – and included herein for reference (see R8 in Attachment A). New crosswalks are proposed to connect the Project to the 380R First Avenue Garage (Garage B) and the future 400R Garage (Garage A), and across the proposed loading dock. Currently there are no crosswalks provided between these two sites. Sidewalks will be provided on site along First Avenue and New Way. These facilities also currently do not exist. The goal is to provide safe and complete pedestrian connectivity between the 380 1st Avenue site and the rest of the Founder's Park campus.

   BETA: Clarification provided – issue resolved.

9. Consideration should be given to raising the crosswalk between Garage B to 380 1st Street as it is likely that this crossing would experience significant pedestrian activity.

   Applicant: We agree with this comment. The Project is currently under design, and this amenity has been discussed as being something to strongly consider. Its viability is being studied in the context of appropriately managing driveway stormwater and associated drainage needs.

   BETA: Raised crosswalk will be provided if viable. If the raised crosswalk is not viable, consideration should be given to providing other safety features.

Two site plans were provided. One site plan shows an interim site layout and the other is a full build layout. The interim site plan shows a three-way stop sign configuration where Founders Drive, New Way, and an unnamed street intersect. The full build plan shows only one stop sign on the New Way approach to the intersection.

10. Provide discussion on how the application of the stop sign on the one approach was determined for the full build layout.

    Applicant: The intention is to install all-way Stop control at New Way/Founders Drive. The goal is to recognize the multi-modal needs of the campus and look for ways to slow down vehicular traffic wherever reasonably feasible.

    BETA: It is understood that the intention is to provide all-way stop control at the New Way/Founders Drive for both the Interim and full build conditions. The full build plans should be revised to reflect the all-way stop control.

TRIP GENERATION

The trip generation calculations were performed for the new use/change in use to estimate the projected trips, using the *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 10th Edition*. There is no ITE land use for Pediatric Ambulatory Center and for the purposes of this TIAS, the Medical-Dental Office Building was used. In addition, the proposed use for 380 1st Avenue was split evenly between Medical-Dental Office and Hospital, to more accurately account for its intended uses. Based upon this categorization the revised development program was assessed using the following ITE Land Use Codes:

- Land Use Code 610: Hospital
- Land Use Code 710: General Office Building
- Land Use Code 720: Medical-Dental Office Building (in lieu of Pediatric Ambulatory Center)

It should be noted that all medical trips used a 100% vehicle trip share, while all office trips used a 90% vehicle trip share, as previously approved in the SDEIR. The proposed use provided in the documents from the April 2020 review with the added Medical-Dental Office Building land use resulted in a total of 732 trips in the morning Peak and 815 trips in the afternoon Peak. The newly proposed uses and trip generation summary is shown in the following table.

Table 3: Proposed BCH Project Weekday Vehicle Trip Generation

Location	Proposed Use	ITE Land Use Code	SF	Estimated Vehicle Trips					
				Morning Peak			Afternoon Peak		
				In	Out	Total	In	Out	Total
380 1st Ave	Pediatric Ambulatory Center	Medical-Dental Office	112,000	243	68	311	109	279	388
		Hospital	112,000	142	67	209	62	132	194
37 A St	Office	General Office	121,000	81	13	94	16	85	101
2 B St	Office	General Office	127,000	85	14	99	17	89	106
Total			452,000	551	162	713	204	585	789

The new proposed use with the added Medical-Dental Office Building land use results in a total of 713 trips in the weekday morning peak and 789 trips in the afternoon peak.

PERMITTED VS. PROPOSED TRIP GENERATION COMPARISON

Once the newly proposed trips were calculated, a comparison was made between the proposed trip generation and the previously approved (permitted) trip generation for the entire site. The permitted trips are taken from the SDEIR, while the proposed new project trips for BCH's development were added to the actual site trips collected in October 2019 to create the future expected trips. The permitted and revised proposed vehicle trips summary is shown in the table below and has previously been reviewed and found to be acceptable by BETA in April 2020.

Table 4: Revised Trip Generation Comparison

Time Period/Direction	Permitted (SDEIR)	Proposed Project + Actual Trips	Difference
Morning Peak Hour			
Entering	1,338	1,373	+35
Exiting	352	321	-31
Total	1,690	1,694	+4
Afternoon Peak Hour			
Entering	453	403	-50
Exiting	1,266	1,405	+139
Total	1,719	1,809	+90

The table shows the proposed project + actual trips would generate 4 more trips than the permitted project in the morning peak hour and 90 more trips in the afternoon peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT

The TIAS states that the trips were distributed to the study area intersections according to the distribution and trip assignment developed in the 2015 SDEIR and the trips were separated and distributed differently between retail and office/hotel/pediatric medical office. The 2015 SDEIR gravity models and mode split data used to determine trip distribution and assignment is from the 2010 Census and other outdated documents. The information used to determine the distribution is based on data that is 10 years old and more recent Census data available.

11. Confirm that the trip distributions from 2015 are still relevant/applicable in 2020. Revise the mode split and trip distribution if needed.

    Applicant: Trip distribution and mode split assumptions are based those inputs used to support the approved 2015 SDEIR. There is no supporting data to elicit a change in trip distribution assumptions made previously. Most traffic is expected to interact, directly, with on- and off-ramps to and from Route 128. Mode split data used previously is very conservative (i.e., very high auto mode share assumption), and frankly, is a factor contributing to why actual, measured trip generation collected on-site is so much lower than that estimated previously. Class A office space on Route 128 is attracting a healthy percentage of reverse commuters from the urban core who use transit and connect to the site via shuttle. Alternative work schedules and remote working have also become a much more prevalent part of employee schedules – and those programs also drive estimated traffic volumes downward. This is likely also true of all of the unbuilt office space studied in the TIA – however our intention and goal was to be consistent with the 2015 SDEIR and be reasonably conservative. We believe the TIA does both of these things – and is likely conservative in the impacts that are delineated in it (i.e., actual future volumes and impacts will also likely be lower).

    BETA: Justification provided – issue resolved.

12. The pediatric medical office use was not included as part of the Founders Park Development back in 2015. Clarify how the pediatric medical office distribution percentages were determined as shown on Figure 10 – Trip Distribution in the TIAS.

    Applicant: The trip distribution and assignment in the peak period analyses is driven primarily by employees travelling to and from the site. This distribution and mode split of that population over the long-term is most likely to be analogous to that of office employees. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA – although we believe the distributional characteristics of that population is also similar to that of the employees.

    BETA: Clarification provided – issue resolved.

13. BCH patient data would be more reasonable to use in determining the trip assignment and distribution for the BCH pediatric medical use.

    Applicant: The trip distribution and assignment in the peak period analysis is actually driven primarily by employees travelling to and from the site, which is likely to be similar to that of the office employees as previously studied in the 2015 SDEIR, and as discussed previously in Response 12. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA.

Further, it is not reasonable to simply re-allocate existing Children's patient data for the purposes of determining trip distribution for this facility. Over the long-term, the use of this facility will be driven by surrounding home-origin markets- and will more likely be reflective of those same home origin data points that drive journey-to-work statistics for workers.

BETA: We agree that the patients would have a lesser impact to the peak commuting hours but would still have an impact. Considering the impact would be minimal - issue resolved.

14. Verify the trip distributions shown on Figure 10 – Trip Distribution. The distribution percentages from west of 1st Avenue do not add up with the percentages shown at the Highland Avenue and 1st Avenue intersection. This also applies to the percentages west of the intersection of 3rd Avenue and Kendrick Street.

    Applicant: The distribution percentages from the I-95 north and south reflect vehicles using both the Highland Avenue and Kendrick Street exits (e.g. 25% of the traffic comes from I-95 NB, 20% uses the Kendrick Street exit and 5% uses the Highland Avenue exit). These are high level distributions and should not be confused with the assignment of those trips in the respective peak periods. Additionally, like many other methodology assumptions, these distribution patterns are reflective of those that supported the 2015 SDEIR review and approval.

    BETA: Clarification provided – issue resolved.

15. Approximately 295 vehicle trips are anticipated to turn right onto 1st Avenue from Highland Avenue and 329 turning left onto 3rd Avenue from Kendrick Street during the morning peak hour during the proposed BCH condition. Clarify why the intersections to the west of these locations were not included in the analysis with the addition of 300 vehicle trips during the peak periods.

    Applicant: The intersections west of First Avenue/Third Avenue are the I-95 interchange on- and off-ramps, where the majority of the Project traffic is expected to originate from. The free flow onto and off of the highway was not previously studied in the 2015 SDEIR and is therefore also not studied in the TIAS. The intersection of Kenrick Street at Hunting Road was previously studied in the SDEIR. However, the Children's Project is anticipated to have only very limited incremental impact west of the I-95 interchanges, as the majority of project trips will come from I-95.

    BETA: Clarification provided – issue resolved.

FUTURE CONDITIONS

The future conditions were analyzed for two scenarios with a seven-year horizon to 2026. The permitted Founder's Park development project and the proposed BCH project were analyzed.

16. A No-Build future condition was not included in the TIAS; however, a No-Build condition analysis was provided in the 2015 SDEIR. A No-Build analysis should be provided in order to determine the true projects impacts. Explain why the No-Build future condition was not analyzed in the TIAS.

    Applicant: A No-Build analysis was provided in the 2015 SDEIR to assess the impact of Center 128 relative to the base condition (if that Project were not approved). That Project, however, was approved and the base condition to compare impacts to is now a fully built Center 128. As such, the approved Build Condition from the SDEIR is, in a sense, the No-Build condition to compare the Children's Project to as a means to clearly quantify incremental impact over and above the approved project. As stated previously, the purpose of this TIA is to serve as an assessment of the

specific impacts of the Project and how the modification of 380 First Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. The most accurate way to do that is to compare this Project to what was previously approved. This will provide the basis to do the following:

1. *Determine the changes in increment impact from that studied, reviewed and approved previously*
2. *Confirm that transportation improvements and mitigation committed to previously in the Special Permit, MEPA Certificate, and Section 61 Findings are still valid and hold true moving forward*
3. *Delineate updates to that committed mitigation, as needed, to reflect any quantified incremental impacts that are identified.*

Inclusion of a No-Build Condition (assuming no Center 128) does none of these things – and represents a fictitious development scenario that can now longer exist. This is typically how TIA's supporting Notice of Project Changes are studied. It is also specifically how we are obligated to study this Project in support of MEPA and MassDOT review and approval – who have recognized that inclusion of a No-Build Condition is neither warranted nor necessary in this case.

BETA: Explanation provided – issue resolved.

The future traffic volumes were determined by applying a 0.5% percent per year growth rate over seven years. A 0.5% growth rate is consistent with the growth rate used in the 2015 SDEIR. BETA finds the growth rate to be reasonable, however it is not clear what future traffic volumes, growth, and office occupancy will look like post pandemic.

Trip generation data for the following additional background developments was determined based on associated Institute for Transportation Engineers (ITE) Trip Generation data and included in the two future conditions.

- 2 Wells Avenue (trips only associated with the unoccupied expansion of the project)
- 180 Wells Avenue
- Newton Nexus
- Northland Industrial (130 Charlemont)
- Northland Newton Development

17. ITE Trip Generation data was used to determine project trips for the above-mentioned projects, however, there are traffic studies for at least some of the projects which provide the number of anticipated trips. The available traffic study data should be provided instead of determining trips based on the ITE Trip Generation for the background projects where applicable.

    Applicant: Project generated trips for the referenced background projects were accessed directly from their respective traffic studies. This language will be updated in the TIA to provide more clarity on this issue.

    BETA: Clarification provided – issue resolved.

18. The backup calculations and distributions used to determine the various development vehicle trips was not provided for reference and review. This information is necessary to determine the appropriateness of the future volumes.

    Applicant: The specific project trips used to develop the traffic volumes in the future conditions are provided in R18 in Attachment A.

    BETA: Information provided – issue resolved.

TRAFFIC OPERATIONS

Traffic operations analyses were performed using Synchro software for the existing conditions, 2026 future approved project, and the 2026 future BCH project build conditions.

19. Provide all study area traffic signal timing and phasing plans for reference.

    Applicant: This signal timing and phase plans are provided in R19 in Attachment A.

    BETA: The signal timing and phasing plans were provided. There are a few minor phasing inconsistencies between the analysis and existing signal operations at the intersections of Highland Avenue at 1st Avenue and Highland Avenue at 2nd Avenue. However, the signal phasing is consistent between the TIAS and SDEIR. The phasing inconsistencies are minor and would not significantly alter the results. Issue resolved.

Capacity analysis results show that all existing signalized intersections operate at an acceptable Level of Service (LOS) D or better overall and all approaches operate at LOS E or better during the existing conditions.

The condition comparison discussions per intersection refer mainly between the existing conditions and the 2026 future BCH build conditions unless otherwise noted. It is noted that all results assume pre- and post-COVID-19 operating conditions.

1ST AVENUE & HIGHLAND AVENUE

Capacity analysis results show a degradation from LOS D during the existing afternoon peak to LOS F during the BCH project condition afternoon peak hour for the 1st Avenue northbound left-turn movement with a minimal increase in queue length. The intersection will operate at an overall LOS D or better during both peak periods.

A comparison between the 2015 SDEIR analysis for the 2022 "Approved" build and the 2026 Approved build in the TIAS reveals a significant difference for the 1st Avenue northbound left turn volume. The 2015 SDEIR shows a volume of 365 vehicles and the TIAS shows a much lower volume of 113 during the morning peak hour.

20. Describe any known reason for the significant difference in left-turn volumes between the two analyses.

    Applicant: During the time that the 2015 SDEIR was prepared, the northbound left-turn moment from First Avenue onto Highland Avenue was a prohibited movement. The TIA made assumptions within the development of the 2022 No-Build/Build Conditions, including modifications to this intersection taking into consideration the anticipated future permitted northbound left

movement. To account for this anticipated change at that time, count volumes were redistributed (approximately 60%) from Second Avenue to First Avenue to account for this permitted movement. In addition, redistribution was estimated to account for the Kendrick Street interchange.

This TIA is based on actual counts, which are indicative of both lower overall traffic activity in/out of Founder's Park from Highland Avenue and higher volumes in/out from Kendrick Street.

BETA: Information provided – issue resolved.

The intersection has recently been reconstructed. It is understood that limited additional improvements are available for this intersection to improve traffic operations at this time.

2ND AVENUE & HIGHLAND AVENUE

Capacity analysis results show that all movements during the morning peak operate at LOS D or better and the overall intersection would operate at LOS B. The 2nd Avenue northbound and southbound movements will continue to operate at LOS E when compared with the existing conditions, however, the northbound right-turn movement will degrade from LOS D to LOS E between the existing and build conditions. The Highland Avenue westbound shared left/through movement operates as a defacto left turn lane during all conditions the morning peak period. The defacto analysis result for the Highland Avenue westbound shared left/through movement indicates that an exclusive westbound left-turn lane is needed.



Figure 1: Existing signal post of northeast corner of 2nd Avenue and Highland Avenue.

Although the overall intersection is shown to operate at LOS D during the evening peak hour BCH project conditions, the volume to capacity ratio is greater than 1.02 which is indicative of an oversaturated intersection and an operation of LOS F, which is degraded from an LOS C during existing conditions.

