Southborough, MA

250 Turnpike Rd. – Exterior Design

05.23.2023 | Scale: N/A

MONTE FRENCH DESIGN STUDIO
ARCHITECTURE + PLANNING

FERRIS DEVELOPMENT GROUP

Comprehensive Permit Application

250 Turnpike Road

Southborough, MA

250 TURNPIKE ROAD, SOUTHBOROUGH

TOWN OF SOUTHBOROUGH ZONING BOARD OF APPEALS

COMPREHENSIVE PERMIT APPLICATION

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FERRIS DEVELOPMENT GROUP

May 23, 2024

VIA HAND DELIVERY
Mr. David Williams, Chair
Southborough Zoning Board of Appeals
9 Cordaville Road
Southborough, MA 01772

VIA HAND DELIVERY
Mr. James F. Hegerty, Town Clerk
Town of Southborough
17 Common Street
Southborough, MA 01772

Re: Comprehensive Permit Application – 250 Turnpike Road, Southborough

Dear Clerk Hegerty, Chair Williams, and Members of the Board of Appeals

I represent FD 250 Turnpike, LLC, and write on its behalf to submit the attached Application for Comprehensive Permit and supporting materials, incorporated by this reference, pursuant to M.G.L. c. 40B and the Board's adopted rules and regulations. We are submitting this Application intending for the public hearing on it to begin no later than the Board's scheduled meeting on July 17, 2024, although we would welcome an earlier date if the Board agrees.

The applicant's and developer's owner, David Ferris, is a Southborough native who grew up here, graduated from Algonquin, lives in Town today, and has based and founded several businesses here. Ferris Development Group, LLC is a commercial real estate owner and operator working in MetroWest with a strong presence on the Route 9 corridor. We self-perform most of our construction projects through our affiliate, Expedited Construction, LLC. Mr. Ferris owns and operates 118, 120, 250 and 352 Turnpike Road. It is very important to Mr. Ferris to have this opportunity to address a local and regional housing need right here in his backyard, and he thanks your Board the Select Board for you anticipated assistance with this application.

With this Application we seek to build a beautiful, modern 56-unit apartment building. Forty-two of the units will be market-rate, and 14 will be restricted affordable as required. By bringing these units to market we seek to try to help alleviate the housing crunch that affects Southborough and MetroWest as a whole. This site is particularly unique because it has direct access on a State Route (9) where this project will not materially affect traffic volumes. Indeed we think, and hope you will agree, that a building of this type, size and location is perfect for bringing apartment to our Town and helping the Town achieve its required housing inventory.

The project will consist of one building of four stories and containing approximately 80,000 square feet. The building height is expected to be 45 feet. The building will be served by 94 parking spaces. The unit mix will include the following:

- Market-rate units: 27 one-bedroom, 11 two-bedroom, and 4 three-bedroom units; and
- Affordable units: 9 one-bedroom, 3 two-bedroom, and 2 three-bedroom units.

Potential amenities at the building are expected to include bicycle storage, a dog-washing station, and enclosed parking.

This site received a positive Project Eligibility Letter ("PEL") from the Massachusetts Housing Finance Agency ("MassHousing") on October 26, 2023. The applicant's receipt of the PEL was required pursuant to 760 CMR 56.04 in order for the ZBA to have jurisdiction over the enclosed Application. MassHousing determined this project is eligible under the requirements of the New England Fund Program of the Federal Home Loan Bank of Boston and that it meets the criteria set forth in 760 CMR 56.04(1) and (4) in terms of the applicant, the project and its design and finances, the site and the applicant's ability to proceed. FD 250 Turnpike, LLC owns the site and is the qualified applicant. The applicant received substantial community input during the MassHousing process that preceded issuance of the PEL, and looks forward to addressing it.

The project will help the Town further achieve its goal of offering rental housing, a significant portion of which will be affordable. And on a site that is well secluded from neighbors and Route 9 itself. The Town's Housing Production Plan calls for housing to support residents and businesses, especially persons at various stages in their lives. The Plan also notes significant limitations imposed on multi-family development by the preexisting zoning in Town. The subject lot has already been subdivided as part of the Zoning Board's comprehensive permit actions. The new building is proposed to be built entirely within the Residence A zone.

The most recent Subsidized Housing Inventory ("SHI") for the Town of Southborough (dated June 29, 2023) indicates that the Town is at 7.95% of its housing units counting toward the calculation. As you know, the required hurdle for a Town is 10%. By building a total of 56 units (42 market-rate, 14 affordable), *all 56 units* will count to the Town's future calculation.

Thank you again for your consideration of this Application. We look forward to your feedback and addressing any questions or concerns that you and the community may have. Please do not hesitate to contact me as you have the follow-up questions regarding these matters.

Sincerely,

George T. Bahnan, Esq.

George T. Bahnan, Esq.
Assistant General Counsel

Encs. – Application for Comprehensive Permit; fee; checklist and required supporting materials

cc: Mr. David M. Ferris
Mr. Louis N. Levine, Esq.
Mr. Mark J. Purple, Town of Southborough
Ms. Katherine Miller, MassHousing

Rev. 2.27.08

CP

TOWN OF SOUTHBOROUGH
BOARD OF APPEALS

COMPREHENSIVE PERMIT APPLICATION FORM

(PLEASE ANSWER ALL OF THE FOLLOWING—USE ADDITIONAL PAGES AS NECESSARY)

1. **Applicant's Name:** FD 250 Turnpike, LLC
2. **Applicant's Address:** 118 Turnpike Road, Suite 300, Southborough, MA 01772
3. **Contact Telephone #(s)** (508) 281-5600 **Email Contact:** bcharville@ferrisdevelopment.com gbahnan@ferrisdevelopment.com
4. **Applicant Is:** Owner: X Tenant: ____ Licensee: ____ Prospective Buyer: ____ Other: ____
5. **Property Owner's Name:** Same as Applicant (if different from Applicant)
6. **Property Owner's Address:** Same as Applicant (if different from Applicant)
7. **Location Of Property (Street Address):** 250 Turnpike Road, Southborough, MA 01772
8. **Zoning District(s) Of All Properties:** Residence A
9. **Map/Lot/Book/Page Identification For All Properties:** 27-0-46-0; Deed Book 67212, Page 69
10. **Sections Of Zoning Regulations Petition Is Regarding:** Residence A
11. **Specific Relief Requested:** *See* Applicant's comprehensive permit application and Applicant's list of requested waivers, enclosed herewith.
12. **Description of Petition, and Applicant's Reasons for the Board to Approve the Petition:**

See Applicant's comprehensive permit application and Applicant's list of requested waivers, enclosed herewith.

Pursuant to M.G.L. c. 40B, sections 21-23 and 760 CMR 56.00 *et seq.*, a comprehensive permit may be granted by a local permitting authority (in Southborough, by its Zoning Board of Appeals) to grant all required local permits and approvals. Applicant specifically proposes to construct a 56-unit (42 market-rate, 14 affordable) apartment building on an undeveloped portion of the 250 Turnpike Road lot. This new building materially will meet the local and regional housing needs that exist in Southborough and MetroWest.

13. Please list any Applicant representatives* who will be present for or will prepare materials for the public hearing(s):

Name	Role (e.g., attorney, architect, etc.)	Address	Telephone Number
David M. Ferris Ferris Development Group	Owner	118 Turnpike Road, Ste 300 Southborough, MA 01772	(508) 281-5600
Louis N. Levine, Esq. D'Agostine, Levine, et al.	Attorney	268 Main Street Acton, MA 01720	(978) 263-7777
Brian R. Charville, Esq. Ferris Development Group	Attorney	118 Turnpike Road, Ste 300 Southborough, MA 01772	(508) 281-5600
James Tetreault, P.E. Azimuth Land Design	Civil Engineer	118 Turnpike Road, Ste 200 Southborough, MA 01772	(508) 485-0137
Monte French Monte French Design Studio	Architect	650 Columbus Avenue, Ste A Boston, MA 02118	(617) 606-4496

(If there are more than five Applicant representatives, please identify them on a separate sheet.)

NOTE: Any such Applicant representatives whose statements or work product are presented to the Board must disclose the nature and extent of any personal interest (beyond payment of customary fees for their services) related to the Application.

CP

14. Have any prior variances or special permits been granted for this property?	_____ NO __X__ YES (if "Yes", please provide details on a separate sheet)
15. Are there any outstanding enforcement actions or regulatory issues related to this property (including, but not limited to, EPA/DEP, Town Boards, Federal or State Government agencies) or have there been any such issues related to this property at any time in the past five years?	__X__ NO _____ YES (if "Yes", please provide details on a separate sheet)
16. Are there any other pending applications with other Town Boards or necessary approvals from other Town Boards related to this application (including, but not limited to, Planning Board, Conservation Commission, Board of Health)? With other Towns? The State of MA?	__X__ NO _____ YES (if "Yes", please provide details on a separate sheet)
17. Application Pre-Filing Review by Building Department	REVIEWED BY Gene Novaki Lara Davis REVIEW DATE 5/7/2024
18. Application Filing with Town Clerk	FILING DATE _____ _____ (Town Clerk Signature)

I hereby request a hearing be fore the Board of Appeals with reference to the above noted petition, and I hereby authorize the Board members and other Town officials, in their official capacity as related to this petition, to have unrestricted access to the subject property for purposes of viewing the subject property in relation to such hearing(s).

Signature Of Applicant: X _____ Date: 5/23/2024

Property Owner's Signature (if not the Applicant) _____ Date: _____

Applicants are advised that all papers filed with the Board appealing a decision of the Southborough Building Inspector, seeking a variance, seeking a special permit, or seeking any other relief from or action by the Board, shall be signed and dated by the party on whose behalf the filing is made or by the party's authorized representative and shall state the address, telephone number, facsimile number, and (if available) electronic mail ("e-mail") address of the party or authorized representative. This signature shall constitute a certification that the signer has read the document and believes the content of the document is true and accurate, and that the document is not interposed for delay. Signature by an authorized representative also certifies the full power and authority to represent the party. Any paper filed with the Board that contains false, inaccurate, or misleading information may be grounds for the Board to deny any relief sought from, or request made to, the Board by any party.

Applicants are also advised that at any public hearing the Board Chairman, at his/her discretion, may elect to have the Applicant and/or the Applicant's representatives sworn in relative to the statements that they make to the Board.

The Board, at its discretion and by majority vote, may require that the Applicant submit additional information related to the Application, including, but not limited to, a proposed "Memo of Decision" specifying proposed findings and conditions.

FOR BOARD USE ONLY

Application Pre-Filing Signature Date: _____ Application Filing Date: _____

Initial Public Hearing Date: _____ Initial Public Hearing Due By: _____

Close of Public Hearing Date: _____ 40 Day Decision Period Expiration: _____

Application for Comprehensive Permit – 250 Turnpike Road, Southborough (cont'd.)

Applicant Representative(s)

Name: George Bahnan
Role: Attorney
Address: 118 Turnpike Road, Ste 300, Southborough, MA 01772
Telephone Number: (508) 281-5600

Prior Variances or Special Permits

Although the parcel of land that the applicant proposes to build the 56-unit multifamily development on has never received a variance of special permit, it was once part of a larger parcel which has received relief. Those variances and special permits are listed below.

- On June 2, 1986, A.J. Lane & Co., Inc., received a site plan approval from the Board of Selectmen.
- On August 8, 1990, Leaf Systems, Inc., received a special permit and variance from the Zoning Board of Appeals for light manufacturing and approval in an Industrial District.
- On March 13, 1996, Duracraft Corp., received a special permit from the Zoning Board of Appeals for additional signage in an Industrial Park District.

The Commonwealth of Massachusetts
William Francis Galvin

Minimum Fee: $500.00

Secretary of the Commonwealth, Corporations Division
One Ashburton Place, 17th floor
Boston, MA 02108-1512
Telephone: (617) 727-9640

Certificate of Organization
(General Laws, Chapter)

Identification Number: 001561895

1. The exact name of the limited liability company is: FD 250 TURNPIKE, LLC

2a. Location of its principal office:

No. and Street: 118 TURNPIKE RD.
STE. 300
City or Town: SOUTHBOROUGH State: MA Zip: 01772 Country: USA

2b. Street address of the office in the Commonwealth at which the records will be maintained:

No. and Street: 118 TURNPIKE RD.
STE. 300
City or Town: SOUTHBOROUGH State: MA Zip: 01772 Country: USA

3. The general character of business, and if the limited liability company is organized to render professional service, the service to be rendered:

REAL ESTATE OWNERSHIP, DEVELOPMENT, MANAGEMENT, LEASING, AND ALL MATTERS R ELATED THERETO AND SUCH OTHER LAWFUL BUSINESS AS MAY BE CONDUCTED IN THE C OMMONWEALTH.

4. The latest date of dissolution, if specified:

5. Name and address of the Resident Agent:

Name: BRIAN R. CHARVILLE
No. and Street: 118 TURNPIKE RD.
STE. 300
City or Town: SOUTHBOROUGH State: MA Zip: 01772 Country: USA

I, BRIAN R. CHARVILLE resident agent of the above limited liability company, consent to my appointment as the resident agent of the above limited liability company pursuant to G. L. Chapter 156C Section 12.

6. The name and business address of each manager, if any:

Title	Individual Name First, Middle, Last, Suffix	Address (no PO Box) Address, City or Town, State, Zip Code
MANAGER	DAVID M. FERRIS	118 TURNPIKE RD., STE. 300 SOUTHBOROUGH, MA 01772 USA

7. The name and business address of the person(s) in addition to the manager(s), authorized to execute documents to be filed with the Corporations Division, and at least one person shall be named if there are no managers.

Title	Individual Name First, Middle, Last, Suffix	Address (no PO Box) Address, City or Town, State, Zip Code
SOC SIGNATORY	BRIAN R. CHARVILLE	118 TURNPIKE RD., STE. 300 SOUTHBOROUGH, MA 01772 USA

8. The name and business address of the person(s) authorized to execute, acknowledge, deliver and record any recordable instrument purporting to affect an interest in real property:

Title	Individual Name First, Middle, Last, Suffix	Address (no PO Box) Address, City or Town, State, Zip Code
REAL PROPERTY	DAVID M. FERRIS	118 TURNPIKE RD., STE. 300 SOUTHBOROUGH, MA 01772 USA

9. Additional matters:

SIGNED UNDER THE PENALTIES OF PERJURY, this 10 Day of February, 2022,
DAVID M. FERRIS

(The certificate must be signed by the person forming the LLC.)

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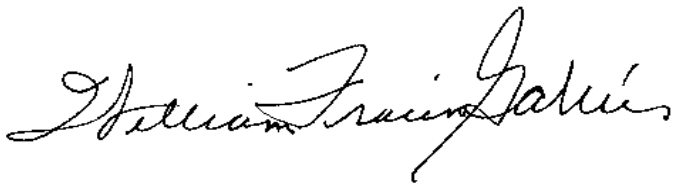
THE COMMONWEALTH OF MASSACHUSETTS

I hereby certify that, upon examination of this document, duly submitted to me, it appears that the provisions of the General Laws relative to corporations have been complied with, and I hereby approve said articles; and the filing fee having been paid, said articles are deemed to have been filed with me on:

February 10, 2022 10:28 AM



WILLIAM FRANCIS GALVIN

Secretary of the Commonwealth

MassHousing

Massachusetts Housing Finance Agency
One Beacon Street Boston, MA 02108

Tel: 617-854-1000
Fax: 617-854-1091

Relay 711
www.masshousing.com

October 26, 2023

FD 250 Turnpike, LLC
118 Turnpike Road, Ste. 300
Southborough, MA
Attention: Brian Charville

Re: 250 Turnpike Road
Project Eligibility/Site Approval
MassHousing ID No. 1197

Dear Mr. Charville:

This letter is in response to your application as "Applicant" for a determination of Project Eligibility ("Site Approval") pursuant to Massachusetts General Laws Chapter 40B ("Chapter 40B"), 760 CMR 56.00 (the "Regulations") and the Comprehensive Permit Guidelines issued by the Executive Office of Housing and Livable Communities ("EOHLC") (the "Guidelines" and, collectively with Chapter 40B and the Regulations, the "Comprehensive Permit Rules"), under the New England Fund ("NEF") Program ("the Program") of the Federal Home Loan Bank of Boston ("FHLBank Boston").

FD 250 Turnpike, LLC (the "Applicant") has submitted an application with MassHousing pursuant to Chapter 40B. You have proposed to build fifty-six (56) units of rental housing (the "Project") on approximately 5.5 acres of land located at 250 Turnpike Road (the "Site") in Southborough (the "Municipality").

In accordance with the Comprehensive Permit Rules, this letter is intended to be a written determination of Project Eligibility by MassHousing acting as Subsidizing Agency under the Guidelines, including Part V thereof, "Housing Programs In Which Funding Is Provided By Other Than A State Agency."

MassHousing has performed an on-site inspection of the Site, which local boards and officials were invited to attend, and has reviewed the pertinent information for the Project submitted by the Applicant, the Municipality and others in accordance with the Comprehensive Permit Rules.

Municipal Comments
Pursuant to the Regulations, the Municipality was given a thirty (30) day period in which to review the Site Approval application and submit comments to MassHousing. An additional comment period of fifteen (15) days was provided to review project revisions that were submitted by the Applicant. Letters providing preliminary comments were provided by the Conservation Commission on August 4, 2023, and the Planning Board on August 17, 2023. A letter was provided by the Southborough Select Board dated September 7, 2023. An additional letter was received from the Planning Board on September 6, 2023. The Select Board voted to support the proposed Project, noting that the Site appears to be well

Maura Healey, Governor
Kim Driscoll, Lt. Governor

Jeanne Pinado, Chair
Carolina Avellaneda, Vice Chair

Chrystal Kornegay, Executive Director

suited for controlled growth and the proposed Project would make meaningful progress towards the Town's affordable housing goals. Notwithstanding the qualified support expressed for the proposed Project, the boards and committees detailed the following issues and concerns about the project and Site:

- The Municipality is concerned about the visual impact of the proposed Project on neighborhood abutters, particularly with respect to building height and building proximity to property lines. To ensure adequate vegetative screening and buffer, the Planning Board recommended maintaining and augmenting tree preservation with native species as much as possible on the Site.

- The Municipality noted the following concerns regarding potential traffic impacts on Parkerville Road:
    - There is concern that 125 Parkerville Road (proposed to be utilized for a 20-foot water line easement for the Project) might also be used to provide direct vehicular access to the development. The Municipality noted that area residents are opposed to this.
    - The Municipality expressed concern for potential additional "cut-through" traffic on Parkerville Road.

- The Municipality noted that that development will require extensive filling operations and raised concerns regarding management of construction vehicles on a very busy Route 9.

- The Conservation Commission noted concerns associated with the proposed grading for the Project and the potential for sedimentation, runoff and erosion, particularly as it relates to disturbance at the edge of onsite wetlands. More robust erosion controls were recommended to protect the Site's resource areas and adjacent properties. The Conservation Commission suggested that exploring alternative means of access could minimize grading impacts within wetland buffer zones. The Planning Board raised similar concerns regarding grade changes at the Site and impacts on wetlands.

- The Conservation Commission requests additional test pit information to ensure appropriate separation from groundwater for the proposed infiltration structures.

- The Conservation Commission is concerned about the impact of stormwater on the onsite wetlands and requests consideration for the following:
    - The proximity of the proposed infiltration structure to the delineated wetland resource area, and any mitigation that may be required for discharges.
    - Utilization of NOAA Atlas 14 rainfall amounts for stormwater management design.
    - Implementing nature based or low impact development alternatives to stormwater management such as 'blue roof stormwater technology' to limit ground disturbance.
    - Management and mitigation measures for increased pollutant loads that may result from increased impervious areas and vehicles at the Site.

- The Planning Board is concerned about the impact of stormwater from the proposed Project on the surrounding neighborhood and requested additional information on management and mitigation.

- The Conservation Commission requested that additional information on the following concerns be incorporated into the Notice of Intent that will need to be filed for the proposed Project:
    - A calculation of the area proposed to be altered within onsite wetland buffer zone areas.
    - The location of snow storage areas.
    - Soil management stockpiling locations during construction.
    - Mitigation plans for the potential loss of wildlife habitat due to disturbance of wetland buffer areas.
    - An Invasive Species Management Plan that outlines the pre-existing conditions and the protocol for management of invasives during the construction process.
    - Additional information on the potential presence of vernal pools at the Site.

- The Conservation Commission indicated that the area labeled "detention basin" on the proposed site plan is a jurisdictional wetland resource areas as determined by the most recent ORAD issued by the Conservation Commission and that the proposed Project would need to conduct any calculations and evaluations to include these areas as wetland resource areas and not stormwater management systems.

- The Conservation Commission requests additional information on construction management Best Management Practices to mitigate potential impacts from sediment and construction debris.

- The Planning Board requested additional information on the status of and resolution to certain conditions restricting development in an August 1990 ZBA Special Permit for the Site.

- The Planning Board is concerned that the proposed Project will place increased demands on the Town of Southborough's water supply.

- The Planning Board is concerned about the impacts of light and noise from the proposed Project on abutting properties and request that outdoor lighting at the development comply with the town's lighting bylaws and with dark sky standards.

- The Planning Board is concerned about the height of the proposed Project, noting a preference for buildings of no more than 3 stories in Town, and requested additional information to help visualize the perceived height of the proposed Project.

- The Planning Board expressed concerns regarding fire apparatus access and maneuverability around the perimeter of the proposed building.

- The Municipality requests additional information regarding trash storage and management for the proposed Project.

- The Planning Board requested that Electric Vehicle (EV) parking spaces be included in the parking lot.

Community Comments

In addition to the comments from town officials, MassHousing received a letter representing the concerns of residents abutting the Site on Parkerville Road, Skylar Drive, and Sarsen Stone Way. The

letter expressed opposition to the proposed Project based on legal issues related to restrictions contained in prior permitting decisions for the Site that restrict further development. Additional concerns raised in the letter echoed concerns raised by the municipality, including but not limited to impacts on area wetlands, increased drainage and stormwater issues, and the scale and height of the proposed building.

MassHousing Determination and Recommendation

MassHousing staff has determined that the Project appears generally eligible under the requirements of the Program, subject to final review of eligibility and to Final Approval.[1] As a result of our review, we have made the findings as required pursuant to 760 CMR 56.04(1) and (4). Each such finding, with supporting reasoning, is set forth in further detail on Attachment 1 hereto. It is important to note that Comprehensive Permit Rules limit MassHousing to these specific findings in order to determine Project Eligibility. If, as here, MassHousing issues a determination of Project Eligibility, the Applicant may apply to the Zoning Board of Appeals ("ZBA") for a comprehensive permit. At that time local boards, officials and members of the public are provided the opportunity to further review the Project to ensure compliance with applicable state and local standards and regulations.

Based on MassHousing's site and design review, and considering feedback received from the Municipality, the following issues should be addressed in the application to the ZBA, and the Applicant should be prepared to explore them more fully during the public hearing process:

- Development of this Site will require compliance with all state and federal environmental laws, regulations and standards applicable to existing conditions and to the proposed use related to building construction, wetland protection, stormwater management, wastewater collection and treatment, and hazardous waste safety. The Applicant should expect that the Municipality will require evidence of such compliance prior to the issuance of a building permit for the Project. To the extent feasible, the Applicant should engage with the Municipality to discuss the Project's ability to meet local wetland standards.

- The Applicant should be prepared to work closely with its design team to address concerns regarding the architectural design of the proposed Project, particularly as it relates to mitigating concerns about building height.

- The Applicant must demonstrate the ability to manage the grading required to construct the proposed Project and respond to concerns raised in connection with construction fill and sedimentation, runoff and erosion at the edge of the on-site wetland. Additionally, the Applicant should be prepared to provide information regarding the management and transport of fill onto the Site during construction.

- The Applicant should be prepared to respond to concerns about traffic impacts on Parkerville Road.

[1] MassHousing has relied on the Applicant to provide truthful and complete information with respect to this approval. If at any point prior to the issuance of a comprehensive permit MassHousing determines that the Applicant has failed to disclose any information pertinent to the findings set forth in 760 CMR 56.04 or information requested in the Certification and Acknowledgment of the Application, MassHousing retains the right to rescind this Site Approval letter.

- The Applicant should be prepared to provide detailed information regarding soil, groundwater, and stormwater conditions at the Site, and ensure appropriate mitigation is incorporated into the design and construction management plan.

- The Applicant should be prepared to address the concerns raised by the Conservation Commission in connection with filing a Notice of Intent.

- The Applicant should be prepared to provide detailed information to address concerns related to water supply in connection with the proposed use.

- The Applicant should be prepared to address the resolution of legal issues related to restrictions affecting the Site prior to Application for a Comprehensive Permit.

- The Applicant should provide a detailed landscaping plan. Consideration should be given to incorporating pervious materials, depicting vegetative buffers, and identifying areas for trash management and snow storage.

- The Applicant should be prepared to provide detailed information relative to light, noise, and related area impacts, and respond to reasonable requests for mitigation.

- The Applicant should engage with the Southborough Fire Department to review the plans and address concerns pertaining to access of fire apparatus to the building.

MassHousing has also reviewed the application for compliance within the requirements of 760 CMR 56.04(2) relative to Application requirements and has determined that the material provided by the Applicant is sufficient to show compliance.

This Site Approval is expressly limited to the development of no more than fifty-six (56) rental units under the terms of the Program, of which not less than fourteen (14) of such units shall be restricted as affordable for low- or moderate-income persons or families as required under the terms of the Guidelines. It is not a commitment or guarantee of financing and does not constitute a site plan or building design approval. Should you consider, prior to obtaining a comprehensive permit, the use of any other housing subsidy program, the construction of additional units or a reduction in the size of the Site, you may be required to submit a new Site Approval application for review by MassHousing. Should you consider a change in tenure type or a change in building type or height, you may be required to submit a new Site Approval application for review by MassHousing.

For guidance on the comprehensive permit review process, you are advised to consult the Guidelines. Further, we urge you to review carefully with legal counsel the M.G.L. c.40B Comprehensive Permit Regulations at 760 CMR 56.00.

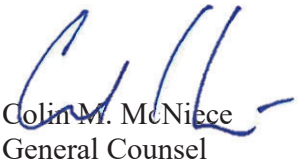
This approval will be effective for a period of two (2) years from the date of this letter. Should the Applicant not apply for a comprehensive permit within this period this letter shall be considered to be expired and no longer in effect unless MassHousing extends the effective period of this letter in writing. In addition, the Applicant is required to notify MassHousing at the following times throughout this two-year period: (1) when the Applicant applies to the local ZBA for a Comprehensive Permit, (2) when the ZBA issues a decision and (3) if applicable, when any appeals are filed.

Should a comprehensive permit be issued, please note that prior to (i) commencement of construction of the Project or (ii) issuance of a building permit, the Applicant is required to submit to MassHousing a request for Final Approval of the Project (as it may have been amended) in accordance with the Comprehensive Permit Rules (see especially 760 CMR 56.04(07) and the Guidelines including, without limitation, Part III thereof concerning Affirmative Fair Housing Marketing and Resident Selection). Final Approval will not be issued unless MassHousing is able to make the same findings at the time of issuing Final Approval as required at Site Approval.

Please note that MassHousing may not issue Final Approval if the Comprehensive Permit contains any conditions that are inconsistent with the regulatory requirements of the New England Fund Program of the FHLBank Boston, for which MassHousing serves as Subsidizing Agency, as reflected in the applicable regulatory documents. In the interest of providing for an efficient review process and in order to avoid the potential lapse of certain appeal rights, the Applicant may wish to submit a "final draft" of the Comprehensive Permit to MassHousing for review. Applicants who avail themselves of this opportunity may avoid significant procedural delays that can result from the need to seek modification of the Comprehensive Permit after its initial issuance.

If you have any questions concerning this letter, please contact Kat Miller at (617) 854-1217.

Sincerely,



Colin M. McNiece
General Counsel

cc: Ed Augustus, Secretary, EOHLC
The Honorable James B. Eldridge
The Honorable Kate Donaghue
Andrew R. Dennington, II, Chair, Southborough Select Board
David Williams, Chair, Southborough Zoning Board of Appeals
Mark J. Purple, Southborough Town Administrator
Karina Quinn, Southborough Town Planner

Attachment 1

760 CMR 56.04 Project Eligibility: Other Responsibilities of Subsidizing Agency
Section (4) Findings and Determinations

250 Turnpike Road, Southborough, MA #1197

MassHousing hereby makes the following findings, based upon its review of the application, and taking into account information received during the site visit and from written comments:

(a) that the proposed Project appears generally eligible under the requirements of the housing subsidy program, subject to final approval under 760 CMR 56.04(7);

The Project is eligible under the NEF housing subsidy program and at least 25% of the units will be available to households earning at or below 80% of the Area Median Income, adjusted for household size, as published by the U.S. Department of Housing and Urban Development ("HUD"). The most recent HUD income limits indicate that 80% of the current median income for a four-person household in Southborough is $94,650.

Proposed rent levels of $1,775 for a one-bedroom affordable unit, $2,130 for a two-bedroom affordable unit and $2,461 for a three-bedroom affordable unit, less utility allowances of $236 for the one-bedroom affordable units, $318 for the two-bedroom affordable units and $396 for the three-bedroom affordable units, are within current affordable rent levels for the Eastern Worcester County HMFA under the NEF Program

The Applicant submitted a letter of financial interest from Digital Federal Credit Union, a member bank of the FHLBank Boston under the NEF Program.

(b) that the site of the proposed Project is generally appropriate for residential development, taking into consideration information provided by the Municipality or other parties regarding municipal actions previously taken to meet affordable housing needs, such as inclusionary zoning, multifamily districts adopted under c.40A, and overlay districts adopted under c.40R, (such finding, with supporting reasoning, to be set forth in reasonable detail);

Based on a site inspection by MassHousing staff, internal discussions, and a thorough review of the application, MassHousing finds that the Site is suitable for residential use and development and that such use would be compatible with surrounding uses and would address the local need for housing.

The Town of Southborough has an EOHLC-approved Housing Production Plan. According to EOHLC's Chapter 40B Subsidized Housing Inventory, updated through June 29, 2023, Southborough has 297 Subsidized Housing Inventory (SHI) units (7.95% of its housing inventory), which is 76 units below the statutory minima requirement of 10%.

(c) that the conceptual project design is generally appropriate for the site on which it is located, taking into consideration factors that may include proposed use, conceptual site plan and building massing, topography, environmental resources, and integration into existing development patterns (such finding, with supporting reasoning, to be set forth in reasonable detail);

Relationship to adjacent streets/Integration into existing development patterns
The Site is located on the eastbound side of Route 9 (Turnpike Road) in Southborough. Turnpike Road is a two-way, four-lane, divided, local-access highway within Southborough, approximately 25 miles west of downtown Boston. The Site is approximately 3 miles west of the Interstate 90 (Mass. Pike) interchange in Framingham (exit 111), 2 miles east of the Interstate 495 interchange (exit 59), and approximately 2.5 miles northwest of Southborough's MBTA commuter rail station. Land uses within the area consist of a mixture of commercial development. Abutting the Site to the north is an existing 3-story brick commercial building that was recently converted to a self-storage facility, owned and operated by the Applicant. Additional commercial properties abut the Site to the north across Turnpike Road. Eagle Leasing Company, a storage and trucking container business is located to the west of the Site. Single family residential development is located to the east, south and west of the Site. Overall, the site is well-positioned to support the proposed multifamily residential use.

Relationship to Adjacent Building Typology (Including building massing, site arrangement, and architectural details):
The developer intends to build a 4-story, 56-unit apartment building on the Site. The proposed building design shows a conventional linear double-loaded corridor building. The building is located in the center of the Site and is oriented such that the short end of the structure is facing the closest abutters on Parkerville Road to minimize potential visual impact. The building's materiality is designed to break down the scale of the structure, utilizing a combination of street level masonry, horizontal lap siding, and individual unit-accessed balconies. The building's roofline slopes slightly inward at the fourth floor. This contemporary mansard style with a flat roof reduces the perceived height of the building.

Density
The Developer intends to build fifty-six (56) rental apartments in one (1) multifamily building on 5.5 acres of land, 4.69 of which are buildable. The resulting density is 11.9 units per buildable acre. The proposed density is acceptable given the proposed housing type.

Conceptual Site Plan
The proposed site layout consists of one conventional linear double-loaded corridor building situated in the center portion of the Site. Access and egress to the Site is proposed via a 28-foot wide access easement that connects the Site to Turnpike Road through the parking lot for the existing commercial property. The proposed Project's access driveway winds south into the Site between the onsite wetlands to reach the proposed residential structure. Surface parking is situated around the perimeter of the building in two parking lots. A smaller lot including 36 spaces is located on the east side of the Site, in front of the building's main entrance. The access driveway extends beyond this smaller lot in a horseshoe shape to access a larger lot at the rear of the building that includes 62 spaces The Project proposes a total of 98 parking spaces resulting in a parking ratio of 1.75 parking spaces per rental unit. The rear parking area is sited above the proposed Project's septic system leaching area. Two infiltration structures proposed for drainage are located on the east side of the Site, on either side of one of the onsite wetlands. The balance of the Site remains wooded. A 20-foot water line easement is proposed to access the Site from Parkerville Road. All other utilities will be extended via utility easement from Turnpike Road.

Environmental Resources
The Site contains 0.81 acres of wetland in the northern portions of the Site. While portions of the roadway, building, and parking areas are within wetland buffer zones, the site plan is organized in a way that generally locates the built portion of the development away from the wetland areas. The proposed Project will need to file a Notice of Intent with the Southborough Conservation Commission.

Topography
The topography slopes upward in a southwesterly direction, towards the abutting properties on Sarsen Stone Way, having an overall grade change of approximately 40 feet. The building is proposed to be cut into the slope, so that the perceived height will be mitigated for a majority of the abutters. While the proposed structure sits at a higher elevation than the abutters on Parkerville Road, visual impact is proposed to be mitigated with robust landscape screening of mature evergreen trees. The topographic features of the Site have been considered in relationship to the proposed development plans and do not constitute an impediment to development of the Site.

(d) that the proposed Project appears financially feasible within the housing market in which it will be situated (based on comparable rentals or sales figures);
According to market data for the region, the residential real estate market appears strong, with an overall upward trajectory in rents. The Route 9 Corridor multifamily submarket has an overall vacancy rate of 3.3%, and has decreased 2.0% over the past 12 months. Rents have increased 4.3% over the last year, with a cumulative increase of 24.7% over the past three years. There is no other multifamily development currently under construction.

The Applicant proposes 56 rental apartments to be financed under the NEF Program. There will be 42 market-rate units with proposed average rent levels of $2,500 for the one-bedroom units; $3,000 for the two-bedroom units; and $3,500 for the three-bedroom units. MassHousing's Appraisal and Marketing team (A&M) performed a market analysis and found that proposed market rents for each unit type fall above comparable market rent averages. A more in-depth market study would be required prior to marketing/lease up of the proposed Project.