21. Some of the signal equipment was not updated as part of the recent roadway project along Highland Avenue. Consideration should be given to upgrading the equipment that was not updated.

    Applicant: The Proposed BCH Project has a minimal impact on traffic operations at the Second Avenue intersection compared to the Approved Project during both the morning and evening peak hours. While overall intersection operations have been documented to decrease from LOS C to LOS D, the overall intersection delay increases by only three seconds.

    More importantly, the Newton-Needham Corridor Project, which is being led by MassDOT, includes significant improvement to Highland Avenue, including its intersection with Second Avenue. That location will be widened to support two lanes in each direction, including exclusive left-turn lanes, bicycle and pedestrian improvements, and complete traffic signal replacement. This information was shared recently at a Virtual Public Meeting held on September 30, 2020. The presentation made at that meeting is provided for reference. Our understanding is that these improvements will be put in place in 2021 – well before BCH Project construction commences.

    BETA: Information provided – issue resolved.

3RD AVENUE & KENDRICK STREET

The capacity analysis results show that the overall intersection operations degrade from LOS C during existing conditions to LOS E during the morning peak period and degrade from LOS C to LOS F during afternoon peak operations. The Kendrick Street eastbound left-turn movement will degrade from LOS E to a significant LOS F during both peak periods with extensive queueing during the morning for both left turn and through eastbound movements. In addition, the Kendrick Street westbound movement would experience significant queuing during the afternoon peak hour. The 3rd Avenue southbound right turn movement will experience a significant increase in delay from a LOS D to LOS F and significant queue lengths during the afternoon peak hour.

4TH AVENUE & KENDRICK STREET

The unsignalized driveway northbound and 4th Avenue southbound approaches to Kendrick Street operate at LOS F during both existing peak periods. The same movements continue to operate at LOS F under both the future Approved and BCH project conditions with significantly increased delay and queues.

The TIAS states that there is a modest increase in traffic at the intersection under the proposed BCH project and conservative gap parameters are assumed in the analysis so in actuality shorter delays would be realized in the future than as presented in the analysis. It was also noted that no queuing was observed in the morning and a maximum queue length of six cars was observed in the evening. BETA observed very few gaps in traffic for vehicles exiting 4th Avenue. Right turn safety issues exiting 4th Avenue onto Kendrick Street westbound due to the travelling speeds combined with limited gaps on Kendrick Street, and also lack of pedestrian safety for pedestrians crossing 4th Avenue were observed as well.

22. There are safety and operational issues at this intersection. A signal warrant analysis was not performed for the intersection. Provide a signal warrant analysis to determine if the intersection meets warrant criteria for signalization.

    Applicant: A limited signal warrant analysis has been conducted for the intersection of Kendrick Street at Fourth Avenue based on the limited peak period traffic count data collected in October 2019. Note that only Warrant 2 – Four-Hour Vehicular Volume and Warrant 3 – Peak Hour were able to be assessed at this time. The other warrant conditions were unable to be reviewed due to the limited count data available. Based on this limited assessment, criteria was met on both Warrants 2 and 3, which relates to the amount of peak period volume wanting to turn from the side street (Fourth Ave) to the primary corridor (Kendrick Street). This partial signal warrant analysis is included in R22 of Attachment A. Note that due to the ongoing Covid-19 Pandemic, it would not be prudent to conduct the very detailed array of traffic counts that are necessary to support a proper, complete signal warrant analysis at this time or into the immediate future as traffic conditions are measurably lower than what one would expect under typical conditions. A full signal warrant could be conducted in the future when counts can be collected representing more typical weekday traffic conditions. Note that Children's is committed to studying safety issues and delineating paths for future improvement – this is a pre-existing condition location, however, that Children's does not generate any new, incremental future impact.

    It should also be noted that in connection with Commonwealth of Massachusetts MEPA review, MassDOT has expressed desire to explore the appropriateness of conducting a Roadway Safety Audit (RSA) at this location in the future, as this intersection is Highway Safety Improvement Program (HSIP)-eligible. It is also our understanding that operational and safety concerns at this intersection have been raised at Needham's Traffic Management Advisory Committee.

The Children's Project does not result in any increased traffic volume at this location versus what was previously studied and approved. However, Children's is committed to working with the Town and MassDOT to conduct both a full Traffic Signal Warrant Analysis and Roadway Safety Audit to help comprehensively assess operational and safety issues at this location. Those studies will be conducted at an appropriate time in the future in a way that is mutually agreeable to the Town, MassDOT, and Children's.

BETA: Signal warrant analysis was provided based on the four hours of peak data collected in October 2019. Two warrants are met based on the preliminary analysis. BCH has committed to providing a full traffic signal warrant analysis at a later time and also conduct a Road Safety Audit (RSA) of the Kendrick Street and 4th Avenue intersection. Issue resolved.

TRANSPORTATION MITIGATION

According to the TIAS, the Approved Founders Park Development included the following mitigation commitments, and the status is "completed."

- Add-A-Lane Project, 1-95 NB off-ramp and 1-95 SB on-ramp at Kendrick Street
- Signalization of Highland Avenue/1st Avenue
- Coordination with of timings at the intersections of 1st Avenue and 2nd Avenue along Highland Avenue
- Kendrick Street/3rd Avenue signal timing adjustments
- Upon issuance of the building permit for the first office building to be constructed, the Proponent will contribute to the Town of Needham a Traffic Improvement Fee of $930,000
- Contribute to the Town of Needham an additional $75,000 for use by the town to hire a traffic engineer to evaluate traffic measures that should be implemented to improve traffic conditions in the immediate area of Needham Crossing
- Contribute $1,000,000 to the New England Business Center Owner's Association (i.e., Needham Crossing Improvement Corporation) available to be used to address traffic issues serving the New England Business Center
- Provide a bike share program for the New England Business Center
- Contribute $100,000 to fund new ingress and egress signs for the New England Business Center

The mitigation measure options provided in the TIAS for the proposed BCH development impacts are the following:

- Signal timings and or phase changes at the Kendrick Street and 3rd Avenue intersection
- To increase the storage capacity of the 3rd Avenue southbound right-turn lane at Kendrick Street

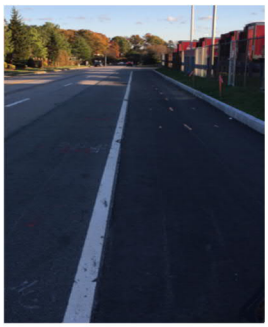


Figure 2: 3rd Avenue Southbound approach to Kendrick Street.

23. Signal timing and phasing adjustment analysis was not performed for the Kendrick Street and 3rd Avenue intersection to determine that timing and/or phase changes would benefit the intersection. Provide analysis to verify that this "mitigation measure" would reduce the project-related impacts to the intersection as indicated in the TIAS.

Applicant: Preliminary signal timing and phasing adjustments show that some of the impacts of the Project have the potential to be mitigated. Mitigation actions that would improve traffic operations include removing the northbound/southbound split phase and running concurrent pedestrian phases. With these in place, operations during the morning peak hour could result in improved LOS compared to the 2026 Approved Project Build Condition and similar operations during the evening peak hour. Preliminary results are summarized along with Synchro results in R23 of Attachment A.

Children's will commit to studying this issue and will retain a signal contractor to make appropriate signal timing and phasing adjustments, as needed, to improve peak period traffic operations at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

BETA: Please provide R23 in Attachment A which is missing. BETA would recommend that the initial signal timing and phasing adjustments be made within 6 months of the issuance of a Building Occupancy Permit.

24. Currently there are two marked southbound travel lanes on 3rd Avenue approaching Kendrick Street. Although the outer lane is not marked with right-turn only lane markings, it operates as a right-turn only lane. Therefore, this mitigation condition already exists and would not improve operations at the intersection. However, right-turn only lane markings and signage could be provided to better delineate the lanes.

    Applicant: The 3rd Avenue approach to Kendrick Street is already striped as suggested with an exclusive right-turn lane on the westbound approach near the intersection. The entire street was recently resurfaced and new thermoplastic lane and crosswalk markings put in place this year. Signage also shows that the right lane is a right turn only lane. We agree that additional right turn only markings could be provided to make this more clear for motorists approaching the intersection. Children's will work with the Town to assess and implement supplemental striping implementation at this location as deemed appropriate and necessary. These improvements would be made within one year after the issuance of a Building Permit for the Project.

    BETA: BCH agrees to better delineate the 3rd Avenue travel lanes approaching Kendrick Street – issue resolved.

25. According to the TIAS, a traffic monitoring program is proposed post-development but not outlined in the mitigation section. Verify that a post-occupancy study to monitor realized development traffic will be included in the mitigation package and all intersections will be reviewed post occupancy to determine the need for signal timing and phasing improvements at that time.

    Applicant: The Project is within, and a part of, the larger Founders Park/Center 128 development. As part of the previous approvals process and outlined in the Section 61 findings, the Proponent of Center 128 has already committed to conducting an annual Traffic Monitoring Program. The BCH buildings will be included in future Founders Park monitoring reporting.

As outlined in section 1.1.4, Proponent of Center 128 will conduct a transportation monitoring study of the project consisting of 24-hour continuous automatic traffic recorder (ATR) counts throughout the study area. The Proponent will also circulate employee surveys to buildings/tenants within the development to determine commuting modes, transit ridership, bicycle parking utilization, vanpool/carpool performance, and parking demands. The monitoring program was to begin three months after the opening of the Kendrick Street ramps and will continue for a period of five years after full occupancy.

A technical memorandum summarizing the results of the monitoring program, including a comparison to the trip generation and mode share estimated for the Founders Park development, is prepared annually by Proponent of Center 128 and provided to the Town of Needham, MassDOT and the 128 Business Council.

Additionally, as outlined in Response 7, Children's is committed to assessing the utilization of its portion of the parking supply at Founder's Park. This monitoring program is proposed to commence one year after receipt of a Certificate of Occupancy for 380 First Avenue and be conducted annually thereafter.

BETA: Clarification provided – issue resolved.

TRANSPORTATION DEMAND MANAGEMENT

The Approved Project also included the following TDM commitments to encourage alternative modes of transportation:

- Appointed TDM Program Coordinator to oversee the program
- Joined the 128 Business Council TMA
- Provide a commuter information website and commuter information centers in each of the buildings on campus
- Promote transit use to hotel guests on their website
- Provide a shuttle bus service for employees of TripAdvisor
- Provide 287 bicycle parking spaces.
- Provide on-site locker rooms and showers for employees
- Participate in Zagster bicycle sharing program
- Offer staggered and flexible work hours to reduce peak hour trips
- Work with MassRIDES to promote ride matching and van pool programs
- Provide information to MassRIDES in tenant's rental agreements
- Offer on-site commuter events to promote alternative travel
- Work with the 128 Business Council to facilitate on-site shuttle bus access
- Offer on-site amenities for employees and residents to reduce mid-day trip making

The BCH Project included the following TDM commitments to reduce auto use for employees:

- Providing an Employee Transportation Advisor who will coordination with the 128 Business Council
- Providing shuttle service connectivity to nearby public transportation nodes (commuter rail and Green Line)

- 50 percent transit pass subsidy for employees
- Carpool assistance and incentives
- Emergency ride home
- Bicycling/walking incentives and amenities
- Telecommuting and compressed workweeks, when feasible
- Display in the Main Lobby transportation-related information for employees, patients, and visitors
- Promotional efforts

The proposed TDM measures are appropriate and reasonable for the development. It should be noted that a change in trips could be seen in the future if tenants change or if TDM strategies retract.

ADDITIONAL COMMENTS

Safety issues were not discussed in the TIAS at the study area intersections or within the project area.

26. The 2026 BCH proposed analysis shows that the traffic operations at the intersection of 3rd Avenue and Kendrick Street would be significantly impacted by the project and mitigation was not proposed to improve the project's impact on the intersection. Consideration should be given to providing intersection improvements to mitigate the development's anticipated impact to the intersection.

    Applicant: Children's is committed to supporting future improvements at this location and will provide a $30,000 contribution to the Town for the purposes of implementing signalization improvements at this location. This contribution would be made within one year after the issuance of a Building Permit for the Project.

    BETA: BETA's understanding is the estimated design and construction costs for the proposed 3rd Avenue and Kendrick Street intersection improvements identified by Tetra Tech in October 2015 are approximately $2.2 million. The estimate is attached for reference.

    Figure 3: On Kendrick Street eastbound approaching 3rd Avenue.

    BCH has committed to provide a $30,000 contribution to improvements at the intersection of 3rd Avenue and Kendrick Street within one year after issuance of a Building Occupancy Permit. BETA recommends that any contribution be provided by BCH at the time of permit request. Explain how the $30,000 contribution was determined.

27. Crash data was not collected, compiled nor analyzed for existing conditions at the study area intersections. This is a standard part of a TIAS. A crash analysis of the latest three years available should be provided to determine safety issues at the intersections, especially the intersections along Kendrick Street.

    Applicant: A detailed crash analysis was performed and is included in R27 of Attachment A. Note that, Kendrick Street at Fourth Avenue has been identified as a Highway Safety Improvement

Program (HSIP) intersection for the years 2015-2017. A total of 19 crashes occurred at this intersection during those three years, including one serious injury crash. Note that the HSIP website does make note of a crash that involved "non-fatal – incapacitating" injuries.

BETA: Crash data was summarized for the study intersections. BCH has committed to conducting an RSA. Issue resolved.

28. The overhead signal head alignment is offset from the travel lanes on Kendrick Street at 3rd Avenue and can be confusing to drivers. See photo. The signal heads should be realigned with the travel lanes to the extent possible. Consideration should be given to realigning the signal heads as part of the mitigation to improve safety at the intersection.

    Applicant: Children's will commit to studying this issue and will retain a signal contractor to make signal head adjustments, as needed, to improve their visibility and overall safety at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

    BETA: BETA would recommend that the overhead signal head adjustments be done as soon as possible.

SUMMARY OF OUTSTANDING ITEMS

For ease of review, the following is a summary of the outstanding comments with the associated subject title and first page of the respective subject section.

2019 BASELINE CONDITIONS/EXISTING CONDITIONS (PAGE 2)

1. Volume data was collected at seven intersections. Four of the intersection volumes were provided on the volume figures in the TIAS and analyzed. Explain why the remaining three intersection volumes, two of which are at site driveways, were not included on the future volume diagrams to show an understanding of the future activity at the proposed driveways.

   Applicant: Note that the purpose of the TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 1st Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. Those previously reviewed and approved filings focused primarily on those four identified gateway intersections to Founders Park. The study area for this TIA simply looks to be consistent with those previously-reviewed and approved efforts supporting the current Special Permit, MEPA Certificate, and Section 61 Findings. The counts collected at the other identified internal driveway locations were commissioned solely for the purposes of assessing and delineating actual trip generation for Founders Park only.

   BETA: Explanation provided. It is noted that the intersections surrounding the site were included on the volume diagrams in the SDEIR. The three remaining intersections should be included in the post occupancy study to determine the realized impacts to the intersections.

PROPOSED SITE PARKING (PAGE 5)

All comments resolved.

PROPOSED SITE ACCESS & CIRCULATION (PAGE 6)

9. Consideration should be given to raising the crosswalk between Garage B to 380 1st Street as it is likely that this crossing would experience significant pedestrian activity.