(e) that an initial pro forma has been reviewed, including a land valuation determination consistent with the Department's Guidelines, and the Project appears financially feasible and consistent with the Department's Guidelines for Cost Examination and Limitations on Profits and Distributions (if applicable) on the basis of estimated development costs;

MassHousing has commissioned an as "As-Is" appraisal which indicates a land valuation of $425,000. Based on a proposed investment of $28,212,046 in equity and permanent financing the development pro forma appears to be financially feasible and within the limitations on profits and distributions.

(f) that the Applicant is a public agency, a non-profit organization, or a Limited Dividend Organization, and it meets the general eligibility standards of the housing program; and

MassHousing finds that the Applicant must be organized as a Limited Dividend Organization. MassHousing sees no reason this requirement could not be met given information reviewed to date. The Applicant meets the general eligibility standards of the NEF housing subsidy program and has executed an Acknowledgment of Obligations to restrict their profits in accordance with the applicable limited dividend provisions.

(g) that the Applicant controls the site, based on evidence that the Applicant or a related entity owns the site or holds an option or contract to acquire such interest in the site, or has such other interest in the site as is deemed by the Subsidizing Agency to be sufficient to control the site.

The Applicant controls the Site through a Quitclaim Deed recorded at the Worcester South District Registry of Deeds in Book 67212; Page 70.

Worcester South District Registry of Deeds
Electronically Recorded Document

This is the first page of the document – Do not remove

Recording Information

Document Number	: 24850
Document Type	: DEED
Recorded Date	: March 04, 2022
Recorded Time	: 10:00:55 AM
Recorded Book and Page	: 67212 / 69
Number of Pages(including cover sheet)	: 4
Receipt Number	: 1427068
Recording Fee (including excise)	: $16,229.00

****
MASSACHUSETTS EXCISE TAX
Worcester District ROD #20 001
Date: 03/04/2022 10:00 AM
Ctrl# 235161 28892 Doc# 00024850
Fee: $16,074.00 Cons: $3,525,000.00
****

Worcester South District Registry of Deeds
Kathryn A. Toomey, Register
90 Front St
Worcester, MA 01608
(508) 798-7717

Recording Requested By,
And After Recording
Please Return to:

Brian R. Charville
Ferris Development Group, LLC
118 Turnpike Road, Ste 300
Southborough, MA, 01772

* three million five hundred twenty five thousand and 00/100

Address of Property: 250 Turnpike Road, Southborough, Massachusetts

QUITCLAIM DEED

BLDG Mass/Lex LLC, a Delaware limited liability company having a place of business at % BLDG Management Co., Inc., 417 Fifth Avenue, 4th Floor, New York, New York 10016 ("Grantor") for consideration paid of $3,525,000.00* Dollars grants to **FD 250 Turnpike, LLC** a Massachusetts limited liability company, having an office at 325 Donald Lynch Blvd., Ste. 205, Marlborough, Massachusetts, 01752 ("Grantee") with Quitclaim Covenants, the land, together with the improvements thereon, in Southborough, Worcester Country, Massachusetts, commonly known and numbered as 250 Turnpike Road, being more particularly bounded and described on Exhibit A attached hereto and incorporated herein by reference.

Subject to and with the benefit of all easements, agreements, restrictions, covenants and other matters of record, in so far as the same are in force and applicable.

Grantor is not taxed as a corporation for federal income tax purposes.

For Grantor's title, see deed dated November 30, 2007 and recorded with the Worcester County Registry of Deeds at Book 42198, Page 350.

IN WITNESS WHEREOF, the Grantor has caused this instrument to be executed as a sealed instrument as of the 1 day of March, 2022.

BLDG MASS/LEX LLC,
a Delaware limited liability company

By: _____
Name: Lloyd Goldman
Title: Authorized Signatory

STATE OF NEW YORK

County of New York, ss

On this 1 day of March, 2022, before me, the undersigned notary public, personally appeared Lloyd Goldman, proved to me through satisfactory evidence of identification, which was a driver's license, to be the person whose name is signed on the preceding or attached document, as an authorized signatory of BLDG Mass/Lex LLC, a Delaware limited liability company, and acknowledged to me that he signed it voluntarily for its stated purpose.

Notary Public

(AFFIX SEAL)

Notary name printed: Jeannine Cacace

My commission expires: 2/24/2023

JEANNINE CACACE
Notary Public, State of New York
No. 01CA6087741
Qualified in Richmond County
Commission Expires Feb. 24, 2023

EXHIBIT A

The land and buildings thereon located in Southborough, Worcester County, Massachusetts, described as follows:

A certain parcel of land with the buildings thereon, situated on the southerly side of the Boston and Worcester Turnpikes and the westerly side of Parkerville Road in the Town of Southborough, Worcester County, Commonwealth of Massachusetts, said parcel being described as follows:

Beginning at the Northwesterly corner of the premises at the Boston & Worcester Turnpike;

Thence N 85°24'45" E, by Boston & Worcester Turnpike, on two courses, measuring 316.00 feet and 189.91 feet to land now or formerly of Margaret Fyrberg;

Thence turning and running S 02°38'06" E, by said Fyrberg land, 124.71 feet;

Thence turning and running N 85°26'22" E, by said Fyrberg land, 178.12 feet to Parkerville Road;

Thence turning and running S 01°02'16" E, by said Parkerville Road, 125.00 feet;

Thence S 00°20'25" E by said Parkerville Road, 200.01 feet to land now or formerly of Thomas F. and Florence Kittridge;

Thence turning and running S 89°11'07" W by said Kittridge land, 290.40 to a point;

Thence turning and running S 00°48'53" E by said Kittridge land and by land now or formerly of David H. Davidson and William P. and Jean Marie Gandteau, 448.61 feet to a point;

Thence turning and running N 78°59'55" W by land now or formerly of John W. and Beth A. Wittcoff Pendergast and Michael S. and Lynne L. Bellotti and John A. and Marguertte T. Bartolini, 375.40 feet to a point;

Thence turning and running N 00°26'35" W by said Bartolini land, 207.29 feet to a point;

Thence turning and running N 81°03'30" by land now or formerly of said John A. and Marguerite T. Bartolini 34.87 feet to a point;

Thence turning and running N 01°50'45" W by land now or formerly of Alvin and Morton Eagle, 107.07 feet;
Thence N 00°03'40" W by said Eagle land, 456.27 feet to the point of beginning.

Being the same premises shown on a plan entitled "Plan of Land, Boston and Worcester Turnpike, Southborough, Mass. Owned by Timothy K. Kanna, Prepared for A.J. Lane Const. Co." dated May 31, 1984, drawn by E. J. Flynn Engineers, Inc. and recorded with the Worcester County Registry of Deeds in Plan Book 521, Plan No. 90.

ATTEST: WORC Kathryn A. Toomey, Register

Section 5: FINANCIAL INFORMATION

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that an initial pro forma has been reviewed and that the Proposed Project appears financially feasible and consistent with the Chapter 40B Guidelines, and that the Proposed Project is fundable under the applicable program.

Initial Capital Budget

Sources

Description	Source	Budgeted
Private Equity	Owner's Cash Equity	$7,337,349
Private Equity	Tax Credit Equity	$0
Private Equity	Developer Fee Contributed or Loaned	$0
Private Equity	Developer Overhead Contributed or Loaned	$0
Other Private Equity		$0
Public/Soft Debt		$0
Subordinate Debt		$0
Permanent Debt	DCU	$8,000,000
Permanent Debt		$10,434,926
Constrution Debt	*for informational purposes only, not included in Sources T*	$0
Additional Source		$0
Additional Source		$0
Total Sources		**$25,772,275**

Pre-Permit Land Value

Item	Budgeted
As-Is Market Value*:	$0
Reasonable Carrying Costs:	$0
Total Pre-Permit Land Value:	$0

** As-Is market value to be determined by a MassHousing commissioned appraisal*

Uses (Costs)

Item		Budgeted
Acquisition Cost (Actual):		
Actual Acquisition Cost: Land		$1,191,995
Actual Acquisition Cost: Buildings		$0
Reasonable Carrying Costs		$0
Subtotal - Acquisition Costs		**$1,191,995**
Construction Costs-Building Structural Costs (Hard Costs):		
Building Structure Costs		$19,273,729
Hard Cost Contingency		$0
Subtotal - Building Structural Costs (Hard Costs)		**$19,273,729**
Construction Costs-Site Work (Hard Costs):		
Earth Work		$636,947
Utilities: On-Site		$533,734
Utilities: Off-Site		$296,519
Roads and Walks		$296,519
Site Improvement		$177,911
Lawns and Plantings		$118,608
Geotechnical Condition		$88,956
Environmental Remediation		$0
Demolition		$0
Unusual Site Conditions/Other Site Work		$0
Subtotal - Site Work (Hard Costs)		**$2,149,194**
Construction Costs-General Conditions, Builders Overhead and Profit (Hard Costs):		
General Conditions		$148,259
Builder's Overhead		$0
Builder's Profit		$593,038
Subtotal - General Conditions, Builder's Overhead & Profit		**$741,297**
General Development Costs (Soft Costs):		
Appraisal and Marketing Study *(not 40B "As Is" Appraisal)*		$0
Marketing and Initial Rent Up *(include model units if any)*		$0
Real Estate Taxes *(during construction)*		$15,000
Utility Usage *(during construction)*		$10,000
Insurance *(during construction)*		$25,000
Security *(during construction)*		$10,000
Inspecting Engineer *(during construction)*		$15,000
Construction Loan Interest		$500,000
Fees to Construction Lender:	TBD	$60,000
Fees to Permanent Lender:	DCU	$60,000
Fees to Other Lenders:		$0

General Development Costs (Soft Costs) *- continued*

Item	Budgeted
Architecture / Engineering	$1,329,853
Survey, Permits, etc.	$30,000
Clerk of the Works	$0
Construction Manager	$100,000
Bond Premiums	$30,000
Environmental Engineer	$0
Legal	$40,000
Title *(including title insurance)* **and Recording**	$20,000
Accounting and Cost Certification *(incl. 40B)*	$10,000
Relocation	$0
40B Site Approval Processing Fee	$7,803
40B Techical Assistance / Mediation Fee	$5,300
40B Land Appraisal Cost *(as-is value)*	$5,000
40B Final Approval Processing Fee	$13,104
40B Subsidizing Agency Cost Certification Examination Fee	$10,000
40B Monitoring Agent Fee	$20,000
MIP	$0
Credit Enhancement	$0
Letter of Credit Fees	$0
Tax Credit Allocation Fee	$0
Other Financing Fees	$0
Development Consultant	$0
Other Consultant:	$0
Other Consultant:	$0
Syndication Costs	$0
Soft Cost Contingency	$100,000
Other Development Costs:	$0
Subtotal - General Development Costs (Soft Costs)	**$2,416,060**
Developer Fee and Overhead:	
Develper Fee	$0
Developer Overhead	$0
Subtotal Developer Fee and Overhead	**$0**
Capitalized Reserves:	
Development Reserves	$0
Initial Rent Up Reserves	$0
Operating Reserves	$0
Net Worth Account	$0
Other Capitalized Reserves	$0

Subtotal - Capitalized Reserves **$0**

Summary of Subtotals

Item	Budgeted
Acquisition Costs (Actual):	$1,191,995
Building Structural Costs (Hard Costs)	$19,273,729
Site Work (Hard Costs)	$2,149,194
General Conditions, Builder's Overhead & Profit (Hard Costs)	$741,297
Developer Fee and Overhead	$0
General Development Costs (Soft Costs)	$2,416,060
Capitalized Reserves	$0
Total Development Costs (TDC)	$25,772,275

Summary

Total Sources	$25,772,275
Total Uses (TDC)	$25,772,275

Projected Developer Fee and Overhead*:	$2,717,628	
Maximum Allowable Developer Fee and Overhead::**	$2,717,628	
Projected Developer Fee and Overhead Equals	100.00	**% of Maximum Allowable Fee and Overhead**

** Note in particular the provisions of Section IV.B.5.a of the Guidelines, which detail the tasks (i) for which a developer may or may not receive compensation beyond the Maximum Allowable Developer Fee and Overhead and (ii) the costs of which must, if the tasks were performed by third parties, be included within the Maximum Allowable Developer Fee and Overhead.*

*** Please consult the most recent DHCD Qualified Allocation Plan (QAP) to determine how to calculate the maximum allowable developer fee and overhead. If you have any questions regarding this calculation, please contact MassHousing.*

Initial Rental Operating Pro-Forma *(for year one of operations)*

Item	Notes	Amount
Permanent Debt Assumptions		
Loan Amount	Lende	$18,434,926
Annual Rate		0.05%
Term		360 Months
Amortization		360 Months
Lender Required Debt Service Coverage Ratio		0.00
Gross Rental Income		$1,651,368
Other Income *(utilities, parking)*		$0
Less Vacancy *(Market Units): 5% (vacancy rate)*		$68,670
Less Vacancy *(Affordable Units): 5% (vacancy rate)*		$0
Gross Effective Income		$1,582,698
Less Operating Expenses		$348,194
Net Operating Income		$1,234,504
Less Permanent Loan Debt Service		$1,187,552
Cash Flow		$46,952
Debt Service Coverage		0.00

Describe Other Income:

Rental Operating Expense Assumption

Item	Notes	Amount
Assumed Maximum Operating Expenses	*Calculated based on Net Operating Income, Debt Service and required Debt Service Coverage listed above.*	$395,146
Assumed Maximum Operating Expense/Unit*	Number of Units: 56	$7,056

** MassHousing may request further detail regarding projected operating expenses if such expenses appear higher or lower than market comparables.*

FERRIS DEVELOPMENT GROUP

Existing Conditions Summary

This proposal aligns with the Town of Southborough's goal to expand affordable housing opportunities and meets the need for more rental housing as stated in the Town's Housing Production Plan. This plan would provide 56 units towards its goals.

The subject property consists of 4.879 acres of land and is shown as Lot B on that certain Approval Not Required Plan dated May 3, 2023, and recorded in the Worcester South Registry District in Plan Book 971, at Plan 88. Lot B is entirely within the Residence A zoning district. Lot B abuts Parkerville Road and several properties on Parkerville Road, Skylar Drive, and Sarsen Stone Way. The construction of a 56-unit apartment building with appurtenant parking and utilities will be on Lot B. The proposed rental development consists of 56 apartment units housed on 4 floors in a single building, with a total of 94 parking spaces (1.68/unit) including 90 standard off-street spaces and 4 of which are accessible spaces. A new private wastewater treatment system will be constructed on site for the proposed new building. The project will comply with all aspects of the applicable Stretch code. Water and electricity can be extended from the existing property at 250 Turnpike grid points. There will be a 40' wide easement across Lot A to Lot B for utilities and ingress/egress access, and also a 12' wide easement from 125 Parkerville Road, also owned by the applicant, for ingress only. The surrounding areas include the Eagle Leasing Company to the west, Route 9 and the applicant's BeeHive building to the north, a forested area to the east, and residential neighborhoods to the northeast and south.

Scaled site plan and architectural details will provide items such as abutter locations, elevations, and other data pertaining to the proposal.

Sincerely,

George T. Bahnan, Esq.

George T. Bahnan, Esq.
Assistant General Counsel

250 Turnpike Rd., Southborough
Proposed Rental Housing Development
Design Approach

The subject property consists of 4.879 acres of land and is shown as Lot B on that certain Approval Not Required Plan dated May 3, 2023, and recorded in the Worcester South Registry District in Plan Book 971, at Plan 88. Lot B is entirely within the Residence A zoning district. Lot A abuts Route 9 East and Lot B is to the south of Lot A, abutting Parkerville Road and several properties on Parkerville Road, Skylar Drive, and Sarsen Stone Way. The construction of a 56-unit apartment building with appurtenant parking and utilities will be on Lot B. The proposed rental development consists of 56 apartment units housed on 4 floors in a single building, with a total of 94 parking spaces (1.68/unit) including 90 standard off-street spaces and 4 of which are accessible spaces. A new private wastewater treatment system will be constructed on site for the proposed new building. Water and electricity can be extended from the existing property at 250 Turnpike grid points. There will be a 40' wide easement from Lot A to the new lot for utilities and ingress/egress access, and also a 12' wide easement from 125 Parkerville Road, also owned by the applicant, for ingress access only. The project proposes a new septic leaching field. The project will comply with all aspects of the applicable Stretch code. The surrounding areas include the Eagle Leasing Company to the west, Route 9 to the north, a forested area to the east, and residential neighborhoods to the south.

This proposal aligns with the Town of Southborough's goal to expand affordable housing opportunities and meets the need for more rental housing as stated in the Town's Housing Production Plan. A benefit of this project is controlled municipality growth with scaled-downsized site development. Of the 56 total units, there will be (36) 1-bedroom units, (14) 2-bedroom units and (6) 3-bedroom units. Twenty-five percent or 14 of the units will be affordable, distributed proportionately across the unit mix. Unit sizes range from 936 square feet of living area to 1,555 square feet. Each unit will contain 1 bedroom and 1 bath, 2 bedrooms and 2 baths, or 3 bedrooms and 2 baths. Each unit will include an office, laundry closet, and balcony or patio.

The development will conform to the new Massachusetts Energy Code Standards and will incorporate sustainable development features and building practices, including Energy-Star rated systems. The units will have energy efficient electric heat pumps, LED lighting and low-flow plumbing fixtures.

Application for Chapter 40B Project Eligibility / Site Approval

for MassHousing-Financed and New England Fund ("NEF") Rental Projects

Section 3: PROJECT INFORMATION

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the proposed project appears generally eligible under the requirements of the housing subsidy program and that the conceptual project design is generally appropriate for the site.

Construction Type: New Construction

Total Dwelling Units:	56	**Total Number of Affordable Units:**	14
Number of Market Units:	42	**Number of AMI 50% Affordable Units:**	0
		Number of AMI 80% Affordable Units:	14

Unit Information:

Unit Type	Bedrooms	Baths	# Of Units	Unit Sq. Ft.	Rent	Utilities
Market	1 Bedroom	1 Bath	27	949	$2,500	$0
Market	2 Bedroom	2 Baths	11	1,400	$3,000	$0
Market	3 Bedroom	2 Baths	4	1,555	$3,500	$0
Affordable Unit - Below 80%	1 Bedroom	1 Bath	9	949	$1,775	$236
Affordable Unit - Below 80%	2 Bedroom	2 Baths	3	1,270	$2,130	$318
Affordable Unit - Below 80%	3 Bedroom	2 Baths	2	1,552	$2,461	$396

Utility Allowance Assumptions *(utilities to be paid by tenants)*:

Tenants to pay electric utilities, which include heating, cooking, electricity and water heating.

Percentage of Units with 3 or More Bedrooms: 10.71

** Note that the January 17, 2014 Interagency Agreement Regarding Housing Opportunities for Families with Children requires that at least 10% of the units in the Project must have three (3) or more bedrooms. Evidence of compliance with this requirement must be provided at Final Approval.*

Handicapped Accessible Units - Total:	0	**Market Rate:**	0	**Affordable:**	0
Gross Density *(units per acre)*:	10.1818	**Net Density** *(units per buildableacre)*:	11.9403		

Building Information:

Building Type	Building Style	Construction Type	Stories	Height	GFA	Number Bldg
Residential	Multi-family	Construction	4	44	85,247	1

Will all features and amenities available to market unit residents also be available to affordable unit residents? Yes

If not, explain the differences:

Parking

Total Parking Spaces Provided: 102 **Ratio of Parking Spaces to Housing Units:** 1.82

Lot Coverage

Buildings:	10%	**Parking and Paved Areas:**	19%
Usable Open Space:	58%	**Unusable Open Space:**	12%
Lot Coverage:	30%		

Does project fit definition of "Large Project" (as defined in 760 CMR 56.03 (6))? No

LIST OF REQUESTED WAIVERS
FROM APPLICABLE TOWN OF SOUTHBOROUGH BYLAWS AND REGULATIONS
Comprehensive Permit – 250 Turnpike Road, Southborough

ZONING BYLAW WAIVERS

Property: 250 Turnpike Road, Southborough, MA (Parcel ID M/B/L: 27-0-46-0)

Zoning Districts: Residence A

	Section Reference	Substance of Section	Request Waiver
1.	§ 174-6, Applicability. § 174-7, Conflict of classifications. § 174-8, Schedule of Use Regulations. § 174-8.2, RA Residence A District. § 174-8.2.B(9), RA Residence A District Use, Uses by Special Permit. § 174-8.9, WFP Wetland and Flood-plain District.* § 174-8.10, CR Critical Resource District.* *See below* #10 for waivers sought from dimensional and development requirements set forth in §§ 174-8.2(D.) and 174-8.5(E.) applicable to the RA and BH Districts.	Multi-family Residential Uses are prohibited in the RA Residence A District. Construction of multi-family residential dwellings are prohibited in the RA Residence A District. Prohibited Uses. All Uses which are not listed above, legally nonconforming or otherwise allowable by the provisions of the zoning regulations are prohibited. Where an activity may be classified under more than one use listed in the Schedule of Use regulations, the more specific classification shall apply, and if equally specific, the more restrictive classification shall govern. Uses referenced in the cited sections requiring a Special Permit. Restrictions and limitations on the number of principal uses and structures allowed on one lot. *It is unclear whether the Property is included in the CR and WFP Districts based on the Southborough Zoning Map.	Waiver is sought from the Sections referenced, to the extent the proposed development shown on the Plans is not in compliance with these provisions of the Zoning Bylaw. The Applicant seeks waiver of the referenced provisions, without limitation, and seeks zoning relief to allow construction of 56 apartment units, for rent, multi-family housing, and waiver is sought from the cited Zoning Bylaw sections in order to allow the proposed multi-family development as shown on the Plans as may be amended and superseded.

		Reference is made to the extent it is so located.	
2.	§ 174-9, Special Permit Requirements.	Multi-family Residential Uses are limited to Elderly housing and are otherwise prohibited.	Waiver is sought from this entire Section to the extent the proposed development shown on the Plans is not in compliance with this section. The Applicant seeks waiver of the referenced provisions, without limitation, and seeks zoning relief to allow construction of 56 units of apartment style, rental multi-family housing, and exception is sought from the cited Zoning Bylaw prohibition to allow the proposed Multi- family Development as shown on the Plans as may be amended and superseded.
3.	§ 174-10, Site Plan Approval.	Under the Zoning Bylaw, Site Plan Review is applicable for any change in use. Major Plan Review Provisions requiring Site Plan Approval and review for any new development or expansion in use which adds 2,000 square feet or more of floor area or which requires 20 or more parking spaces.	Waiver sought from entire Section to the extent the proposed development shown on the Plans is not in compliance with the provisions of the Zoning Bylaw.
4.	§ 174-11, Signs.	Generally.	Waiver sought from this entire section to the extent the proposed development shown on the Plans is not in compliance with the provisions of the Zoning Bylaw. Further, waiver is requested to allow the development's sign to be illuminated daily after 10 p.m.
5.	§ 174-12, Parking and Loading Regulations. § 174-12.C(2), Dimensional	Generally; Surfacing, Dimensional Requirements; Parking Requirements, Egress. Required Parking Space Dimensions: 9 ½' x 18'.	Waiver sought from the entirety of this Section to the extent the proposed development shown on the Plans is not in compliance with these provisions of the Zoning Bylaw. The Applicant seeks waiver of the referenced provisions, without

	Requirements, Parking. § 174-12.E(1), Parking Requirements, Dwellings. § 174-12.1, Outdoor Illumination.	Requirement: 2 parking spaces for each 1 or 2 bedroom unit, and 3 parking spaces for each 3 bedroom unit. Generally.	limitation, and seeks zoning relief to allow construction of 56 units of apartment style, rental multi-family housing providing for 94 parking spaces (1.68:1 ratio) where 118 are required and applicable outdoor illumination requirements as sited with attention to pole heights, fixture mounting heights, lumen limits and other applicable restrictions and exception is sought from the cited Zoning Bylaw prohibitions accordingly and with respect to surfacing, dimensional requirements and egress to allow the proposed Multi-family Development as shown on the Plans as may be amended and superseded. Waiver is sought from required parking spaces dimensions at: 9' x 18'.
6.	§ 174-13, Landscaping.	Generally.	Waiver is sought from this entire Section to the extent the proposed development shown on the Plans is not in compliance. Specifically, without limitation, waiver is sought to allow for reduced number of trees and shrubs in lieu of the 40' tree spacing and 3' shrub spacing, and elimination of the requirement of tree planting within 60' of every parking space.
7.	§ 174-13.2, Major Residential Development.	Requires a Special Permit from the Planning Board and an Application to the Southborough Housing Opportunity Partnership Committee, or by Subdivision of the Property in accordance with applicable Southborough laws and regulations subject to recommendations of the Board of Health and the Planning Board's regulations relative to subdivision of land for construction of eight	Waiver sought from this entire section to the extent the proposed development shown on the Plans is not in compliance and to the extent such Major Residential Development regulations are more restrictive than those prescribed in M.G.L. c. 40B §§ 21-23 and 760 CMR 56.00. The Applicant seeks waiver of the referenced provisions, without limitation, and seeks zoning relief to

		or more dwelling units, and subject further to the use regulations prescribed in § 174-8, Schedule of Use Regulations. Affordable Housing Requirements require 12.5% of units in a Major Residential Development be perpetually restricted and in no case for less than 50 years.	allow construction of 56 units of apartment style, rental multi-family housing, and exception is sought from the cited Zoning Bylaw prohibitions accordingly to allow the proposed Multifamily Development as shown on the Plans as may be amended and superseded.
8.	§ 174-13.3, Lower Impact Development.	Generally.	Waiver sought from this entire section to the extent the proposed development shown on the Plans is not in compliance with this section of the Zoning Bylaw, and to the extent such Lower Impact Development regulations are more restrictive than those prescribed in M.G.L. c. 40B §§ 21-23 and 760 CMR 56.00 and other applicable state and federal law.
9.	Article IV, Dimensional Regulations. §§ 174-14, Compliance Required; 174-15, Applicability; 174 17, Previously Recorded Lots. *See also* § 174-8.2(D.) and § 174-8.7(E.), Development Standards regarding specific Dimensional Requirements applicable to the proposed development depicted in the Plans.	No structure shall be erected or used, premises used, or lot changed in size or shape except in conformity with the requirements of this section, unless otherwise provided in the Zoning Bylaw or by statute. RA Residence A District -Minimum frontage: 150' -Minimum Setbacks: Front – 35 ft Rear: 50 ft Side: 25 ft Other Street: 35 ft -Maximum Height – 35 ft; 2 ½ stories -Maximum Floor Area Ratio: 0.18	The Applicant seeks waiver of the referenced provisions and sections, without limitation, and seeks zoning relief to allow the proposed Multi-family Development as shown on Plans, as may be amended and superseded, with 94 parking spaces serving 56 units (ratio 1.68:1) contained within the referenced parcels. Applicable Waivers sought: - Height – 44.0 feet, 4 stories - Floor Area Ratio: 0.40

10.	Zoning Bylaw Generally.	Any and all provisions contained in the Zoning Bylaw which are more restrictive than state requirements which are in effect as of the date hereof and which are not consistent with the development of housing to meet the local and regional Housing Need in the Town of Southborough and MetroWest.	The Applicant seeks waiver of the referenced provisions and sections, without limitation, and seeks zoning relief from the specific and applicable requirements of these provisions and to allow the proposed Multi-family Development as shown on the Plans submitted herewith as may be amended and superseded.

TOWN OF SOUTHBOROUGH WETLANDS REGULATIONS – CHAPTER 170, WETLANDS PROTECTION, ADOPTED JANUARY 2, 2002, AS AMENDED, UPDATED OR REVISED

1.	Chapter 170, Wetlands Protection.	Any and all provisions contained in the Town of Southborough Wetlands Regulations which are more restrictive than state requirements which are in effect as of the date hereof and which are NOT consistent with the development of housing to meet the local and regional Housing Need in the Town of Southborough.	To the extent otherwise applicable, waiver is sought from any applicable provision of the referenced Wetlands By-law and to allow the proposed Multi-family Development as shown on the Plans as may be amended and superseded. To the extent any relief under the Town of Southborough Wetlands Regulations would be required for the proposed development as depicted in the Plans as may be amended and superseded, the Zoning Board of Appeals will act instead of the Conservation Commission to grant such applicable and requested waivers, exemptions and relief excepting that relief which may be required under the Massachusetts Wetlands Protection Act. A Comprehensive Permit may provide all local permits and approvals pursuant to M.G.L. c. 40B §§ 21-23 and 760 CMR 56 enabling construction of the proposed Multi-family Development to meet the local and regional Housing Need in the Town of Southborough.

SOUTHBOROUGH SUBDIVISION REGULATIONS – CHAPTER 244, SUBDIVISION OF LAND, ADOPTED AUGUST 18, 1986, UPDATED OR REVISED

1.	Southborough Subdivision Regulations Regarding the Subdivision of Land Generally.	Any and all provisions contained in the Town of Southborough Rules and Regulations Regarding the Subdivision of Land which in effect as of the date hereof and which are NOT consistent with the development of housing to meet the local and regional Housing Need in the Town of Southborough.	Waiver is sought from any applicable provision of this Regulation regarding, joining of lots, the regulation of roadways, driveways, passageways or which are otherwise applicable to the instant project and to allow the proposed Multi-family Development as shown on the Plans as may be amended and superseded. To the extent any relief under the Town of Southborough Rules and Regulations Regarding the Subdivision of Land would be required for the proposed development as depicted in the Plans as may be amended and superseded, the Zoning Board of Appeals will act instead of the Planning Board to grant such applicable and requested waivers, exemptions and relief. A Comprehensive Permit may provide all local permits and approvals pursuant to M.G.L. c. 40B §§ 21-23 and 760 CMR 56 enabling construction of the proposed Multi-family Development to meet the local and regional Housing Need in the Town of Southborough.
	§ 244-3, Plan believed not to require approval.	Plans to be recorded in the registry of deeds that do not require approval, must be endorsed by the Planning Board.	
	§ 244-4, Plan requiring approval.	Plans requiring approval must be approved by the Planning Board.	
	§ 244-6, Limit on dwelling on a lot.	Not more than one building designed or available for use for dwelling purposes shall be erected or placed or converted to use as such on any lots in a subdivision, or elsewhere in the Town of Southborough, without the consent of the Planning Board.	
	§ 244-8.A-D, Access Agency.	Generally.	
	§ 244-9.C, Board action on preliminary plan.	The Planning Board may disapprove the preliminary plan, stating specific reasons, or may approve the preliminary plan, with modifications.	
	§ 244-10.D-G, Definitive plan.	Generally.	
	§ 244-11, Action on definitive plan.	Generally.	

	§ 244-13, Streets.	Generally.	
	§ 244-14.A & B, Open Space.	Generally.	
	§ 244-16.A, Lot Drainage.	Lot drainage. Lots shall be prepared and graded in such a manner in accordance with the approved topographic plans that the development of one lot shall not interfere with the proper drainage of other lots and will not cause ponding or flooding.	
	§ 224-16.B (2), Drainage System.	Location of street drain and manholes. The main street drain and the manholes centered thereon shall be located five feet from the center line of pavement.	
	§ 224-21, Sidewalks.	Generally.	
	§ 224-24, Grass plots.	Generally.	
	§ 224-24, Shade trees.	Generally.	
	Article V, Required Improvements, Construction Standards.	Generally.	
	Article III, Plan Submission Approval and Procedure §244-9 (B)(2).	(b) Major existing features of the land, such as walls, fences, large trees, wooded areas, ledge outcrops, major ditches, wetlands and water bodies. (c) All existing structures above and below ground (where known), such as buildings, water mains and other pipelines, polelines, wells and tanks. Water mains within one thousand (1,000) feet shall be indicated. (d) Profiles of existing grade and approximate proposed finish	

	§ 244-Attachment 1, Design Standards for Various Street Classifications.	grades of the roadway, and drain and sewer utilities. Major Residential / Minor Commercial Collector • Right-of-Way Width (60') • Min. Centerline Curve Radius (250') • Max. Street Grade (6%) • Pavement (Roadway Width) (38') • Curbing Type, Radius under 50 feet (Granite) • Curbing Type, Radius 50 to 100 feet (Granite) • Curbing Type, Grade Over 6% (Asphalt) • Catch Basin Inlet Type (Granite) • Bit. Sidewalk of 5' Width (2 sides)	

TOWN OF SOUTHBOROUGH CHARTER, GENERAL BY-LAWS

1.	Generally and Charter and General Bylaws.	Any and all provisions contained in the Town of Southborough Charter and General Bylaws which are more restrictive than state requirements which are in effect as of the date hereof and which are no consistent with the development of housing to meet the local and regional Housing Need in the Town of Southborough and MetroWest.	To waive the specific and applicable requirements of these provisions, including, without limitation, any regulations and requirements which are more restrictive than state Building, Public Health and Fire Code requirements and/or from any conditions which may be imposed on the proposed development which require utility, water, wastewater connection fees and inflow and infiltration (I&I) fees which are not required by local bylaw or written regulation and which are not charged, in the normal course, to market rate and non-subsidized housing and to, generally allow the proposed Multi-family Development as shown on the Plans submitted herewith as may be amended and superseded.

TOWN OF SOUTHBOROUGH COMPREHENSIVE PERMIT REGULATIONS AND GUIDELINES

1.	Generally.	Any and all provisions contained in the Town of Southborough Comprehensive Permit Regulations and Guidelines which are not inconsistent with state requirements prescribed in G.L. c. 40B, §§ 21-23, and 760 CMR 56.00 et seq. which are in effect as of the date hereof and which are NOT consistent with the development of housing to meet the local and regional Housing Need in the Town of Southborough.	Pursuant to 760 CMR 56.05(1), "The Zoning Board of Appeals shall adopt rules, not inconsistent with M.G.L. c. 40B, §§ 20 through 23, for the conduct of its business …Such rules shall be consistent with the purpose of M.G.L. c. 40B, §§ 20 through 23 to provide a streamlined permitting process that overcomes regulatory barriers to the development of Low or Moderate Income Housing." To exempt from and waive the specific and applicable requirements of these provisions, including, without limitation, any regulations and requirements which are not inconsistent with state requirements and to, generally provide for a more streamlined process that overcomes regulatory barriers to allow for the proposed Multi-family Development as shown on the Plans submitted herewith as may be amended and superseded.
2.	§4.0 Filing, Time Limits and Notice. §4.1.2.	A complete financial pro forma, detailing the projected costs and revenues of the proposed project shall be submitted.	760 CMR 56.05(6), "Review of Financial Statements" requires: (a) A Board may request to review the pro forma or other financial statements for a Project only after the following preconditions have been met: 1. *other consultant review has been completed*; 2. *the Applicant has had an opportunity to modify its original proposal to address issues raised*; 3. *the Board has had an opportunity to propose conditions to mitigate the Project's impacts and to consider requested Waivers*; and

			4. *the Applicant has indicated that it does not agree to the proposed condition(s) or Waiver denial(s) because they would render the Project uneconomic. A Board may not conduct review of a pro forma in order to see whether a Project would still be economic if the number of dwelling units were reduced, unless such reduction is justified by a valid health, safety, environmental, design, open space, planning, or other local concern that directly results from the size of a project on a particular site, consistent with 760 CMR 56.07(3)*. The Applicant and the proposed Development and Application is not subject to the financial pro-forma requirement under the Town's Comprehensive Permit Regulations and Guidelines because the prescribed pre-conditions have not yet been met.
3.	§4.0 Filing, Time Limits and Notice. §4.1.3.13.	Plan shall show location and results of soil, percolation and water table tests using the Department of Environmental Protection Soil Evaluation procedures under Title V.	The proposed wastewater treatment facility and associated leach field will be reviewed and approved by the Department of Environmental Protection pursuant to the Massachusetts Ground Water Discharge Permitting Program pursuant to 314 CMR 5.00 *et seq*.
4.	§4.0 Filing, Time Limits and Notice. §4.1.3.16.	The Board may, at its discretion, require that additional information be included in the plans. The Board may engage a Massachusetts-registered Professional Engineer or other professional advisor, experienced in various areas, including such areas as groundwater evaluation,	760 CMR 56.05(5)(b) requires: "A review fee may be imposed only if: 1. *the work of the consultant consists of review of studies prepared on behalf of the Applicant, and not of independent studies on behalf of the Board*;

		hydrogeology or hazardous and toxic materials, to review the Application for completeness and correctness with the Applicant required to pay for the cost of the review pursuant to Section 5, "Review Fees".	2. *the work is in connection with the Applicant's specific Project*; and 3. all written results and reports are made part of the record before the Board. 4. a review fee may only be imposed in compliance with applicable law and the Board's rules." Exemption is sought from the specific and applicable requirements of the Town's Comprehensive Permit Regulations and Guidelines, including, without limitation, any regulations and requirements which are not inconsistent with state requirements and to, generally provide for a more streamlined process that overcomes regulatory barriers to allow for the proposed Multi-family Development as shown on the Plans submitted herewith as may be amended and superseded.

The requested waivers set forth herein are those of which the Applicant is aware as of ***May 8, 2024****. The Applicant will continue to update this list if necessary during the Board's consideration of the application.*

Comprehensive Permit
Site Approval Application
Rental

www.masshousing.com | www.masshousingrental.com

Comprehensive Permit Site Approval Application/Rental

Attached is the Massachusetts Housing Finance Agency ("MassHousing") application form for Project Eligibility/Site Approval ("Site Approval") under the state's comprehensive permit statute (M.G.L. c. 40B, Sections 20-23 enacted as Chapter 774 of the Acts of 1969) known as "Chapter 40B". Developers seeking a comprehensive permit to construct affordable housing under Chapter 40B and intending to use a MassHousing financing program or financing through the New England Fund ("NEF") program must receive Site Approval from MassHousing. This approval (also referred to as "project eligibility approval") is a required component of any comprehensive permit application to be submitted to the local Zoning Board of Appeals of the municipality in which the development is to be located.

As part of its review of your application, MassHousing will conduct an inspection of the site and will solicit comments from the relevant municipality. MassHousing will consider any relevant concerns that the municipality might have about the proposed project or the developer. The applicant is encouraged, therefore, to make contact with the municipality prior to submitting the Site Approval application in order to ensure that the applicant understands any concerns that the municipality may be likely to raise regarding the proposed development.

In order for a project to receive Site Approval, MassHousing must determine that (i) the applicant has sufficient legal control of the site, (ii) the applicant is a public agency, non-profit organization or limited dividend organization, and (iii) the applicant and the project are generally eligible under the requirements of the MassHousing program selected by the applicant, subject to final eligibility review and approval. Furthermore, MassHousing must determine that the site of the proposed project is generally appropriate for residential development (taking into consideration municipal actions previously taken to meet affordable housing needs) and that the conceptual project design is generally appropriate for the site. In order for MassHousing to be able to make these findings (required by 760 CMR 56.04 (4)), it is important that you answer all questions in the application and include all required attachments.

Please note that MassHousing requires that all applicants meet with a member of our Planning and Programs Department staff before submitting their application. Applications for any projects that have not been the subject of a required pre-application meeting will not be accepted or processed.

Upon completion of its analysis, MassHousing will either issue a Site Approval Letter that approves, conditionally approves or denies the application. If the application is approved, the applicant should apply to the Zoning Board of Appeals within two years from the date of the Site Approval Letter (unless MassHousing extends such term in writing).

Please note that Site Approval from MassHousing does not constitute a loan commitment by MassHousing or any other financing program. All potential MassHousing financing is subject to further review and underwriting by MassHousing's Rental Lending Department.

Please be sure you have familiarized yourself with all of the applicable requirements set forth in the Chapter 40B regulations and guidelines, which can be found at

https://www.mass.gov/doc/760-cmr-56-comprehensive-permit-low-or-moderate-income-housing/download
www.mass.gov/hed/docs/dhcd/legal/comprehensivepermitguidelines.pdf.

Instructions for completing the Site Approval Application are included in the application form which is attached. The completed application form and all additional documentation should be sent, after your pre-application meeting has been held, to:

Manager of Planning Programs
One Beacon Street, Boston, MA 02108

We look forward to working with you on your proposed development. Please contact Jessica Malcolm at 617-854-1201 or jmalcolm@masshousing.com to discuss scheduling your pre-application meeting or if there is any assistance that we can provide in the meantime to make your application process a smooth and efficient one.

Our Commitment to You

MassHousing recognizes that applicants seek some measure of predictability regarding the timeframe for our processing of their applications. Our staff will endeavor to adhere to the following schedule for reviewing applications for site approval :

Within one week of receipt of your application (provided that you have attended a required pre-application meeting) a member of our staff will notify you of any of the items listed on the checklist at the end of the application form that were missing from your application package. Please note that our acknowledgement of receipt of an item does not indicate that any substantive review has yet taken place.

If your application package is missing any of the items indicated on the checklist by an asterisk, we will not be able to continue processing your application until such items are received.

If we have received the information which is crucial to the commencement of our review process, we will proceed to (i) give the municipality a period of thirty (30) days in which to submit comments relating to your proposal, (ii) schedule and conduct a site visit, and (iii) solicit bids for and commission and review an “as is” appraisal of your site.

If during our review of your application package we determine that additional information or clarification is needed, we will notify you as soon as possible. Depending on when we receive such additional information, this may affect the amount of time required for MassHousing to complete the site approval process.

Assuming that your application package was complete and that you respond in a timely manner to requests for additional information or clarification, we would expect to issue or deny your site approval within 90 days of our receipt of your application package.

Application for Chapter 40B Project Eligibility / Site Approval

for MassHousing-Financed and New England Fund ("NEF") Rental Projects

Section 1: GENERAL INFORMATION

Name of Proposed Project: 250 Turnpike Road

Municipality: Southborough **County:** Worcester

Address of Site: 250 Turnpike Rd

Cross Street: Parkerville Road

Zip Code: 01772

Tax Parcel I.D. Number(s): 27/2/A

Name of Proposed Development Entity Ferris Development Group, LLC
(typically a single purpose entity):

Entity Type: Limited Dividend Organization

** If the Proposed Development Entity is a Non-Profit, please contact MassHousing regarding additional documentation that must be submitted.*

Has this entity aleady been formed? Yes **State Formed:** Massachusetts

Name of Applicant: FD 250 Turnpike, LLC
(typically the Proposed Development Entity or its controlling entity or individual)

Applicant's Web Address: http://www.ferrisdevelopment.com

Does the applicant have a related party relationship with any other member of the development team? Yes

If yes, please explain:

David M. Ferris is the owner of both LLC's.

Primary Contact Information:

Contact Name: Brian Charville **Relationship to Applicant:**

Company Name: Ferris Development Group, LLC

Address: 118 Turnpike Rd., Ste. 300

Municipality: Southborough **State:** Massachusetts **Zip:** 01772

Phone: 508-281-5610 **Cell Phone:** 617-631-4434

Email: bcharville@ferrisdevelopment.com

Secondary Contact Information:

Contact Name: David M. Ferris **Relationship to Applicant:**

Company Name: FD 250 Turnpike, LLC

Address: 118 Turnpike Rd., Ste. 300

Municipality: Southborough **State:** Massachusetts **Zip:** 01772

Phone: 508-281-5600 **Cell Phone:**

Email: david@ferrisdevelopment.com

Additional Contact Information:

Contact Name: **Relationship to Applicant:**

Company Name:

Address:

Municipality: **State:** **Zip:**

Phone: **Cell Phone:**

Email:

Anticipated Construction Financing: Other

Name of Lender (if not MassHousing financed):

Anticipated Permanent Financing: NEF

Other Lenders: Digital Credit Union

Please note: under the NEF Program, a minimum of 25% of the Permanent financing must be obtained from an NEF Lender and remain in place for 5 years

Age Restriction: None

Brief Project Description:

250 Turnpike Road is comprised of Lot A, an existing 4.29 acre lot housing a brick building, and Lot B an existing 5.53 acre vacant lot. Lot A is located mostly in the Industrial zone and partly in Residence A zoning district. Lot B is located entirely in Residence A zoning district. The proposal includes construction of a 4-story apartment building with 56 rental units and 102 parking spaces. Access will be via a driveway access easement through the existing parking area on Lot A to Route 9.

Section 2: EXISTING CONDITIONS / SITE INFORMATION

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the site is generally appropriate for residential development.

Buildable Area Calculations (Acres)

Total Site Area:	**5.50**
Wetland Area *(per MA DEP)*:	0.81
Flood Hazard Area *(per FEMA)*:	0.00
Endangered Species Habitat *(per MESA)*:	0.00
Conservation / Article 97 Land:	0.00
Protected Agricultural Land *(i.e. EO 193)*:	0.00
Other Non-Buildable:	**0.00**
Total Non-Buildable Area:	0.81
Total Buildable Area:	4.69

Current use of the site and prior use if known:

Vacant land.

Is the site located entirely within one municipality? Yes

If not, in what other municipality is the site located?

How much land is in each municipality?

Additional Site Addresses:

Current zoning classification and principal permitted uses:

Residence A - conservation, one-family houses, etc

Previous Development Efforts

Please list any previous applications pertaining to construction on or development of the site, including (i) type of application (comprehensive permit, subdivision, special permit, etc.); (ii) application filing date; (iii) date of denial, approval or withdrawal. Also indicate the current Applicant's role, if any, in the previous applications.

Note that, pursuant to 760 CMR 56.03 (1), a decision of a Zoning Board of Appeals to deny a Comprehensive Permit, or (if the Statutory Minima defined at 760 CMR 56.03 (3) (b or c) have been satisfied) grant a Comprehensive Permit with conditions, shall be upheld if a related application has previously been received, as set forth in 760 CMR 56.03 (7).

None.

To the best of your knowledge, has this site ever been rejected for project eligibility/site approval by another subsidizing agency or authority? No

If Rejected, Please Explain:

Existing Utilities and Infrastructure	Yes/No	Description
Wastewater- private wastewater treatment	Yes	Private wastewater treatment
Wastewater - public sewer	No	
Storm Sewer	Yes	Can be extended from Lot A
Water-public water	Yes	Easement to connect to town water
Water-private well	No	
Natural Gas	Yes	Can be extended from Lot A
Electricity	Yes	Can be extended from Lot A
Roadway Access to Site	Yes	Easement through Lot A
Sidewalk Access to Site	No	
Other	No	

Describe Surrounding Land Uses:

The existing structure to the north is being converted to a self-storage use; there are residential homes to the south, west and east.

Surrounding Land Use/Amenities	Distance from Site	Available by Public Transportation?
Shopping Facilities	4.00	N/A
Schools	3.00	N/A
Government Offices	3.00	N/A
Multi-Family Housing	3.00	N/A
Public Safety Facilities	3.00	N/A

Office/Industrial Uses	0.01	N/A
Conservation Land	1.00	N/A
Recreational Facilities	1.00	N/A
Houses of Worship	3.00	N/A
Other	0.00	N/A

Public transportation near the Site, including type of transportaion and distance from site:

MBTA station at 87 Southville Rd. approximately 6 minutes from the site.

Site Characteristics and Development Constraints

Are there any easements, rights of way or other restrictions of record affecting the development of the site ?	Yes
Is there any evidence of hazardous, flammable or explosive material on the site?	No
Is the site, or any portion thereof, located within a designated flood hazard area?	No
Does the site include areas designated by Natural Heritage as endangered species habitat?	No
Are there documented state-designated wetlands on the site?	Yes
Are there documented vernal pools on the site?	No
Is the site within a local or state Historic District or listed on the National Register or Historic Places?	No
Has the site or any building(s) on the site been designated as a local, state or national landmark?	No
Are there existing buildings and structures on site?	No
Does the site include documented archeological resources?	No
Does the site include any known significant areas of ledge or steep slopes?	No

Application for Chapter 40B Project Eligibility / Site Approval

for MassHousing-Financed and New England Fund ("NEF") Rental Projects

Section 3: PROJECT INFORMATION

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that the proposed project appears generally eligible under the requirements of the housing subsidy program and that the conceptual project design is generally appropriate for the site.

Construction Type: New Construction

Total Dwelling Units:	56	**Total Number of Affordable Units:**	14
Number of Market Units:	42	**Number of AMI 50% Affordable Units:**	0
		Number of AMI 80% Affordable Units:	14

Unit Information:

Unit Type	Bedrooms	Baths	# Of Units	Unit Sq. Ft.	Rent	Utilities
Market	1 Bedroom	1 Bath	27	949	$2,500	$0
Market	2 Bedroom	2 Baths	11	1,400	$3,000	$0
Market	3 Bedroom	2 Baths	4	1,555	$3,500	$0
Affordable Unit - Below 80%	1 Bedroom	1 Bath	9	949	$1,775	$236
Affordable Unit - Below 80%	2 Bedroom	2 Baths	3	1,270	$2,130	$318
Affordable Unit - Below 80%	3 Bedroom	2 Baths	2	1,552	$2,461	$396

Utility Allowance Assumptions *(utilities to be paid by tenants)*:

Tenants to pay electric utilities, which include heating, cooking, electricity and water heating.

Percentage of Units with 3 or More Bedrooms: 10.71

** Note that the January 17, 2014 Interagency Agreement Regarding Housing Opportunities for Families with Children requires that at least 10% of the units in the Project must have three (3) or more bedrooms. Evidence of compliance with this requirement must be provided at Final Approval.*

Handicapped Accessible Units - Total:	0	**Market Rate:**	0	**Affordable:**	0
Gross Density *(units per acre)*:	10.1818	**Net Density** *(units per buildableacre)*:	11.9403		

Building Information:

Building Type	Building Style	Construction Type	Stories	Height	GFA	Number Bldg
Residential	Multi-family	Construction	4	44	85,247	1

Will all features and amenities available to market unit residents also be available to affordable unit residents? Yes

If not, explain the differences:

Parking

Total Parking Spaces Provided: 102 **Ratio of Parking Spaces to Housing Units:** 1.82

Lot Coverage

Buildings:	10%	**Parking and Paved Areas:**	19%
Usable Open Space:	58%	**Unusable Open Space:**	12%
Lot Coverage:	30%		

Does project fit definition of "Large Project" (as defined in 760 CMR 56.03 (6))? No

Section 4: SITE CONTROL

Grantor/Seller: BLDG MASS LEX LLC

Grantee/Buyer: FD 250 TURNPIKE LLC

Grantee/Buyer Type: Applicant

If Other, Explain:

Are the Parties Related? No

For Deeds or Ground Leases:

Date(s) of Deed(s) or Ground Leases(s): 03/04/2022

Purchase Price: $3,525,000

For Purchase and Sales Agreements or Option Agreements:

Date of Agreement:

Expiration Date:

Date of Extension *(if extension granted)***:**

New Expiration Date *(if extension granted)***:**

Purchase Price: $0

Will any easements or rights of way over other properties be required in order to develop the site as proposed?: No

If Yes, Current Status of Easement: Owned by Development Entity

Date(s) of Easements(s):

For Easements:

Date of Agreement:

Purchase Price: $0

For Easement Purchase and Sales Agreements or Easement Option Agreements:

Expiration Date:

Date of Extension *(if extension granted)***:**

New Expiration Date *(if extension granted)*

Purchase Price: $0

Section 5: FINANCIAL INFORMATION

In order to issue Site Approval, MassHousing must find (as required by 760 CMR 56.04 (4)) that an initial pro forma has been reviewed and that the Proposed Project appears financially feasible and consistent with the Chapter 40B Guidelines, and that the Proposed Project is fundable under the applicable program.

Initial Capital Budget

Sources

Description	Source	Budgeted
Private Equity	Owner's Cash Equity	$7,337,349
Private Equity	Tax Credit Equity	$0
Private Equity	Developer Fee Contributed or Loaned	$0
Private Equity	Developer Overhead Contributed or Loaned	$0
Other Private Equity		$0
Public/Soft Debt		$0
Subordinate Debt		$0
Permanent Debt	DCU	$8,000,000
Permanent Debt		$10,434,926
Constrution Debt	*for informational purposes only, not included in Sources T*	$0
Additional Source		$0
Additional Source		$0
Total Sources		**$25,772,275**

Pre-Permit Land Value

Item	Budgeted
As-Is Market Value*:	$0
Reasonable Carrying Costs:	$0
Total Pre-Permit Land Value:	$0

** As-Is market value to be determined by a MassHousing commissioned appraisal*

Uses (Costs)

Item		Budgeted
Acquisition Cost (Actual):		
Actual Acquisition Cost: Land		$1,191,995
Actual Acquisition Cost: Buildings		$0
Reasonable Carrying Costs		$0
Subtotal - Acquisition Costs		**$1,191,995**
Construction Costs-Building Structural Costs (Hard Costs):		
Building Structure Costs		$19,273,729
Hard Cost Contingency		$0
Subtotal - Building Structural Costs (Hard Costs)		**$19,273,729**
Construction Costs-Site Work (Hard Costs):		
Earth Work		$636,947
Utilities: On-Site		$533,734
Utilities: Off-Site		$296,519
Roads and Walks		$296,519
Site Improvement		$177,911
Lawns and Plantings		$118,608
Geotechnical Condition		$88,956
Environmental Remediation		$0
Demolition		$0
Unusual Site Conditions/Other Site Work		$0
Subtotal - Site Work (Hard Costs)		**$2,149,194**
Construction Costs-General Conditions, Builders Overhead and Profit (Hard Costs):		
General Conditions		$148,259
Builder's Overhead		$0
Builder's Profit		$593,038
Subtotal - General Conditions, Builder's Overhead & Profit		**$741,297**
General Development Costs (Soft Costs):		
Appraisal and Marketing Study *(not 40B "As Is" Appraisal)*		$0
Marketing and Initial Rent Up *(include model units if any)*		$0
Real Estate Taxes *(during construction)*		$15,000
Utility Usage *(during construction)*		$10,000
Insurance *(during construction)*		$25,000
Security *(during construction)*		$10,000
Inspecting Engineer *(during construction)*		$15,000
Construction Loan Interest		$500,000
Fees to Construction Lender:	TBD	$60,000
Fees to Permanent Lender:	DCU	$60,000
Fees to Other Lenders:		$0

General Development Costs (Soft Costs) *- continued*

Item	Budgeted
Architecture / Engineering	$1,329,853
Survey, Permits, etc.	$30,000
Clerk of the Works	$0
Construction Manager	$100,000
Bond Premiums	$30,000
Environmental Engineer	$0
Legal	$40,000
Title *(including title insurance)* **and Recording**	$20,000
Accounting and Cost Certification *(incl. 40B)*	$10,000
Relocation	$0
40B Site Approval Processing Fee	$7,803
40B Techical Assistance / Mediation Fee	$5,300
40B Land Appraisal Cost *(as-is value)*	$5,000
40B Final Approval Processing Fee	$13,104
40B Subsidizing Agency Cost Certification Examination Fee	$10,000
40B Monitoring Agent Fee	$20,000
MIP	$0
Credit Enhancement	$0
Letter of Credit Fees	$0
Tax Credit Allocation Fee	$0
Other Financing Fees	$0
Development Consultant	$0
Other Consultant:	$0
Other Consultant:	$0
Syndication Costs	$0
Soft Cost Contingency	$100,000
Other Development Costs:	$0
Subtotal - General Development Costs (Soft Costs)	**$2,416,060**
Developer Fee and Overhead:	
Develper Fee	$0
Developer Overhead	$0
Subtotal Developer Fee and Overhead	**$0**
Capitalized Reserves:	
Development Reserves	$0
Initial Rent Up Reserves	$0
Operating Reserves	$0
Net Worth Account	$0
Other Capitalized Reserves	$0

Subtotal - Capitalized Reserves **$0**

Summary of Subtotals

Item	Budgeted
Acquisition Costs (Actual):	$1,191,995
Building Structural Costs (Hard Costs)	$19,273,729
Site Work (Hard Costs)	$2,149,194
General Conditions, Builder's Overhead & Profit (Hard Costs)	$741,297
Developer Fee and Overhead	$0
General Development Costs (Soft Costs)	$2,416,060
Capitalized Reserves	$0
Total Development Costs (TDC)	$25,772,275

Summary

Total Sources	$25,772,275
Total Uses (TDC)	$25,772,275

Projected Developer Fee and Overhead*:	$2,717,628	
Maximum Allowable Developer Fee and Overhead::**	$2,717,628	
Projected Developer Fee and Overhead Equals	100.00	**% of Maximum Allowable Fee and Overhead**

** Note in particular the provisions of Section IV.B.5.a of the Guidelines, which detail the tasks (i) for which a developer may or may not receive compensation beyond the Maximum Allowable Developer Fee and Overhead and (ii) the costs of which must, if the tasks were performed by third parties, be included within the Maximum Allowable Developer Fee and Overhead.*

*** Please consult the most recent DHCD Qualified Allocation Plan (QAP) to determine how to calculate the maximum allowable developer fee and overhead. If you have any questions regarding this calculation, please contact MassHousing.*

Initial Rental Operating Pro-Forma *(for year one of operations)*

Item	Notes	Amount
Permanent Debt Assumptions		
Loan Amount	Lende	$18,434,926
Annual Rate		0.05%
Term		360 Months
Amortization		360 Months
Lender Required Debt Service Coverage Ratio		0.00
Gross Rental Income		$1,651,368
Other Income *(utilities, parking)*		$0
Less Vacancy *(Market Units): 5% (vacancy rate)*		$68,670
Less Vacancy *(Affordable Units): 5% (vacancy rate)*		$0
Gross Effective Income		$1,582,698
Less Operating Expenses		$348,194
Net Operating Income		$1,234,504
Less Permanent Loan Debt Service		$1,187,552
Cash Flow		$46,952
Debt Service Coverage		0.00

Describe Other Income:

Rental Operating Expense Assumption

Item	Notes	Amount
Assumed Maximum Operating Expenses	*Calculated based on Net Operating Income, Debt Service and required Debt Service Coverage listed above.*	$395,146
Assumed Maximum Operating Expense/Unit*	Number of Units: 56	$7,056

** MassHousing may request further detail regarding projected operating expenses if such expenses appear higher or lower than market comparables.*

Section 6: APPLICANT QUALIFICATIONS, ENTITY INFORMATION, AND CERTIFICATION

In order to issue Site Approval MassHousing must find (as required by 760 CRM 56.04 (4)) that the applicant is either a non-profit public agency or would be eligible to apply as a Limited Dividend Organization and meets the general eligibility standards of the program.

Development Team:

Company Name	Contact Name	Contact Role	Applicant	Dev Entity	Primary For Role
FD 250 Turnpike, LLC	David M. Ferris	Owner	Yes	No	Yes
Ferris Development Group	Brian Charville	Attorney	No	Yes	Yes
Azimuth Land Design, LLC	James Tetreault	Consultant - Architect and Enginee	No	No	Yes
L.A. Associates, Inc.	Kristen Costa	Lottery Agent	No	No	Yes
Monte French Design Stud	Monte French	Consultant - Architect and Enginee	No	No	No

Entities Responsible for Development Tasks:

Development Task	Developer / Applicant	Contact Name / Company
40B Consultant	No	L.A. Associates, Inc., Kristen Costa
Architecture and Engineering	No	Azimuth Land Design, LLC, James Tetreault
Architecture and Engineering	No	Monte French Design Studio, Monte French
Construction Management	Yes	FD 250 Turnpike, LLC, David M. Ferris
Finance Package	No	Ferris Development Group, LLC, Brian Charville
Local Permitting	No	L.A. Associates, Inc., Kristen Costa

Affiliated Entities:

Company Name	Individual Name	Affiliation	Relation
250 Turnpike Road, LLC	David M. Ferris	Managing Entity	Applicant

Previous Applications:

Project Name:	**Filing Date:**
Municipality:	
Subsidizing Agency:	**Decision:**
Type:	**Other Reference:**

Certification and Acknowledgement

I hereby certify on behalf of the Applicant, under pains and penalties of perjury, that the information provided above for each of the Applicant Entities is, to the best of my knowledge, true and complete; and that each of the following questions has been answered correctly to the best of my knowledge and belief:

(Please attach a written explanation for all of the following questions that are answered with a "Yes". Explanations should be attached to this Section 6.)

Question	Answer
Is there pending litigation with respect to any of the Applicant Entities?	No
Are there any outstanding liens or judgments against any properties owned by any of the Applicant Entities?	No
Have any of the Applicant Entities failed to comply with provisions of Massachusetts law related to taxes, reporting of employees and contractors, or withholding of child support?	No
Have any of the Applicant Entities ever been the subject of a felony indictment or conviction?	No
During the last 10 years, have any of the Applicant Entities ever been party to a lawsuit involving fraud, gross negligence, misrepresentation, dishonesty, breach of fiduciary responsibility or bankruptcy?	No
Have any of the Applicant Entities failed to carry out obligations in connection with a Comprehensive Permit issued pursuant to M.G.L. c. 40B and any regulations or guidelines promulgated thereunder (whether or not MassHousing is or was the Subsidizing Agency/Project Administrator) including, but not limited to, completion of a cost examination and return of any excess profits or distributions?	No
Have any of the Applicant Entities ever been charged with a violation of state or federal fair housing requirements?	No
Are any of the Applicant Entities not current on all existing obligations to the Commonwealth of Massachusetts, and any agency, authority or instrument thereof?	No

I further certify that the information set forth in this application (including attachments) is true, accurate and complete as of the date hereof to the best of my/our knowledge, information and belief. I further understand that MassHousing is relying on this information in processing the request for Site Approval in connection with the above-referenced project; and

I hereby acknowledge our commitment and obligation to comply with requirements for cost examination and limitations on profits and distributions, all as found at 760 CMR 56.04(8) and will be more particularly set forth in a Regulatory Agreement by and between the Applicant and MassHousing.

I hereby acknowledge that will be required to provide financial surety by means of bond, cash escrow and a surety escrow agree- ment or letter of credit with the agreement that it may be called upon or used in the event that the Developer fails either to (i) complete and submit the examined Cost Certification as required by 760 CMR 56.04(8) and the Regulatory Agreement, or (ii) pay over to the Subsidizing Agency or the Municipality any funds in excess of the limitations on profits and distributions from capital sources as required by 760 CMR 56.04(8) and as set forth in the Regulatory Agreement.

Signature: _____

Name: David M. Ferris

Title: Owner

Date: 06/20/2023

Section 7: NOTIFICATION AND FEES

Notices

Event	Date
Date(s) of meetings, if any, with municipal officials prior to submission of application to MassHousing:	06/06/2023
Date of Pre-Application Meeting with MassHousing:	02/13/2023
Date copy of complete application sent to chief elected office of municipality:	06/29/2023
Date notice of application sent to DHCD:	06/27/2023

Fees

All fees that are payable to MassHousing should be sent via ACH/Wire Transfer. Please contact MassHousing for the ACH/Wire Transfer instructions.

Fees payable to the Massachusetts Housing Partnership should be sent directly to MHP with the MHP Cover Letter

Fee	Amount	Description
Chapter 40B Technical Assistance/Mediation Fee:	$2,500	*(Limited Dividend Sponsor $2,500, Non-Profit or Public Agency Sponsor $1,000)*
Unit Fee:	$2,800	*($50 per Unit)*
Total TA/Mediation and Unit Fee:	**$5,300**	*(Payable to Massachusetts Housing Partnership)*

Land Appraisal Cost: You will be required to pay for an "as-is" market value appraisal of the Site to be commission by MassHousing. MasHousing will contact you once a quote has been received for the cost of the appraisal.

SUSTAINABLE DEVELOPMENT CRITERIA

MassHousing encourages housing development that is consistent with sustainable development designs and green building practices. Please provide information indicating that your development complies with either Method 1 or Method 2 of the Sustainable Development Principles

Method 2 - Consistency with Sustainable Development Principals

Development meets a minimum of **five (5)** of the Commonwealth's *Sustainable Development Principles* as shown in the next section below.

If the development involves strong municipal support, the development need only meet four (4) of the Sustainable Development Principles. However, one (1) of the Principles met must be **Protect Land and Ecosystems**. Please check the applicable boxes within the "Optional - Demonstration of Municipal Support" section below, include an explanation in the box if necessary and provide attachments where applicable.

Optional - Demonstration of Municipal Support

- Letter of Support from the Chief Elected Official of the municipality *	No
- Housing development involves municipal funding	No
- Housing development involves land owned or donated by the municipality	No

**Other acceptable evidence: Zoning variance issued by ZBA for project; Minutes from Board of Selectman meeting showing that project was discussed and approved, etc.*

Explanation (Required)

Please explain at the end of each category how the development follows the relevant *Sustainable Development Principle(s)* and explain how the development demonstrates each of the checked "X" statements listed under the *Sustainable Development Principle(s)*.

(1) Concentrate Development and Mix Uses
Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. Encourage remediation and reuse of existing sites, structures, and infrastructure rather than new construction in undeveloped areas. Create pedestrian friendly districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with open spaces and homes.

- Higher density than surrounding area	Yes
- Mixes uses or adds new uses to an existing neighborhood	Yes
- Includes multi-family housing	Yes
- Utilizes existing water/sewer infrastructure	Yes
- Compact and/or clustered so as to preserve undeveloped land	Yes
- Reuse existing sites, structured, or infrastructure	No
- Pedestrian friendly	No
- Other (discuss below	No

Explanation (Required)

Surrounding uses are commercial and single family residential. This apartment building is higher density, mixes uses with multi-family housing, uses existing town water site utilities. Project includes one structure to preserve undeveloped land.

(2) Advance Equity & Make Efficient Decisions

Promote equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning and decision making to ensure social, economic, and environmental justice. Ensure that the interests of future generations are not compromised by today's decisions.

Promote development in accordance with smart growth and environmental stewardship.

- Concerted public participation effort (beyond the minimally required public hearings)	No
- Streamlined permitting process, such as 40B or 40R	Yes
- Universal Design and/or visitability	No
- Creates affordable housing in middle to upper income area and/or meets regional need	Yes
- Creates affordable housing in high poverty area	No
- Promotes diversity and social equity and improves the neighborhood	Yes
- Includes environmental cleanup and/or neighborhood improvement in an Environmental Justice Community	No
- Other (discuss below)	No

Explanation (Required)

This is a 40B application.

(3) Protect Land and Ecosystems

Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality and accessibility of open spaces and recreational opportunities.

- Creation or preservation of open space or passive recreational facilities	Yes
- Protection of sensitive land, including prime agricultural land, critical habitats, and wetlands	No
- Enviromental remediation or clean up	No
- Responds to state or federal mandate (e.g., clean drinking water, drainage, etc.)	No
- Eliminates or reduces neighborhood blight	No
- Addresses public health and safety risk	No
- Cultural or Historic landscape/existing neighborhood enhancement	No
- Other (discuss below)	No

Explanation (Required)

This project includes approximately one acre of usable open space and preserves .81 acres of unusable open space.

(4) Use Natural Resources Wisely

Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy, water and materials.

- Uses alternative technologies for water and/or wastewater treatment	No
- Uses low impact development (LID) for other innovative techniques	No
- Other (discuss below)	No

Explanation (Required)

(5) Expand Housing Opportunities

Support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels and household types. Build homes near jobs, transit, and where services are available. Foster the development of housing, particularly multifamily and single-family homes, in a way that is compatible with a community's character and vision and with providing new housing choices for people of all means.

- Includes rental units, including for low/mod households	Yes
- Includes homeownership units, including for low/mod households	No
- Includes housing options for special needs and disabled population	No
- Expands the term of affordability	No
- Homes are near jobs, transit and other services	No
- Other (discuss below)	No

Explanation (Required)

This is a proposed apartment building which will include 25% affordable units.

(6) Provide Transportation Choice

Maintain and expand transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality. Prioritize rail, bus, boat, rapid and surface transit, shared-vehicle and shared-ride services, bicycling and walking. Invest strategically in existing and new passenger and freight transportation infrastructure that supports sound economic development consistent with smart growth objectives.

- Walkable to public transportation	No
- Reduces dependence on private automobiles (e.g., provides previously unavailable shared transportation, such as Zip Car or shuttle buses)	No
- Increased bike and ped access	No
- For rural areas, located in close proximity (i.e., approximately one mile) to a transportation corridor that provides access to employment centers, retail/commercial centers, civic or cultural destinations	Yes
- Other (discuss below)	No

Explanation (Required)

This site has direct access to Route 9, which runs from Worcester to Brookline.

(7) Increase Job and Business Opportunities

Attract businesses and jobs to locations near housing, infrastructure, and transportation options. Promote economic development in industry clusters. Expand access to education, training and entrepreneurial opportunities. Support growth of local businesses, including sustainable natural resource-based businesses, such as agriculture, forestry, clean energy technology and fisheries.

- Permanent Jobs	No
- Permanent jobs for low- or moderate- income persons	No
- Jobs near housing, service or transit	No
- Housing near an employment center	No
- Expand access to education, training or entrepreneurial opportunities	No
- Support local business	No
- Support natural resource-based businesses (i.e., farming, forestry, or aquaculture)	No
- Re-uses or recycles matierials from a local or regional industry's waste stream	No
- Support manufacture of resource-efficient materials, such as recycled or low-toxicity materials	No
- Support businesses that utilize locally produced resources such as locally harvested wood or agricultural products	No
- Other (discuss below)	No

Explanation (Required)

(8) Promote Clean Energy

Maximize energy efficiency and renewable energy opportunities. Support energy conservation strategies, local clean power generation, distributed generation technologies, and innovative industries. Reduce greenhouse gas emissions and consumption of fossil fuels.