   Applicant: We agree with this comment. The Project is currently under design, and this amenity has been discussed as being something to strongly consider. Its viability is being studied in the context of appropriately managing driveway stormwater and associated drainage needs.

   BETA: Raised crosswalk will be provided if viable. If the raised crosswalk is not viable, consideration should be given to providing other safety features.

10. Provide discussion on how the application of the stop sign on the one approach was determined for the full build layout.

    Applicant: The intention is to install all-way Stop control at New Way/Founders Drive. The goal is to recognize the multi-modal needs of the campus and look for ways to slow down vehicular traffic wherever reasonably feasible.

BETA: It is understood that the intention is to provide all-way stop control at the New Way/Founders Drive for both the Interim and full build conditions. The full build plans should be revised to reflect the all-way stop control.

TRIP DISTRIBUTION AND ASSIGNMENT (PAGE 9)

All comments resolved.

FUTURE CONDITIONS (PAGE 11)

All comments resolved.

TRAFFIC OPERATIONS (PAGE 12)

All comments resolved.

1ST AVENUE & HIGHLAND AVENUE (PAGE 13)

All comments resolved.

2ND AVENUE & HIGHLAND AVENUE (PAGE 14)

All comments resolved.

4TH AVENUE & KENDRICK STREET (PAGE 15)

All comments resolved.

TRANSPORTATION MITIGATION (PAGE 16)

23. Signal timing and phasing adjustment analysis was not performed for the Kendrick Street and 3rd Avenue intersection to determine that timing and/or phase changes would benefit the intersection. Provide analysis to verify that this "mitigation measure" would reduce the project-related impacts to the intersection as indicated in the TIAS.

    Applicant: Preliminary signal timing and phasing adjustments show that some of the impacts of the Project have the potential to be mitigated. Mitigation actions that would improve traffic operations include removing the northbound/southbound split phase and running concurrent pedestrian phases. With these in place, operations during the morning peak hour could result in improved LOS compared to the 2026 Approved Project Build Condition and similar operations during the evening peak hour. Preliminary results are summarized along with Synchro results in R23 of Attachment A.

    Children's will commit to studying this issue and will retain a signal contractor to make appropriate signal timing and phasing adjustments, as needed, to improve peak period traffic operations at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

    BETA: Please provide R23 in Attachment A which is missing. BETA would recommend that the initial signal timing and phasing adjustments be made within 6 months of the issuance of a Building Occupancy Permit.

ADDITIONAL COMMENTS (PAGE 19)

26. The 2026 BCH proposed analysis shows that the traffic operations at the intersection of 3rd Avenue and Kendrick Street would be significantly impacted by the project and mitigation was not proposed to improve the project's impact on the intersection. Consideration should be given to providing intersection improvements to mitigate the development's anticipated impact to the intersection.

    Applicant: Children's is committed to supporting future improvements at this location and will provide a $30,000 contribution to the Town for the purposes of implementing signalization improvements at this location. This contribution would be made within one year after the issuance of a Building Permit for the Project.

    BETA: BETA's understanding is the estimated design and construction costs for the proposed 3rd Avenue and Kendrick Street intersection improvements identified by Tetra Tech in October 2015 are approximately $2.2 million. The estimate is attached for reference.

    BCH has committed to provide a $30,000 contribution to improvements at the intersection of 3rd Avenue and Kendrick Street within one year after issuance of a Building Occupancy Permit. BETA recommends that any contribution be provided by BCH at the time of permit request. Explain how the $30,000 contribution was determined.

28. The overhead signal head alignment is offset from the travel lanes on Kendrick Street at 3rd Avenue and can be confusing to drivers. See photo. The signal heads should be realigned with the travel lanes to the extent possible. Consideration should be given to realigning the signal heads as part of the mitigation to improve safety at the intersection.

    Applicant: Children's will commit to studying this issue and will retain a signal contractor to make signal head adjustments, as needed, to improve their visibility and overall safety at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

    BETA: BETA would recommend that the overhead signal head adjustments be done as soon as possible.

PRELIMINARY ESTIMATE

CITY\TOWN: NEEDHAM
PROJECT: KENDRICK STREET AT 3RD AVENUE INTERSECTION

E.W.O. #:
FILE

OCTOBER 2, 2015

ITEM #	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL VALUE
101.	CLEARING AND GRUBBING	1	AC	$13,224.00	$13,224.00
120.1	UNCLASSIFIED EXCAVATION	2,500	CY	$35.00	$87,500.00
121.	CLASS A ROCK EXCAVATION	250	CY	$100.00	$25,000.00
141.	CLASS A TRENCH EXCAVATION	900	CY	$32.00	$28,800.00
141.1	TEST PIT FOR EXPLORATION	10	CY	$57.00	$570.00
142.	CLASS B TRENCH	25	CY	$24.00	$600.00
150.	ORDINARY BORROW	100	CY	$24.00	$2,400.00
151.	GRAVEL BORROW	700	CY	$37.00	$25,900.00
156.	CRUSHED STONE	30	TON	$36.00	$1,080.00
170.	FINE GRADING AND COMPACTING	3,100	SY	$4.00	$12,400.00
180.1	HEALTH AND SAFETY PLAN	1	LS	$3,500.00	$3,500.00
180.2	IMPLEMENTATION OF HEALTH AND SAFETY PLAN	200	HR	$76.00	$15,200.00
201.	CATCH BASIN	9	EA	$3,500.00	$31,500.00
220.3	DRAINAGE STRUCTURE CHANGE IN TYPE	9	EA	$700.00	$6,300.00
221.	FRAME AND COVER	9	EA	$605.00	$5,445.00
222.1	FRAME AND GRATE - MASS DOT CASCADE TYPE	9	EA	$700.00	$6,300.00
224.12	12 INCH HOOD	9	EA	$375.00	$3,375.00
227.3	REMOVAL AND DISPOSAL OF DRAINAGE STRUCTURE SEDIMENTS	13	CY	$375.00	$4,875.00
227.31	REMOVAL AND DISPOSAL OF DRAINAGE PIPE SEDIMENTS	1,200	FT	$7.00	$8,400.00
241.12	12 INCH REINFORCED CONCRETE PIPE	200	FT	$100.00	$20,000.00
303.06	6 INCH DUCTILE IRON WATER PIPE (MECHANICAL JOINT)	15	FT	$120.00	$1,800.00
309.	DUCTILE IRON FITTINGS FOR WATER PIPE	100	LB	$6.00	$600.00
358.	GATE BOX ADJUSTED	4	EA	$200.00	$800.00
376.	HYDRANT REMOVED AND RESET	1	EA	$4,600.00	$4,600.00
402.	DENSE GRADED CRUSHED STONE FOR SUB-BASE	300	CY	$60.00	$18,000.00
431.1	HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE	30	CY	$50.00	$1,500.00
440.1	LIQUID CALCIUM FOR PRIMING GRAVEL FOR DUST CONTROL	2,550	GAL	$1.00	$2,550.00
443.	WATER FOR ROADWAY DUST CONTROL	20	MGL	$45.00	$900.00
450.9	CONTRACTOR QUALITY CONTROL	1,100	TON	$2.00	$2,200.00
453.	HMA JOINT SEALANT	2,800	FT	$1.00	$2,800.00
460.	HOT MIX ASPHALT	1,100	TON	$190.00	$209,000.00
472.	HOT MIX ASPHALT FOR MISCELLANEOUS WORK	100	TON	$166.00	$16,600.00
482.3	SAWING ASPHALT PAVEMENT	2,800	FT	$2.00	$5,600.00
506.	GRANITE CURB TYPE VB - STRAIGHT	1,085	FT	$35.00	$37,975.00
506.1	GRANITE CURB TYPE VB - CURVED	50	FT	$45.00	$2,250.00
509.1	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - CURVED	20	FT	$45.00	$900.00
580.	CURB REMOVED AND RESET	2,950	FT	$20.00	$59,000.00
630.	HIGHWAY GUARD REMOVED AND RESET	650	FT	$11.00	$7,150.00
685.	STONE MASONRY WALL IN CEMENT MORTAR	410	CY	$700.00	$287,000.00
697.1	SILT SACK	9	EA	$135.00	$1,215.00
701.	CEMENT CONCRETE SIDEWALK	400	SY	$48.00	$19,200.00
701.2	CEMENT CONCRETE WHEELCHAIR RAMP	125	SY	$54.00	$6,750.00
702.	HOT MIX ASPHALT WALK SURFACE	80	TON	$200.00	$16,000.00
710.3	BOUND - LETTERED GRANITE	4	EA	$400.00	$1,600.00
710.4	BOUND - PLAIN GRANITE	6	EA	$300.00	$1,800.00
740.	ENGINEERS FIELD OFFICE AND EQUIPMENT (TYPE A)	12	MO	$2,325.00	$27,900.00
748.	MOBILIZATION	1	LS	$51,965.67	$51,965.67
751.	LOAM BORROW	150	CY	$50.00	$7,500.00
761.12	COMPOST FILTER TUBE	600	FT	$4.00	$2,400.00
765.	SEEDING	1,050	SY	$2.00	$2,100.00
769.	PAVEMENT MILLING MULCH UNDER GUARD RAIL	650	FT	$8.00	$5,200.00
816.01	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 1	1	LS	$250,000.00	$250,000.00
	SIGNING AND SUPPORTS	1	LS	$6,000.00	$6,000.00
	TRAFFIC MANAGEMENT	1	LS	$200,000.00	$200,000.00
864.04	PAVEMENT ARROW AND LEGENDS - REFL. WHITE (THERMOPLASTIC)	445	SF	$6.00	$2,670.00
865.1	CROSS WALKS AND STOP LINES - REFLECTORIZED WHITE (THERMOPLASTIC)	500	SF	$2.00	$1,000.00
866.06	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC)	4,600	FT	$1.00	$4,600.00
867.06	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	4,800	FT	$1.00	$4,800.00
869.	GORE LINES - REFLECTORIZED YELLOW LINE (THERMOPLASTIC)	230	SF	$2.00	$460.00
903.	3000 PSI, 1.5 IN., 470 CEMENT CONCRETE	1	CY	$400.00	$400.00
904.	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE	25	CY	$1,000.00	$25,000.00
996.31	MECHANICALLY STABILIZED EARTH WALL	280	SY	$650.00	$182,000.00

NOTE: Unit bid prices based on MassDOT state wide 09/14 through 09/15 weighted average bid prices.

* 6 UP's included for contingency ($15,000 EA)

SUBTOTAL =	$1,784,154.67
*UTILITY POLE RELOCATION =	$90,000.00
25% CONTINGENCY =	$468,538.67
TOTAL=	$2,342,693
SAY	**$2,350,000**

To: Lee Newman
Director of Community Planning and Development
Town of Needham, MA

Date: December 10, 2020

Project #: 14631.00

From: Sean Manning, PE, PTOE
Ryan White, PE
Samantha Lathrop

Re: Response to Traffic Peer Response Review – Boston Children's Hospital – Needham, MA dated December 7, 2020

Overview

Boston Children's Hospital has been working with the Town of Needham for over a year to facilitate the development of a 224,000 square-foot pediatric medical facility at 380 First Avenue (the "Project"). As a result of these collaborative efforts, the Town unanimously voted at its annual Town Meeting on June 8, 2020, to amend the New England Business Center zoning district to allow the Project, which is located at Center 128 West within the Founders Park development.

Transportation and other potential development impacts have been extensively reviewed in connection with the previous approval process for Center 128 West (and Founders Park generally). Boston Children's Hospital proposes to change only the use of the previously proposed office building at 380 First Avenue to pediatric medical facility and to reallocate 34,491 square feet from the approved 37 A Street office building to the proposed 380 First Avenue building. The overall gross square footage of Center 128 West and Founders Park will not change, nor will the number of parking spaces. Accordingly, the Transportation Impact Access Study (TIAS) was commissioned to determine whether any increased transportation impacts would result from this change of use and reallocation of square footage.

The purpose of this memorandum is to provide responses to the outstanding items raised by the Town of Needham through their selected Transportation Peer Reviewer (BETA) regarding the Project. A Response to Traffic Peer Review was prepared by VHB and submitted to the Town on November 24, 2020. The status of each comment is delineated in BETA's Peer Response Review memorandum to the Town of Needham dated November 10, 2020 (and attached for reference). BETA has found the majority of items to be resolved. The outstanding items are included herein and reiterated and followed by applicant responses in the sections below. Where necessary and applicable, revisions to the TIAS have been made and are provided in **Attachment B**.

1. Volume data was collected at seven intersections. Four of the intersection volumes were provided on the volume figures in the TIAS and analyzed. Explain why the remaining three intersection volumes, two of which are at site driveways, were not included on the future volume diagrams to show an understanding of the future activity at the proposed driveways.

   Applicant Response: Note that the purpose of the TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 1st Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and

Memorandum

approved previously. Those previously reviewed and approved filings focused primarily on those four identified gateway intersections to Founders Park. The study area for this TIA simply looks to be consistent with those previously-reviewed and approved efforts supporting the current Special Permit, MEPA Certificate, and Section 61 Findings. The counts collected at the other identified internal driveway locations were commissioned solely for the purposes of assessing and delineating actual trip generation for Founders Park only.

BETA Response: Explanation provided. It is noted that the intersections surrounding the site were included on the volume diagrams in the SDEIR. The three remaining intersections should be included in the post occupancy study to determine the realized impacts to the intersections.

Applicant Re-Response: Post occupancy studies will be conducted in accordance with the larger Founders Park site mitigation commitments as stated in the Section 61 Findings.

9. Consideration should be given to raising the crosswalk between Garage B to 380 1st Street as it is likely that this crossing would experience significant pedestrian activity.

Applicant Response: We agree with this comment. The Project is currently under design, and this amenity has been discussed as being something to strongly consider. Its viability is being studied in the context of appropriately managing driveway stormwater and associated drainage needs.

BETA Response: Raised crosswalk will be provided if viable. If the raised crosswalk is not viable, consideration should be given to providing other safety features.

Applicant Re-Response: Comment noted. This is currently under study and will be included into the design if feasible.

10. Provide discussion on how the application of the stop sign on the one approach was determined for the full build layout.

Applicant Response: The intention is to install all-way Stop control at New Way/Founders Drive. The goal is to recognize the multi-modal needs of the campus and look for ways to slow down vehicular traffic wherever reasonably feasible.

BETA Response: It is understood that the intention is to provide all-way stop control at the New Way/Founders Drive for both the Interim and full build conditions. The full build plans should be revised to reflect the all-way stop control.

Applicant Re-Response: All-way stop control at New Way/Founders Drive will be provided on all plans, as already anticipated.

Memorandum

23. Signal timing and phasing adjustment was not performed for the Kendrick Street and 3rd Avenue intersection to determine that timing and/or phase changes would benefit the intersection. Provide analysis to verify that this "mitigation measure" would reduce the project-related impacts to the intersection as indicate din the TIAS.

Applicant Response: Preliminary signal timing and phasing adjustments show that some of the impacts of the Project have the potential to be mitigated. Mitigation actions that would improve traffic operations include removing the northbound/southbound split phase and running concurrent pedestrian phases. With these in place, operations during the morning peak hour could result in improved LOS compared to the 2026 Approved Project Build Condition and similar operations during the evening peak hour. Preliminary results are summarized along with Synchro results in **R23 of Attachment A**.