- Energy Star or Equivalent*	Yes
- Uses renewable energy source, recycled and/or non-/low-toxic materials, exceeds the state energy code, is configured to optimize solar access, and/or otherwise results in was reduction and conservation of resources	No
- Other (discuss below)	No

*All units are required by MassHousing to be Energy Star Efficient. Please include in your explanation a description of how the development will meet Energy Star criteria.

Explanation (Required)

All units will include electric heat pump systems and energy efficient appliances.

(9) Plan Regionally

Support the development and implementation of local and regional, state and interstate plans that have broad public support and are consistent with these principles. Foster development projects, land and water conservation, transportation and housing that have a regional or multi-community benefit. Consider the long term costs and benefits to the Commonwealth.

- Consistent with a municipally supported regional plan	No
- Addresses barriers identified in a Regional Analysis of Impediments to Fair Housing	No
- Measureable public benefit beyond the applicant community	No
- Other (discuss below)	No

Explanation (Required)

Section 6: APPLICANT QUALIFICATIONS, ENTITY INFORMATION, AND CERTIFICATION

In order to issue Site Approval MassHousing must find (as required by 760 CRM 56.04 (4)) that the applicant is either a non-profit public agency or would be eligible to apply as a Limited Dividend Organization and meets the general eligibility standards of the program.

Development Team:

Company Name	Contact Name	Contact Role	Applicant	Dev Entity	Primary For Role
FD 250 Turnpike, LLC	David M. Ferris	Owner	Yes	No	Yes
Ferris Development Group	Brian Charville	Attorney	No	Yes	Yes
Azimuth Land Design, LLC	James Tetreault	Consultant - Architect and Enginee	No	No	Yes
L.A. Associates, Inc.	Kristen Costa	Lottery Agent	No	No	Yes
Monte French Design Stud	Monte French	Consultant - Architect and Enginee	No	No	No

Entities Responsible for Development Tasks:

Development Task	Developer / Applicant	Contact Name / Company
40B Consultant	No	L.A. Associates, Inc., Kristen Costa
Architecture and Engineering	No	Azimuth Land Design, LLC, James Tetreault
Architecture and Engineering	No	Monte French Design Studio, Monte French
Construction Management	Yes	FD 250 Turnpike, LLC, David M. Ferris
Finance Package	No	Ferris Development Group, LLC, Brian Charville
Local Permitting	No	L.A. Associates, Inc., Kristen Costa

Affiliated Entities:

Company Name	Individual Name	Affiliation	Relation
250 Turnpike Road, LLC	David M. Ferris	Managing Entity	Applicant

David M. Ferris, Esq.

Southborough, Massachusetts, United States

david@ferrisdevelopment.com

linkedin.com/in/david-m-ferris-esq-844a581

Summary

With over 20+ years of experience as a wealth advisor and real estate mogul, in 2012 I formed Ferris Capital, LLC, a Registered Investment Advisory firm which grew to manage approximately $1B for 160 families based out of Boston, New York, San Francisco, and London. Ferris Capital was recently acquired in 2022, by Creative Planning; one of the largest and most successful independent financial planning companies in the United States. Creative Planning continues to serve Ferris Capital clients with cutting-edge investment, tax, trust and financial planning services. Additionally, I am CEO of Ferris Development Group, a company that I established to manage personal and commercial real estate holdings. Ferris Development Group is responsible for acquiring, renovating, and leasing multi-family properties in the suburban office, lab, medical and industrial space. Altogether, these properties equate to nearly 1 million sq ft, which serves just shy of 100 public and private companies.

Experience

CEO

Ferris Capital, LLC

Oct 2012 - Jun 2022 (9 years 9 months)

A world-class independent wealth advisory firm established in 2012 that advised 160 families across Boston, New York, San Francisco and London. Ferris Capital managed over $500M in client capital on a discretionary basis using liquid and non-liquid securities and was recently acquired by Creative Planning for $755 AUM in June 2022.

Owner

Ferris Development Group

2008 - 2022 (14 years)

Founded in 2008 to manage personal and commercial real estate holdings. The Ferris Development Group leases properties and builds out custom tenant spaces for approximately 25-40% less than other operators. The ability to improve the holdings and propel occupancy rates from 0-100%, allowed for Ferris Development's stellar growth.

Senior Vice President

Merrill Lynch

Sep 2002 - Oct 2012 (10 years 2 months)

Senior Vice President of Investments at Merrill Lynch/ Bank of America and ran a team that focused on ultra-high net worth families and institutions. During my tenure, I was consistently ranked as one of the top performers in the company.

Principal

Thomas Weisel Partners

Mar 2000 - Sep 2002 (2 years 7 months)

A principal at Thomas Weisel Partners where I helped establish the Private Client Group in Boston.

Education

Loyola University New Orleans College of Law

Law

1993 - 1996

Boston College

BA, Political Science

1990 - 1993

Skills

Investments • Alternative Investments • Portfolio Management • Asset Management • Private Equity • Mutual Funds • Real Estate • Retirement • Asset Managment • Equities

BRIAN R. CHARVILLE

LEGAL AND PROFESSIONAL EXPERIENCE

The Ferris Companies (Development, Capital, Construction), Southborough, MA March 2015 – Present
General Counsel (throughout) *and Chief Operating Officer* (2018 – Present)

- Counsel, represent and lead commercial and residential real-estate acquisition and development company with 700,000 sf of office/lab/data center, 200,000 sf of retail and 55,000 sf of self-storage space.
- Obtain land-use permitting approvals for tenant uses and ground-up projects, including site plans, special permits and variances, primarily in Boston and its MetroWest suburbs.
- Appear before local boards and commissions regarding zoning and other land-use matters. Counsel firms' leaders regarding by-right potential and land use permitting and appeals.
- Negotiate, write and implement retail, office, industrial and residential leases and related documents, including licenses, estoppels, SNDAs, ROFO/R notices and amendments, as well as loan documents.
- Advise the company, affiliated real-estate funds and fellow officers and employees in all phases of purchases, sales, financing and refinancing, leasing, risk management, and investor relations. Regularly handle investor and bank communications. Direct experience with SEC and IRS compliance exams.
- Represent the firms in litigation (including trial) when necessary, and ADR.
- Serve as member of company's executive team, including participation in acquisition and disposition strategies and pipeline cultivation; analyze existing and new business lines and opportunities. Form, maintain and manage corporate governance and compliance for dozens of business entities.
- Direct asset and property managers on leasing, CapEx and overall asset control. Draft, negotiate and manage general contracts and subcontracts, including AIA materials, and oversee contractors and subs.

Murphy & Riley, P.C., Boston, MA September 2013 – February 2015
Senior Associate

- Defended insurance companies, their insureds, and self-insured entities in construction, real estate, property and casualty, employment, and civil rights cases in state and federal courts in Massachusetts.
- Managed paper and electronic discovery processes, prepared pleadings for all stages of litigation, including motions for summary judgment, evaluated and analyzed cases and advised clients, represented clients at pre-trial hearings and other court proceedings, and took and defended discovery depositions.

Arlington County, Virginia, Arlington, VA February 2009 – August 2013
Assistant County Attorney (in-house civil counsel)

- Advised County Board (governing body) and its employees in development and real-estate matters and related litigation, including eminent domain; represented County in acquisitions and divestitures.

COMMUNITY INVOLVEMENT

Lynnfield Planning Board – *Elected Member*, April 2017 – Present; *Elected Chairman*, November 2017 – Present

MarketStreet (Lynnfield) Advisory Committee – Ex Officio *Member*, May 2017 – July 2018

QUALIFICATIONS AND EDUCATION

Bar Admissions: Massachusetts (active), Virginia (inactive) and District of Columbia ('retired')

Wake Forest University School of Law, Winston-Salem, N.C.; J.D., May 2005

Monte French

Founder & Principal

Monte has over 20 years of design and management experience on projects ranging from small adaptive reuse to international competitions. Through each project Monte focuses on exceeding client expectations, developing aesthetically purposeful designs, community-based interaction, and creating thoughtful building systems through critical thinking of each element. Monte has been a Boston area native throughout his 20 years of architectural engagement; and brings nuanced experience in tackling the challenges of executing projects in urban contexts and navigating the complexities of municipal and civic processes.

Years of Experience:

Total number of years of experience:	20 years

Summary of Experience:

Monte French Design Studio, Boston, MA	Principal	2014 - Present
CBT Architects, Boston, MA	Senior Associate	2006 - 2013
Goody Clancy, Boston, MA	Designer	1998 - 2006
United State Navy	Second Class Petty Officer, AT-2	1993 - 1999

Summary of Past Projects:

11 East Lenox, CLT Mid-rise Multifamily	Boston MA
88 North Washington, CLT High-rise Hotel	Boston, MA
1065 Tremont Street, Mid-rise Mixed Use	Boston, MA
One Newcomb Place, Mid-rise Multifamily	Boston, MA
44 N Beacon, Mid-rise Mixed Use	Boston, MA
58 Burbank, CLT Urban Infill, Single Family	Boston, MA
1035 Commonwealth, Mid-rise Mixed Use	Boston, MA
582 Cambridge, Mid-rise Multifamily	Boston, MA
Avalon North Station,High-rise Multifamily	Boston, MA
Liberty Mutual Headquarters, High-rise Office	Boston, MA
Atlantic Wharf, High-rise Office & Residential	Boston, MA
Trans National Place, High-rise Office	Boston, MA
Nantun Tower, High-rise Multifamily	Taichung, Taiwan
Sky Garden, High-rise Residential	Taiwan
MIT Brain and Cognitive Sciences Complex	Cambridge, MA
Trinity Church Preservation	Boston, MA
Wheeling Federal Building Courthouse	Wheeling, WV
Purdue University, Krannert Business School	West Lafayette, IN
University of Chicago, Renee Granville-Grossman Residential	Chicago, IL

Education:

Boston Architectural College	Bachelor of Architecture

Registrations:

National Council of Architectural Registration Boards	NCARB

Role and Responsibilities:

Principal in charge; Project lead in project direction, strategic decisions, design direction, and community outreach.

Area of Expertise:

Design, project delievery, community outreach, and technical oversight

MONTE FRENCH
DESIGN STUDIO
ARCHITECTURE + PLANNING

James L. Tetreault, PE, LSE, CPESC
Chief Engineer
jamest@azimuthlanddesign.co
(508)485-0137

EDUCATION:
Bachelor of Science in Civil Engineering
Washington University in St. Louis, 1987

PROFESSIONAL REGISTRATIONS
Professional Engineer, Massachusetts, (No. 38548)
Licensed Soil Evaluator, Massachusetts, (No. 2421)
Certified Professional in Erosion & Sediment Control, (No. 4971)

SUMMARY OF EXPERIENCE:
Mr. Tetreault is the Chief Engineer at Azimuth Land Design, LLC. He has more than 35 years experience as lead designer and managing teams of professionals working on complex engineering projects. He has directly managed several hundred projects from conception to completion of construction consulting with a variety of clients, other professionals, peer reviewers and governmental officials from City, Town, State and Federal jurisdictions to shepherd projects to successful completion.

He has designed roads, industrial sites, distribution centers, apartment complexes, residential subdivisions, commercial sites of all kinds and every variety of small residential site.

EMPLOYMENT HISTORY:

Current – Azimuth Land Design, LLC
As Azimuth Land Design, LLC's Chief Engineer, Mr. Tetreault has overseen in house and multi-firm teams of engineers and consultants involved in the design and permitting of four Chapter 40B apartment complex developments that are being permitted. He has prepared site plans for a 5 story laboratory building and office park complex and a variety of smaller residential, industrial and commercial projects.

1988-2021 Thompson-Liston Associates, Inc.
As Project Engineer, Mr. Tetreault was responsible for design and project development coordination of a variety of projects. He gained licensure as a Professional Engineer, a Licensed Soil Evaluator and a Certified Professional of Erosion and Sediment Control. He was lead design engineer on projects including the 40 lot Hidden Farm Estates subdivision in Worcester, the 43 lot Southwoods subdivision in Shrewsbury, the 47 lot Barnard Hill subdivision in Boylston, the 70 lot Tall Pines subdivision in Northborough and the 118 lot Winter Heights subdivision in Worcester, among others. He was the design engineer for the Brookside Apartments development in Boylston, participated in the design and permitting of the Madison Place, Shrewsbury apartment development and designed the septic system and other elements of the FedEx distribution center in Boylston. These and many other projects large and small gave him experience in a wide range of contexts of developments and design and regulatory challenges.

James L. Tetreault, PE, LSE, CPESC
Chief Engineer
jamest@azimuthlanddesign.co
(508)485-0137

1987-1988 New World Development, Inc.
As a staff engineer, Mr. Tetreault participated in the design of a variety of small residential and commercial projects.

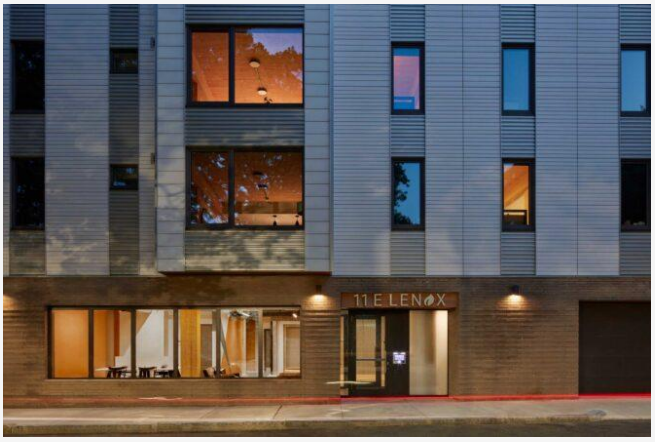
1987 Visniewski Engineering Associates, Inc.
As a staff engineer, Mr. Tetreault participated in the design of a variety of small and medium sized residential developments.

1986 Para Land Surveying, Inc.
Summer vacation of college, Mr. Tetreault worked on a survey field crew.

MONTE FRENCH DESIGN STUDIOS
We design buildings|

1065 Tremont

Multi Family



Mass Timber Passive House @ 11 E Lenox

Mass Timber, Multi Family

NOWA Hotel

Commercial, In-Progress, Mass Timber

Ttoren

Multi Family
Cultural, In-Progress, Multi Family

FERRIS DEVELOPMENT GROUP

About Us

Founded in 2009, Ferris Development is an investment real estate advisory firm specializing in the acquisition, management and leasing of commercial assets. The team currently has approximately 900,000 square feet of commercial office space under management in the Boston Metro west market. Construction projects for our tenants are managed through our construction company named Expedited Construction.

Tenant Roster

Arthur J. Gallagher
Ashley Home Store
Amazon Robotics
Amica Insurance
ARCpoint Labs
AZ Corporation
AT&T
Bohler Engineering
The Channel Company
Columbia Gas of MA
Concord Insurance
Conexant Systems
Control Point Associates
Conversant
Doble Engineering
Financial Foundations
FedEx
Ford Motor Co.
Harvest Power
Hewlett Packard Enterprise
Homeward Residential
Informa USA
Kadence International
Kleinfelder
Law Offices of David A. Camiel
McDonald Lamond Canzoneri
Nanostone Water
Nasdaq, Inc.
NORESCO
Park Place Technologies
PNC Bank
Regis College
RoviSys
T-Mobile
Whitestone Associates, Inc.
Xceedance
Young Chang Co Ltd.
Zensar Technologies

L.A. ASSOCIATES, INC.

Affordable Housing Experience

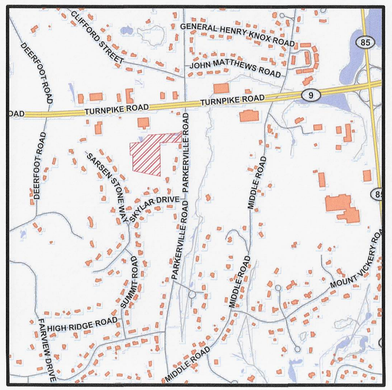
Kristen Costa, President - State Certified Housing Consultant / Lottery Agent

LOCATION	PROJECT	DESCRIPTION	DATE
120 Turnpike Rd., Southborough	60 rental units; 15 affordable	40B MassHousing; permitting project	2023
250 Turnpike Rd., Southborough	56 rental units; 14 affordable	40B MassHousing; permitting project	2023
Four Corners, Newton	7 home ownership; 1 affordable	LIP Local Action Unit; conducting lottery	2023
Deacon Farm Ln., Gloucester	13 home ownership; 2 affordable	LIP Local Action Unit; permitting; conducting lottery	2023
26 Christian Circle, Haverhill	Resale home ownership unit	LIP DHCD	2023
23 Ridgewood Crossing #24, Hingham	1 ownership unit	LIP Local Action Unit; permitting; conducting lottery	2023
270 Central St., Hingham	1 ownership unit	Town owned; conducting lottery	2023
113-117 Wapping Rd., Kingston	60 over-55 ownership; 15 affordable	40B MassHousing; permitted project; conducting lottery	2022 – present
0 Plymouth St., Carver	3 over-55 rental units	LIP Local Action Unit; permitted; conducting lottery	2022 – present
Ashley Court, Peabody	32 home ownership; 6 affordable	LIP Local Action Unit; permitted; conducting lottery	2022 – present
Baldwin Landing, Wilmington	12 home ownership; 3 affordable	40B MassHousing; permitted project; conducted lottery	2022 – present
195 Salem St., Unit 2305, Wilmington	Resale over-55 unit	LIP DHCD	2022
57 Brewster Rd., Stoughton	Resale home ownership unit	LIP DHCD	2022
1702 Pouliot Place, Wilmington	Resale home ownership unit	LIP DHCD	2022
142 Main St., Amesbury #7 & #9	12 home ownership; 2 affordable	LIP Local Action Unit; permitted; conducted lottery	2022 – present
1403 Lords Court, Wilmington	Resale home ownership unit	LIP DHCD	2022
Rachel's Village, Wilmington	36 home ownership; 5 affordable	LIP Local Action Unit; permitted; conducted lottery	2022 – present
30 E. Main St. #4, Georgetown	1 Town-owned rental unit	LIP Local Action Unit; permitted; conducted lottery	2021 – 2022
140 Main St. Unit C, Amesbury	6 home ownership; 1 affordable	LIP Local Action Unit; permitted; conducted lottery	2021 – 2022
32 Nahant St., Wakefield	24 rental units; 6 affordable	40B MassHousing; permitting project	2021 – present

PRELIMINARY SITE PLAN OF LAND AT 250 TURNPIKE ROAD

IN

SOUTHBOROUGH, MASSACHUSETTS



LOCUS MAP

ZONING COMPLIANCE TABLE

THE SITE IS LOCATED IN THE RESIDENCE A ZONING DISTRICT. THE FOLLOWING TABLE COMPARES THE RESIDENCE A ZONING REQUIREMENTS AND DIMENSIONS PROPOSED AT THIS SITE:

DIMENSION	REQUIREMENT	PROPOSED
MIN. LOT AREA	43,560	212,572 S.F.
MIN. FRONTAGE	150'	150.00'
MIN. FRONT YARD	35'	413'(TO PARKERVILLE RD)
MIN. SIDE YARD	25'	41'
MIN. REAR YARD	50'	155'
MAX. FLOOR AREA RATIO	0.18	0.40
MAX. BUILDING HEIGHT	35'	43.5'

PROPOSED SCOPE:
RESIDENTIAL:
- ONE BEDROOM FLATS: 36
- TWO BEDROOM FLATS: 14
- THREE BEDROOM FLATS: 6
- TOTAL UNITS: 56
- TOTAL BEDROOMS: 82

OFF-STREET PARKING:
PARKING SPACES PROVIDED - RESIDENTIAL 98
PARKING SPACES PROVIDED
- GARAGES 10
- SURFACE SPACES 88

TOTAL: 98
TOTAM:
HC SPACES REQUIRED: 6
HC SPACES PROVIDED: 6(ALL VAN ACCESSIBLE)

UNIT SUMMARY

STYLE	BEDROOMS	BATHROOMS	AREA(S.F.)	DISTRIBUTION BY AREA	NUMBER	DISTRIBUTION BY TYPE
UNIT A	1	1	949	54.7%	36	64.3%
UNIT B	2	2	1,270	6.1%	3	5.4%
UNIT C	2	2	1,381	6.6%	3	14.3%
UNIT D	2	2	1,382	17.7%	8	5.0%
UNIT E	3	2	1,547	7.4%	3	5.4%
UNIT F	3	2	1,549	7.4%	3	5.4%
TOTAL	82	76	62,461	--	56	--

OWNER & APPLICANT:

FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MASSACHUSETTS 01772

CLIENT NUMBER: 502
JOB NUMBER: 245-502
DRAWING : 250TURNPIKECURRENT.dwg

PREPARED BY

AZIMUTH LAND DESIGN, LLC
118 TURNPIKE ROAD, SUITE 200
SOUTHBOROUGH, MASSACHUSETTS 01772
TELEPHONE (508) 485-0137
EMAIL: jamest@azimuthlanddesign.co

DATE:
MAY 19, 2023

COMMONWEALTH OF MASSACHUSETTS
JAMES L. PETREAULT
CIVIL
NO. 32846
REGISTERED PROFESSIONAL ENGINEER
5/19/2023

SHEET DIRECTORY

Associates Traffic, Transportation & Civil Engineering
Ali R. Khorasani, P.E. P.O. Box 804, Spencer, MA 0156, Tel: (508) 560-4041

Traffic Impact Study

Prepared For
FD 250 Turnpike, LLC

Proposed Self Storage
and
Multi-Family Residential Development
Located at
250 Turnpike Road
Southborough, Massachusetts

October 2023

TABLE OF CONTENTS

1
INTRODUCTION

FD 250 Turnpike, LLC, the developer of an existing site, hereafter referred to as the applicant is proposing the redevelopment of a 4.3-acre parcel of land (Lot A) that is zoned Industrial to overhaul an existing three-story building at the site to house a self-storage facility that will accommodate storage needs of different clients with varying size storage areas. Also, the applicant is proposing to build a four-story apartment building on a parcel of land that is 5.5 acres (Lot B) that is zoned Residential.

Lot A of the site will consist of 55,000 square feet (sf) of self-storage and an additional 14,400-sf contractor's yard building. The proposed site will provide a total of 43 off-street parking spaces associated with the self-storage facility, 17 of which will be for the three-story building and 26 parking spaces for the connected contractors' yard building. Additionally, two loading docks will also be provided at the backside of the three-story building. The additional building will contain a total of 10 units of storage totaling 1,440 sf each.

Lot B of the site is proposed to include a four-story building containing 56 apartment units. A total of 102 parking spaces will be provided for the apartment building, six of which will be designed and designated as handicap accessible parking spaces, and 12 will be in parking garages.

The site is located south of Turnpike Road and west of Parkerville Road. The site also abuts a mobile storage company, Eagle Leasing Company, to the west. The site is 9.8 acres in total, and it presently has a three-story building that has been used as an office building in the past. Most of Lot A at the site is zoned Industrial and all of Lot B is zoned Residential. Land use along Turnpike Road is a mixture of Industrial, Commercial, and Residential. Figure 1 depicts the proposed site plan. As shown in Figure 1, the proposed site will be accessed via two existing driveways from Turnpike Road; a westerly driveway to access the three-story building, an easterly driveway that will provide access to both the new contractor's yard building, and the proposed apartment building.

Project description

The applicant proposes to develop an existing site currently occupied by a three-story building that was previously used as an office building. The existing building will be redeveloped and used as a self-storage facility. In addition, a 14,400-sf contractor's building will be constructed to accommodate the storage needs of different clients with varying size storage areas. The site is divided into two lots, Lot A and Lot B. Lot A of the site, which includes an existing three-story building, is zoned Industrial and is in an area with mixed uses. Lot B, which is located behind (south of) Lot A, is proposed to have a four-story building to provide 56 apartment

units. Lot B is zoned Residential.

The site plan shows both Lot A and Lot B as depicted in Figure 1 and in the aerial photo in Figure 2. The proposed site is located south of Turnpike Road and west of Parkerville Road. Eagle Leasing Company is located on the west side and abuts the proposed property.

The proposed parking spaces are designed and situated in such a way that they will offer ample off-street parking. This will eliminate the potential for on-street parking activities, thus maintaining the best safety for motorists along Turnpike Road. All storage areas will have appropriate access for varying types and sizes of goods. The proposed development site will have two driveways, both on Turnpike Road, and they will be 34 feet wide. This will allow for ease of ingress/egress by all types of vehicles. These driveways and all parking spaces are designed in such a way that they will provide safe access to all storage areas and apartments. The dimensions of the proposed driveways and parking spaces are designed and will be built to meet or exceed the standards of the Town of Southborough.

Figure 1 - Proposed Development Site Plan

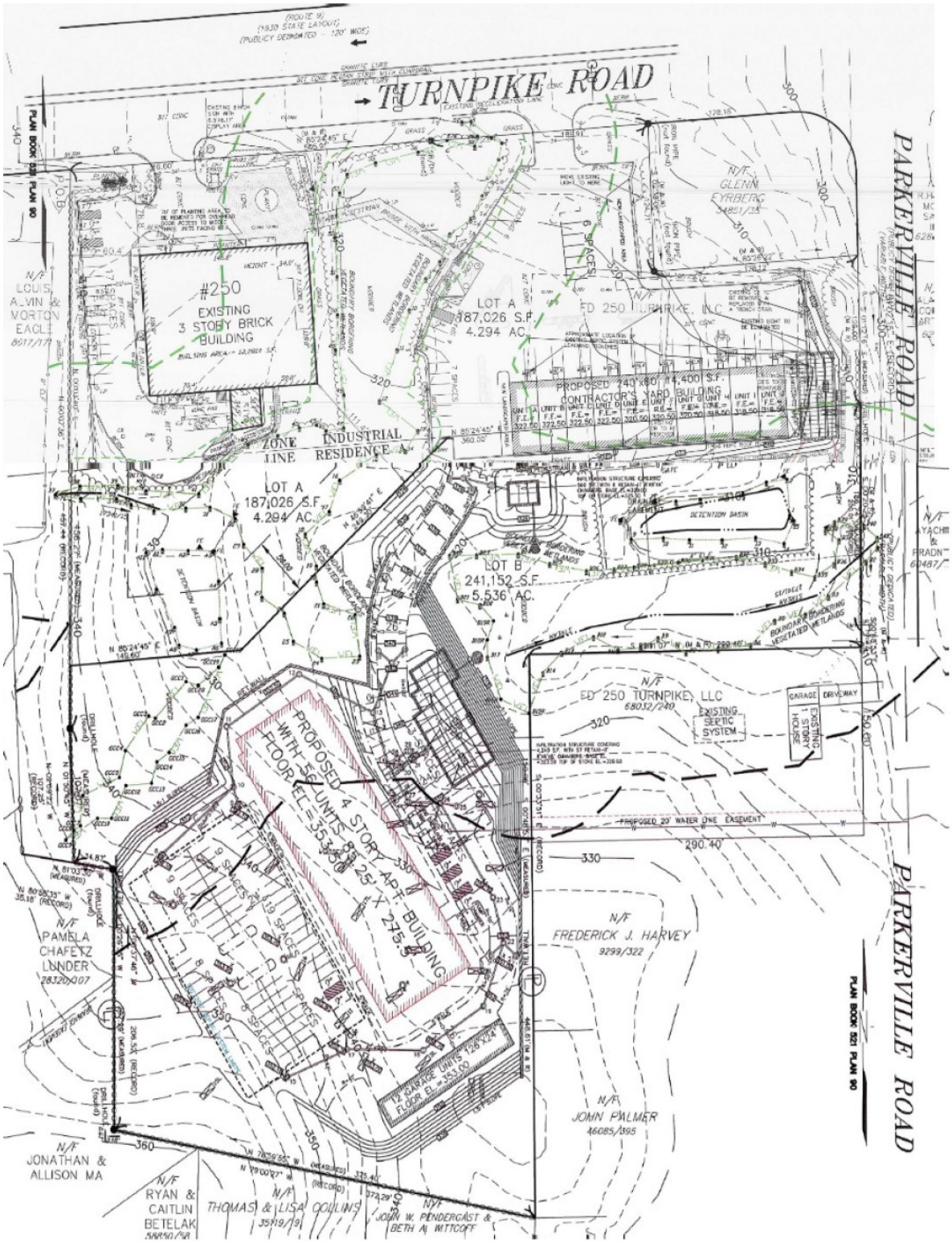


Figure 2 - Aerial Photo of The Proposed Site

2

EXISTING CONDITIONS

Evaluation of the transportation impacts associated with the proposed development project requires a thorough understanding of the existing transportation system in the immediate vicinity of the site. Evaluating existing roadway network operating conditions necessitates an examination of Turnpike Road (Route 9) traffic volumes and geometric features. Each of these elements is described below.

Study Area Roadway Network

The study area for this traffic impact report has been defined to include the evaluation of the intersections of Turnpike Road with two existing site driveways.

Turnpike Road (Route 9) is a two-way divided roadway with two travel lanes in each direction. Turnpike Road in the eastbound direction also has an auxiliary lane that acts as both accelerating and decelerating lanes along its length at and in the vicinity of the proposed site. This auxiliary lane is long enough at some locations that it could be considered a shared through and right-turn lane. It is a principal arterial roadway with a mixture of Industrial, Residential, and Commercial land uses. It traverses in easterly and westerly directions and provides access to the city of Boston to the east and to the city of Worcester and other major communities to the west. The eastbound approach of Turnpike Road has an average grade of 5% in the vicinity of the proposed site and a pavement width of 36 feet. It provides two 11-foot travel lanes and an11-foot shoulder in front of Eagle Leasing Company and a three-foot shoulder on the north side next to the jersey barrier. It has three 11-foot lanes in front of 250 Turnpike Road where the right lane becomes an auxiliary lane to accommodate accelerating/decelerating vehicles and a three-foot shoulder on the northside of the road. There are no sidewalks along this stretch of Turnpike Road. There is no opportunity for on-street parking on either side of Turnpike Road. Turnpike Road (Route 9) intersects Routes 85, 30 and the Massachusetts Turnpike (Interstate 90) and other points to the east and, it intersects with Interstate 495 and other major roadways in the westerly direction. Daily traffic volume in both directions for Turnpike Road at a point west of Woodland Road was obtained from the *massDOT* website. The Annual Average Daily Traffic (AADT) on Turnpike Road from permanent counting station #3082 was recorded at 37,124 vehicles per day in 2022, whereas 19,266 vehicles were recorded traveling in the easterly direction and 17,857 were observed traveling in the westerly direction. The *massDOT* permanent counting station #3082 shows a decline in traffic over the past few years most likely due to the COVID-19 pandemic. Once the volumes are adjusted in accordance with the *massDOT* Engineering Directive E-20-005, the 2022 daily volume is projected based on the 2019 volume (last year before the COVID-19 pandemic) at a rate of 0.01 or 1% per year (as seen in the Traffic Volumes Section), thus multiplied by 1.04 to reflect a four-year increase. The projected 2023 volume for this location of Turnpike Road is 19,844 vehicles per day in the

easterly direction and 18,393 vehicles per day in the westerly direction. The *massDOT* procedure is further described below in the Traffic Volumes section of this report. Finally, the speed limit on Turnpike Road is posted at 50 miles per hour (mph). As stated earlier, Turnpike Road is straight and has an average vertical curve of 5% along its length in the vicinity of 250 Turnpike Road.

Site Access Driveways will serve the existing three-story building and its auxiliary parking lot just to the east of the building. The driveways will be 34 feet wide to provide for two-way traffic and to accommodate all types of vehicles entering and exiting the site. Both driveways traverse in the northerly/southerly directions and intersect Turnpike Road at 90 degrees forming two "T" intersections 300 feet apart. No sidewalks or on-street parking are provided on either side of these driveways, however, an existing 11-foot nine inches wide bridge walk path connecting the auxiliary parking lot to the existing building is provided. Both driveways have a vertical slope averaging 8% along their short length, and they flatten out at their intersection with Turnpike Road and within the parking areas. The following Figure 3 is an aerial photo that shows an approximate roadway profile of the eastbound side of Turnpike Road in the vicinity of the proposed site driveways. The following Figures 4 and 5 show the profiles of both driveways.

Intersections of Turnpike Road and Existing site driveways are two, three-legged intersections with multi-lane eastbound approaches and single lane northbound approaches. As stated herein above, since Turnpike Road is a divided highway at this location, only its eastbound approach intersects these two driveways, therefore, creating two right-turn in and right-turn out intersections. As stated earlier, the eastbound approach has an auxiliary lane that provides for an acceleration/deceleration lane to accommodate traffic to and from these two driveways, as well as other nearby driveways and intersecting roadways.

Figure 3- Turnpike Road Profile

Figure 4- Easterly Driveway Profile

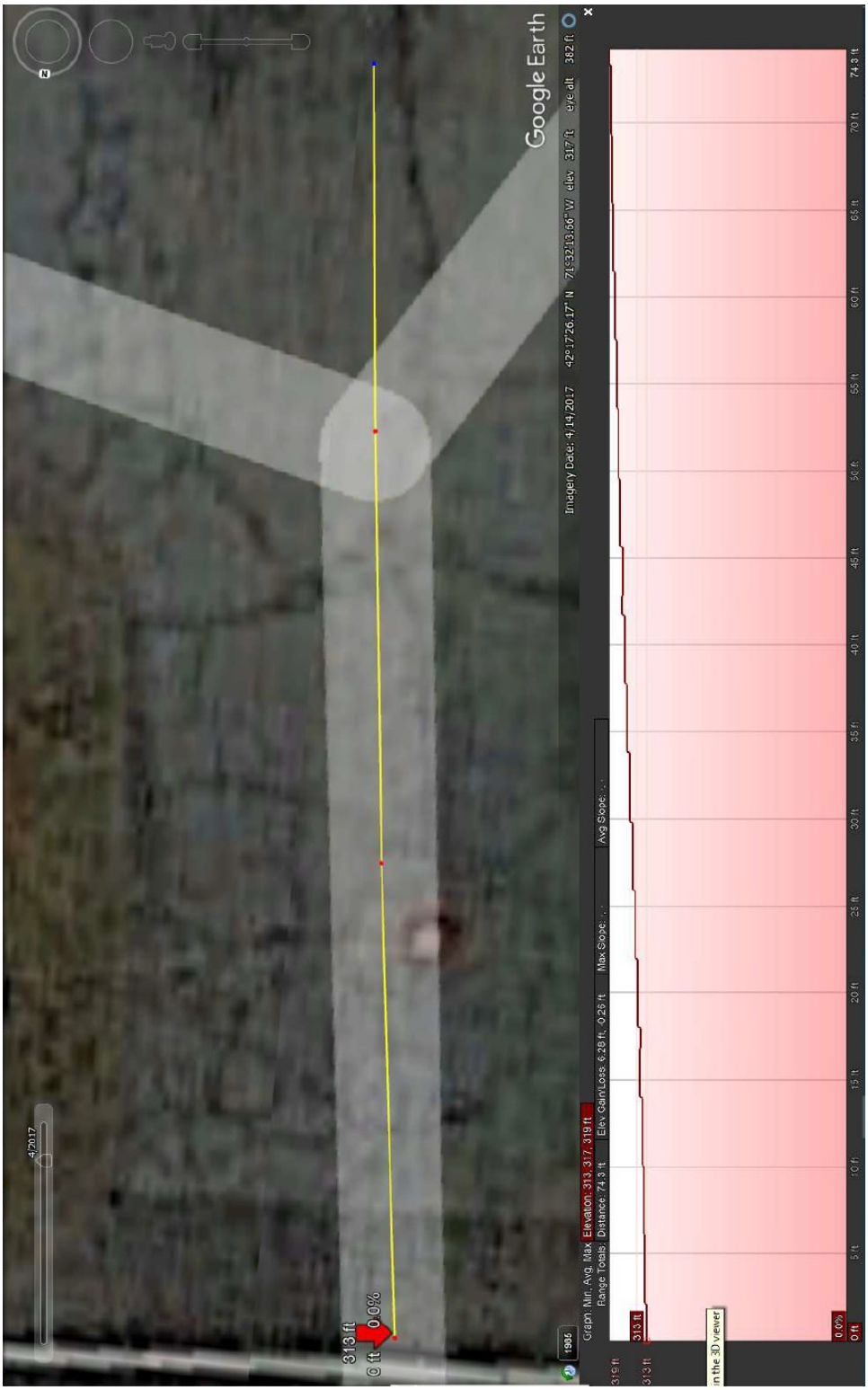
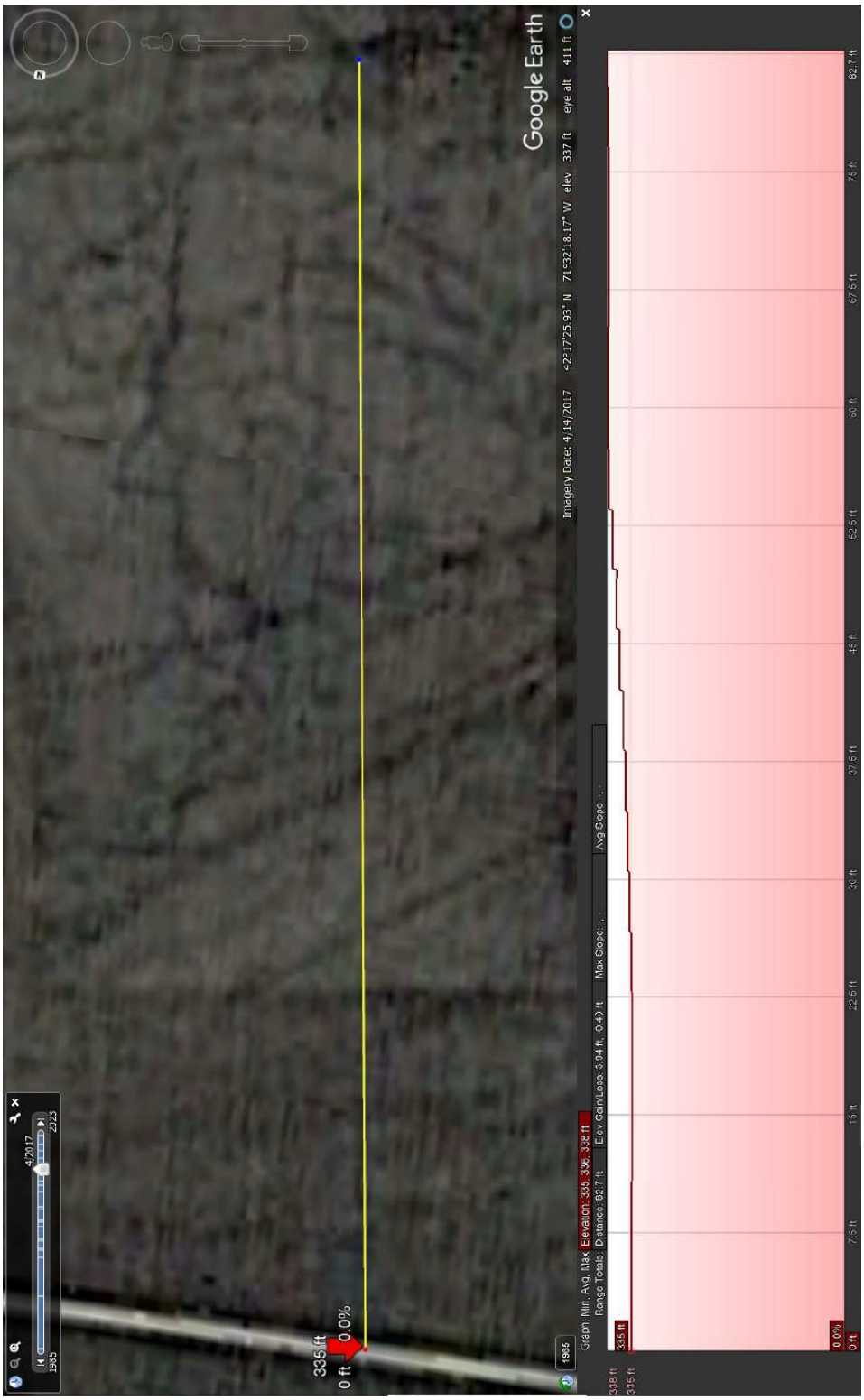


Figure 5- Westerly Driveway Profile



Traffic Volumes

Although COVID-19 is no longer considered a pandemic, due to the reductions in traffic volumes caused by the pandemic over the past few years, traffic counts from *massDOT* counting station #3082 taken in 2022 may undercount the baseline traffic. However, a portion of the work force has grown accustomed to working from home at least a few days a week. Therefore, traffic volumes are not expected to increase noticeably. Nevertheless, the latest *massDOT* traffic counts were compared with the *massDOT* historic traffic data and adjusted using the *massDOT* guidelines.

Since the proposed site is an existing site that in previous years was used as an office building but is presently under renovation and not in use, no new traffic counts could be collected. Instead, the traffic associated with the proposed self-storage and apartment building land uses is compared with that of office buildings provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* Land Use 710. Therefore, no new traffic counts were taken to show peak hour volumes at either driveway. However, peak two-way traffic volumes and the eastbound traffic volumes along Turnpike Road were obtained from the *massDOT* database.

The *massDOT* peak hour counts were collected on Wednesday, May 11, 2022. The peak hours occurred during the hours of 7-8 AM for the eastbound direction of traffic, and during 4-5 PM for two-way traffic on Turnpike Road. A copy of the hourly traffic volumes for the two-way and the eastbound direction is included in the Appendix section of this report.

As mentioned above, the COVID-19 pandemic has caused a drop in vehicular traffic over the last few years. In April 2020, *massDOT* published the Guidance on Traffic Count Data and how to estimate existing and future traffic counts taken after March 13, 2020. The procedure to adjust traffic volumes to pre-COVID conditions requires the use of historical and seasonal data provided by the *massDOT*, to adjust for seasonal and historical changes, and then forecast the data to the existing year.

The *massDOT* provides historical adjustment factors from 2014 to 2019 as well as seasonal adjustment factors. Based on the *massDOT* Traffic Volume and Classification, Turnpike Road is included in group R3 for the Growth Factor and Seasonal Factor. Based on group R3, the yearly growth rate for this group is averaged at 0.043 over a five-year period of 2014-2019, or 0.0086 (0.86%) per year. However, to account for the worst-case scenario, an adjustment factor of 1% was used, and the peak hour volumes were further increased by 4% to reflect adjusted volumes for the baseline (year 2023).

As stated herein above, the *massDOT* Highway Division also provides statewide traffic data collection that includes weekday seasonal factors. To evaluate the potential for seasonal fluctuation of traffic volumes on Turnpike Road, weekday seasonal factors were obtained from the *massDOT* Statewide Traffic Data Collection. The review of the *massDOT* seasonal adjustment factors shows that roadways having characteristics similar to that of Turnpike

Road (R3) have a factor of 0.89 for traffic counts collected in the month of May. Therefore, the peak hour volumes were further adjusted by multiplying them by this factor. A copy of the *massDOT* seasonal adjustment factors is included in the Technical Appendix section of this report.

Typically, the PM peak period has the higher volumes, and is considered the critical peak. As is the case here, higher traffic volumes also occur during the PM peak period for two-way traffic on Turnpike Road. However, the eastbound peak traffic occurs from 7-8 AM. The percentage of truck traffic (vehicles with three axels or more) at the above-mentioned *massDOT* permanent counting station #3082 along Turnpike Road near the proposed site was last recorded by *massDOT* at approximately 1.7%. This value is considered below the average of 2% for roadways having similar characteristics.

Safety Concerns

Sight Distances: To evaluate the safety of traffic to and from the site via its two driveways, sight distances were measured in the field and analyzed.

Sight distance is defined in the *massDOT Project Development and Design Guide* as the length of roadway ahead that is visible to the road users. In most cases, specific sight distance measures apply to motor vehicles and bicyclists. There are two aspects of sight distance that apply to the site driveways. They are:

- Stopping sight distance
- Intersection sight distance

The sight distances are related to the design speed (posted speed) of the roadway and are based on the standards of the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* also referred to as the *Green Book*.

Stopping Sight Distance is further described in the *massDOT Project Development and Design Guide* as the distance necessary for a vehicle traveling at the design speed (posted speed limit) before reaching a stationary object in its path. The sight distance at every point along a roadway should be at least the stopping sight distance.

The sight distances for vehicles leaving the site via the access driveways to the left was measured in the field. The measured distance is from a point 5 feet back of a stop bar (approximately 15 feet from the street line) and 3.5 feet above grade to represent drivers' eye height to an object 3.5 feet above roadway grade. The field review of Turnpike Road showed that the available sight line to the left (west) for the traffic coming out of the site via the westerly driveway on Turnpike Road is more than 580 feet and greater than 880 feet for the easterly driveway. As stated earlier, the posted speed limit is 50 mph. The available sight distance for these driveways is shown visually in the following photographs.

Based on Basic Design Controls for roadway design, the Stopping Sight Distance is calculated using the formula d=(V*V)/(30*f), plus the time required for perception and reaction by a driver (2.5 seconds). V is approach speed in mph, and f=0.28-0.35. The stopping sight distances for different speeds are calculated and are provided in Exhibit 3-8 of the 2006 *massDOT Project Development and Design Guide*. A copy of this exhibit is presented in the Technical Appendix section of this report. Due to the average grade of 5% on Turnpike Road near the proposed site, the required stopping sight distance for 50 mph is 474 feet to the left (west). The sight distance was also examined vertically for both driveways. The above aerial photo in Figure 3 illustrates the general road profile of Turnpike Road in the vicinity of the site driveways.

As demonstrated herein above, the available sight distances are greater than the standard value for vehicles traveling at 50 mph passing the site driveways. Therefore, proper stopping sight distances will be provided.

Intersection Sight Distance is explained by the *massDOT Project Development and Design Guide* as a sight distance at an intersection to allow drivers to perceive the presence of potentially conflicting vehicles. This should occur in sufficient time for a motorist to stop or adjust their speed, as appropriate, to avoid colliding in the intersection. Intersection sight distance also allows drivers of stopped vehicles with a sufficient view of the intersecting roadway to decide when to enter or cross the intersecting roadway. The AASHTO *Green Book* provides procedures to determine desirable intersection sight distances at intersections for various cases, one such procedure is Intersection Sight Triangle. Exhibit 3-11 of the *massDOT Project Development and Design Guide* demonstrates the sight distances needed based on Intersection Sight Triangle methodology. A copy of Exhibit 3-11is included in the Technical Appendix section of this report. As shown in this exhibit, for the posted speed limit of 50 mph on Turnpike Road, 480 feet should be provided for vehicles turning right from the site driveway.

Again, as demonstrated herein above, available sight distances are greater than the desired values for intersection sight distances. Therefore, proper intersection sight distances are provided in the westerly direction for the proposed site driveways.

From proposed westerly driveway looking to the left (west)

From proposed easterly driveway looking to the left (west)

Accidents: The latest accident data compiled by the *massDOT* were obtained and reviewed for a four-and-a-half-year period of January 2019 - June 2023. This review revealed that there were no accidents recorded at or near either of the proposed site driveways over the past four-and-a-half-year period.

This accident analysis concludes there are no safety deficiencies associated with the existing site driveways.

Existing Conditions Summary

The proposed site, totaling 9.8 acres, consists of an existing three-story building that was previously used as an office building and a total of 176 parking spaces, 159 of which are in a parking lot that is connected via a walking path.

Turnpike Road can be characterized as a two-way divided roadway with two travel lanes in each direction along most of its length. However, in some areas, particularly at/near major intersecting roadways, it has three to five lanes including turning lanes in each direction. Its easterly leg in the vicinity of the proposed site has two through lanes and a third lane that functions as an accelerating/decelerating lane. The easterly direction of Turnpike Road is 36 feet wide around the proposed site. It is a principal arterial roadway that serves many types of land uses, including industrial uses as well as office parks and residential properties.

The current land use designation for the northerly half of the site of the proposed development project is Industrial, and the southerly half of the site is zoned Residential as established by the community.

3
FUTURE CONDITIONS

Where possible, traffic volumes in the study area are projected to post-development levels. Projected traffic volumes include the existing traffic data, projected into the future peak hour, and added to the new traffic expected to be generated by the proposed land use for the development project site.

Site-Generated Traffic

The magnitude of traffic volumes that will be generated by the proposed development site was forecasted using the *Trip Generation*[1] *Manual* published by the ITE.

Based on the ITE *Trip Generation Manual*, the rates at which the proposed land uses (self-storage/min-warehouse facilities and multi-family residential housing) generate traffic vary depending upon the time of day. These rates were used to calculate the number of trips expected to be generated by the proposed site during an average weekday morning and afternoon peak traffic periods, as well as during Saturday peak period. This information is summarized in Table 1. The ITE rates and graphs for the proposed uses are presented in the Technical Appendix section of this report.

Typically, the number of trips associated with the existing office building is subtracted from the trips associated with the proposed new land uses in order to assess the impact of the development project. However, since the building at the proposed site is currently under renovation and not occupied, new traffic counts cannot be obtained. Therefore, for comparison, the trips that could be generated by office building land use were projected utilizing the ITE *Trip Generation Manual* rates. A copy of the ITE rates and graphs for office buildings is also presented in the Technical Appendix section of this report.

The total new trips anticipated to be generated by the proposed land uses at the proposed development site are calculated and compared with trips that could be generated by an office building at this site. The resulting values are also listed below in Table 1.

[1] *Trip Generation,* Institute of Transportation Engineers; Washington, DC

Table 1 – Trip Generation Data

	Existing 55,000 SF Office Building (ITE Land Use 710)											
	Daily	%In	%Out	AM Peak	%In	%Out	PM Peak	%In	%Out	Sat Peak	%In	%Out
Rate Trips/1000 SF	9.74	50	50	1.16	86	14	1.15	16	84	0.53	54	46
Total LU 710 Trips	**536**	**268**	**268**	**64**	**55**	**9**	**63**	**10**	**53**	**29**	**16**	**13**

	Proposed 69,400 SF Mini-Warehouse (ITE Land Use 151)											
	Daily	%In	%Out	AM Peak	%In	%Out	PM Peak	%In	%Out	Sat Peak	%In	%Out
Rate Trips/1000 SF	1.51	50	50	0.1	60	40	0.17	47	53	0.31	59	41
Total LU 151 Trips	105	53	52	7	4	3	12	6	6	22	13	9

	Proposed 56 Units Multi-Family - Mid-Rise Housing LU Code 221											
	Daily	%In	%Out	AM Pk	%In	%Out	PM Pk	%In	%Out	Sat Pk	%In	%Out
Rate Trips/Unit	5.44	50	50	0.36	26	74	0.44	61	39	0.44	0.49	0.51
Total LU 221 Trips	305	152	153	20	5	15	25	15	10	25	12	13
Total New Trips	**410**	**205**	**205**	**27**	**9**	**18**	**37**	**21**	**16**	**47**	**25**	**22**
Differential	**-126**	**-63**	**-63**	**-37**	**-46**	**9**	**-26**	**11**	**-37**	**18**	**9**	**9**

As can be seen in the above Table 1, the total number of new trips expected to be generated by the proposed development results in significantly lower traffic during morning and afternoon peak periods. Typically, the PM peak period represents the critical peak traffic volumes on area roadways, including on Turnpike Road. However, as stated earlier in this report, the critical peak traffic occurs during morning rush hour for traffic traveling in the easterly direction. Also shown in Table 1 for comparison, are traffic volumes typically generated by an office building at this location if the building were to be reused as an office space. The data revealed that office buildings generate extensively higher traffic volumes during morning and afternoon rush hours, consistent with the traffic pattern on Turnpike Road. Upon review of Table 1, it is concluded that the existing land use, office building, would be generating traffic volumes anywhere from 70% to 137% greater than those of an office building during critical peak periods (morning and afternoon rush hours).

Clearly, the traffic impact of the proposed development, which includes a self-storage facility and a 56-unit apartment building, will be considerably lower than the traffic associated with the existing building if it were to be reused as an office space.

Trip Distribution and Assignment

Generally, such factors as population density, land use, availability of major highways in the area, and other demographics make up the traffic patterns within a community and the directional distribution of the projected site-generated trips to and from the proposed development site is based on existing travel patterns within the immediate vicinity of the site. However, since Turnpike Road is a divided highway with jersey barriers separating eastbound and westbound traffic, the traffic to and from the site can only be achieved in the easterly direction via right-turn in and right-turn out maneuvers.

As shown in Table 1, during AM peak period, a sum of nine vehicles would be arriving from points west at the proposed site and 18 vehicles would be exiting from the site in the easterly direction via both driveways. During PM peak period, a total of 21 vehicles are expected to arrive and 16 vehicles will be departing from the proposed site via both driveways.

Site Access and Circulation

Site access and internal traffic circulation were evaluated as part of assessing the proposed development project. Access to the proposed site is achieved through two existing driveways on Turnpike Road. The site driveways are intended to provide full access to all storage areas and their associated parking spaces, as well as to those spaces for the proposed apartments. The driveways are 34 feet wide and are designed to accommodate traffic by all types of vehicles to and from the proposed site in a safe and efficient manner.

Finally, a total of 43 off-street parking spaces will be provided for the self-storage facility. They are strategically located in relation to the driveways, and they include six parking spaces designed and designated as handicap accessible parking for the self-storage facility. Also, two loading spaces will be provided on the south side of the building with direct access to the first floor. Finally, 102 parking spaces are proposed for the apartment building of which six spaces will be designated as handicap accessible for use by the tenants of the apartment building. The dimensions of all parking spaces and their associated aisles will meet or exceed the requirements of the Town of Southborough zoning bylaws.

The magnitude of parking spaces that will be needed for the proposed self-storage and apartment building development project was projected by using the 3rd edition of the *Parking Generation*[2] *Manual,* also published by the ITE.

Based on the ITE *Parking Generation Manual*, a copy of which is included in the Technical Appendix section of this report, the 85th percentile or peak period parking demand rate for self-storage facilities is 0.2 parking spaces per 1,000 sf. As stated earlier, a total of 43 parking spaces are proposed for this site. Thus, the proposed parking supply is calculated at 0.62 spaces

[2] *Parking Generation,* Institute of Transportation Engineers; Washington, DC

per 1,000 sf. The proposed number of parking spaces is 210% greater than that in the ITE *Parking Generation Manual*. Similarly, based on the ITE *Parking Generation Manual,* the 85th percentile or peak parking demand rate for mid-rise apartment buildings is 1.46 spaces per apartment unit. Since a total of 102 parking spaces are proposed, the parking supply of 1.82 spaces per unit associated with the apartment building will be 25% greater than that of the ITE *Parking Generation Manual*.

Therefore, based on the above assessment, it is concluded that ample parking spaces will be provided.

4

TRAFFIC OPERATIONS

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic flow within the study area. To assess the quality of traffic flow, typically intersection capacity analyses are performed to measure existing conditions and for projected future design year of 2028 (five years into future) conditions with and without the implementation of the proposed development project. Intersection capacity analyses provide an indication of how well roadway facilities and their components serve the additional traffic demands placed upon them. However, since traffic volumes associated with the proposed self-storage facility and an apartment building are not substantial and lower than those associated with the former office building land use, no traffic operation measures are needed. As stated earlier, the site driveways operated safely and efficiently when the site was used as an office building, which generated notably more traffic. Under proposed land use conditions, much less traffic is expected during critical peak periods. Also, under proposed development conditions, entering and exiting traffic is more evenly distributed during rush hours than traffic from an office building.

As presented herein above, the additional traffic from the proposed development project will have no impact on the Turnpike Road traffic at these two driveways.

5
FINDINGS

This traffic study has been conducted in order to evaluate the potential traffic impacts associated with the development of the proposed site located at 250 Turnpike Road in Southborough, Massachusetts, approximately a half mile west of Cordaville Road (Route 85). This study includes the evaluation of potential traffic that could be generated by the proposed self-storage facility and an apartment building, and compared with traffic that would be generated if the existing building were to be utilized as an office building again. It also includes the safety evaluation for both existing driveways in terms of the number of accidents and available sight distances.

The above evaluation revealed that the traffic associated with the current use of the site (office building) would generate a much higher amount of vehicular traffic than the proposed uses as a self-storage facility and an apartment building.

Additionally, the proposed driveways are 34 feet wide, enough to accommodate two-way traffic by larger vehicles entering and exiting the site without any difficulty.

Finally, the available sight distances for vehicles entering and exiting the proposed site via the proposed driveways far exceed those required for the posted 50 mph speed limit on Turnpike Road. Therefore, the traffic from the proposed development site can easily be accommodated by Turnpike Road.

Conclusion & Recommendations

It is concluded that Turnpike Road in the immediate vicinity of the proposed development site has sufficient capacity to safely serve the anticipated traffic from the proposed self-storage facility and apartment building. Safety analyses concluded that there are no safety issues along Turnpike Road and its intersections with the existing site driveways. This evaluation indicates that the proposed development site will only generate a total of 21 vehicles entering or 16 vehicles exiting the site via its two driveways during the critical PM peak period, or one vehicle entering or exiting the site every 3-4 minutes. Similarly, the proposed site will generate 25 trips entering and 22 trips exiting the site via both driveways during Saturday peak hour, or one vehicle entering the site every 2.4 minutes and exiting the site every 2.7 minutes via both driveways. Therefore, it is concluded that the new trips associated with the proposed self-storage and apartment building land uses are not considered significant and they can easily be accommodated by Turnpike Road. It is important to note that normally, traffic signals in the proximity of a driveway or an unsignalized intersection will create gaps between vehicles in the stream of traffic as a direct result of alternating the right of way for each street. Therefore, the presence of a traffic

signal system at the intersection of Turnpike Road and Crystal Pond Road, located approximately a half mile west of the proposed site, generates ample gaps in the flow of Turnpike Road traffic. In this case, when the lights for the eastbound approach of Turnpike Road turn red, there will be a gap created in the flow of Turnpike Road traffic. Consequently, there will be more opportunities for traffic leaving the site driveways to turn right onto Turnpike Road with little or no delay. To maintain optimum safety and efficiency at these two driveways, the following are recommended.

- Any new landscaping or the installation of any new signage along the frontage of the proposed site on Turnpike Road should be located far enough inside the property line and be limited to no more than 2.5 feet above grade as not to impede the available sight lines.

- Each driveway should be posted with a stop sign (R1-1) and a stop bar for traffic exiting the site.

- Each driveway should also be posted with a no left-turn sign (R3-2)facing traffic leaving the site.

Appendix

massDOT Hourly Traffic Volumes from Station #3082

Two-Wat Traffic Volumes

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	111	92	83	63	349
1:00-2:00	47	59	36	37	179
2:00-3:00	50	39	37	38	164
3:00-4:00	33	43	38	55	169
4:00-5:00	50	77	93	128	348
5:00-6:00	155	243	320	410	1,128
6:00-7:00	500	575	678	737	2,490
7:00-8:00	692	759	807	795	3,053
8:00-9:00	739	687	665	666	2,757
9:00-10:00	610	566	540	559	2,275
10:00-11:00	480	513	537	518	2,048
11:00-12:00	486	484	535	574	2,079
12:00-13:00	539	557	569	555	2,220
13:00-14:00	519	527	560	574	2,180
14:00-15:00	569	591	602	637	2,399
15:00-16:00	676	665	653	738	2,732
16:00-17:00	812	811	809	751	3,183
17:00-18:00	835	730	787	759	3,111
18:00-19:00	649	594	626	583	2,452
19:00-20:00	467	521	422	440	1,850
20:00-21:00	396	424	371	344	1,535
21:00-22:00	329	307	290	271	1,197
22:00-23:00	249	266	264	221	1,000
23:00-24:00	213	180	183	130	706
Total					41,604
AADT					37,213
AM Peak	07:15-08:15 3,100				
PM Peak	16:15-17:15 3,206				

Eastbound Traffic Volumes

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	40	38	27	27	132
1:00-2:00	23	24	14	19	80
2:00-3:00	21	21	22	19	83
3:00-4:00	23	23	22	35	103
4:00-5:00	35	46	55	84	220
5:00-6:00	98	173	219	268	758
6:00-7:00	355	394	455	493	1,697
7:00-8:00	426	462	492	477	1,857
8:00-9:00	446	366	368	358	1,538
9:00-10:00	343	329	304	282	1,258
10:00-11:00	268	269	304	272	1,113
11:00-12:00	252	274	298	319	1,143
12:00-13:00	285	275	289	274	1,123
13:00-14:00	252	248	262	278	1,040
14:00-15:00	251	264	293	307	1,115
15:00-16:00	316	279	291	308	1,194
16:00-17:00	348	368	389	309	1,414
17:00-18:00	424	372	384	382	1,562
18:00-19:00	306	282	295	283	1,166
19:00-20:00	198	222	174	196	790
20:00-21:00	173	209	169	155	706
21:00-22:00	139	131	133	109	512
22:00-23:00	124	112	125	91	452
23:00-24:00	79	60	56	44	239
Total					21,295
AM Peak	07:15-08:15 1,877				
PM Peak	17:00-18:00 1,562				

Historic Traffic Fluctuation Trend on Major Highways in Worcester County.

Massachusetts Highway Department
Statewide Traffic Data Collection
2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114, 1116,2196,2197 and 2198.

5/31/2020

MassDOT Yearly Growth Rates

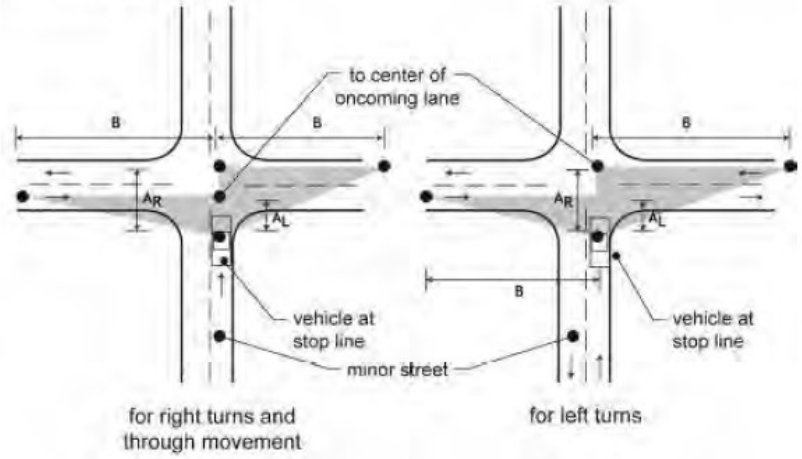
for data from 2014 to 2018

Growth Factors					
Group	**Grow 2014 to 2015**	**Grow 2015 to 2016**	**Grow 2016 to 2017**	**Grow 2017 to 2018**	**Grow 2018 to 2019**
R1	0	0.023	0.004	0.018	0.016
R2	0.05	0.068	0.004	0.014	0.014
R3	-0.038	0.002	0.008	0.011	0.06
R4-7	-0.01	0.003	0.001	0.011	0.012
Rec – East		0.032	0.02	0.041	0.025
Rec – West		0.051	-0.008	0.029	0
U1-Boston	0.061	0.07	-0.003	0.012	0.006
U1-Essex	0.024	0.025	0.007	0.014	0.011
U1-Southeast	0.05	0.062	0.021	0.014	0
U1-West	0.03	-0.027	0.02	0.028	0.013
U1-Worcester	0.042	0.005	0.018	0.01	0.01
U2	0.04	0.048	0.008	0.01	0.02
U3	0.011	0.013	0.011	0.014	0.004
U4-7	0.023	0.062	0.017	0.003	-0.004

updated
5/1/2020

Exhibit 3-11
Sight Triangle Case B

Departure Sight Triangles



Sight Triangle Legs: Case B – Stop Control on Cross Street

	Length of Sight Triangle Legs (feet)			
Major Street Design Speed (mph)	Minor Street for Vehicles Approaching From Right (A_R, feet)	Minor Street for Vehicles Approaching From Left (A_L, feet)	Major Street For Left Turns (B, feet)	Major Street for Right Turns or Through (B, feet)
15	32.5	20.5	170	145
20	32.5	20.5	225	195
25	32.5	20.5	280	240
30	32.5	20.5	335	290
35	32.5	20.5	390	335
40	32.5	20.5	445	385
45	32.5	20.5	500	430
50	32.5	20.5	555	480
55	32.5	20.5	610	530
60	32.5	20.5	665	575
65	32.5	20.5	720	625
70	32.5	20.5	775	670
75	32.5	20.5	830	720

Sight triangle legs shown are for passenger car crossing or turning into a two-lane street, with grades (all approaches) 3 percent or less. For other grades and for other major street widths, recalculate using AASHTO *Green Book* formulas.