Children's will commit to studying this issue and will retain a signal contractor to make appropriate signal timing and phasing adjustments, as needed, to improve peak period traffic operations at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

BETA Response: Please provided R23 in Attachment A which is missing. BETA would recommend that the initial signal timing and phasing adjustments be made within 6 months of the issuance of a Building Occupancy Permit.

Applicant Re-Response: R23 is provided in Attachment B. BCH agrees to retain a signal contractor to make an appropriate one-time signal timing and phasing adjustment to improve peak period traffic operations at Kendrick Street and Third Avenue within six months after the issuance of the Building Permit.

26. The 2026 BCH proposed analysis shows that the traffic operations at the intersections of 3rd Avenue and Kendrick Street would be significantly impacted by the project and mitigation was not proposed to improve the project's impact on the intersection. Consideration should be given to providing intersection improvements to mitigate the development's anticipated impact to the intersection.

Applicant Response: Children's is committed to supporting future improvements at this location and will provide a $30,000 contribution to the Town for the purposes of implementing signalization improvements at this location. This contribution would be made within one year after the issuance of a Building Permit for the Project.

Memorandum

BETA Response: BETA's understanding is the estimated design and construction costs for the proposed 3rd Avenue and Kendrick Street intersection improvements identified by Tetra Tech in October 2015 are approximately $2.2 million. The estimate is attached for reference.

BCH has committed to provide a $30,000 contribution to improvements at the intersection of 3rd Avenue and Kendrick Street within one year after issuance of a Building Occupancy Permit. BETA recommends that any contribution be provided by BCH at the time of the permit request. Explain how the $30,000 contribution was determined.

Applicant Re-Response: Several improvements have already been constructed at this intersection including street resurfacing and striping. BCH is committed to contributing an additional $30,000 for improvements in addition to extending the right turn arrow striping on Third Avenue southbound, adjusting the location of the signal heads in the eastbound direction, and modifying the timing and phasing to improve peak period traffic operations. This amount would be a reasonable, sufficient allocation to implement audible pedestrian signals (APS) at this location. This amount is based on comparable efforts where VHB has worked to implement this technology at intersections with a similar geometric configuration. BCH agrees to contribute this amount within six months after the issuance of Building Permit.

28. The overhead signal head alignment is offset from the travel lanes on Kendrick Street at 3rd Avenue and can be confusing to drivers. See photo. The signal heads should be realigned with the travel lanes to the extent possible. Consideration should be given to realigning the signal heads as part of the mitigation to improve safety at the intersection.

Applicant Response: Children's will commit to studying this issue and will retain a signal contractor to make signal head adjustments, as needed, to improve their visibility and overall safety at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

BETA Response: BETA would recommend that the overhead signal adjustments be done as soon as possible.

Applicant Re-Response: BCH is committed to retaining a signal contractor to make a one-time signal head adjustment, as needed, to improve their visibly and overall safety within six months after the issuance of Building Permit.

Attachment B

Response to Traffic Peer Response Review
Boston Children's Hospital
Needham, MA

Mitigated Results for Kendrick Street at Third Avenue Needham, MA

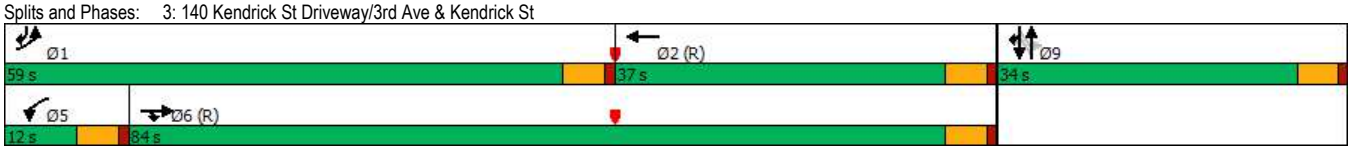
Location	Peak Hour	Mov't	2026 Approved Project Build					2026 BCH Proposed Project Build					2026 BCH Proposed Project Build Mitigated				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Kendrick Street at Third Avenue	AM	EB L	1.09	107	F	~564	#793	>1.20	>120	F	~687	#923	0.98	65.8	E	536	#791
		EB T	0.94	33	C	521	#1415	0.95	34	C	553	#1415	0.86	21.3	C	554	#1017
		EB R	0.03	4	A	0	8	0.03	4	A	0	8	0.03	7.2	A	0	12
		WB L	0.33	69	E	4	18	0.33	69	E	4	18	0.33	68.6	E	4	18
		WB T/R	0.77	48	D	278	#714	0.79	49	D	288	#722	0.84	53.4	D	327	#454
		NB L	0.2	62	E	8	22	0.2	62	E	8	22	0.05	41.8	D	7	18
		NB T/R	0.18	62	E	8	24	0.18	62	E	8	24	0.03	41.6	D	7	19
		SB L/T	0.71	66	E	103	75	0.74	68	E	112	81	0.53	47.4	D	103	73
		SB R	0.25	20	C	0	0	0.35	21	C	0	0	0.52	12.4	B	166	76
		Overall	**0.91**	**47**	**D**			**0.97**	**56**	**E**			**0.87**	**34.4**	**C**		
	PM	EB L	0.78	69	E	120	#228	1.09	146	F	~193	#353	0.6	44.7	D	153	239
		EB T	0.53	18	B	178	#547	0.53	18	B	178	#547	0.46	12.4	B	174	291
		EB R	0	4	A	0	0	0	4	A	0	0	0	1.1	A	0	0
		WB L	0.38	68	E	4	18	0.38	68	E	4	18	0.38	68.1	E	4	18
		WB T/R	1.06	75	E	616	#1215	1.07	78	E	623	#1222	1.14	109.3	F	~818	#961
		NB L	0.64	69	E	48	56	0.64	69	E	48	56	0.31	40.1	D	41	48
		NB T/R	0.04	56	E	2	11	0.04	56	E	2	11	0.02	37	D	1	9
		SB L/T	0.82	72	E	161	#243	0.88	81	F	172	#267	0.64	46.2	D	156	218
		SB R	0.97	75	E	340	#484	>1.20	>120	F	~600	#687	1.11	95.2	F	~878	#965
		Overall	**0.99**	**60**	**E**			**1.09**	**85**	**F**			**1.17**	**74.1**	**E**		

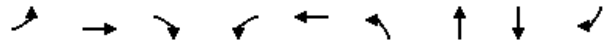
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	651	1965	46	5	628	106	7	7	3	55	4	194
Future Volume (vph)	651	1965	46	5	628	106	7	7	3	55	4	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	10	10	11	10	12	14	14	14	14	14
Storage Length (ft)	0		375	150		0	0		0	0		100
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							
Frt			0.850		0.978			0.957				0.850
Flt Protected	0.950			0.950			0.950				0.955	
Satd. Flow (prot)	1668	3455	1507	1404	3336	0	1543	1772	0	0	1670	1295
Flt Permitted	0.950			0.950			0.579				0.730	
Satd. Flow (perm)	1668	3455	1507	1404	3336	0	940	1772	0	0	1277	1295
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			59		14			4				29
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1163			1023			199			1283	
Travel Time (s)		26.4			23.3			4.5			29.2	
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.98	0.98	0.98	0.95	0.95	0.95	0.71	0.71	0.71	0.43	0.43	0.43
Heavy Vehicles (%)	1%	1%	0%	20%	2%	2%	17%	0%	33%	17%	0%	33%
Adj. Flow (vph)	664	2005	47	5	661	112	10	10	4	128	9	451
Shared Lane Traffic (%)												
Lane Group Flow (vph)	664	2005	47	5	773	0	10	14	0	0	137	451
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.09	1.04	1.09	1.09	1.04	1.09	1.00	0.92	0.92	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	Prot	Prot	NA		Perm	NA		Perm	NA	pt+ov
Protected Phases	1	6	6	5	2			9			9	1 9
Permitted Phases							9			9		
Detector Phase	1	6	6	5	2		9	9		9	9	1 9
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	33.0	33.0	12.0	33.0		34.0	34.0		34.0	34.0	
Total Split (s)	59.0	84.0	84.0	12.0	37.0		34.0	34.0		34.0	34.0	
Total Split (%)	45.4%	64.6%	64.6%	9.2%	28.5%		26.2%	26.2%		26.2%	26.2%	
Maximum Green (s)	54.0	79.0	79.0	7.0	32.0		29.0	29.0		29.0	29.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Walk Time (s)		7.0	7.0		7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0	21.0		21.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)		10	10		10		10	10		10	10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	53.1	91.3	91.3	7.0	35.7		26.3	26.3			26.3	84.3
Actuated g/C Ratio	0.41	0.70	0.70	0.05	0.27		0.20	0.20			0.20	0.65
v/c Ratio	0.98	0.83	0.04	0.07	0.84		0.05	0.04			0.53	0.53
Control Delay	67.2	18.9	1.7	60.6	53.5		41.0	32.3			53.9	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	67.2	18.9	1.7	60.6	53.5		41.0	32.3			53.9	13.5
LOS	E	B	A	E	D		D	C			D	B
Approach Delay		30.4			53.5			35.9			22.9	
Approach LOS		C			D			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 33.8		Intersection LOS: C	
Intersection Capacity Utilization 82.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: 140 Kendrick St Driveway/3rd Ave & Kendrick St





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	664	2005	47	5	773	10	14	137	451
v/c Ratio	0.98	0.83	0.04	0.07	0.84	0.05	0.04	0.53	0.53
Control Delay	67.2	18.9	1.7	60.6	53.5	41.0	32.3	53.9	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.2	18.9	1.7	60.6	53.5	41.0	32.3	53.9	13.5
Queue Length 50th (ft)	536	554	0	4	327	7	7	103	166
Queue Length 95th (ft)	#791	#1017	12	18	#454	18	19	73	76
Internal Link Dist (ft)		1083			943		119	1203	
Turn Bay Length (ft)			375	150					100
Base Capacity (vph)	692	2427	1076	75	925	209	398	284	851
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.83	0.04	0.07	0.84	0.05	0.04	0.48	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	651	1965	46	5	628	106	7	7	3	55	4	194
Future Volume (vph)	651	1965	46	5	628	106	7	7	3	55	4	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	10	10	11	10	12	14	14	14	14	14
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.96	1.00
Satd. Flow (prot)	1668	3455	1507	1404	3337		1543	1773			1671	1295
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.58	1.00			0.73	1.00
Satd. Flow (perm)	1668	3455	1507	1404	3337		941	1773			1277	1295
Peak-hour factor, PHF	0.98	0.98	0.98	0.95	0.95	0.95	0.71	0.71	0.71	0.43	0.43	0.43
Adj. Flow (vph)	664	2005	47	5	661	112	10	10	4	128	9	451
RTOR Reduction (vph)	0	0	15	0	10	0	0	3	0	0	0	10
Lane Group Flow (vph)	664	2005	32	5	763	0	10	11	0	0	137	441
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	1%	1%	0%	20%	2%	2%	17%	0%	33%	17%	0%	33%
Turn Type	Prot	NA	Prot	Prot	NA		Perm	NA		Perm	NA	pt+ov
Protected Phases	1	6	6	5	2			9			9	1 9
Permitted Phases							9			9		
Actuated Green, G (s)	53.1	87.3	87.3	1.4	35.6		26.3	26.3			26.3	84.4
Effective Green, g (s)	53.1	87.3	87.3	1.4	35.6		26.3	26.3			26.3	84.4
Actuated g/C Ratio	0.41	0.67	0.67	0.01	0.27		0.20	0.20			0.20	0.65
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	681	2320	1012	15	913		190	358			258	840
v/s Ratio Prot	c0.40	c0.58	0.02	0.00	0.23			0.01				c0.34
v/s Ratio Perm							0.01				0.11	
v/c Ratio	0.98	0.86	0.03	0.33	0.84		0.05	0.03			0.53	0.52
Uniform Delay, d1	37.8	16.7	7.2	63.8	44.4		41.8	41.6			46.3	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	28.0	4.6	0.1	4.7	8.9		0.0	0.0			1.1	0.3
Delay (s)	65.8	21.3	7.2	68.6	53.4		41.8	41.6			47.4	12.4
Level of Service	E	C	A	E	D		D	D			D	B
Approach Delay (s)		31.9			53.5			41.7			20.6	
Approach LOS		C			D			D			C	

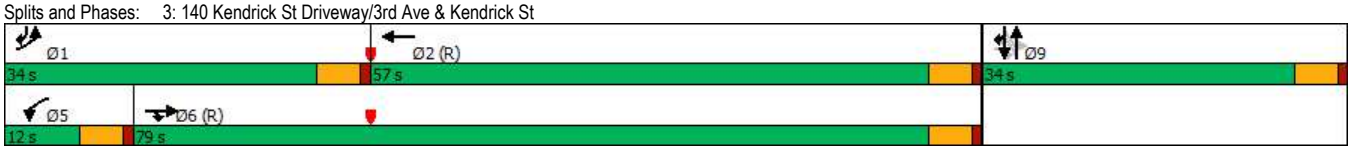
Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	969	3	5	1543	49	33	1	8	172	2	786
Future Volume (vph)	200	969	3	5	1543	49	33	1	8	172	2	786
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	10	10	11	10	12	14	14	14	14	14
Storage Length (ft)	0		375	150		0	0		0	0		100
Storage Lanes	1		1	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							
Frt			0.850		0.995			0.868				0.850
Flt Protected	0.950			0.950			0.950				0.953	
Satd. Flow (prot)	1518	3455	1507	1203	3453	0	1752	1441	0	0	1912	1706
Flt Permitted	0.950			0.950			0.457				0.716	
Satd. Flow (perm)	1518	3455	1507	1203	3453	0	843	1441	0	0	1437	1706
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			17		3			15				17
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1163			1023			199			1262	
Travel Time (s)		26.4			23.3			4.5			28.7	
Confl. Bikes (#/hr)						1						
Peak Hour Factor	0.95	0.95	0.95	0.97	0.97	0.97	0.54	0.54	0.54	0.82	0.82	0.82
Heavy Vehicles (%)	11%	1%	0%	40%	0%	16%	3%	0%	25%	1%	0%	1%
Adj. Flow (vph)	211	1020	3	5	1591	51	61	2	15	210	2	959
Shared Lane Traffic (%)												
Lane Group Flow (vph)	211	1020	3	5	1642	0	61	17	0	0	212	959
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.09	1.04	1.09	1.09	1.04	1.09	1.00	0.92	0.92	0.92	0.92	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA	custom	Prot	NA		Perm	NA		Perm	NA	pt+ov
Protected Phases	1	6	6	5	2			9			9	1 9
Permitted Phases			9				9			9		
Detector Phase	1	6	6	5	2		9	9		9	9	1 9
Switch Phase												
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)	12.0	33.0	33.0	12.0	33.0		34.0	34.0		34.0	34.0	
Total Split (s)	34.0	79.0	79.0	12.0	57.0		34.0	34.0		34.0	34.0	
Total Split (%)	27.2%	63.2%	63.2%	9.6%	45.6%		27.2%	27.2%		27.2%	27.2%	
Maximum Green (s)	29.0	74.0	74.0	7.0	52.0		29.0	29.0		29.0	29.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None		None	None	
Walk Time (s)		7.0	7.0		7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		21.0	21.0		21.0		21.0	21.0		21.0	21.0	
Pedestrian Calls (#/hr)		10	10		10		10	10		10	10	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	29.0	83.6	121.6	7.0	52.0		29.0	29.0			29.0	63.0
Actuated g/C Ratio	0.23	0.67	0.97	0.06	0.42		0.23	0.23			0.23	0.50
v/c Ratio	0.60	0.44	0.00	0.07	1.14		0.31	0.05			0.64	1.10
Control Delay	51.0	11.0	0.0	58.6	107.1		45.1	18.2			53.1	93.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	51.0	11.0	0.0	58.6	107.1		45.1	18.2			53.1	93.6
LOS	D	B	A	E	F		D	B			D	F
Approach Delay		17.8			107.0			39.2			86.3	
Approach LOS		B			F			D			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 125			
Actuated Cycle Length: 125			
Offset: 55 (44%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 73.2		Intersection LOS: E	
Intersection Capacity Utilization 111.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 3: 140 Kendrick St Driveway/3rd Ave & Kendrick St





Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	211	1020	3	5	1642	61	17	212	959
v/c Ratio	0.60	0.44	0.00	0.07	1.14	0.31	0.05	0.64	1.10
Control Delay	51.0	11.0	0.0	58.6	107.1	45.1	18.2	53.1	93.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	11.0	0.0	58.6	107.1	45.1	18.2	53.1	93.6
Queue Length 50th (ft)	153	174	0	4	~818	41	1	156	~878
Queue Length 95th (ft)	239	291	0	18	#961	48	9	218	#965
Internal Link Dist (ft)		1083			943		119	1182	
Turn Bay Length (ft)			375	150					100
Base Capacity (vph)	352	2311	1466	67	1438	195	345	333	868
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.44	0.00	0.07	1.14	0.31	0.05	0.64	1.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	969	3	5	1543	49	33	1	8	172	2	786
Future Volume (vph)	200	969	3	5	1543	49	33	1	8	172	2	786
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	10	10	11	10	12	14	14	14	14	14
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1518	3455	1507	1203	3454		1752	1441			1912	1706
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.46	1.00			0.72	1.00
Satd. Flow (perm)	1518	3455	1507	1203	3454		843	1441			1437	1706
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.54	0.54	0.54	0.82	0.82	0.82
Adj. Flow (vph)	211	1020	3	5	1591	51	61	2	15	210	2	959
RTOR Reduction (vph)	0	0	0	0	2	0	0	12	0	0	0	8
Lane Group Flow (vph)	211	1020	3	5	1640	0	61	5	0	0	212	951
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	11%	1%	0%	40%	0%	16%	3%	0%	25%	1%	0%	1%
Turn Type	Prot	NA	custom	Prot	NA		Perm	NA		Perm	NA	pt+ov
Protected Phases	1	6	6	5	2			9			9	1 9
Permitted Phases			9				9			9		
Actuated Green, G (s)	29.0	79.6	108.6	1.4	52.0		29.0	29.0			29.0	63.0
Effective Green, g (s)	29.0	79.6	108.6	1.4	52.0		29.0	29.0			29.0	63.0
Actuated g/C Ratio	0.23	0.64	0.87	0.01	0.42		0.23	0.23			0.23	0.50
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0			2.0	
Lane Grp Cap (vph)	352	2200	1369	13	1436		195	334			333	859
v/s Ratio Prot	0.14	0.30	0.00	0.00	c0.47			0.00				c0.56
v/s Ratio Perm			0.00				0.07				0.15	
v/c Ratio	0.60	0.46	0.00	0.38	1.14		0.31	0.02			0.64	1.11
Uniform Delay, d1	42.8	11.7	1.1	61.4	36.5		39.7	37.0			43.3	31.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.8	0.7	0.0	6.8	72.8		0.3	0.0			2.9	64.2
Delay (s)	44.7	12.4	1.1	68.1	109.3		40.1	37.0			46.2	95.2
Level of Service	D	B	A	E	F		D	D			D	F
Approach Delay (s)		17.9			109.2			39.4			86.3	
Approach LOS		B			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	74.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	111.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

IMPROVING COMMUNITIES TOGETHER

MEMORANDUM

Date:	December 14, 2020	Job No.:	7363
To:	Lee Newman, Director of Planning and Community Development		
Cc:	Anthony Del Gaizo, PE, Town Engineer		
From:	Jaklyn Centracchio, PE, PTOE		
Subject:	Traffic Peer Review – Boston Children's Hospital – Needham, MA		

Responses to the second round of peer review comments for *the Traffic Peer Review - Boston Children's Hospital – Needham, MA Memorandum*, prepared by BETA Group, Inc., dated December 7, 2020 were received from the Applicant on December 10, 2020. BETA Group, (BETA) reviewed the submitted response documents.

BASIS OF REVIEW

The following response documents were received by BETA and will form the basis of the review:

- *Response to Traffic Peer Review – Boston Children's Hospital – Needham, MA dated December 7, 2020*, prepared by Vanasse Hangen Brustlin, Inc (VHB) dated December 10, 2020
- *Response to Traffic Peer Review – Boston Children's Hospital – Needham, MA dated November 10, 2020* and Attachments, prepared by Vanasse Hangen Brustlin, Inc (VHB) dated November 24, 2020
- *Transportation Impact and Access Study (TIAS)*, Boston Children's Hospital New Pediatric Medical Facility at Founders Park, VHB, October 7, 2020
- Boston Children's Hospital Needham Satellite Project, Needham Special Permit Submission, Plan Set, Payette, October 7, 2020
- Supplemental Draft Environmental Impact Report (SDEIR), prepared by Epsilon Associates, Inc., submitted to the Massachusetts Environmental Policy Act on August 31, 2015

COMPILED REVIEW KEY

BETA's original comments are in standard text, the Applicant provided responses dated November 24, 2020 and December 10, 2020 (responses in *italic text*), and BETA has provided comments on the status of each (status in standard bold text).

PROJECT OVERVIEW

The project site is located within Founder's Park in Needham, Massachusetts and proposes phased construction of three new buildings located at 380 1st Avenue, 37 A Street and 2 B Street. Access to the three buildings would be provided from 1st Avenue, A Street and B Street. As proposed, the buildings would consist of a mix of Pediatric Ambulatory Center and General Office Space land uses, totaling approximately 452,000 square feet (SF):

- 380 1st Avenue – Pediatric Ambulatory Center (224,000 SF)
- 37 A Street – Office (101,000 SF)
- 2 B Street – Office (127,000 SF)
- Total = 452,000 SF

Prior to this TIAS, BETA reviewed in depth several documents prepared by the proponent's traffic consultant involving the proposed parking demand and trip generation. It should be noted that while the estimated usage and total square footage of the three new buildings was equal to 452,000 SF, the sizes of two of the buildings were different. The proposed building sizes as of April 2020 were as follows:

- 380 1st Avenue – Pediatric Ambulatory Center (245,000 SF)
- 37 A Street – Office (80,000 SF)
- 2 B Street – Office (127,000 SF)
- Total = 452,000 SF

The building square footage differences slightly alter the individual trip generation and parking generation numbers but overall are comparable to those reviewed in April 2020.

The TIAS included an evaluation and summary of the proposed transportation elements and impacts of the project using actual collected vehicle trips based on traffic counts conducted on October 10, 2019 and comparison to previously approved development (based upon the SDEIR, dated August 31, 2015). Again, this data was previously reviewed by BETA in April 2020 and the data provided in the TIAS are similar, therefore, minimal discussion on these topics is provided within this memorandum for these topics.

2019 Baseline Conditions/Existing Conditions

Manual turning movement counts (TMCs) were collected at seven (7) intersections on Thursday, October 10, 2019 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Traffic volume data were also collected via automatic traffic recorder (ATR) at 16 locations over a 24-hour period on Thursday, October 10, 2019. The weekday morning and afternoon peak hours were determined to be 8:00-9:00 AM and 4:45-5:45 PM, respectively. The raw volume data is provided in the Appendix of the TIAS.

The following four intersections were analyzed within the TIAS and noted as the key project area intersections:

- Highland Avenue at 1st Avenue
- Highland Avenue at 2nd Avenue
- Kendrick Street at 3rd Avenue
- Kendrick Street at 4th Avenue

1. Volume data was collected at seven intersections. Four of the intersection volumes were provided on the volume figures in the TIAS and analyzed. Explain why the remaining three intersection volumes, two of which are at site driveways, were not included on the future volume diagrams to show an understanding of the future activity at the proposed driveways.

   Applicant: Note that the purpose of the TIA is to serve as an assessment of the specific impacts of the Project and how the modification of 380 1st Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. Those previously reviewed and approved filings focused primarily on those four identified gateway intersections to Founders Park. The study area for this TIA simply looks to be consistent with those previously-reviewed and approved efforts supporting the current Special Permit, MEPA Certificate, and Section 61 Findings. The counts collected at the other identified internal driveway locations were commissioned solely for the purposes of assessing and delineating actual trip generation for Founders Park only.

BETA: Explanation provided. It is noted that the intersections surrounding the site were included on the volume diagrams in the SDEIR. The three remaining intersections should be included in the post occupancy study to determine the realized impacts to the intersections.

Applicant: Post occupancy studies will be conducted in accordance with the larger Founders Park site mitigation commitments as stated in the Section 61 Findings.

BETA: Information provided - issue resolved.

2. It is typical and recommended to collect ATR data for a longer period to accommodate the potential fluctuations in day to day traffic volumes to determine average daily volumes. Explain why 48-hour data was not collected.

   Applicant: ATR data were collected for 24-hours specifically for the purposes of comparing actual trip generation to estimated trip generation. All of these count data were compared back to the TMC and ATR data collected by MassDOT and their consultant (McMahon) in connection with post-construction counts collected and compiled for the Route 128 Add-A-Lane Project – including new interchange ramps and roadway improvements along both Highland Avenue and Kendrick Street. We are confident that count information is consistent with that effort and accurately reflects recent, typical traffic conditions (pre-Covid-19 Pandemic).

   BETA: Explanation provided – issue resolved.

3. Speed data was not collected via the ATR's. Explain why speed data was not included with the ATR data collection, particularly on Kendrick Street where travelling speeds are significant, as is standard practice for a TIAS.

   Applicant: Collection and inclusion of detailed speed data is not generally provided in a typical TIA – unless specifically requested. As noted above, the primary purpose of TIAS was to determine whether a change in use from Office to Pediatric Medical Facility would yield increased traffic impact versus that previously studied and approved in the 2015 SDEIR, and reflected in the current Special Permit, MEPA Certificate, and Section 61 Finding.

   BETA: Explanation provided – issue resolved.

4. Volume data was collected at 16 ATR locations and the raw data was provided in the Appendix. However, the data was not provided or summarized in the study itself. A summary of the ATR data is not only a standard part of a TIAS but would be helpful to understand the existing traffic volumes and patterns throughout the study area. In addition, it would provide a baseline for the post occupancy monitoring.

   Applicant: Again, the purpose of the ATR data was to compare actual trip generation for Founders Park versus with the trip generation estimates quantified in the 2015 SDEIR. The ATR data is summarized at a high level in the TIAS. However, as requested, a more detailed ATR summary is provided in R4 of Attachment A.

   BETA: Summary table provided – issue resolved.

5. Provide the TMC data sheets for the Kendrick Street and 3rd Avenue afternoon peak periods which are missing from the Appendix.

   Applicant: The TMC data sheets were provided in the TIAS submission. See Pages 315-322 of the TIAS. For reference, we have also included those materials in R5 of Attachment A.

   BETA: Information provided – issue resolved.

The proponent reviewed the need for a seasonal adjustment. Since the proponent found the traffic volumes in October were found to be average-month conditions the volumes were not adjusted. The source of the seasonal adjustment information was not provided in the TIAS. Based on historical data for from MassDOT, BETA found the volumes to be higher than average in the month of October and therefore finds not adjusting the volumes to be a conservative approach and acceptable.

The traffic volumes were collected in October 2019. Since then a few changes have occurred relative to traffic volumes. One of which is that the 189 B Street building received its occupancy permit on November 1, 2019 after the original counts were conducted. The building occupancy trips are considered "estimated" although at some point after October 2019 the trips generated by the building would have been "actual" and realized. The second change relative to traffic volumes is the COVID-19 impact on traffic volumes. The TIAS did not mention COVID-19 related impacts.

6. Due to a high percentage of people are working remotely, at least part time, it is not reasonable to collect new data at this time. However, occupancy after the October 2019 counts and prior to COVID-19 changes in traffic, and current and potential future traffic patterns and changes due to COVID-19 are important to note in the TIAS.

   Applicant: The occupancy of 189 B Street was reflected in our previously studied and reviewed Trip Generation analysis. That occupancy is included within the TIA based on the trip generating characteristics of that building per ITE Trip Generation and previous studies, reflective of how that building asset was accounted for in previous local and Commonwealth jurisdictional review.
   As noted, it would be impossible to collect accurate traffic data that would reflect typical peak period conditions given the systemic change in travel behaviors that are currently being experienced due to the ongoing Covid-19 Pandemic. Traffic volumes are significantly lower than that experienced prior to March 2020. It is unclear when volumes might return to pre-March 2020 levels, even after the Pandemic ends.

   Consequently, we have elected to use ITE data for that one occupied building consistent with how the impacts of that building were quantified previously. However, based on an extremely detailed study of trip generating characteristics of other occupied Founders Park buildings – and documented in our previously-reviewed and approved Trip Generation Memorandum, we know that this approach is a conservative assessment of the impact of that building's actual occupancy (as all occupied Founders Park Buildings have been shown to have significantly lower trip generating characteristics than what ITE estimates suggest).

   BETA: Information provided – issue resolved.

PROJECT CHANGE DESCRIPTION

LAND USE AND BUILDING SIZES

The changes to the permitted Founders Park development are similar to the BCH Proposed Project in terms of total building square footage, however one of the uses are different and the building sizes vary. The following table outlines the comparison of the permitted and proposed projects.

Table 1: Comparison of Permitted and Revised Proposed Use

Location	Permitted		Proposed	
	Use	SF	Use	SF
380 1st Avenue	Office	189,509	Pediatric Ambulatory Center	224,000
37 A Street	Office	135,000	Office	101,000
2 B Street	Office	127,145	Office	127,000
Total		451,654		452,000

PROPOSED SITE PARKING

The first phase of construction consists of the 380 1st Avenue building. The interim parking plan to support this will consist of expanding the existing parking garage at 380R 1st Street (Garage B) by 530 parking spaces as currently approved. BCH will utilize 138 of the 264 existing surplus parking spaces in the existing Garage B. In addition, a temporary surface lot at 37A Street will be constructed with 105 spaces for a total of 773 spaces for interim parking.

The full build parking plan will include the previously approved 530 space addition to Garage B, and a new 925 space parking garage located at 400R 1st Avenue (Garage A) for a total of 1,455 spaces.