Source: *A Policy on Geometric Design of Streets and Highways*, AASHTO, Washington DC, 2004. Chapter 3 Elements of Design

Exhibit 3-8
Motor Vehicle Stopping Sight Distances

	Stopping Sight Distance (ft) by Percent Grade (%)						
		Downgrade			Upgrade		
Design Speed	0	3	6	9	3	6	9
20	115	116	120	126	109	107	104
25	155	158	165	173	147	143	140
30	200	205	215	227	200	184	179
35	250	257	271	287	237	229	222
40	305	315	333	354	289	278	269
45	360	378	400	427	344	331	320
50	425	446	474	507	405	388	375
55	495	520	553	593	469	450	433
60	570	598	638	686	538	515	495
65	645	682	728	785	612	584	561
70	730	771	825	891	690	658	631
75	820	866	927	1003	772	736	704

Source: A Policy on Geometric Design of Streets and Highways, AASHTO, Washington DC, 2004. Chapter 3 Elements of Design

Mini-Warehouse
(151)

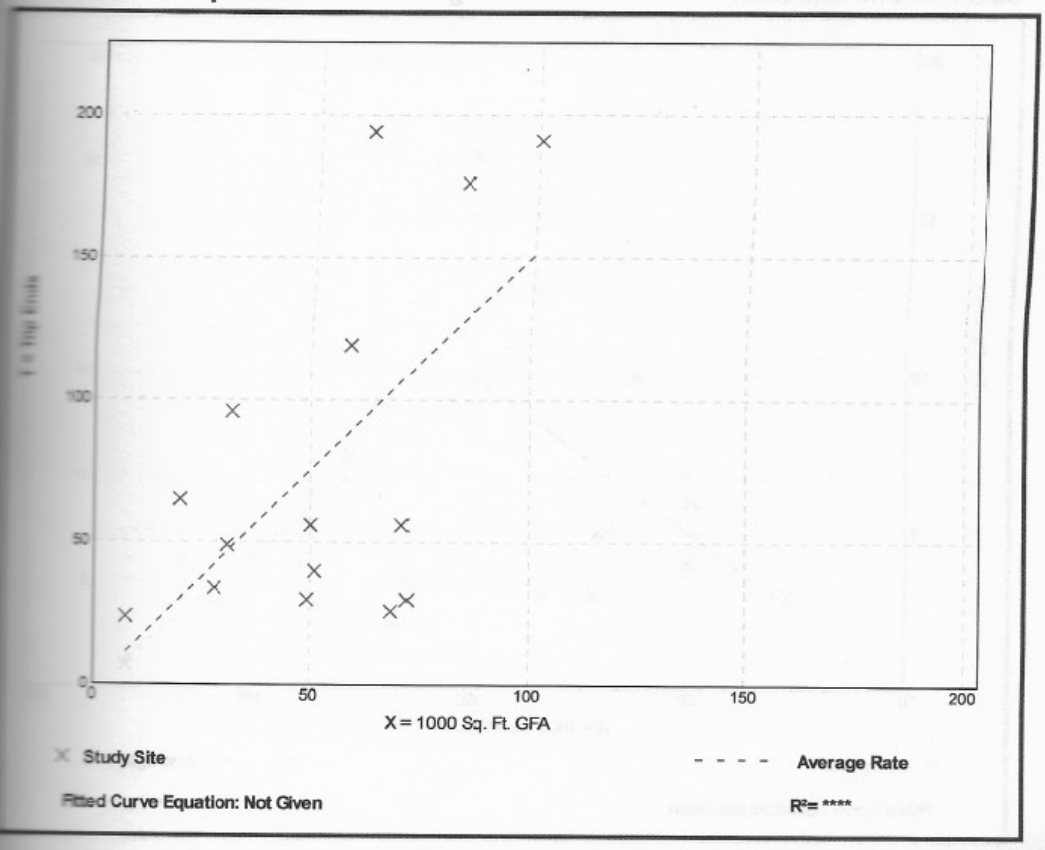
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 15
1000 Sq. Ft. GFA: 52
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.51	0.38 - 3.25	0.95

Data Plot and Equation



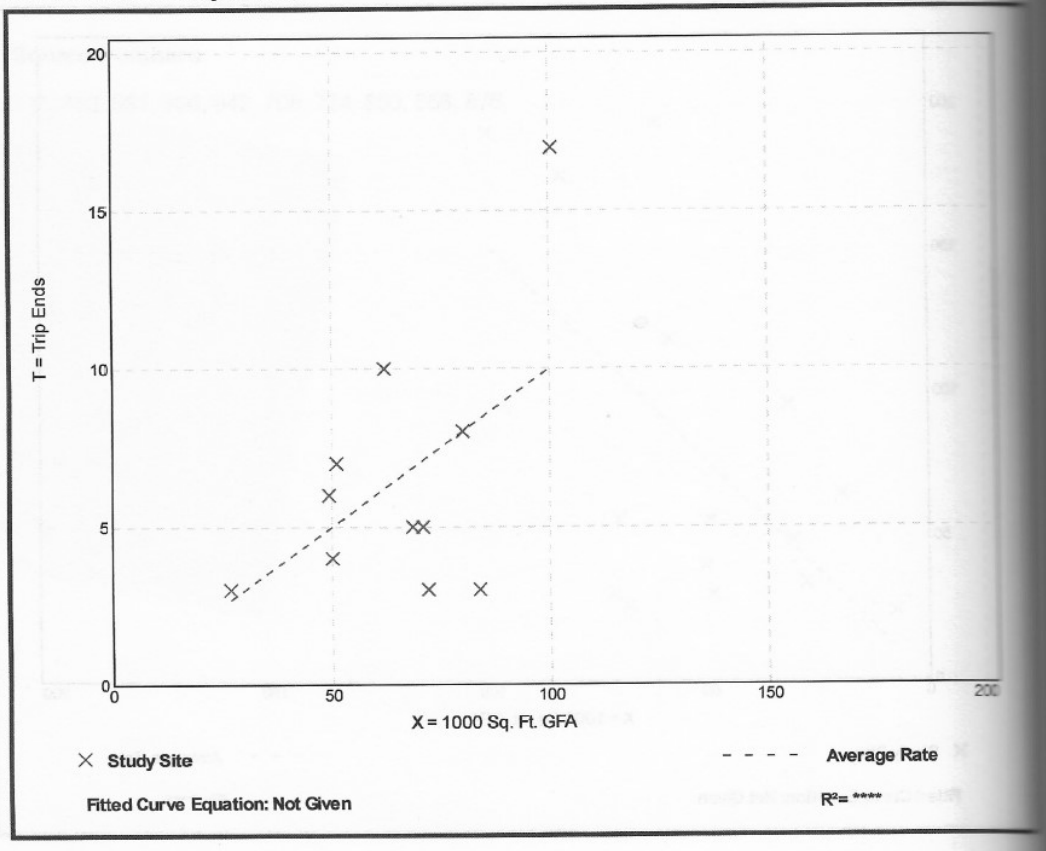
Mini-Warehouse
(151)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 11
1000 Sq. Ft. GFA: 65
Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.10	0.04 - 0.17	0.05

Data Plot and Equation



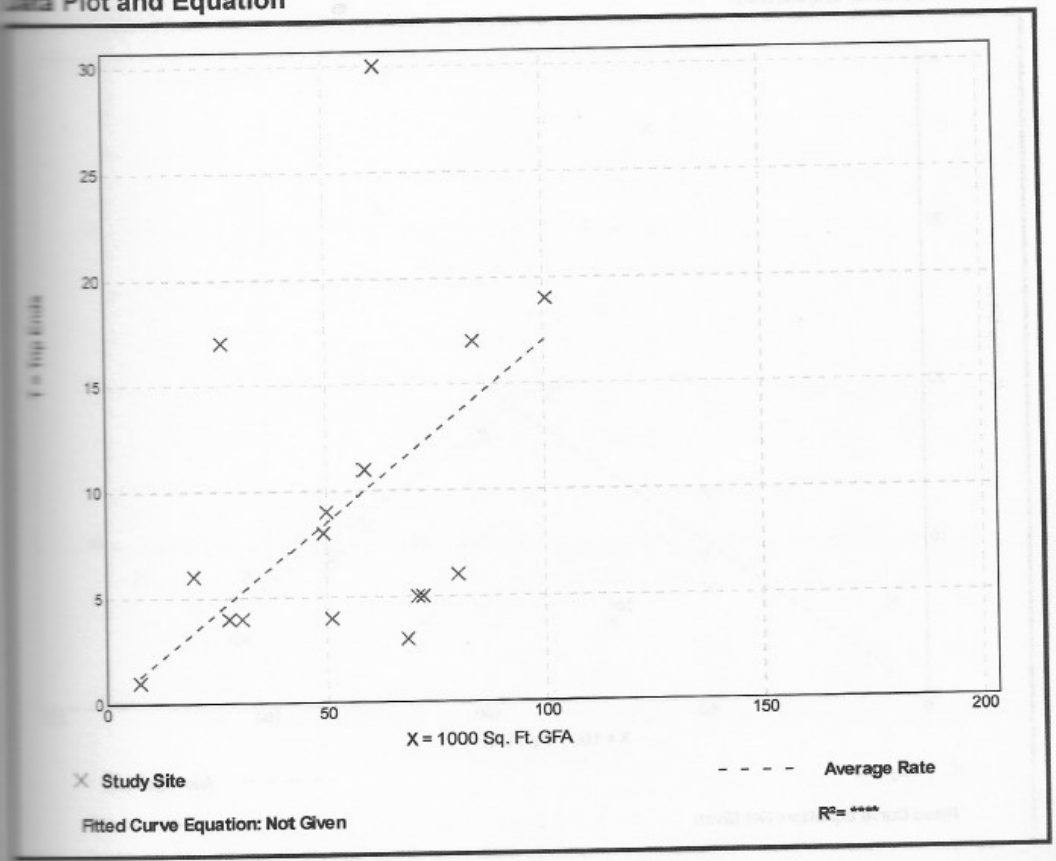
Mini-Warehouse
(151)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 16
1000 Sq. Ft. GFA: 54
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.04 - 0.64	0.14

Data Plot and Equation



Mini-Warehouse
(151)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

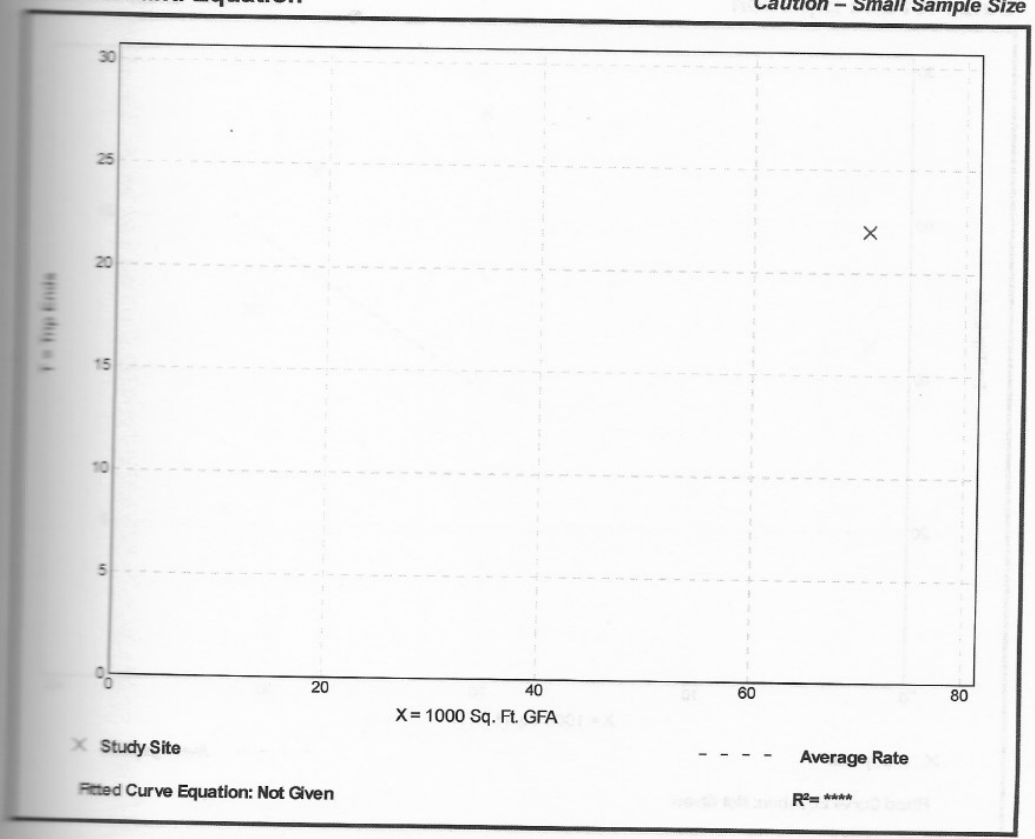
Setting/Location: **General Urban/Suburban**
Number of Studies: 1
1000 Sq. Ft. GFA: 71
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.31	0.31 - 0.31	*

Data Plot and Equation

Caution – Small Sample Size



Fitted Curve Equation: Not Given

R^2= ****

Multifamily Housing (Mid-Rise)
(221)

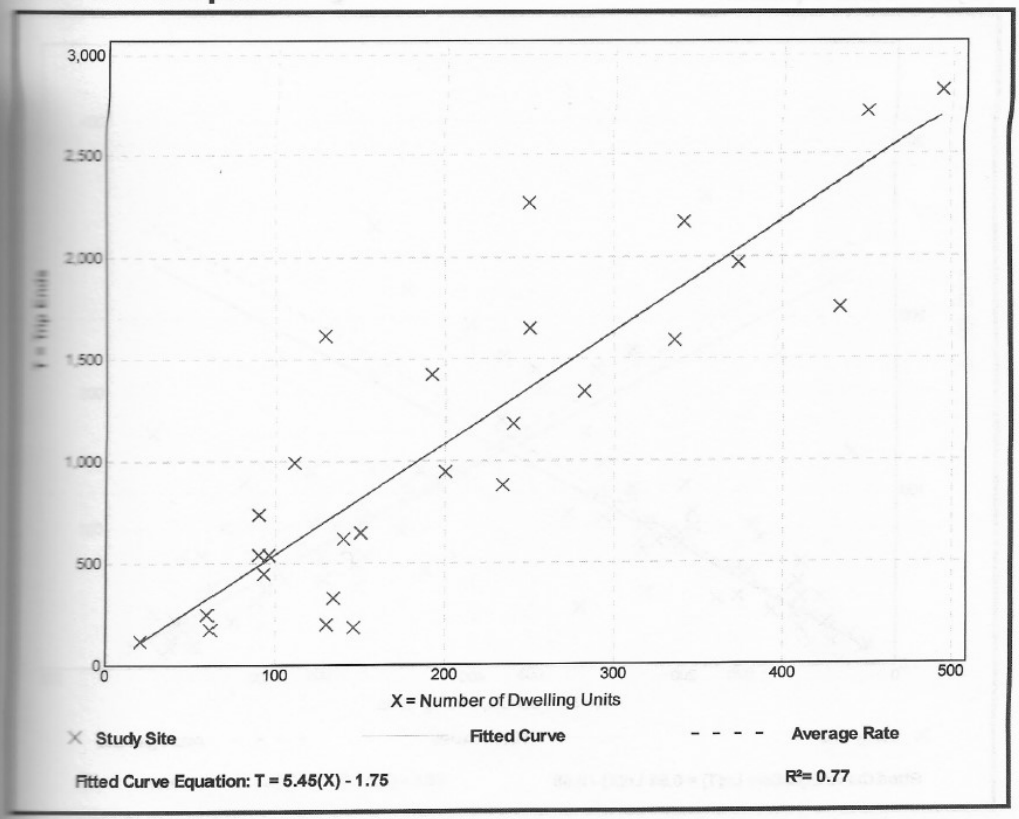
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 27
Avg. Num. of Dwelling Units: 205
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
5.44	1.27 - 12.50	2.03

Data Plot and Equation



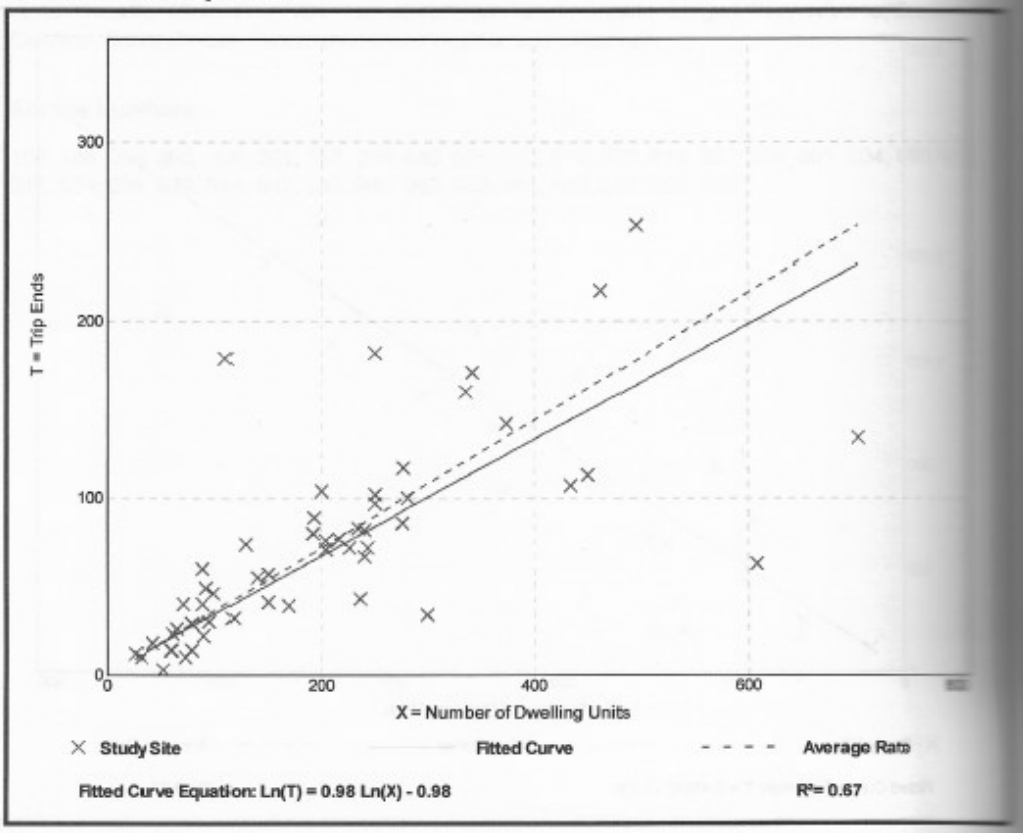
Multifamily Housing (Mid-Rise)
(221)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 53
Avg. Num. of Dwelling Units: 207
Directional Distribution: 26% entering, 74% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.36	0.06 - 1.61	0.19

Data Plot and Equation



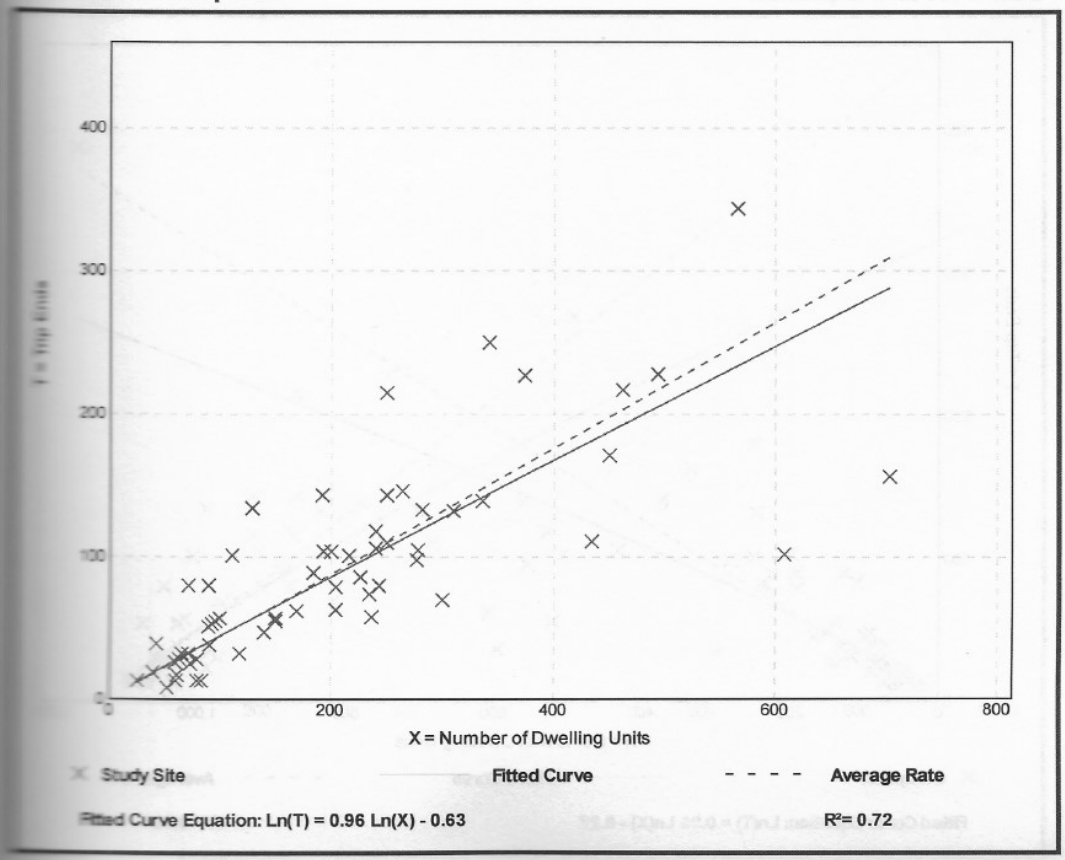
Multifamily Housing (Mid-Rise)
(221)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 60
Avg. Num. of Dwelling Units: 208
Directional Distribution: 61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.11	0.19

Data Plot and Equation



Multifamily Housing (Mid-Rise)
(221)

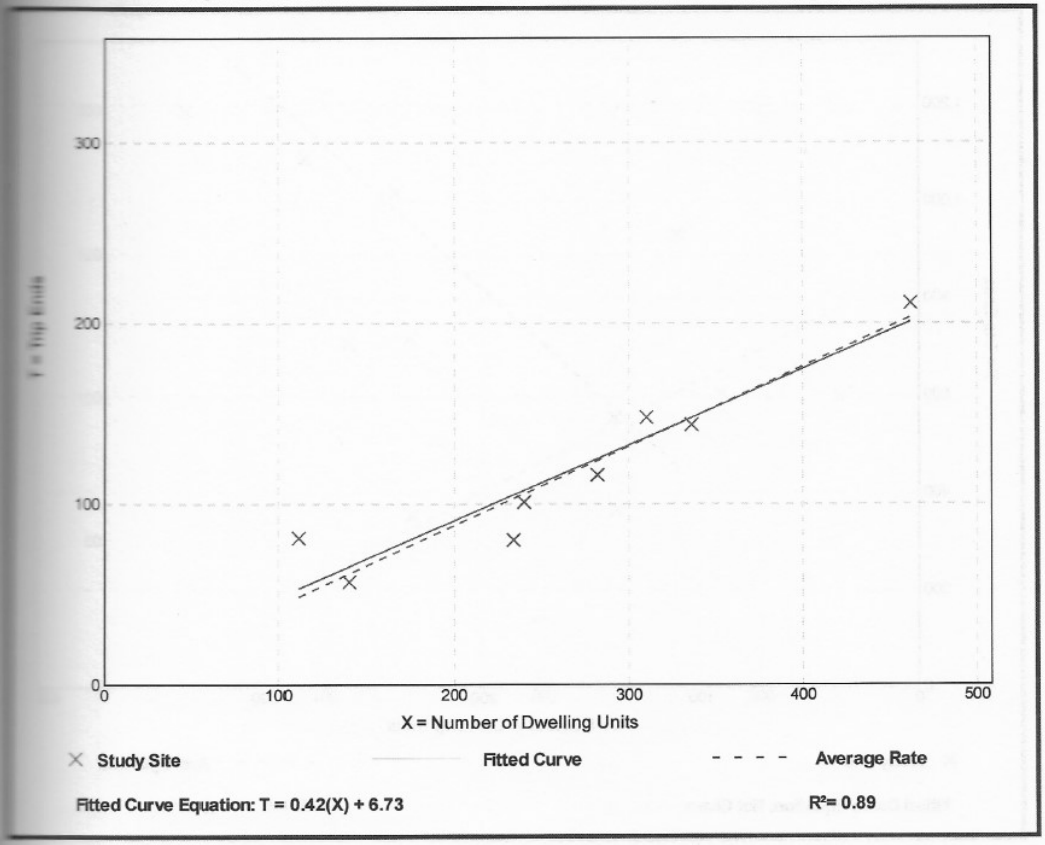
Vehicle Trip Ends vs: Dwelling Units
On a: Saturday, Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 8
Avg. Num. of Dwelling Units: 264
Directional Distribution: 49% entering, 51% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.34 - 0.73	0.08

Data Plot and Equation



Fitted Curve Equation: T = 0.42(X) + 6.73

R^2= 0.89

General Office Building
(710)

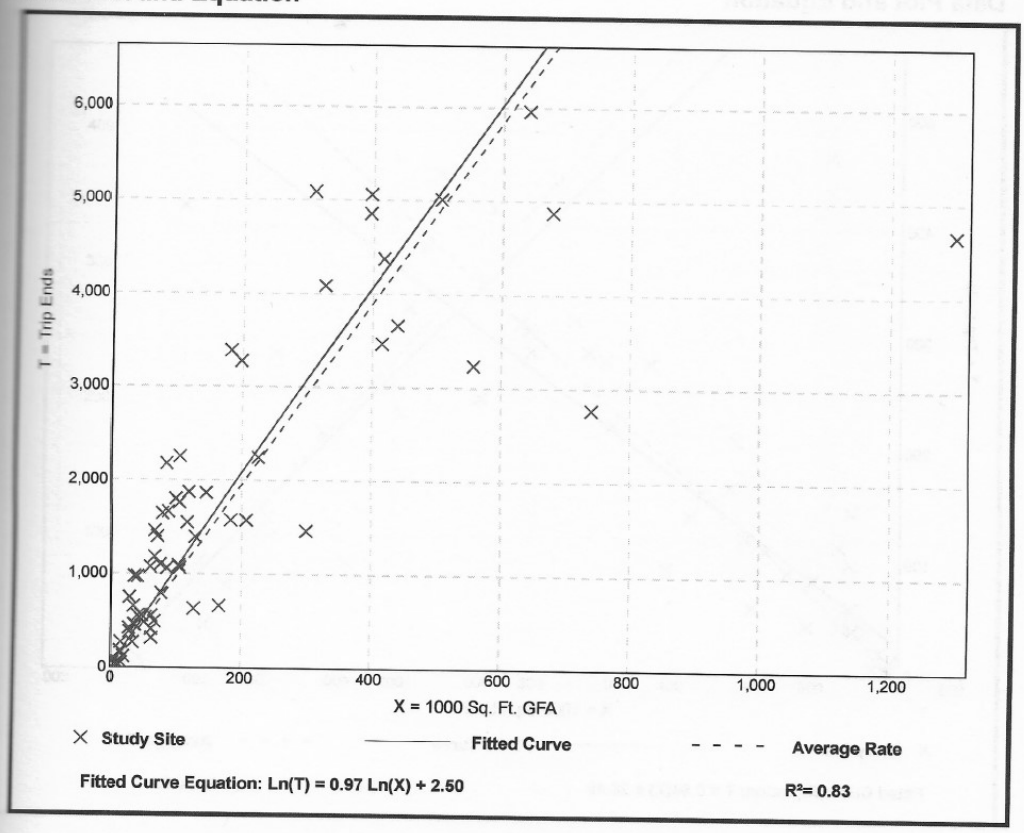
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 66
1000 Sq. Ft. GFA: 171
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.74	2.71 - 27.56	5.15

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.97 Ln(X) + 2.50 **R^2= 0.83**

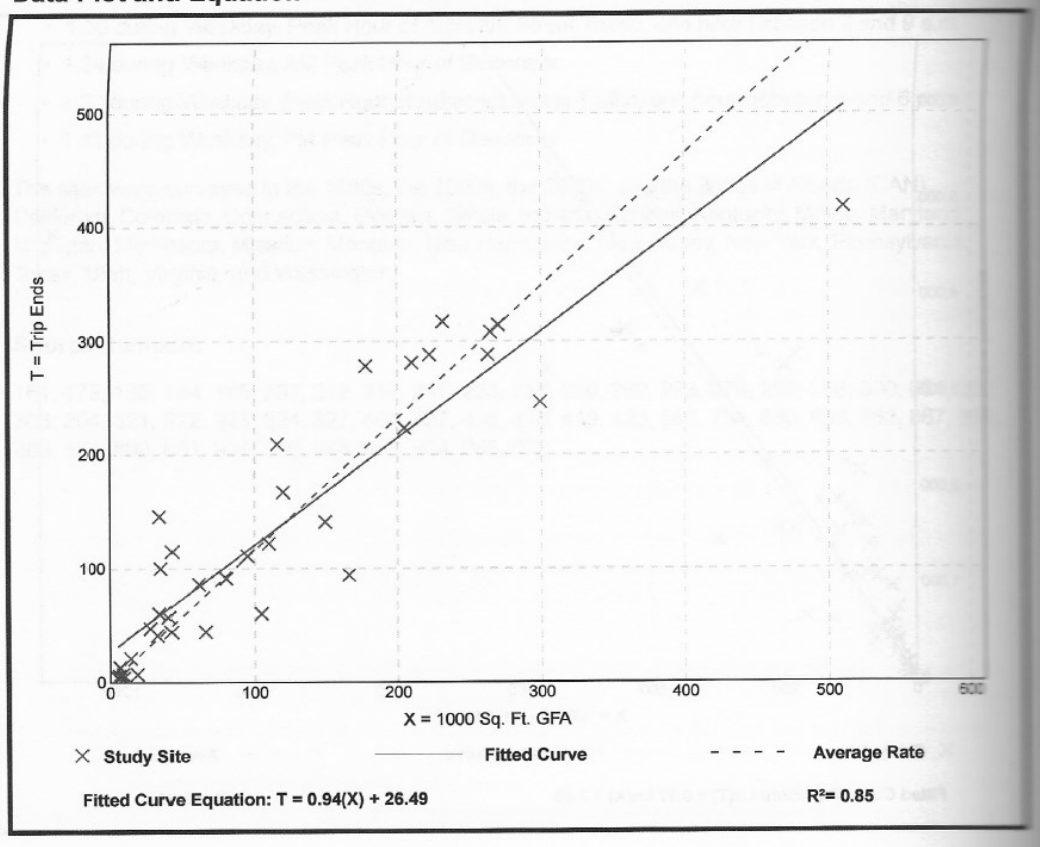
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 35
1000 Sq. Ft. GFA: 117
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

Data Plot and Equation



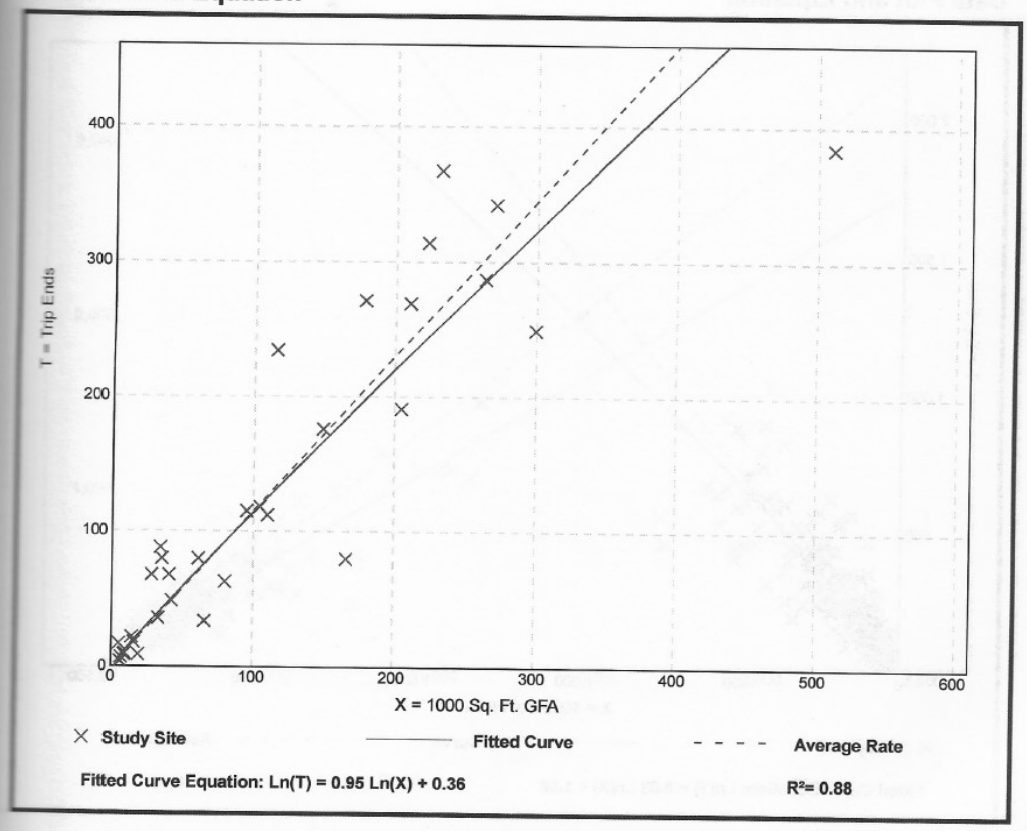
General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 32
1000 Sq. Ft. GFA: 114
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation



General Office Building
(710)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Saturday, Peak Hour of Generator**

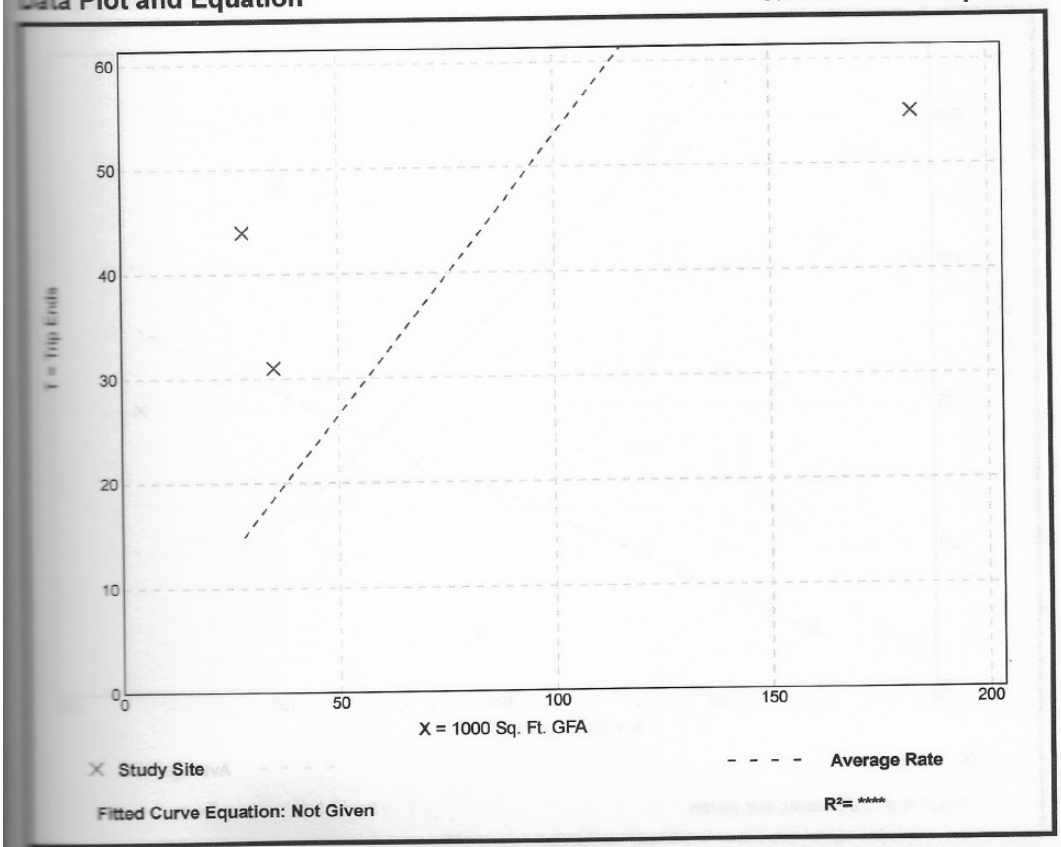
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
1000 Sq. Ft. GFA: 82
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.53	0.30 - 1.57	1.29

Data Plot and Equation

Caution – Small Sample Size



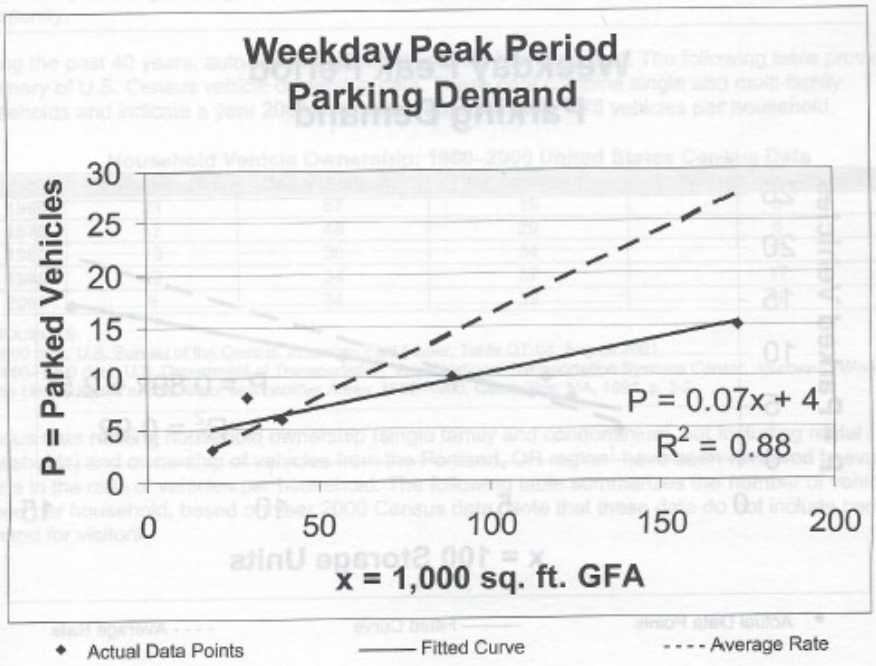
Fitted Curve Equation: Not Given

R^2= ****

Land Use: 151
Mini-Warehouse

Average Peak Period Parking Demand vs: 1,000 sq. ft. GFA
On a: Weekday

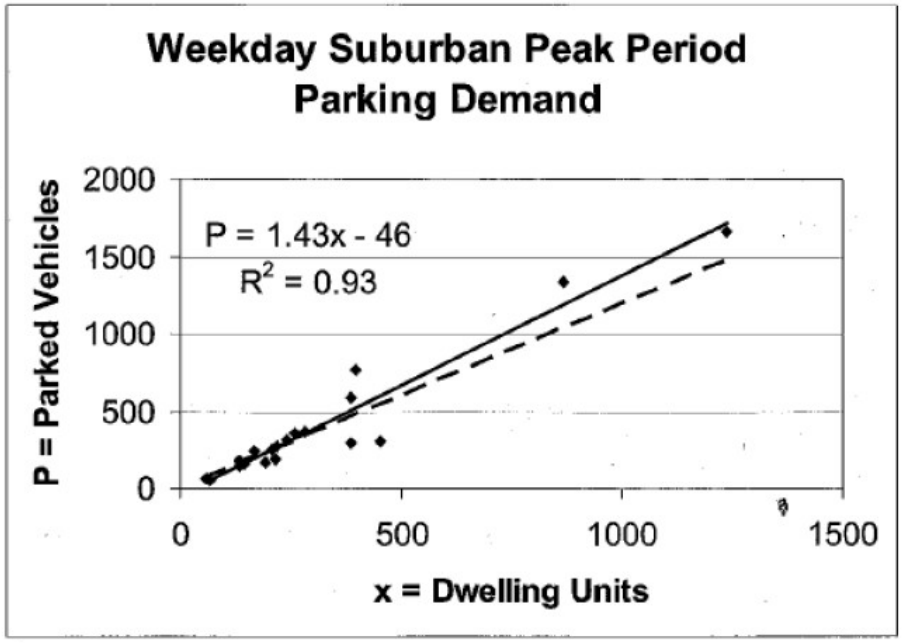
Statistic	Peak Period Demand
Peak Period	10:00 a.m.–12:00 p.m.; 4:00–5:00 p.m.
Number of Study Sites	5
Average Size of Study Sites	70,000 sq. ft. GFA
Average Peak Period Parking Demand	0.16 vehicles per 1,000 sq. ft. GFA
Standard Deviation	0.07
Coefficient of Variation	46%
Range	0.09–0.27 vehicles per 1,000 sq. ft. GFA
85th Percentile	0.20 vehicles per 1,000 sq. ft. GFA
33rd Percentile	0.13 vehicles per 1,000 sq. ft. GFA



Land Use: 221
Low/Mid-Rise Apartment

Average Peak Period Parking Demand vs: Dwelling Units
On a: Weekday
Location: Suburban

Statistic	Peak Period Demand
Peak Period	12:00–5:00 a.m.
Number of Study Sites	19
Average Size of Study Sites	320 dwelling units
Average Peak Period Parking Demand	1.20 vehicles per dwelling unit
Standard Deviation	0.32
Coefficient of Variation	26%
Range	0.68–1.94 vehicles per dwelling unit
85th Percentile	1.46 vehicles per dwelling unit
33rd Percentile	1.09 vehicles per dwelling unit



Fwd: RE: 250 Turnpike, Southborough

Kristen Costa <kriscosta@laassoc.com>
Mon 5/6/2024 4:33 PM
To:George Bahnan <gbahnan@ferrisdevelopment.com>

2 attachments (435 KB)
Rental_Final Approval Application Requirements 2024.pdf; NEF Rental Regulatory Agreement rev 01182024.docx;

External (kriscosta@laassoc.com)

Report This Email FAQ Skout Email Protection

See below.

Kristen E. Costa
L.A. Associates, Inc.
11 Middlesex Ave., Suite 5
Wilmington, MA 01887
cell (978) 758-0197

www.laassoc.com

---------- Original Message ----------
From: Katherine Miller <KMiller@masshousing.com>
To: Kristen Costa <kriscosta@laassoc.com>
Date: 05/06/2024 3:17 PM EDT
Subject: RE: 250 Turnpike, Southborough

Hi Kristen,

Thank you for the update.

This email is to confirm that MassHousing's monitoring process is the same for all rental developments. A monitoring plan will be reviewed by MassHousing during our Final Approval process. MassHousing typically acts as the monitoring agent for NEF rental projects. We review and approve the Lottery and management agent qualifications and the AFHMP/resident selection plan in connection with our Final Approval. Affordability and Limited Dividend Monitoring reporting is collected annually and reviewed by our rental management team once a project completes lease-up, as required under our Regulatory Agreement. I am attaching our final approval requirements in addition to a blank copy of our NEF rental regulatory agreement. Sections 3-5 and 17-18 of the RA address use restriction and rents, resident selection and monitoring agents.

Best,

Kat

One Beacon Street, Boston, MA 02108

Twitter | Facebook | LinkedIn | Newsletter

Kat Miller

Planning and Programs Specialist

Cell: 351-220-8215

Office: 617-854-1217

KMiller@masshousing.com

www.masshousing.com

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From: Kristen Costa <kriscosta@laassoc.com>
Sent: Monday, May 6, 2024 2:58 PM
To: Katherine Miller <KMiller@masshousing.com>
Subject: 250 Turnpike, Southborough

CAUTION: This email came from outside MassHousing. Use caution when opening attachments, clicking links, or responding to this email. Original Sender: kriscosta@laassoc.com.

Kat,

We anticipate filing our comprehensive permit application in regard to 250 Turnpike Road sometime this week. One of the items we need is a Long Term Monitoring Plan, which we provided for 120 Turnpike in the form of the email from you below. Could you please send a similar (or the same) email 250 Turnpike Road?

Thank you!

Kristen E. Costa
L.A. Associates, Inc.
11 Middlesex Ave., Suite 5
Wilmington, MA 01887
cell (978) 758-0197

www.laassoc.com

> On 10/26/2023 3:55 PM EDT Katherine Miller <kmiller@masshousing.com> wrote:
>
> Hi Kristen,
>
> Yes, this would be established and confirmed by MassHousing during our Final Approval process. MassHousing typically acts as the monitoring agent for NEF rental projects. We review and approve the Lottery and management agent qualifications and the AFHMP/resident selection plan in connection with our Final Approval. Affordability and Limited Dividend Monitoring reporting is collected annually and reviewed by our rental management team once a project completes lease-up, as required under our Regulatory Agreement. I am attaching our final approval requirements in addition to a blank copy of our NEF rental regulatory agreement. Sections 3-5 and 17-18 of the RA address use restriction and rents, resident selection and monitoring agents.

Hope this helps,

Kat

One Beacon Street, Boston, MA 02108

Twitter | Facebook | LinkedIn | Newsletter

Kat Miller

Planning and Programs Specialist

Cell: 351-220-8215

Office: 617-854-1217

KMiller@masshousing.com

www.masshousing.com

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From: Kristen Costa <kriscosta@laassoc.com>
Sent: Thursday, October 26, 2023 12:17 PM
To: Katherine Miller <KMiller@masshousing.com>
Subject: 120 Turnpike, Southborough

Kat,

The team is filing with the ZBA and one of the application requirements is a Long Term Monitoring Plan. I explained that this is established by MassHousing during the final application process; that MassHousing selects the monitoring agent and provides legal documents that establish the terms. Is there a better way for me to respond, or something I can provide that should satisfy them?

Kristen E. Costa

L.A. Associates, Inc.
11 Middlesex Ave., Suite 5
Wilmington, MA 01887
cell (978) 758-0197

300 feet Abutters List Report - Zoning Board of Appeals

Board of Assessors
17 Common Street Southborough, MA 01772

May 13, 2024

Subject Property:

Parcel Number:	27-0000-046-0	Mailing Address:	FD 250 TURNPIKE LLC 325 DONALD LYNCH BLVD STE 205 MARLBOROUGH, MA 01752
Property Address:	0 PARKERVILLE ROAD		

Abutters:

Parcel Number:	27-0000-002-0	Mailing Address:	FD 250 TURNPIKE ROAD LLC 118 TURNPIKE ROAD STE 300 SOUTHBOROUGH, MA 01772
Property Address:	125 PARKERVILLE ROAD		
Parcel Number:	27-0000-002-A	Mailing Address:	FD 250 TURNPIKE LLC 325 DONALD LYNCH BLVD STE 205 MARLBOROUGH, MA 01752
Property Address:	250 TURNPIKE ROAD		
Parcel Number:	27-0000-003-0	Mailing Address:	FYRBERG, GLENN F 242 TURNPIKE ROAD SOUTHBOROUGH, MA 01772
Property Address:	242 TURNPIKE ROAD		
Parcel Number:	27-0000-004-0	Mailing Address:	EAGLE, LOUIS AND MORTON AND DA MARK TRS EAGLE REALTY NOMINEE 258 TURNPIKE ROAD SOUTHBOROUGH, MA 01772
Property Address:	258 TURNPIKE ROAD		
Parcel Number:	27-0000-016-A	Mailing Address:	PALMER, JOHN M 131 PARKERVILLE ROAD SOUTHBOROUGH, MA 01772
Property Address:	131 PARKERVILLE ROAD		
Parcel Number:	27-0000-016-B	Mailing Address:	HOJLO, JEFFREY F AND SUSAN F 133 PARKERVILLE ROAD SOUTHBOROUGH, MA 01772
Property Address:	133 PARKERVILLE ROAD		
Parcel Number:	27-0000-016-C	Mailing Address:	ADELSON RACHEL P TRS RACHEL P ADELSON REV TRUST 1 SKYLAR DRIVE SOUTHBOROUGH, MA 01772
Property Address:	1 SKYLAR DRIVE		
Parcel Number:	27-0000-017-0	Mailing Address:	HARVEY, FREDERICK J 129 PARKERVILLE ROAD SOUTHBOROUGH, MA 01772
Property Address:	129 PARKERVILLE ROAD		
Parcel Number:	27-0000-018-0	Mailing Address:	WITTCOFF BETH A 3 SKYLAR DRIVE SOUTHBOROUGH, MA 01772
Property Address:	3 SKYLAR DRIVE		
Parcel Number:	27-0000-019-0	Mailing Address:	FALLON AMANDA M AND DANIEL F 5 SKYLAR DRIVE SOUTHBOROUGH, MA 01772
Property Address:	5 SKYLAR DRIVE		

CERTIFIED COPY

300 feet Abutters List Report

Board of Assessors
17 Common Street Southborough, MA 01772

May 13, 2024

Parcel Number:	27-0000-020-0	Mailing Address:	JAMES W AND HARLEY G MUNSELL TRS SEVEN SKYLAR DRIVE REALTY TRUST 7 SKYLAR DR SOUTHBOROUGH, MA 01772-1745
Property Address:	7 SKYLAR DRIVE		
Parcel Number:	27-0000-034-0	Mailing Address:	MAHONEY BRIAN T AND STEPHANIE D CONNORS 9 SARSEN STONE WAY SOUTHBOROUGH, MA 01772
Property Address:	9 SARSEN STONE WAY		
Parcel Number:	27-0000-035-0	Mailing Address:	SEHGAL MANAV 7 SARSEN STONE WAY SOUTHBOROUGH, MA 01772
Property Address:	7 SARSEN STONE WAY		
Parcel Number:	27-0000-036-0	Mailing Address:	GILMAN ALEX S AND JULIE 5 SARSEN STONE WAY SOUTHBOROUGH, MA 01772
Property Address:	5 SARSEN STONE WAY		
Parcel Number:	27-0000-037-0	Mailing Address:	MA JONATHAN AND ALLISON 3 SARSEN STONE WAY SOUTHBOROUGH, MA 01772
Property Address:	3 SARSEN STONE WAY		
Parcel Number:	27-0000-038-0	Mailing Address:	BETELAK RYAN AND CAITLIN 1 SARSEN STONE WAY SOUTHBOROUGH, MA 01772-0001
Property Address:	1 SARSEN STONE WAY		
Parcel Number:	28-0000-009-0	Mailing Address:	RH LONG MOTOR SALES INC 218 TURNPIKE ROAD SOUTHBOROUGH, MA 01772
Property Address:	218 TURNPIKE ROAD		
Parcel Number:	28-0000-031-0	Mailing Address:	SHARRON DEREK R AND LAUREN M TRS 8 LEEDS WAY REALTY TRUST 8 LEEDS WAY SOUTHBOROUGH, MA 01772
Property Address:	8 LEEDS WAY		
Parcel Number:	28-0000-032-0	Mailing Address:	PAUL SOHAM AND PAYEL GUHA THAKURTA 9 LEEDS WAY SOUTHBOROUGH, MA 01772
Property Address:	9 LEEDS WAY		
Parcel Number:	28-0000-033-0	Mailing Address:	AYACHIT MIHIR AND PRADNYA PATIL 10 LEEDS WAY SOUTHBOROUGH, MA 01772
Property Address:	10 LEEDS WAY		
Parcel Number:	28-0000-034-0	Mailing Address:	BARTOLINI ALAN AND JACQUELINE 11 LEEDS WAY SOUTHBOROUGH, MA 01772
Property Address:	11 LEEDS WAY		

CERTIFIED COPY

300 feet Abutters List Report

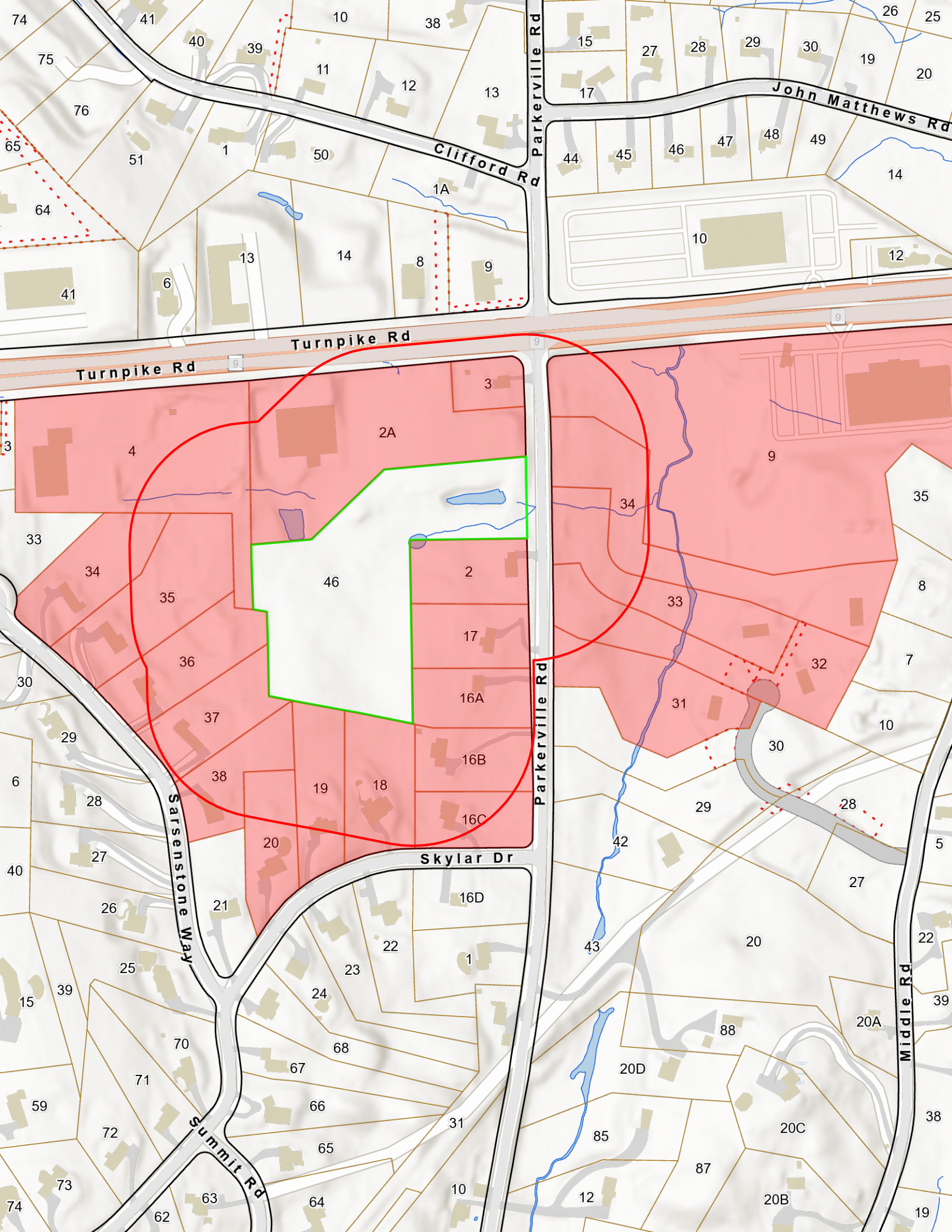
Board of Assessors
17 Common Street Southborough, MA 01772

May 13, 2024

This list contains the certified list of owners on record with the Town of Southborough.
The mailing address is for the property owner as of July 1st.

Authorized Signature

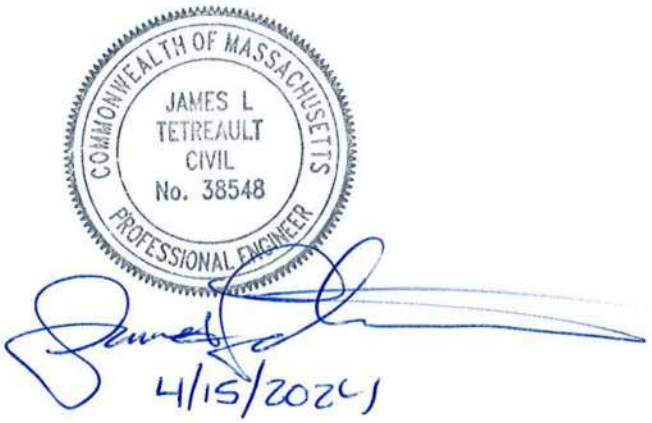
CERTIFIED COPY


Turnpike Rd
Turnpike Rd
Clifford Rd
Parkerville Rd
John Matthews Rd
Parkerville Rd
Skylar Dr
Sarsenstone Way
Summit Rd
Middle Rd

DRAINAGE REPORT
FOR COMPREHENSIVE PERMIT DEVELOPMENT
AT
AT 250 TURNPIKE ROAD, SOUTHBOROUGH, MA

Job #245-502 Client #502

APRIL 15, 2024



AZIMUTH LAND DESIGN, LLC
118 Turnpike Road, Suite 200, Southborough, MA 01772 (508) 485-0137

INTRODUCTION

The purpose of this Drainage Report is to confirm that, following the construction of an apartment building under a comprehensive permit process, that the peak rate of runoff from this property to the two properties that receive runoff from it, Turnpike Road (Route 9) and Parkerville Road, will not increase in any of the 2, 10, 25 or 100 year return frequency storm events.

The property at 250 Turnpike Road receives runoff from the abutting Eagle Leasing site and from the Sarsen Stone Way subdivision. There are two existing detention basins on site that receive discharge from the existing drainage systems behind the existing building and from the lower parking area. There is also an existing detention basin on the east side of two Sarsen Stone Way lots and a small existing detention basin on the Eagle Leasing site.

In addition to constructing an apartment building with 56 units, the Applicant proposes to construct parking spaces, driving aisles, sidewalks and landscaped areas that would all increase the peak rate of flow of runoff from the property if no mitigation was undertaken. The Applicant will construct two in ground detention/infiltration structures to both infiltrate and detain runoff. Through the use of these two structures, the peak rate of flow from the site will be kept at or below the predevelopment rate of flow.

Near the site's entrance off the existing parking area, a detention/infiltration structure with 10 8'x8'x3'high Retain-it modules will be constructed. Under the parking opposite the proposed building, a detention/infiltration structure with 63 8'x8'x5'high Retain-It modules will be constructed.

Flow from parking areas discharged into both structures will pass through CDS stormwater filtration units to remove TSS before infiltration.

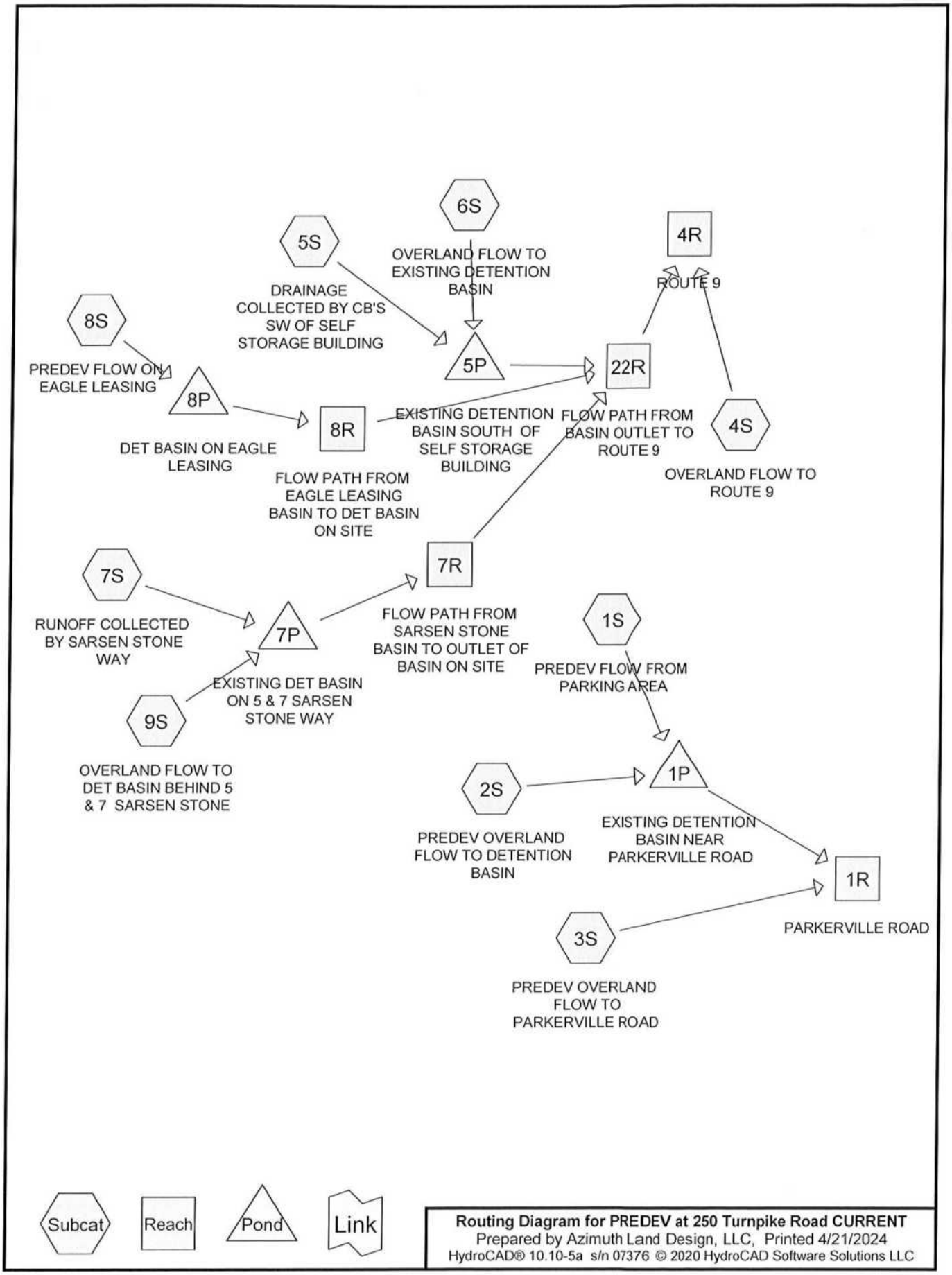
Soils on site are a mix of Woodbridge series soils categorized as hydrologic soil group C soils and Canton series soils categorized as hydrologic soil group B soils.

Calculations were made using the HydroCAD stormwater modeling program. The first table, below, compares the peak predevelopment and postdevelopment rates of flows of stormwater at the design points:

DESIGN POINT	PEAK FLOW RATE (in cfs)			
	2 yr storm	10 yr storm	25 yr storm	100 yr storm
Flow to Turnpike Road				
Reach #4 pre	14.41 pre	34.86 pre	57.74 pre	92.67 pre
Reach #14 post	14.34	34.69	57.46	92.27
Flow to Parkerville Road				
Reach #1 pre	3.71 pre	9.01 pre	12.61 pre	18.40 pre
Reach #11 post	2.99	6.81	9.64	14.63

The next table compares the volume of runoff leaving the site in the pre and postdevelopment conditions at the design points.

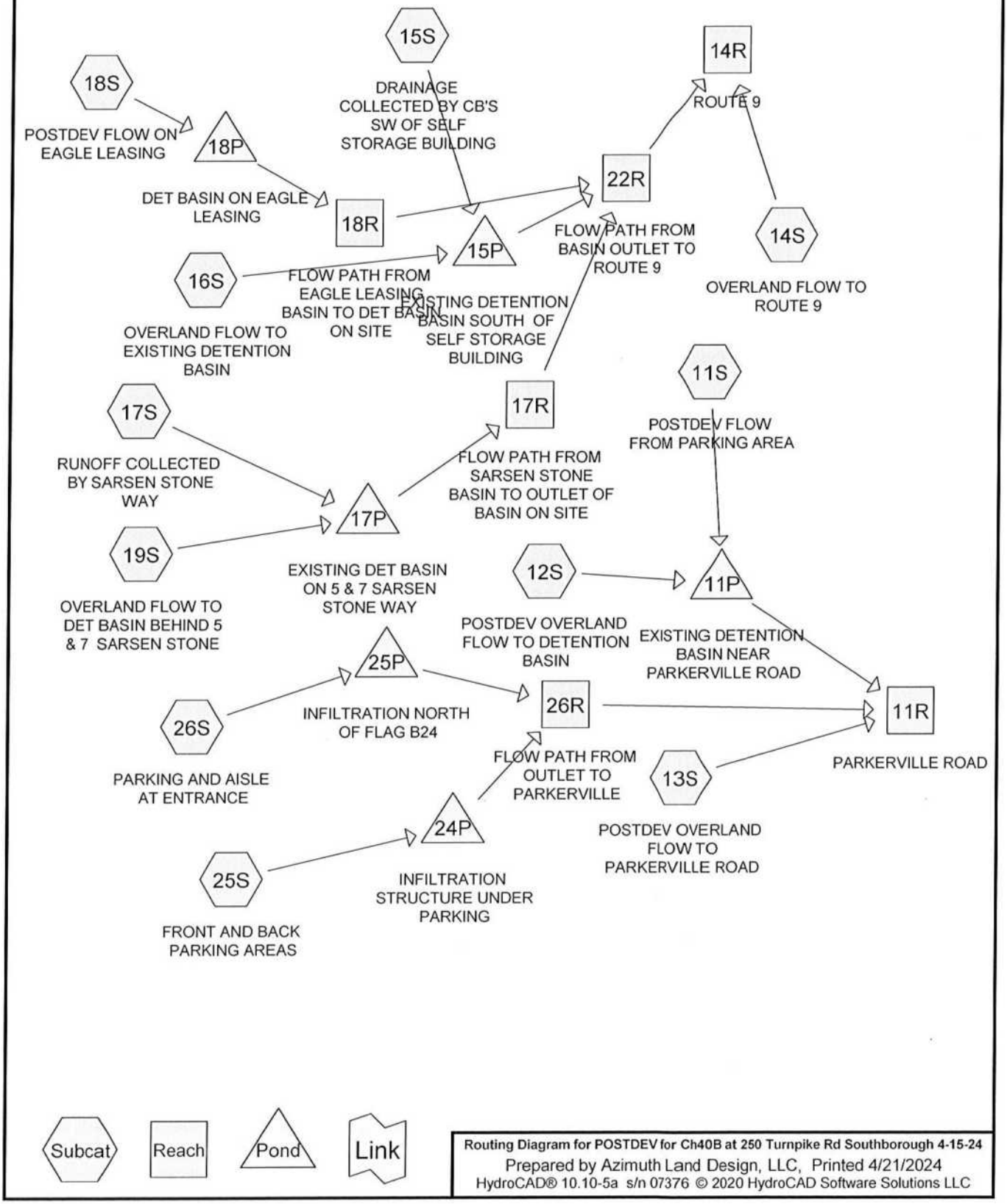
DESIGN POINT	VOLUME OF FLOW (in acre-feet)			
	2 yr storm	10 yr storm	25 yr storm	100 yr storm
Flow to Turnpike Road				
Reach #4 pre	2.740 pre	5.781 pre	7.857 pre	11.205 pre
Reach #14 post	2.735	5.761	7.828	11.163
Flow to Parkerville Road				
Reach #1 pre	0.550 pre	1.199 pre	1.664 pre	2.435 pre
Reach #11 post	0.513	1.173	1.658	2.466



Routing Diagram for PREDEV at 250 Turnpike Road CURRENT
Prepared by Azimuth Land Design, LLC, Printed 4/21/2024
HydroCAD® 10.10-5a s/n 07376 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.878	68	1 acre lots, 20% imp, HSG B (7S)
7.286	84	1 acre lots, 20% imp, HSG D (7S)
1.998	70	1/2 acre lots, 25% imp, HSG B (9S)
0.311	85	1/2 acre lots, 25% imp, HSG D (9S)
2.200	61	>75% Grass cover, Good, HSG B (1S, 3S, 4S, 5S, 8S)
0.927	74	>75% Grass cover, Good, HSG C (1S, 4S, 5S, 8S)
0.142	80	>75% Grass cover, Good, HSG D (8S)
2.814	98	Paved parking, HSG B (1S, 4S, 5S, 8S)
2.638	98	Paved parking, HSG C (4S, 5S, 8S)
0.005	98	Paved parking, HSG D (8S)
0.018	98	Roofs, HSG B (3S)
0.143	98	Water Surface, HSG B (2S, 9S)
0.057	98	Water Surface, HSG C (6S)
5.548	55	Woods, Good, HSG B (2S, 3S, 4S, 8S, 9S)
5.715	70	Woods, Good, HSG C (2S, 3S, 4S, 6S, 9S)
32.681	**75**	**TOTAL AREA**



Routing Diagram for POSTDEV for Ch40B at 250 Turnpike Rd Southborough 4-15-24

Prepared by Azimuth Land Design, LLC, Printed 4/21/2024

HydroCAD® 10.10-5a s/n 07376 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.878	68	1 acre lots, 20% imp, HSG B (17S)
7.286	84	1 acre lots, 20% imp, HSG D (17S)
1.998	70	1/2 acre lots, 25% imp, HSG B (19S)
0.311	85	1/2 acre lots, 25% imp, HSG D (19S)
2.522	61	>75% Grass cover, Good, HSG B (11S, 12S, 13S, 14S, 15S, 18S, 25S)
1.914	74	>75% Grass cover, Good, HSG C (11S, 12S, 13S, 14S, 15S, 18S, 25S, 26S)
0.142	80	>75% Grass cover, Good, HSG D (18S)
2.814	98	Paved parking, HSG B (11S, 14S, 15S, 18S)
4.157	98	Paved parking, HSG C (14S, 15S, 18S, 25S, 26S)
0.005	98	Paved parking, HSG D (18S)
0.018	98	Roofs, HSG B (13S)
0.143	98	Water Surface, HSG B (12S, 19S)
0.057	98	Water Surface, HSG C (16S)
3.727	55	Woods, Good, HSG B (12S, 13S, 14S, 18S, 19S, 25S)
1.112	55	Woods, Good, HSG B(-5624 TO PARKING) (14S)
3.597	70	Woods, Good, HSG C (12S, 13S, 14S, 16S, 19S)
32.681	**77**	**TOTAL AREA**

2 YEAR STORM

PREDEVELOPMENT

Summary for Subcatchment 1S: PREDEV FLOW FROM PARKING AREA

Runoff = 3.14 cfs @ 12.08 hrs, Volume= 0.247 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 2S: PREDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 0.16 cfs @ 12.20 hrs, Volume= 0.020 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
19,065	62	Weighted Average
16,152		84.72% Pervious Area
2,913		15.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 3S: PREDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 2.02 cfs @ 12.42 hrs, Volume= 0.284 af, Depth> 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
144,569	70	Woods, Good, HSG C
63,690	55	Woods, Good, HSG B
16,200	61	>75% Grass cover, Good, HSG B
780	98	Roofs, HSG B
225,239	65	Weighted Average
224,459		99.65% Pervious Area
780		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 4S: OVERLAND FLOW TO ROUTE 9

Runoff = 3.03 cfs @ 12.28 hrs, Volume= 0.342 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
54,059	55	Woods, Good, HSG B
24,068	55	Woods, Good, HSG B
36,060	70	Woods, Good, HSG C
33,500	61	>75% Grass cover, Good, HSG B
1,900	74	>75% Grass cover, Good, HSG C
42,307	98	Paved parking, HSG B
2,250	98	Paved parking, HSG B
4,349	98	Paved parking, HSG C
198,493	70	Weighted Average
149,587		75.36% Pervious Area
48,906		24.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides

18.3 1,366 Total

Summary for Subcatchment 5S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 6S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 0.93 cfs @ 12.19 hrs, Volume= 0.090 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 7S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 15.43 cfs @ 12.13 hrs, Volume= 1.214 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 8S: PREDEV FLOW ON EAGLE LEASING

Runoff = 8.93 cfs @ 12.18 hrs, Volume= 0.788 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 9S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 2.99 cfs @ 12.10 hrs, Volume= 0.247 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Reach 1R: PARKERVILLE ROAD

Inflow Area = 6.603 ac, 15.88% Impervious, Inflow Depth > 1.00" for 2 YEAR event
Inflow = 3.71 cfs @ 12.36 hrs, Volume= 0.550 af
Outflow = 3.71 cfs @ 12.36 hrs, Volume= 0.550 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 4R: ROUTE 9

Inflow Area = 26.078 ac, 27.75% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 14.41 cfs @ 12.38 hrs, Volume= 2.744 af
Outflow = 14.41 cfs @ 12.38 hrs, Volume= 2.744 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 7R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af
Outflow = 5.74 cfs @ 12.56 hrs, Volume= 1.454 af, Atten= 0%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 3.96 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 3.0 min

Peak Storage= 575 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 5.21'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'

‡

Summary for Reach 8R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 1.57" for 2 YEAR event
Inflow = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af
Outflow = 5.24 cfs @ 12.41 hrs, Volume= 0.787 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.09 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.30 fps, Avg. Travel Time= 0.8 min

Peak Storage= 116 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 3.14'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 1.34" for 2 YEAR event
Inflow = 11.90 cfs @ 12.46 hrs, Volume= 2.405 af
Outflow = 11.90 cfs @ 12.50 hrs, Volume= 2.402 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 5.42 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.72 fps, Avg. Travel Time= 2.3 min

Peak Storage= 841 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 9.84'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Pond 1P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.432 ac, 71.98% Impervious, Inflow Depth > 2.24" for 2 YEAR event
Inflow = 3.23 cfs @ 12.09 hrs, Volume= 0.267 af
Outflow = 2.00 cfs @ 12.20 hrs, Volume= 0.266 af, Atten= 38%, Lag= 6.8 min
Primary = 2.00 cfs @ 12.20 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.29' @ 12.20 hrs Surf.Area= 3,644 sf Storage= 1,431 cf

Plug-Flow detention time= 9.9 min calculated for 0.266 af (100% of inflow)
Center-of-Mass det. time= 8.8 min (783.9 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.00 cfs @ 12.20 hrs HW=309.29' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.00 cfs @ 3.02 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 1.21" for 2 YEAR event
Inflow = 1.75 cfs @ 12.13 hrs, Volume= 0.164 af
Outflow = 1.02 cfs @ 12.38 hrs, Volume= 0.164 af, Atten= 42%, Lag= 15.3 min
Primary = 1.02 cfs @ 12.38 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.08' @ 12.38 hrs Surf.Area= 3,729 sf Storage= 1,230 cf