An extensive review of the Parking Generation Evaluation was performed by BETA in April 2020. It was noted by BETA that while 138 existing surplus parking spaces were observed to be currently unused, many of them are allocated for existing uses and could be utilized in the future if tenants change or a reduction in mode shares is seen. The proponent agreed that a review of the parking supply and utilization should be considered as part of the future traffic and parking monitoring program for the site.

7. The review of the parking supply should be added in the future traffic and parking monitoring program as part of the mitigation.

   Applicant: Children's is committed to assessing the utilization of their allocated parking supply moving forward at Founder's Park. We recommend that this monitoring program commence one year after receipt of a Certificate of Occupancy (C of O) for 380 First Avenue and be conducted annually thereafter, as mutually agreed to by both Boston Children's Hospital and the Town of Needham.

   BETA: BCH stated they will assess the parking supply post occupancy. Issue resolved.

As mentioned earlier in the memorandum, this TIAS proposes slightly different building sizes than as indicated in the previous review which slightly alters the individual parking generation numbers, but the total required spaces is comparable to those reviewed in April 2020. The table below summarizes the revised parking demand per the zoning amendment to include the Pediatric Medical Facility land use.

Table 2: Revised Parking Demand

Location	Zoning By-Law Use	Program Size (KSF)	Required Parking (spaces/KSF)	Parking Demand (spaces)
380 1st Avenue	Medical Facility, Pediatric	224	3.45	773
37 A Street	Office Building	101	3.33	337
2 B Street	Office Building	127	3.33	423
Total		452	3.39	1,533

PROPOSED SITE ACCESS & CIRCULATION

Access to the three new buildings would be provided from 1st Avenue, A Street and B Street. Patient drop off for 380 1st Avenue will be via Founders Drive and egress via a driveway along New Way. Access to 37A Street will be via A Street.

A revised walking path network has been proposed to and from the site buildings and parking garages. A raised crosswalk exists for the crossing between the amphitheater and 380 1st Avenue and a speed table exists between the amphitheater and Garage A. The proposed connection from Garage B to 380 1st Street is marked but not raised.

8. Clarify the proposed pedestrian amenities for this project versus what exists today.

   Applicant: A site plan showing the pedestrian connections is provided in the TIA – and included herein for reference (see R8 in Attachment A). New crosswalks are proposed to connect the Project to the 380R First Avenue Garage (Garage B) and the future 400R Garage (Garage A), and across the proposed loading dock. Currently there are no crosswalks provided between these two sites. Sidewalks will be provided on site along First Avenue and New Way. These facilities also currently do not exist. The goal is to provide safe and complete pedestrian connectivity between the 380 1st Avenue site and the rest of the Founder's Park campus.

   BETA: Clarification provided – issue resolved.

9. Consideration should be given to raising the crosswalk between Garage B to 380 1st Street as it is likely that this crossing would experience significant pedestrian activity.

   Applicant: We agree with this comment. The Project is currently under design, and this amenity has been discussed as being something to strongly consider. Its viability is being studied in the context of appropriately managing driveway stormwater and associated drainage needs.

   BETA: Raised crosswalk will be provided if viable. If the raised crosswalk is not viable, consideration should be given to providing other safety features.

Applicant: Comment noted. This is currently under study and will be included into the design if feasible.

BETA: Issue resolved.

Two site plans were provided. One site plan shows an interim site layout and the other is a full build layout. The interim site plan shows a three-way stop sign configuration where Founders Drive, New Way, and an unnamed street intersect. The full build plan shows only one stop sign on the New Way approach to the intersection.

10. Provide discussion on how the application of the stop sign on the one approach was determined for the full build layout.

    Applicant: The intention is to install all-way Stop control at New Way/Founders Drive. The goal is to recognize the multi-modal needs of the campus and look for ways to slow down vehicular traffic wherever reasonably feasible.

    BETA: It is understood that the intention is to provide all-way stop control at the New Way/Founders Drive for both the Interim and full build conditions. The full build plans should be revised to reflect the all-way stop control.

    Applicant: All-way stop control at New Way/Founders Drive will be provided on all plans, as already anticipated.

    BETA: Information provided – issue resolved.

TRIP GENERATION

The trip generation calculations were performed for the new use/change in use to estimate the projected trips, using the *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 10th Edition*. There is no ITE land use for Pediatric Ambulatory Center and for the purposes of this TIAS, the Medical-Dental Office Building was used. In addition, the proposed use for 380 1st Avenue was split evenly between Medical-Dental Office and Hospital, to more accurately account for its intended uses. Based upon this categorization the revised development program was assessed using the following ITE Land Use Codes:

- Land Use Code 610: Hospital
- Land Use Code 710: General Office Building
- Land Use Code 720: Medical-Dental Office Building (in lieu of Pediatric Ambulatory Center)

It should be noted that all medical trips used a 100% vehicle trip share, while all office trips used a 90% vehicle trip share, as previously approved in the SDEIR. The proposed use provided in the documents from the April 2020 review with the added Medical-Dental Office Building land use resulted in a total of 732 trips in the morning Peak and 815 trips in the afternoon Peak. The newly proposed uses and trip generation summary is shown in the following table.

Table 3: Proposed BCH Project Weekday Vehicle Trip Generation

Location	Proposed Use	ITE Land Use Code	SF	Estimated Vehicle Trips					
				Morning Peak			Afternoon Peak		
				In	Out	Total	In	Out	Total
380 1st Ave	Pediatric Ambulatory Center	Medical-Dental Office	112,000	243	68	311	109	279	388
		Hospital	112,000	142	67	209	62	132	194
37 A St	Office	General Office	121,000	81	13	94	16	85	101
2 B St	Office	General Office	127,000	85	14	99	17	89	106
Total			452,000	551	162	713	204	585	789

The new proposed use with the added Medical-Dental Office Building land use results in a total of 713 trips in the weekday morning peak and 789 trips in the afternoon peak.

PERMITTED VS. PROPOSED TRIP GENERATION COMPARISON

Once the newly proposed trips were calculated, a comparison was made between the proposed trip generation and the previously approved (permitted) trip generation for the entire site. The permitted trips are taken from the SDEIR, while the proposed new project trips for BCH's development were added to the actual site trips collected in October 2019 to create the future expected trips. The permitted and revised proposed vehicle trips summary is shown in the table below and has previously been reviewed and found to be acceptable by BETA in April 2020.

Table 4: Revised Trip Generation Comparison

Time Period/Direction	Permitted (SDEIR)	Proposed Project + Actual Trips	Difference
Morning Peak Hour			
Entering	1,338	1,373	+35
Exiting	352	321	-31
Total	1,690	1,694	+4
Afternoon Peak Hour			
Entering	453	403	-50
Exiting	1,266	1,405	+139
Total	1,719	1,809	+90

The table shows the proposed project + actual trips would generate 4 more trips than the permitted project in the morning peak hour and 90 more trips in the afternoon peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT

The TIAS states that the trips were distributed to the study area intersections according to the distribution and trip assignment developed in the 2015 SDEIR and the trips were separated and distributed differently between retail and office/hotel/pediatric medical office. The 2015 SDEIR gravity models and mode split data used to determine trip distribution and assignment is from the 2010 Census and other outdated documents. The information used to determine the distribution is based on data that is 10 years old and more recent Census data available.

11. Confirm that the trip distributions from 2015 are still relevant/applicable in 2020. Revise the mode split and trip distribution if needed.

    Applicant: Trip distribution and mode split assumptions are based those inputs used to support the approved 2015 SDEIR. There is no supporting data to elicit a change in trip distribution assumptions made previously. Most traffic is expected to interact, directly, with on- and off-ramps to and from Route 128. Mode split data used previously is very conservative (i.e., very high auto mode share assumption), and frankly, is a factor contributing to why actual, measured trip generation collected on-site is so much lower than that estimated previously. Class A office space on Route 128 is attracting a healthy percentage of reverse commuters from the urban core who use transit and connect to the site via shuttle. Alternative work schedules and remote working have also become a much more prevalent part of employee schedules – and those programs also drive estimated traffic volumes downward. This is likely also true of all of the unbuilt office space studied in the TIA – however our intention and goal was to be consistent with the 2015 SDEIR and be reasonably conservative. We believe the TIA does both of these things – and is likely conservative in the impacts that are delineated in it (i.e., actual future volumes and impacts will also likely be lower).

    BETA: Justification provided – issue resolved.

12. The pediatric medical office use was not included as part of the Founders Park Development back in 2015. Clarify how the pediatric medical office distribution percentages were determined as shown on Figure 10 – Trip Distribution in the TIAS.

    Applicant: The trip distribution and assignment in the peak period analyses is driven primarily by employees travelling to and from the site. This distribution and mode split of that population over the long-term is most likely to be analogous to that of office employees. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA – although we believe the distributional characteristics of that population is also similar to that of the employees.

    BETA: Clarification provided – issue resolved.

13. BCH patient data would be more reasonable to use in determining the trip assignment and distribution for the BCH pediatric medical use.

    Applicant: The trip distribution and assignment in the peak period analysis is actually driven primarily by employees travelling to and from the site, which is likely to be similar to that of the office employees as previously studied in the 2015 SDEIR, and as discussed previously in Response 12. Patients of the pediatric medical facility will be arriving and departing, primarily, during off peak hours and have a lesser influence on the study of peak commuter periods, as is typical in a TIA.

Further, it is not reasonable to simply re-allocate existing Children's patient data for the purposes of determining trip distribution for this facility. Over the long-term, the use of this facility will be driven by surrounding home-origin markets- and will more likely be reflective of those same home origin data points that drive journey-to-work statistics for workers.

BETA: We agree that the patients would have a lesser impact to the peak commuting hours but would still have an impact. Considering the impact would be minimal - issue resolved.

14. Verify the trip distributions shown on Figure 10 – Trip Distribution. The distribution percentages from west of 1st Avenue do not add up with the percentages shown at the Highland Avenue and 1st Avenue intersection. This also applies to the percentages west of the intersection of 3rd Avenue and Kendrick Street.

    Applicant: The distribution percentages from the I-95 north and south reflect vehicles using both the Highland Avenue and Kendrick Street exits (e.g. 25% of the traffic comes from I-95 NB, 20% uses the Kendrick Street exit and 5% uses the Highland Avenue exit). These are high level distributions and should not be confused with the assignment of those trips in the respective peak periods. Additionally, like many other methodology assumptions, these distribution patterns are reflective of those that supported the 2015 SDEIR review and approval.

    BETA: Clarification provided – issue resolved.

15. Approximately 295 vehicle trips are anticipated to turn right onto 1st Avenue from Highland Avenue and 329 turning left onto 3rd Avenue from Kendrick Street during the morning peak hour during the proposed BCH condition. Clarify why the intersections to the west of these locations were not included in the analysis with the addition of 300 vehicle trips during the peak periods.

    Applicant: The intersections west of First Avenue/Third Avenue are the I-95 interchange on- and off-ramps, where the majority of the Project traffic is expected to originate from. The free flow onto and off of the highway was not previously studied in the 2015 SDEIR and is therefore also not studied in the TIAS. The intersection of Kenrick Street at Hunting Road was previously studied in the SDEIR. However, the Children's Project is anticipated to have only very limited incremental impact west of the I-95 interchanges, as the majority of project trips will come from I-95.

    BETA: Clarification provided – issue resolved.

FUTURE CONDITIONS

The future conditions were analyzed for two scenarios with a seven-year horizon to 2026. The permitted Founder's Park development project and the proposed BCH project were analyzed.

16. A No-Build future condition was not included in the TIAS; however, a No-Build condition analysis was provided in the 2015 SDEIR. A No-Build analysis should be provided in order to determine the true projects impacts. Explain why the No-Build future condition was not analyzed in the TIAS.

    Applicant: A No-Build analysis was provided in the 2015 SDEIR to assess the impact of Center 128 relative to the base condition (if that Project were not approved). That Project, however, was approved and the base condition to compare impacts to is now a fully built Center 128. As such, the approved Build Condition from the SDEIR is, in a sense, the No-Build condition to compare the Children's Project to as a means to clearly quantify incremental impact over and above the approved project. As stated previously, the purpose of this TIA is to serve as an assessment of the

specific impacts of the Project and how the modification of 380 First Avenue from an approved Office use to a proposed Pediatric Medical Facility use would result in changes in peak period traffic impacts versus what was reviewed and approved previously. The most accurate way to do that is to compare this Project to what was previously approved. This will provide the basis to do the following:

1. *Determine the changes in increment impact from that studied, reviewed and approved previously*
2. *Confirm that transportation improvements and mitigation committed to previously in the Special Permit, MEPA Certificate, and Section 61 Findings are still valid and hold true moving forward*
3. *Delineate updates to that committed mitigation, as needed, to reflect any quantified incremental impacts that are identified.*

Inclusion of a No-Build Condition (assuming no Center 128) does none of these things – and represents a fictitious development scenario that can now longer exist. This is typically how TIA's supporting Notice of Project Changes are studied. It is also specifically how we are obligated to study this Project in support of MEPA and MassDOT review and approval – who have recognized that inclusion of a No-Build Condition is neither warranted nor necessary in this case.

BETA: Explanation provided – issue resolved.

The future traffic volumes were determined by applying a 0.5% percent per year growth rate over seven years. A 0.5% growth rate is consistent with the growth rate used in the 2015 SDEIR. BETA finds the growth rate to be reasonable, however it is not clear what future traffic volumes, growth, and office occupancy will look like post pandemic.

Trip generation data for the following additional background developments was determined based on associated Institute for Transportation Engineers (ITE) Trip Generation data and included in the two future conditions.

- 2 Wells Avenue (trips only associated with the unoccupied expansion of the project)
- 180 Wells Avenue
- Newton Nexus
- Northland Industrial (130 Charlemont)
- Northland Newton Development

17. ITE Trip Generation data was used to determine project trips for the above-mentioned projects, however, there are traffic studies for at least some of the projects which provide the number of anticipated trips. The available traffic study data should be provided instead of determining trips based on the ITE Trip Generation for the background projects where applicable.

    Applicant: Project generated trips for the referenced background projects were accessed directly from their respective traffic studies. This language will be updated in the TIA to provide more clarity on this issue.

    BETA: Clarification provided – issue resolved.

18. The backup calculations and distributions used to determine the various development vehicle trips was not provided for reference and review. This information is necessary to determine the appropriateness of the future volumes.

    Applicant: The specific project trips used to develop the traffic volumes in the future conditions are provided in R18 in Attachment A.

    BETA: Information provided – issue resolved.

TRAFFIC OPERATIONS

Traffic operations analyses were performed using Synchro software for the existing conditions, 2026 future approved project, and the 2026 future BCH project build conditions.

19. Provide all study area traffic signal timing and phasing plans for reference.

    Applicant: This signal timing and phase plans are provided in R19 in Attachment A.

    BETA: The signal timing and phasing plans were provided. There are a few minor phasing inconsistencies between the analysis and existing signal operations at the intersections of Highland Avenue at 1st Avenue and Highland Avenue at 2nd Avenue. However, the signal phasing is consistent between the TIAS and SDEIR. The phasing inconsistencies are minor and would not significantly alter the results. Issue resolved.

Capacity analysis results show that all existing signalized intersections operate at an acceptable Level of Service (LOS) D or better overall and all approaches operate at LOS E or better during the existing conditions.

The condition comparison discussions per intersection refer mainly between the existing conditions and the 2026 future BCH build conditions unless otherwise noted. It is noted that all results assume pre- and post-COVID-19 operating conditions.

1ST AVENUE & HIGHLAND AVENUE

Capacity analysis results show a degradation from LOS D during the existing afternoon peak to LOS F during the BCH project condition afternoon peak hour for the 1st Avenue northbound left-turn movement with a minimal increase in queue length. The intersection will operate at an overall LOS D or better during both peak periods.

A comparison between the 2015 SDEIR analysis for the 2022 "Approved" build and the 2026 Approved build in the TIAS reveals a significant difference for the 1st Avenue northbound left turn volume. The 2015 SDEIR shows a volume of 365 vehicles and the TIAS shows a much lower volume of 113 during the morning peak hour.

20. Describe any known reason for the significant difference in left-turn volumes between the two analyses.

    Applicant: During the time that the 2015 SDEIR was prepared, the northbound left-turn moment from First Avenue onto Highland Avenue was a prohibited movement. The TIA made assumptions within the development of the 2022 No-Build/Build Conditions, including modifications to this intersection taking into consideration the anticipated future permitted northbound left

movement. To account for this anticipated change at that time, count volumes were redistributed (approximately 60%) from Second Avenue to First Avenue to account for this permitted movement. In addition, redistribution was estimated to account for the Kendrick Street interchange.

This TIA is based on actual counts, which are indicative of both lower overall traffic activity in/out of Founder's Park from Highland Avenue and higher volumes in/out from Kendrick Street.

BETA: Information provided – issue resolved.

The intersection has recently been reconstructed. It is understood that limited additional improvements are available for this intersection to improve traffic operations at this time.

2ND AVENUE & HIGHLAND AVENUE

Capacity analysis results show that all movements during the morning peak operate at LOS D or better and the overall intersection would operate at LOS B. The 2nd Avenue northbound and southbound movements will continue to operate at LOS E when compared with the existing conditions, however, the northbound right-turn movement will degrade from LOS D to LOS E between the existing and build conditions. The Highland Avenue westbound shared left/through movement operates as a defacto left turn lane during all conditions the morning peak period. The defacto analysis result for the Highland Avenue westbound shared left/through movement indicates that an exclusive westbound left-turn lane is needed.



Figure 1: Existing signal post of northeast corner of 2nd Avenue and Highland Avenue.

Although the overall intersection is shown to operate at LOS D during the evening peak hour BCH project conditions, the volume to capacity ratio is greater than 1.02 which is indicative of an oversaturated intersection and an operation of LOS F, which is degraded from an LOS C during existing conditions.

21. Some of the signal equipment was not updated as part of the recent roadway project along Highland Avenue. Consideration should be given to upgrading the equipment that was not updated.

    Applicant: The Proposed BCH Project has a minimal impact on traffic operations at the Second Avenue intersection compared to the Approved Project during both the morning and evening peak hours. While overall intersection operations have been documented to decrease from LOS C to LOS D, the overall intersection delay increases by only three seconds.

    More importantly, the Newton-Needham Corridor Project, which is being led by MassDOT, includes significant improvement to Highland Avenue, including its intersection with Second Avenue. That location will be widened to support two lanes in each direction, including exclusive left-turn lanes, bicycle and pedestrian improvements, and complete traffic signal replacement. This information was shared recently at a Virtual Public Meeting held on September 30, 2020. The presentation made at that meeting is provided for reference. Our understanding is that these improvements will be put in place in 2021 – well before BCH Project construction commences.

    BETA: Information provided – issue resolved.

3RD AVENUE & KENDRICK STREET

The capacity analysis results show that the overall intersection operations degrade from LOS C during existing conditions to LOS E during the morning peak period and degrade from LOS C to LOS F during afternoon peak operations. The Kendrick Street eastbound left-turn movement will degrade from LOS E to a significant LOS F during both peak periods with extensive queueing during the morning for both left turn and through eastbound movements. In addition, the Kendrick Street westbound movement would experience significant queuing during the afternoon peak hour. The 3rd Avenue southbound right turn movement will experience a significant increase in delay from a LOS D to LOS F and significant queue lengths during the afternoon peak hour.

4TH AVENUE & KENDRICK STREET

The unsignalized driveway northbound and 4th Avenue southbound approaches to Kendrick Street operate at LOS F during both existing peak periods. The same movements continue to operate at LOS F under both the future Approved and BCH project conditions with significantly increased delay and queues.

The TIAS states that there is a modest increase in traffic at the intersection under the proposed BCH project and conservative gap parameters are assumed in the analysis so in actuality shorter delays would be realized in the future than as presented in the analysis. It was also noted that no queuing was observed in the morning and a maximum queue length of six cars was observed in the evening. BETA observed very few gaps in traffic for vehicles exiting 4th Avenue. Right turn safety issues exiting 4th Avenue onto Kendrick Street westbound due to the travelling speeds combined with limited gaps on Kendrick Street, and also lack of pedestrian safety for pedestrians crossing 4th Avenue were observed as well.

22. There are safety and operational issues at this intersection. A signal warrant analysis was not performed for the intersection. Provide a signal warrant analysis to determine if the intersection meets warrant criteria for signalization.

    Applicant: A limited signal warrant analysis has been conducted for the intersection of Kendrick Street at Fourth Avenue based on the limited peak period traffic count data collected in October 2019. Note that only Warrant 2 – Four-Hour Vehicular Volume and Warrant 3 – Peak Hour were able to be assessed at this time. The other warrant conditions were unable to be reviewed due to the limited count data available. Based on this limited assessment, criteria was met on both Warrants 2 and 3, which relates to the amount of peak period volume wanting to turn from the side street (Fourth Ave) to the primary corridor (Kendrick Street). This partial signal warrant analysis is included in R22 of Attachment A. Note that due to the ongoing Covid-19 Pandemic, it would not be prudent to conduct the very detailed array of traffic counts that are necessary to support a proper, complete signal warrant analysis at this time or into the immediate future as traffic conditions are measurably lower than what one would expect under typical conditions. A full signal warrant could be conducted in the future when counts can be collected representing more typical weekday traffic conditions. Note that Children's is committed to studying safety issues and delineating paths for future improvement – this is a pre-existing condition location, however, that Children's does not generate any new, incremental future impact.

    It should also be noted that in connection with Commonwealth of Massachusetts MEPA review, MassDOT has expressed desire to explore the appropriateness of conducting a Roadway Safety Audit (RSA) at this location in the future, as this intersection is Highway Safety Improvement Program (HSIP)-eligible. It is also our understanding that operational and safety concerns at this intersection have been raised at Needham's Traffic Management Advisory Committee.

The Children's Project does not result in any increased traffic volume at this location versus what was previously studied and approved. However, Children's is committed to working with the Town and MassDOT to conduct both a full Traffic Signal Warrant Analysis and Roadway Safety Audit to help comprehensively assess operational and safety issues at this location. Those studies will be conducted at an appropriate time in the future in a way that is mutually agreeable to the Town, MassDOT, and Children's.

BETA: Signal warrant analysis was provided based on the four hours of peak data collected in October 2019. Two warrants are met based on the preliminary analysis. BCH has committed to providing a full traffic signal warrant analysis at a later time and also conduct a Road Safety Audit (RSA) of the Kendrick Street and 4th Avenue intersection. Issue resolved.

TRANSPORTATION MITIGATION

According to the TIAS, the Approved Founders Park Development included the following mitigation commitments, and the status is "completed."

- Add-A-Lane Project, 1-95 NB off-ramp and 1-95 SB on-ramp at Kendrick Street
- Signalization of Highland Avenue/1st Avenue
- Coordination with of timings at the intersections of 1st Avenue and 2nd Avenue along Highland Avenue
- Kendrick Street/3rd Avenue signal timing adjustments
- Upon issuance of the building permit for the first office building to be constructed, the Proponent will contribute to the Town of Needham a Traffic Improvement Fee of $930,000
- Contribute to the Town of Needham an additional $75,000 for use by the town to hire a traffic engineer to evaluate traffic measures that should be implemented to improve traffic conditions in the immediate area of Needham Crossing
- Contribute $1,000,000 to the New England Business Center Owner's Association (i.e., Needham Crossing Improvement Corporation) available to be used to address traffic issues serving the New England Business Center
- Provide a bike share program for the New England Business Center
- Contribute $100,000 to fund new ingress and egress signs for the New England Business Center

The mitigation measure options provided in the TIAS for the proposed BCH development impacts are the following:

- Signal timings and or phase changes at the Kendrick Street and 3rd Avenue intersection
- To increase the storage capacity of the 3rd Avenue southbound right-turn lane at Kendrick Street

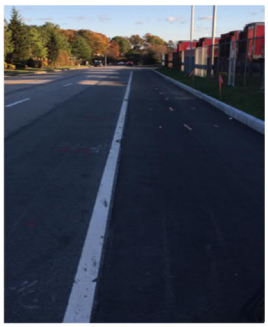


Figure 2: 3rd Avenue Southbound approach to Kendrick Street.

23. Signal timing and phasing adjustment analysis was not performed for the Kendrick Street and 3rd Avenue intersection to determine that timing and/or phase changes would benefit the intersection. Provide analysis to verify that this "mitigation measure" would reduce the project-related impacts to the intersection as indicated in the TIAS.

Applicant: Preliminary signal timing and phasing adjustments show that some of the impacts of the Project have the potential to be mitigated. Mitigation actions that would improve traffic operations include removing the northbound/southbound split phase and running concurrent pedestrian phases. With these in place, operations during the morning peak hour could result in improved LOS compared to the 2026 Approved Project Build Condition and similar operations during the evening peak hour. Preliminary results are summarized along with Synchro results in R23 of Attachment A.

Children's will commit to studying this issue and will retain a signal contractor to make appropriate signal timing and phasing adjustments, as needed, to improve peak period traffic operations at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

BETA: Please provide R23 in Attachment A which is missing. BETA would recommend that the initial signal timing and phasing adjustments be made within 6 months of the issuance of a Building Occupancy Permit.

Applicant: R23 is provided in Attachment B. BCH agrees to retain a signal contractor to make an appropriate one-time signal timing and phasing adjustment to improve peak period traffic operations at Kendrick Street and Third Avenue within six months after the issuance of the Building Permit.

BETA: Information provided – issue resolved.

24. Currently there are two marked southbound travel lanes on 3rd Avenue approaching Kendrick Street. Although the outer lane is not marked with right-turn only lane markings, it operates as a right-turn only lane. Therefore, this mitigation condition already exists and would not improve operations at the intersection. However, right-turn only lane markings and signage could be provided to better delineate the lanes.

    Applicant: The 3rd Avenue approach to Kendrick Street is already striped as suggested with an exclusive right-turn lane on the westbound approach near the intersection. The entire street was recently resurfaced and new thermoplastic lane and crosswalk markings put in place this year. Signage also shows that the right lane is a right turn only lane. We agree that additional right turn only markings could be provided to make this more clear for motorists approaching the intersection. Children's will work with the Town to assess and implement supplemental striping implementation at this location as deemed appropriate and necessary. These improvements would be made within one year after the issuance of a Building Permit for the Project.

    BETA: BCH agrees to better delineate the 3rd Avenue travel lanes approaching Kendrick Street – issue resolved.

25. According to the TIAS, a traffic monitoring program is proposed post-development but not outlined in the mitigation section. Verify that a post-occupancy study to monitor realized development traffic will be included in the mitigation package and all intersections will be reviewed post occupancy to determine the need for signal timing and phasing improvements at that time.

Applicant: The Project is within, and a part of, the larger Founders Park/Center 128 development. As part of the previous approvals process and outlined in the Section 61 findings, the Proponent of Center 128 has already committed to conducting an annual Traffic Monitoring Program. The BCH buildings will be included in future Founders Park monitoring reporting.

As outlined in section 1.1.4, Proponent of Center 128 will conduct a transportation monitoring study of the project consisting of 24-hour continuous automatic traffic recorder (ATR) counts throughout the study area. The Proponent will also circulate employee surveys to buildings/tenants within the development to determine commuting modes, transit ridership, bicycle parking utilization, vanpool/carpool performance, and parking demands. The monitoring program was to begin three months after the opening of the Kendrick Street ramps and will continue for a period of five years after full occupancy.

A technical memorandum summarizing the results of the monitoring program, including a comparison to the trip generation and mode share estimated for the Founders Park development, is prepared annually by Proponent of Center 128 and provided to the Town of Needham, MassDOT and the 128 Business Council.

Additionally, as outlined in Response 7, Children's is committed to assessing the utilization of its portion of the parking supply at Founder's Park. This monitoring program is proposed to commence one year after receipt of a Certificate of Occupancy for 380 First Avenue and be conducted annually thereafter.

BETA: Clarification provided – issue resolved.

TRANSPORTATION DEMAND MANAGEMENT

The Approved Project also included the following TDM commitments to encourage alternative modes of transportation:

- Appointed TDM Program Coordinator to oversee the program
- Joined the 128 Business Council TMA
- Provide a commuter information website and commuter information centers in each of the buildings on campus
- Promote transit use to hotel guests on their website
- Provide a shuttle bus service for employees of TripAdvisor
- Provide 287 bicycle parking spaces.
- Provide on-site locker rooms and showers for employees
- Participate in Zagster bicycle sharing program
- Offer staggered and flexible work hours to reduce peak hour trips
- Work with MassRIDES to promote ride matching and van pool programs
- Provide information to MassRIDES in tenant's rental agreements
- Offer on-site commuter events to promote alternative travel
- Work with the 128 Business Council to facilitate on-site shuttle bus access
- Offer on-site amenities for employees and residents to reduce mid-day trip making

The BCH Project included the following TDM commitments to reduce auto use for employees:

- Providing an Employee Transportation Advisor who will coordination with the 128 Business Council
- Providing shuttle service connectivity to nearby public transportation nodes (commuter rail and Green Line)
- 50 percent transit pass subsidy for employees
- Carpool assistance and incentives
- Emergency ride home
- Bicycling/walking incentives and amenities
- Telecommuting and compressed workweeks, when feasible
- Display in the Main Lobby transportation-related information for employees, patients, and visitors
- Promotional efforts

The proposed TDM measures are appropriate and reasonable for the development. It should be noted that a change in trips could be seen in the future if tenants change or if TDM strategies retract.

ADDITIONAL COMMENTS

Safety issues were not discussed in the TIAS at the study area intersections or within the project area.

26. The 2026 BCH proposed analysis shows that the traffic operations at the intersection of 3rd Avenue and Kendrick Street would be significantly impacted by the project and mitigation was not proposed to improve the project's impact on the intersection. Consideration should be given to providing intersection improvements to mitigate the development's anticipated impact to the intersection.

    Applicant: Children's is committed to supporting future improvements at this location and will provide a $30,000 contribution to the Town for the purposes of implementing signalization improvements at this location. This contribution would be made within one year after the issuance of a Building Permit for the Project.

    BETA: BETA's understanding is the estimated design and construction costs for the proposed 3rd Avenue and Kendrick Street intersection improvements identified by Tetra Tech in October 2015 are approximately $2.2 million. The estimate is attached for reference.



Figure 3: On Kendrick Street eastbound approaching 3rd Avenue.

    BCH has committed to provide a $30,000 contribution to improvements at the intersection of 3rd Avenue and Kendrick Street within one year after issuance of a Building Occupancy Permit. BETA recommends that any contribution be provided by BCH at the time of permit request. Explain how the $30,000 contribution was determined.

    Applicant: Several improvements have already been constructed at this intersection including street resurfacing and striping. BCH is committed to contributing an additional $30,000 for

improvements in addition to extending the right turn arrow striping on Third Avenue southbound, adjusting the location of the signal heads in the eastbound direction, and modifying the timing and phasing to improve peak period traffic operations. This amount would be a reasonable, sufficient allocation to implement audible pedestrian signals (APS) at this location. This amount is based on comparable efforts where VHB has worked to implement this technology at intersections with a similar geometric configuration. BCH agrees to contribute this amount within six months after the issuance of Building Permit.

BETA: Explanation provided – issue resolved.

27. Crash data was not collected, compiled nor analyzed for existing conditions at the study area intersections. This is a standard part of a TIAS. A crash analysis of the latest three years available should be provided to determine safety issues at the intersections, especially the intersections along Kendrick Street.

Applicant: A detailed crash analysis was performed and is included in R27 of Attachment A. Note that, Kendrick Street at Fourth Avenue has been identified as a Highway Safety Improvement Program (HSIP) intersection for the years 2015-2017. A total of 19 crashes occurred at this intersection during those three years, including one serious injury crash. Note that the HSIP website does make note of a crash that involved "non-fatal – incapacitating" injuries.

BETA: Crash data was summarized for the study intersections. BCH has committed to conducting an RSA. Issue resolved.

28. The overhead signal head alignment is offset from the travel lanes on Kendrick Street at 3rd Avenue and can be confusing to drivers. See photo. The signal heads should be realigned with the travel lanes to the extent possible. Consideration should be given to realigning the signal heads as part of the mitigation to improve safety at the intersection.

Applicant: Children's will commit to studying this issue and will retain a signal contractor to make signal head adjustments, as needed, to improve their visibility and overall safety at this identified location. This improvement would be implemented within one year after the issuance of a Building Permit for the Project.

BETA: BETA would recommend that the overhead signal head adjustments be done as soon as possible.

Applicant: BCH is committed to retaining a signal contractor to make a one-time signal head adjustment, as needed, to improve their visibly and overall safety within six months after the issuance of Building Permit.

BETA: Information provided – issue resolved.

Boston Children's Response to Needham Engineering Comments dated 11/16/20

Founder's Park Sewage Flow Comparison

Structure	Location	Approved Flow (gpd)	Proposed Flow (gpd)	Flow Increase (gpd)
		(a)	(b)	(c = b-a)
Building One	380 First Avenue	14,213	20,925	6,712
Building Two	2 B Street	9,535	9,535	-
Building Three (Trip Advisor)	400 First Avenue	21,626	21,626[1]	-
Building Four	37 A Street	10,125	7,538	(2,587)
	Total:	55,499	37,998	4,125

Note: [1] Existing Building

11/30/2020
Prepared by GJT

TOWN OF NEEDHAM, MASSACHUSETTS
PUBLIC WORKS DEPARTMENT
500 Dedham Avenue, Needham, MA 02492
Telephone (781) 455-7550 FAX (781) 449-9023

December 14, 2020

Needham Planning Board
Needham Public Service Administration Building
Needham, MA 02492

RE: Amendment to Major Project Special Permit No. 2012-07
37 A Street, 66 B Streets, 360 and 41 First Avenue- Children's Hospital

Dear Members of the Board,

The Department of Public Works has completed its review of the above referenced request for an Amendment to a Special Permit. The applicant has submitted follow up information based on comments received from the previous Planning Board meeting.

The review was conducted in accordance with the Planning Board's regulations and standard engineering practice. The documents submitted for review are as follows:

1. VHB Response to Traffic Peer Review dated November 25, 2020 and attachments.
2. BETA Traffic Review Response dated December 7, 2020.
3. VHB 2nd Response to Traffic Peer Review dated December 10, 2020.
4. Founders Park Sewage Flow Comparison dated November 16, 2020.

Our comments and recommendations are as follows:

- The DPW has previously noted the NPDES requirements. The applicant will need to comply with the Public Out Reach & Education and Public Participation & Involvement control measures. The applicant shall submit a letter to the DPW identifying the measures selected and dates by which the measures will be completed in order to incorporate it into the Planning Board's decision.

- The applicant has submitted a flow comparison chart of the differences between the previously proposed buildings versus the current proposal. The applicant will have to remove 4 times the amount of infiltration/inflow from the Town's sewer system in accordance with DEP's requirements OR would have to pay $8.00 per gallon (4,125 X 4 X $8.00=$132,000) to the Town for the Town to remove the infiltration/inflow. The applicant should document to the town on how they propose to proceed with the infiltration/inflow removal requirements.

- The applicant's submitted Transportation Impact and Access Study was complete with Appendix providing peer review from BETA Engineering. We agree with the findings from VHB and BETA per the December 10, 2020 VHB Response document provided with no comment or objection.

If you have any questions regarding the above, please contact our office at 781-455-7538.

Truly yours,

Thomas Ryder
Assistant Town Engineer

October 20, 2020

The Needham Planning Board Virtual Meeting using Zoom was remotely called to order by Jeanne McKnight, Chairman, on Tuesday, October 20, 2020, at 7:15 p.m. with Messrs. Jacobs, Alpert, Owens and Block, as well as Planning Director, Ms. Newman and Assistant Planner, Ms. Clee.

Ms. McKnight took a roll call attendance of people expected to be on the agenda. She noted this is an open meeting that is being held remotely because of Governor Baker's executive order on March 12, 2020 due to the COVID Virus. All attendees are present by video conference. She reviewed the rules of conduct for zoom meetings. She noted this meeting has no public hearings so there will be no public comments. If any votes are taken at the meeting the vote will be conducted by roll call.

Upon a motion made by Mr. Alpert, and seconded by Mr. Jacobs, it was by a roll call vote of the five members present unanimously:
VOTED: to automatically continue the meeting to 11/4/20 at 7:15 p.m. with the same zoom ID number if any technical difficulties arise that keep the Planning Board from continuing this meeting tonight.

Request to Extend Temporary Occupancy Permit: Amendment to Major Project Site Plan Review No. 2013-02: Town of Needham, 1471 Highland Avenue, Needham, Massachusetts, Petitioner (Property located at 1407 Central Avenue, Needham, Massachusetts).

Ms. Newman noted this is the Jack Cogswell Building. She has a request from Stephen Gentile, Project Manager, noting a previous extension and requesting a second extension of the temporary Certificate of Occupancy. Covid 19 has disrupted the work schedule and the applicants are requesting an extension for another 60 days until 1/13/2021. The lot consolidation plan with land court approvals has been delayed due to many delays in the courts.

Upon a motion made by Mr. Owens, and seconded by Mr. Block, it was by a roll call vote of the five members present unanimously:
VOTED: to approve the requested extension to 1/13/21 in light of the circumstances.

Vote to request project review fee pursuant to Chapter 44, Section 53G of the General Laws: Major Project Site Plan Special Permit No. 2012-07: The Children's Hospital Corporation c/o Boston Children's Hospital, 300 Longwood Avenue, Boston, Massachusetts, Petitioner (Property located at 66 B Street, 360 First Avenue, 410 First Avenue and 37 A Street, Needham, Massachusetts).

Ms. Newman noted she has read the scope of work from Beta for peer review. They have established a parking requirement and she has received the trip generation use. The peer review was done be Beta. Children's Hospital was not ready to do a traffic study at that time. The Special Permit was filed last week and will have a peer review. Mr. Block asked what the industry standards are here and if the applicant will reimburse the town for the expense. Ms. Newman noted the applicant will give the money before the review begins. Mr. Block asked what is included in their overhead costs. What is the industry standard? Ms. Newman will get that information for him.

Ms. McKnight noted on the 2nd page of the proposal, task 4, future conditions and traffic operations analysis, she wants to make sure there are 2 things that happen. The proposed Highland Avenue/Needham Street state highway renovation project timeframe should be taken into account and the Northland Needham development project, a 2 acre development, should also be taken into consideration. She feels any analysis should include these 2 projects. Ms. Newman stated the Planning Board consultant will be looking at what the applicant's consultant has come up with and will make sure those projects have been included. Mr. Block noted they are charging 36 hours for 4 meetings. Ms. Newman clarified it was up to 36 hours.

Mr. Alpert noted in the subdivision regulations and procedural rules, Section 9, this is money funded by the applicant, put in a specific fund held by the Town and Beta will charge based on the amount of services performed.

If it is not all incurred all expense balances will be refunded to the applicant. The Board has the authority to go back to the applicant if more money is needed. The Town is not paying for this. He noted he was on the Board when someone he believes was Rockwood Lane challenged the fees. The applicant has the right and ability to complain. Rockwood was brought before the Board and the Town Manager. If the fees get too high the applicant has the right to bring it back to the Board. Ms. McKnight stated $21,175 is the total cost being asked to request for a Peer Review Transportation and Access Study.

Upon a motion made by Mr. Alpert, and seconded by Mr. Owens, it was by a roll call vote of the five members present unanimously:

VOTED: to direct our Planning Director to enter into an agreement for the hire of Beta as the Planning Board consultant to review the traffic study that has been presented by the applicant for Children's Hospital and assess the fee of $21, 175 to be held and expended pursuant to Section 9 of our subdivision and procedures rules and MGLs Chapter 44, Section 53G.

Determination of Use Category Assignment under zoning: Massage therapy service in the Center Business District.

Ms. Newman noted the Building Inspector wants to make sure this is an allowed use. Building Inspector David Roche noted there will be one office, 200 square feet and one employee. He suggested 2 parking spaces, which the property owner has to dedicate to this space. The Building Inspector was going to classify this as professional services. Mr. Alpert made a general comment regarding this By-Law. This is a catchall use provision. All services not enumerated elsewhere. It bothers him this is a use as of right and not a special permit. The use catchall creates a use as of right. He would like to see this changed to a special permit use. Mr. Owens feels this is an allowed use. Ms. McKnight agreed.

Minutes

Ms. McKnight will drop off a set of minutes she has marked up.

Correspondence

There was no correspondence.

Report from Planning Director and Board members.

Mr. Block asked if there was an update on traffic for Highway Commercial 1. Ms. Newman stated she met with GPI today to revise 2 components. She will have the revised copy next week and will get it out to the working group. She is scheduling with the Town Manager for the working group for the next week or two. She wants to have the meetings taped so the other members of the Board can hear GPIs presentation. Her impression is the news is good. GPI is showing a 1.35 FAR with commercial and office with an ancillary retail use is able to be done at Gould and Highland. It also shows a reduction in trips with the Add-a-Lane making a right onto Gould Street. Mr. Block asked if someone could say the results are skewed due to Covid. Ms. Newman stated the data was gathered prior to Covid. She feels the results are positive.

Mr. Block asked about the timing in being able to present at the April Town Meeting. Ms. Newman will set up a meeting and work with Natasha. They need to figure out the density and land use profile then the zoning can be drafted. Ms. McKnight asked who the working group was. Ms. Newman noted 2 members of the Planning Board, 2 members of the Select Board, 2 members of the Finance Committee, the Town Manager and herself. She will share the adjustments in the traffic study.

Mr. Jacobs noted at the Pollard School near the entrance/exit on Dedham Avenue there is a gate that is supposed to be down at all times except when the buses enter or exit. It has apparently been damaged and has not been closed in possibly 2 years. He feels this is a blatant disregard of the permit. He asked if the Board members want to press to get that gate fixed. Mr. Owens asked if the Board has spoken with the School Department and they ignored it or

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are they not paying attention. Mr. Jacobs stated he had asked the Planning Director at some point to speak with them about getting it fixed but that was over a year ago. Ms. Newman stated she had reached out to the School Department at that point and thought it was taken care of.

Mr. Owens suggested Ms. Newman reach out to them again and ask what the plan is. If they continue to ignore the request the Board should take action. The Building Inspector could do that as the enforcement. Ms. Newman will reach out to the Superintendent and report back at the next meeting.

Mr. Alpert gave a report of the Chair/Vice-Chair meeting with the Select Board last week on the Tree By-Law. It was made clear Tree Warden Ed Olsen and the Select Board are not in favor of pursuing a Tree By-Law. They feel it would create a large amount of work and there is not the staff for it at this time. There was talk about being more proactive with creating a tree fund. Developers would be assessed a fee for the Town to plant trees around town. They feel it would be too onerous to enforce but they will continue to discuss it. Mr. Olsen has offered to have his counterpart from Lexington come to a meeting to discuss their Tree By-Law.

Ms. Newman stated she is preparing the budget for the Planning and Community Development Department. This includes identification of a request for a Warrant Article for money for planning studies. In 2015 there was an allocation of $45,000 which has been depleted. There was an appropriation at Special Town Meeting in the Spring for $45,000 which is being used for the GPI Study. The regular funds have been depleted. She is putting in a request for $60,000 as part of the budget proposal and a request for $50,000 refunding for a small grant program. Ms. McKnight noted it sounded reasonable.

Ms. Newman noted Selectman Dan Matthews has drafted 40B guidelines. She requested all members take a look at that. The Planning Boards role is to make a recommendation. Mr. Block noted the Board should have a conversation regarding where they can identify high density development as a goal for redevelopment. Ms. McKnight stated the report does identify several sites in town. Ms. Newman had emailed the proposed guidelines to all members and will forward again. She will attach the old guidelines and the new.

Upon a motion made by Mr. Block, and seconded by Mr. Alpert, it was by a roll call vote of the five members present unanimously:
VOTED: to adjourn the meeting at 8:20 p.m.

Respectfully submitted,
Donna J. Kalinowski, Notetaker

_____
Paul Alpert, Vice-Chairman and Clerk

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NEEDHAM PLANNING BOARD
2021 MEETING SCHEDULE

MEETING DATE	LOCATION
Monday, January 4, 2021	VIA ZOOM
January 19, 2021	VIA ZOOM
February 2, 2021	VIA ZOOM
February 16, 2021 (school vacation week)	VIA ZOOM
March 2, 2021	VIA ZOOM
March 16, 2021	VIA ZOOM
April 6, 2021	VIA ZOOM
April 20, 2021 (school vacation week)	VIA ZOOM
No May 3, 2021 Due to ATM	
May 18, 2021	VIA ZOOM
June 1, 2021	VIA ZOOM
June 15, 2021	VIA ZOOM
July 2021 - TBD	VIA ZOOM
August 2021 - TBD	VIA ZOOM
Wednesday, September 8, 2021 (Mon. 9/6 Labor Day & Tues. 9/7, 2nd day Rosh Hashanah)	VIA ZOOM
September 21, 2021	VIA ZOOM
October 5, 2021	VIA ZOOM
October 19, 2021	VIA ZOOM
November 2, 2021	VIA ZOOM
November 16, 2021	VIA ZOOM
December 7, 2021	VIA ZOOM
December 21, 2021	VIA ZOOM

All Planning Board meetings begin at 7:00 p.m. unless otherwise noted.

12/2020