Plug-Flow detention time= 18.4 min calculated for 0.164 af (99% of inflow)
Center-of-Mass det. time= 15.5 min (868.1 - 852.6)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.02 cfs @ 12.38 hrs HW=326.08' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.02 cfs @ 3.10 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 7P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 18.37 cfs @ 12.12 hrs, Volume= 1.461 af
Outflow = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af, Atten= 69%, Lag= 23.4 min
Primary = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 353.80' @ 12.51 hrs Surf.Area= 8,316 sf Storage= 16,011 cf

Plug-Flow detention time= 26.3 min calculated for 1.456 af (100% of inflow)
Center-of-Mass det. time= 24.3 min (875.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.74 cfs @ 12.51 hrs HW=353.80' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.74 cfs @ 7.31 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 8P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 1.57" for 2 YEAR event
Inflow = 8.93 cfs @ 12.18 hrs, Volume= 0.788 af
Outflow = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af, Atten= 41%, Lag= 13.2 min
Primary = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 344.92' @ 12.40 hrs Surf.Area= 5,269 sf Storage= 3,684 cf

Plug-Flow detention time= 4.4 min calculated for 0.788 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (846.2 - 842.0)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=5.25 cfs @ 12.40 hrs HW=344.92' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.25 cfs @ 6.68 fps)
└—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

POSTDEVELOPMENT

Summary for Subcatchment 11S: POSTDEV FLOW FROM PARKING AREA

Runoff = 3.14 cfs @ 12.08 hrs, Volume= 0.247 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 12S: POSTDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 0.19 cfs @ 12.19 hrs, Volume= 0.022 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
860	74	>75% Grass cover, Good, HSG C
200	61	>75% Grass cover, Good, HSG B
20,125	63	Weighted Average
17,212		85.53% Pervious Area
2,913		14.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 13S: POSTDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 1.22 cfs @ 12.41 hrs, Volume= 0.168 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
12,321	70	Woods, Good, HSG C
24,459	70	Woods, Good, HSG C
16,779	55	Woods, Good, HSG B
2,590	55	Woods, Good, HSG B
4,373	55	Woods, Good, HSG B
22,514	61	>75% Grass cover, Good, HSG B
19,561	74	>75% Grass cover, Good, HSG C
780	98	Roofs, HSG B
916	61	>75% Grass cover, Good, HSG B
121	55	Woods, Good, HSG B
4,473	74	>75% Grass cover, Good, HSG C
15,520	70	Woods, Good, HSG C
124,407	66	Weighted Average
123,627		99.37% Pervious Area
780		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 14S: OVERLAND FLOW TO ROUTE 9

Runoff = 2.96 cfs @ 12.28 hrs, Volume= 0.333 af, Depth> 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

	Area (sf)	CN	Description
*	48,435	55	Woods, Good, HSG B(-5624 TO PARKING)
	24,068	55	Woods, Good, HSG B
	36,060	70	Woods, Good, HSG C
	33,500	61	>75% Grass cover, Good, HSG B
	1,900	74	>75% Grass cover, Good, HSG C
	42,307	98	Paved parking, HSG B
	2,250	98	Paved parking, HSG B
	4,349	98	Paved parking, HSG C
	665	61	>75% Grass cover, Good, HSG B
	193,534	70	Weighted Average
	144,628		74.73% Pervious Area
	48,906		25.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
18.3	1,366	Total			

Summary for Subcatchment 15S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 1.04 cfs @ 12.09 hrs, Volume= 0.075 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 16S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 0.93 cfs @ 12.19 hrs, Volume= 0.090 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 17S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 15.43 cfs @ 12.13 hrs, Volume= 1.214 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 18S: POSTDEV FLOW ON EAGLE LEASING

Runoff = 8.93 cfs @ 12.18 hrs, Volume= 0.788 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 19S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 2.99 cfs @ 12.10 hrs, Volume= 0.247 af, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Subcatchment 25S: FRONT AND BACK PARKING AREAS

Runoff = 3.34 cfs @ 12.24 hrs, Volume= 0.330 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
56,961	98	Paved parking, HSG C
5,900	61	>75% Grass cover, Good, HSG B
14,594	55	Woods, Good, HSG B
15,197	74	>75% Grass cover, Good, HSG C
92,652	85	Weighted Average
35,691		38.52% Pervious Area
56,961		61.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.3	169	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	15	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	134	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.1	368	Total			

Summary for Subcatchment 26S: PARKING AND AISLE AT ENTRANCE

Runoff = 0.82 cfs @ 12.06 hrs, Volume= 0.057 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2 YEAR Rainfall=3.33"

Area (sf)	CN	Description
2,891	74	>75% Grass cover, Good, HSG C
9,207	98	Paved parking, HSG C
12,098	92	Weighted Average
2,891		23.90% Pervious Area
9,207		76.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	41	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	185	0.0560	4.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.3	226	Total			

Summary for Reach 11R: PARKERVILLE ROAD

Inflow Area = 6.717 ac, 38.23% Impervious, Inflow Depth > 0.92" for 2 YEAR event
Inflow = 2.99 cfs @ 12.32 hrs, Volume= 0.513 af
Outflow = 2.99 cfs @ 12.32 hrs, Volume= 0.513 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 14R: ROUTE 9

Inflow Area = 25.964 ac, 27.87% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 14.34 cfs @ 12.38 hrs, Volume= 2.735 af
Outflow = 14.34 cfs @ 12.38 hrs, Volume= 2.735 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 17R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af
Outflow = 5.74 cfs @ 12.56 hrs, Volume= 1.454 af, Atten= 0%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 3.96 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 2.18 fps, Avg. Travel Time= 3.0 min

Peak Storage= 575 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 5.21'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'

‡

Summary for Reach 18R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 1.57" for 2 YEAR event
Inflow = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af
Outflow = 5.24 cfs @ 12.41 hrs, Volume= 0.787 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.09 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.30 fps, Avg. Travel Time= 0.8 min

Peak Storage= 116 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 3.14'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 1.34" for 2 YEAR event
Inflow = 11.90 cfs @ 12.46 hrs, Volume= 2.405 af
Outflow = 11.90 cfs @ 12.50 hrs, Volume= 2.402 af, Atten= 0%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 5.42 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.72 fps, Avg. Travel Time= 2.3 min

Peak Storage= 841 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 9.84'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Reach 26R: FLOW PATH FROM OUTLET TO PARKERVILLE

Inflow Area = 2.405 ac, 63.17% Impervious, Inflow Depth = 0.38" for 2 YEAR event
Inflow = 0.33 cfs @ 12.98 hrs, Volume= 0.077 af
Outflow = 0.33 cfs @ 13.11 hrs, Volume= 0.077 af, Atten= 0%, Lag= 7.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 1.35 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 6.1 min

Peak Storage= 88 cf @ 13.03 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 7.45'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 232.32 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 46.00'
Length= 360.0' Slope= 0.0375 '/'
Inlet Invert= 318.00', Outlet Invert= 304.50'

‡

Summary for Pond 11P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.456 ac, 70.77% Impervious, Inflow Depth > 2.22" for 2 YEAR event
Inflow = 3.26 cfs @ 12.09 hrs, Volume= 0.269 af
Outflow = 2.01 cfs @ 12.20 hrs, Volume= 0.269 af, Atten= 38%, Lag= 6.9 min
Primary = 2.01 cfs @ 12.20 hrs, Volume= 0.269 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.29' @ 12.20 hrs Surf.Area= 3,662 sf Storage= 1,445 cf

Plug-Flow detention time= 9.9 min calculated for 0.269 af (100% of inflow)
Center-of-Mass det. time= 8.8 min (784.8 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.01 cfs @ 12.20 hrs HW=309.29' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.01 cfs @ 3.02 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 1.21" for 2 YEAR event
Inflow = 1.75 cfs @ 12.13 hrs, Volume= 0.164 af
Outflow = 1.02 cfs @ 12.38 hrs, Volume= 0.164 af, Atten= 42%, Lag= 15.3 min
Primary = 1.02 cfs @ 12.38 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.08' @ 12.38 hrs Surf.Area= 3,729 sf Storage= 1,230 cf

Plug-Flow detention time= 18.4 min calculated for 0.164 af (99% of inflow)
Center-of-Mass det. time= 15.5 min (868.1 - 852.6)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.02 cfs @ 12.38 hrs HW=326.08' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.02 cfs @ 3.10 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 1.26" for 2 YEAR event
Inflow = 18.37 cfs @ 12.12 hrs, Volume= 1.461 af
Outflow = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af, Atten= 69%, Lag= 23.4 min
Primary = 5.74 cfs @ 12.51 hrs, Volume= 1.456 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 353.80' @ 12.51 hrs Surf.Area= 8,316 sf Storage= 16,011 cf

Plug-Flow detention time= 26.3 min calculated for 1.456 af (100% of inflow)
Center-of-Mass det. time= 24.3 min (875.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.74 cfs @ 12.51 hrs HW=353.80' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.74 cfs @ 7.31 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 18P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 1.57" for 2 YEAR event
Inflow = 8.93 cfs @ 12.18 hrs, Volume= 0.788 af
Outflow = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af, Atten= 41%, Lag= 13.2 min
Primary = 5.25 cfs @ 12.40 hrs, Volume= 0.788 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 344.92' @ 12.40 hrs Surf.Area= 5,269 sf Storage= 3,684 cf

Plug-Flow detention time= 4.4 min calculated for 0.788 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (846.2 - 842.0)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=5.25 cfs @ 12.40 hrs HW=344.92' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.25 cfs @ 6.68 fps)
└—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 24P: INFILTRATION STRUCTURE UNDER PARKING

Inflow Area = 2.127 ac, 61.48% Impervious, Inflow Depth > 1.86" for 2 YEAR event
Inflow = 3.34 cfs @ 12.24 hrs, Volume= 0.330 af
Outflow = 0.59 cfs @ 12.98 hrs, Volume= 0.330 af, Atten= 82%, Lag= 44.5 min
Discarded = 0.26 cfs @ 11.56 hrs, Volume= 0.253 af
Primary = 0.33 cfs @ 12.98 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 323.78' @ 12.98 hrs Surf.Area= 4,656 sf Storage= 5,615 cf

Plug-Flow detention time= 121.0 min calculated for 0.329 af (100% of inflow)
Center-of-Mass det. time= 119.7 min (952.3 - 832.6)

Volume	Invert	Avail.Storage	Storage Description
#1	322.00'	2,966 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,264 cf Overall - 22,848 cf Embedded = 7,416 cf x 40.0% Voids
#2	322.50'	17,021 cf	**retain_it retain_it 5.0'** x 63 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 1,329.9 cf perimeter wall
		19,987 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
322.00	4,656	0	0
328.50	4,656	30,264	30,264

Device	Routing	Invert	Outlet Devices
#1	Discarded	322.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	326.00'	**8.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 326.00' / 319.00' S= 0.3889 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

#3	Primary	323.00'	**4.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 323.00' / 320.00' S= 0.1667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.26 cfs @ 11.56 hrs HW=322.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.33 cfs @ 12.98 hrs HW=323.78' (Free Discharge)
├**2=Culvert** (Controls 0.00 cfs)
└**3=Culvert** (Inlet Controls 0.33 cfs @ 3.78 fps)

Summary for Pond 25P: INFILTRATION NORTH OF FLAG B24

Inflow Area =	0.278 ac, 76.10% Impervious, Inflow Depth > 2.47"	for 2 YEAR event		
Inflow =	0.82 cfs @ 12.06 hrs, Volume=	0.057 af		
Outflow =	0.05 cfs @ 11.20 hrs, Volume=	0.057 af, Atten= 94%, Lag= 0.0 min		
Discarded =	0.05 cfs @ 11.20 hrs, Volume=	0.057 af		
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 319.94' @ 13.76 hrs Surf.Area= 880 sf Storage= 1,099 cf

Plug-Flow detention time= 196.9 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 196.2 min (990.6 - 794.4)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	821 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 4,400 cf Overall - 2,347 cf Embedded = 2,053 cf x 40.0% Voids
#2	318.50'	1,640 cf	**retain_it retain_it 3.0'** x 10 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 66.1 cf perimeter wall
		2,461 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
318.00	880	0	0
323.00	880	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 321.00' / 317.50' S= 0.1029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 11.20 hrs HW=318.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=318.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

10 YEAR STORM

PREDEVELOPMENT

Summary for Subcatchment 1S: PREDEV FLOW FROM PARKING AREA

Runoff = 4.92 cfs @ 12.08 hrs, Volume= 0.396 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 2S: PREDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 0.61 cfs @ 12.17 hrs, Volume= 0.055 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
19,065	62	Weighted Average
16,152		84.72% Pervious Area
2,913		15.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 3S: PREDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 6.22 cfs @ 12.37 hrs, Volume= 0.748 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
144,569	70	Woods, Good, HSG C
63,690	55	Woods, Good, HSG B
16,200	61	>75% Grass cover, Good, HSG B
780	98	Roofs, HSG B
225,239	65	Weighted Average
224,459		99.65% Pervious Area
780		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 4S: OVERLAND FLOW TO ROUTE 9

Runoff = 7.81 cfs @ 12.26 hrs, Volume= 0.810 af, Depth> 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
54,059	55	Woods, Good, HSG B
24,068	55	Woods, Good, HSG B
36,060	70	Woods, Good, HSG C
33,500	61	>75% Grass cover, Good, HSG B
1,900	74	>75% Grass cover, Good, HSG C
42,307	98	Paved parking, HSG B
2,250	98	Paved parking, HSG B
4,349	98	Paved parking, HSG C
198,493	70	Weighted Average
149,587		75.36% Pervious Area
48,906		24.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides

18.3 1,366 Total

Summary for Subcatchment 5S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 1.96 cfs @ 12.09 hrs, Volume= 0.141 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 6S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 2.32 cfs @ 12.18 hrs, Volume= 0.209 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 7S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 31.84 cfs @ 12.12 hrs, Volume= 2.472 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 8S: PREDEV FLOW ON EAGLE LEASING

Runoff = 17.78 cfs @ 12.17 hrs, Volume= 1.559 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 9S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 8.29 cfs @ 12.09 hrs, Volume= 0.609 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Reach 1R: PARKERVILLE ROAD

Inflow Area = 6.603 ac, 15.88% Impervious, Inflow Depth > 2.18" for 10 YEAR event
Inflow = 9.01 cfs @ 12.36 hrs, Volume= 1.199 af
Outflow = 9.01 cfs @ 12.36 hrs, Volume= 1.199 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 4R: ROUTE 9

Inflow Area = 26.078 ac, 27.75% Impervious, Inflow Depth > 2.66" for 10 YEAR event
Inflow = 34.86 cfs @ 12.38 hrs, Volume= 5.781 af
Outflow = 34.86 cfs @ 12.38 hrs, Volume= 5.781 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 7R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 2.66" for 10 YEAR event
Inflow = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af
Outflow = 19.61 cfs @ 12.37 hrs, Volume= 3.069 af, Atten= 1%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 5.50 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.60 fps, Avg. Travel Time= 2.5 min

Peak Storage= 1,420 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.73' , Surface Width= 7.82'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'

‡

Summary for Reach 8R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 3.10" for 10 YEAR event
Inflow = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af
Outflow = 6.71 cfs @ 12.54 hrs, Volume= 1.558 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.56 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.89 fps, Avg. Travel Time= 0.7 min

Peak Storage= 139 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 3.41'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 2.77" for 10 YEAR event
Inflow = 28.52 cfs @ 12.37 hrs, Volume= 4.975 af
Outflow = 28.34 cfs @ 12.40 hrs, Volume= 4.971 af, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 6.81 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 3.20 fps, Avg. Travel Time= 2.0 min

Peak Storage= 1,598 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 13.26'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Pond 1P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.432 ac, 71.98% Impervious, Inflow Depth > 3.79" for 10 YEAR event
Inflow = 5.38 cfs @ 12.09 hrs, Volume= 0.452 af
Outflow = 2.89 cfs @ 12.24 hrs, Volume= 0.451 af, Atten= 46%, Lag= 9.3 min
Primary = 2.89 cfs @ 12.24 hrs, Volume= 0.451 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.58' @ 12.24 hrs Surf.Area= 5,028 sf Storage= 2,725 cf

Plug-Flow detention time= 11.0 min calculated for 0.451 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (778.9 - 769.0)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.89 cfs @ 12.24 hrs HW=309.58' (Free Discharge)
1=Culvert (Inlet Controls 2.89 cfs @ 3.68 fps)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 2.58" for 10 YEAR event
Inflow = 3.86 cfs @ 12.13 hrs, Volume= 0.350 af
Outflow = 2.32 cfs @ 12.35 hrs, Volume= 0.349 af, Atten= 40%, Lag= 13.4 min
Primary = 2.32 cfs @ 12.35 hrs, Volume= 0.349 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.48' @ 12.35 hrs Surf.Area= 3,869 sf Storage= 2,757 cf

Plug-Flow detention time= 18.8 min calculated for 0.349 af (100% of inflow)
Center-of-Mass det. time= 16.3 min (848.6 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.32 cfs @ 12.35 hrs HW=326.48' (Free Discharge)
1=Culvert (Barrel Controls 2.32 cfs @ 3.73 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 7P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 2.67" for 10 YEAR event
Inflow = 39.78 cfs @ 12.12 hrs, Volume= 3.081 af
Outflow = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af, Atten= 50%, Lag= 12.9 min
Primary = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 355.39' @ 12.33 hrs Surf.Area= 15,154 sf Storage= 34,144 cf

Plug-Flow detention time= 35.3 min calculated for 3.067 af (100% of inflow)
Center-of-Mass det. time= 33.5 min (863.2 - 829.7)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=19.66 cfs @ 12.33 hrs HW=355.39' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.46 cfs @ 9.49 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 12.21 cfs @ 1.57 fps)

Summary for Pond 8P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 3.10" for 10 YEAR event
Inflow = 17.78 cfs @ 12.17 hrs, Volume= 1.559 af
Outflow = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af, Atten= 62%, Lag= 21.4 min
Primary = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 346.15' @ 12.53 hrs Surf.Area= 11,290 sf Storage= 13,617 cf

Plug-Flow detention time= 12.5 min calculated for 1.556 af (100% of inflow)
Center-of-Mass det. time= 12.3 min (834.8 - 822.5)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=6.71 cfs @ 12.53 hrs HW=346.15' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.71 cfs @ 8.54 fps)
└—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

POSTDEVELOPMENT

Summary for Subcatchment 11S: POSTDEV FLOW FROM PARKING AREA

Runoff = 4.92 cfs @ 12.08 hrs, Volume= 0.396 af, Depth> 4.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 12S: POSTDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 0.68 cfs @ 12.17 hrs, Volume= 0.061 af, Depth> 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
860	74	>75% Grass cover, Good, HSG C
200	61	>75% Grass cover, Good, HSG B
20,125	63	Weighted Average
17,212		85.53% Pervious Area
2,913		14.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 13S: POSTDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 3.61 cfs @ 12.37 hrs, Volume= 0.431 af, Depth> 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
12,321	70	Woods, Good, HSG C
24,459	70	Woods, Good, HSG C
16,779	55	Woods, Good, HSG B
2,590	55	Woods, Good, HSG B
4,373	55	Woods, Good, HSG B
22,514	61	>75% Grass cover, Good, HSG B
19,561	74	>75% Grass cover, Good, HSG C
780	98	Roofs, HSG B
916	61	>75% Grass cover, Good, HSG B
121	55	Woods, Good, HSG B
4,473	74	>75% Grass cover, Good, HSG C
15,520	70	Woods, Good, HSG C
124,407	66	Weighted Average
123,627		99.37% Pervious Area
780		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 14S: OVERLAND FLOW TO ROUTE 9

Runoff = 7.62 cfs @ 12.26 hrs, Volume= 0.789 af, Depth> 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

	Area (sf)	CN	Description
*	48,435	55	Woods, Good, HSG B(-5624 TO PARKING)
	24,068	55	Woods, Good, HSG B
	36,060	70	Woods, Good, HSG C
	33,500	61	>75% Grass cover, Good, HSG B
	1,900	74	>75% Grass cover, Good, HSG C
	42,307	98	Paved parking, HSG B
	2,250	98	Paved parking, HSG B
	4,349	98	Paved parking, HSG C
	665	61	>75% Grass cover, Good, HSG B
	193,534	70	Weighted Average
	144,628		74.73% Pervious Area
	48,906		25.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
18.3	1,366	Total			

Summary for Subcatchment 15S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 1.96 cfs @ 12.09 hrs, Volume= 0.141 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 16S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 2.32 cfs @ 12.18 hrs, Volume= 0.209 af, Depth> 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 17S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 31.84 cfs @ 12.12 hrs, Volume= 2.472 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 18S: POSTDEV FLOW ON EAGLE LEASING

Runoff = 17.78 cfs @ 12.17 hrs, Volume= 1.559 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 19S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 8.29 cfs @ 12.09 hrs, Volume= 0.609 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Subcatchment 25S: FRONT AND BACK PARKING AREAS

Runoff = 6.20 cfs @ 12.23 hrs, Volume= 0.618 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
56,961	98	Paved parking, HSG C
5,900	61	>75% Grass cover, Good, HSG B
14,594	55	Woods, Good, HSG B
15,197	74	>75% Grass cover, Good, HSG C
92,652	85	Weighted Average
35,691		38.52% Pervious Area
56,961		61.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.3	169	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	15	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	134	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.1	368	Total			

Summary for Subcatchment 26S: PARKING AND AISLE AT ENTRANCE

Runoff = 1.35 cfs @ 12.06 hrs, Volume= 0.098 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10 YEAR Rainfall=5.14"

Area (sf)	CN	Description
2,891	74	>75% Grass cover, Good, HSG C
9,207	98	Paved parking, HSG C
12,098	92	Weighted Average
2,891		23.90% Pervious Area
9,207		76.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	41	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	185	0.0560	4.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.3	226	Total			

Summary for Reach 11R: PARKERVILLE ROAD

Inflow Area = 6.717 ac, 38.23% Impervious, Inflow Depth > 2.10" for 10 YEAR event
Inflow = 6.81 cfs @ 12.37 hrs, Volume= 1.173 af
Outflow = 6.81 cfs @ 12.37 hrs, Volume= 1.173 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 14R: ROUTE 9

Inflow Area = 25.964 ac, 27.87% Impervious, Inflow Depth > 2.66" for 10 YEAR event
Inflow = 34.69 cfs @ 12.39 hrs, Volume= 5.761 af
Outflow = 34.69 cfs @ 12.39 hrs, Volume= 5.761 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

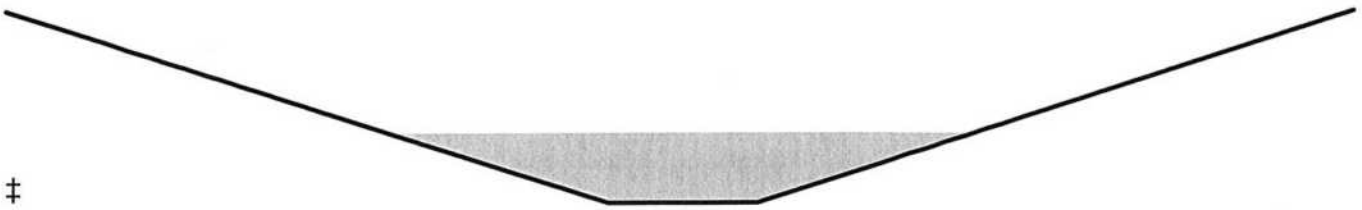
Summary for Reach 17R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 2.66" for 10 YEAR event
Inflow = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af
Outflow = 19.61 cfs @ 12.37 hrs, Volume= 3.069 af, Atten= 1%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 5.50 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 2.60 fps, Avg. Travel Time= 2.5 min

Peak Storage= 1,420 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.73' , Surface Width= 7.82'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'



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Summary for Reach 18R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 3.10" for 10 YEAR event
Inflow = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af
Outflow = 6.71 cfs @ 12.54 hrs, Volume= 1.558 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.56 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.89 fps, Avg. Travel Time= 0.7 min

Peak Storage= 139 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 3.41'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 2.77" for 10 YEAR event
Inflow = 28.52 cfs @ 12.37 hrs, Volume= 4.975 af
Outflow = 28.34 cfs @ 12.40 hrs, Volume= 4.971 af, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 6.81 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 3.20 fps, Avg. Travel Time= 2.0 min

Peak Storage= 1,598 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 13.26'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Reach 26R: FLOW PATH FROM OUTLET TO PARKERVILLE

Inflow Area = 2.405 ac, 63.17% Impervious, Inflow Depth = 1.42" for 10 YEAR event
Inflow = 0.73 cfs @ 12.78 hrs, Volume= 0.285 af
Outflow = 0.73 cfs @ 12.89 hrs, Volume= 0.285 af, Atten= 0%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 4.6 min

Peak Storage= 148 cf @ 12.83 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 8.30'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 232.32 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 46.00'
Length= 360.0' Slope= 0.0375 '/'
Inlet Invert= 318.00', Outlet Invert= 304.50'

‡

Summary for Pond 11P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.456 ac, 70.77% Impervious, Inflow Depth > 3.77" for 10 YEAR event
Inflow = 5.44 cfs @ 12.09 hrs, Volume= 0.458 af
Outflow = 2.91 cfs @ 12.25 hrs, Volume= 0.457 af, Atten= 46%, Lag= 9.4 min
Primary = 2.91 cfs @ 12.25 hrs, Volume= 0.457 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.59' @ 12.25 hrs Surf.Area= 5,074 sf Storage= 2,774 cf

Plug-Flow detention time= 11.0 min calculated for 0.457 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (779.9 - 769.9)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.91 cfs @ 12.25 hrs HW=309.59' (Free Discharge)
1=Culvert (Inlet Controls 2.91 cfs @ 3.71 fps)
2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 15P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 2.58" for 10 YEAR event
Inflow = 3.86 cfs @ 12.13 hrs, Volume= 0.350 af
Outflow = 2.32 cfs @ 12.35 hrs, Volume= 0.349 af, Atten= 40%, Lag= 13.4 min
Primary = 2.32 cfs @ 12.35 hrs, Volume= 0.349 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.48' @ 12.35 hrs Surf.Area= 3,869 sf Storage= 2,757 cf

Plug-Flow detention time= 18.8 min calculated for 0.349 af (100% of inflow)
Center-of-Mass det. time= 16.3 min (848.6 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.32 cfs @ 12.35 hrs HW=326.48' (Free Discharge)
1=Culvert (Barrel Controls 2.32 cfs @ 3.73 fps)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 17P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 2.67" for 10 YEAR event
Inflow = 39.78 cfs @ 12.12 hrs, Volume= 3.081 af
Outflow = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af, Atten= 50%, Lag= 12.9 min
Primary = 19.80 cfs @ 12.33 hrs, Volume= 3.072 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 355.39' @ 12.33 hrs Surf.Area= 15,154 sf Storage= 34,144 cf

Plug-Flow detention time= 35.3 min calculated for 3.067 af (100% of inflow)
Center-of-Mass det. time= 33.5 min (863.2 - 829.7)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=19.66 cfs @ 12.33 hrs HW=355.39' (Free Discharge)
└─**1=Culvert** (Inlet Controls 7.46 cfs @ 9.49 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 12.21 cfs @ 1.57 fps)

Summary for Pond 18P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 3.10" for 10 YEAR event
Inflow = 17.78 cfs @ 12.17 hrs, Volume= 1.559 af
Outflow = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af, Atten= 62%, Lag= 21.4 min
Primary = 6.71 cfs @ 12.53 hrs, Volume= 1.558 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 346.15' @ 12.53 hrs Surf.Area= 11,290 sf Storage= 13,617 cf

Plug-Flow detention time= 12.5 min calculated for 1.556 af (100% of inflow)
Center-of-Mass det. time= 12.3 min (834.8 - 822.5)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=6.71 cfs @ 12.53 hrs HW=346.15' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.71 cfs @ 8.54 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 24P: INFILTRATION STRUCTURE UNDER PARKING

Inflow Area = 2.127 ac, 61.48% Impervious, Inflow Depth > 3.49" for 10 YEAR event
Inflow = 6.20 cfs @ 12.23 hrs, Volume= 0.618 af
Outflow = 0.90 cfs @ 13.08 hrs, Volume= 0.595 af, Atten= 86%, Lag= 51.0 min
Discarded = 0.26 cfs @ 10.48 hrs, Volume= 0.321 af
Primary = 0.64 cfs @ 13.08 hrs, Volume= 0.274 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 325.47' @ 13.08 hrs Surf.Area= 4,656 sf Storage= 11,771 cf

Plug-Flow detention time= 160.0 min calculated for 0.595 af (96% of inflow)
Center-of-Mass det. time= 138.8 min (953.7 - 814.9)

Volume	Invert	Avail.Storage	Storage Description
#1	322.00'	2,966 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,264 cf Overall - 22,848 cf Embedded = 7,416 cf x 40.0% Voids
#2	322.50'	17,021 cf	**retain_it retain_it 5.0'** x 63 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 1,329.9 cf perimeter wall
		19,987 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
322.00	4,656	0	0
328.50	4,656	30,264	30,264

Device	Routing	Invert	Outlet Devices
#1	Discarded	322.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	326.00'	**8.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 326.00' / 319.00' S= 0.3889 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

#3	Primary	323.00'	**4.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 323.00' / 320.00' S= 0.1667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.26 cfs @ 10.48 hrs HW=322.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.64 cfs @ 13.08 hrs HW=325.47' (Free Discharge)
├**2=Culvert** (Controls 0.00 cfs)
└**3=Culvert** (Inlet Controls 0.64 cfs @ 7.30 fps)

Summary for Pond 25P: INFILTRATION NORTH OF FLAG B24

Inflow Area =	0.278 ac, 76.10% Impervious, Inflow Depth > 4.22"		for 10 YEAR event	
Inflow =	1.35 cfs @	12.06 hrs, Volume=	0.098 af	
Outflow =	0.16 cfs @	12.62 hrs, Volume=	0.076 af,	Atten= 88%, Lag= 33.5 min
Discarded =	0.05 cfs @	10.04 hrs, Volume=	0.065 af	
Primary =	0.11 cfs @	12.62 hrs, Volume=	0.011 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 321.20' @ 12.62 hrs Surf.Area= 880 sf Storage= 1,911 cf

Plug-Flow detention time= 232.1 min calculated for 0.076 af (78% of inflow)
Center-of-Mass det. time= 153.0 min (933.0 - 780.0)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	821 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 4,400 cf Overall - 2,347 cf Embedded = 2,053 cf x 40.0% Voids
#2	318.50'	1,640 cf	**retain_it retain_it 3.0'** x 10 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 66.1 cf perimeter wall
		2,461 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
318.00	880	0	0
323.00	880	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 321.00' / 317.50' S= 0.1029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 10.04 hrs HW=318.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.11 cfs @ 12.62 hrs HW=321.20' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.11 cfs @ 1.52 fps)

25 YEAR STORM

PREDEVELOPMENT

Summary for Subcatchment 1S: PREDEV FLOW FROM PARKING AREA

Runoff = 6.03 cfs @ 12.08 hrs, Volume= 0.490 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 2S: PREDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 0.95 cfs @ 12.16 hrs, Volume= 0.083 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
19,065	62	Weighted Average
16,152		84.72% Pervious Area
2,913		15.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 3S: PREDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 9.32 cfs @ 12.36 hrs, Volume= 1.092 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
144,569	70	Woods, Good, HSG C
63,690	55	Woods, Good, HSG B
16,200	61	>75% Grass cover, Good, HSG B
780	98	Roofs, HSG B
225,239	65	Weighted Average
224,459		99.65% Pervious Area
780		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 4S: OVERLAND FLOW TO ROUTE 9

Runoff = 11.20 cfs @ 12.26 hrs, Volume= 1.143 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
54,059	55	Woods, Good, HSG B
24,068	55	Woods, Good, HSG B
36,060	70	Woods, Good, HSG C
33,500	61	>75% Grass cover, Good, HSG B
1,900	74	>75% Grass cover, Good, HSG C
42,307	98	Paved parking, HSG B
2,250	98	Paved parking, HSG B
4,349	98	Paved parking, HSG C
198,493	70	Weighted Average
149,587		75.36% Pervious Area
48,906		24.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides

18.3 1,366 Total

Summary for Subcatchment 5S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 2.54 cfs @ 12.09 hrs, Volume= 0.185 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 6S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 3.31 cfs @ 12.18 hrs, Volume= 0.293 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 7S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 42.58 cfs @ 12.12 hrs, Volume= 3.317 af, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 8S: PREDEV FLOW ON EAGLE LEASING

Runoff = 23.50 cfs @ 12.17 hrs, Volume= 2.071 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 9S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 12.06 cfs @ 12.09 hrs, Volume= 0.871 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Reach 1R: PARKERVILLE ROAD

Inflow Area = 6.603 ac, 15.88% Impervious, Inflow Depth > 3.02" for 25 YEAR event
Inflow = 12.61 cfs @ 12.35 hrs, Volume= 1.664 af
Outflow = 12.61 cfs @ 12.35 hrs, Volume= 1.664 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 4R: ROUTE 9

Inflow Area = 26.078 ac, 27.75% Impervious, Inflow Depth > 3.62" for 25 YEAR event
Inflow = 57.74 cfs @ 12.29 hrs, Volume= 7.857 af
Outflow = 57.74 cfs @ 12.29 hrs, Volume= 7.857 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

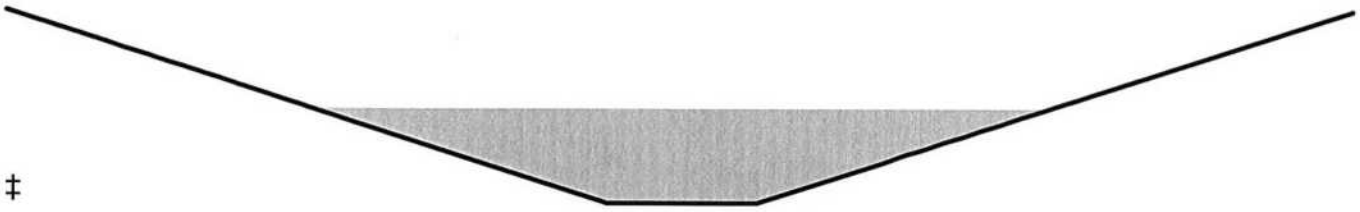
Summary for Reach 7R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 3.62" for 25 YEAR event
Inflow = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af
Outflow = 37.57 cfs @ 12.26 hrs, Volume= 4.172 af, Atten= 2%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 6.51 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 2.4 min

Peak Storage= 2,298 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.98' , Surface Width= 9.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'



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Summary for Reach 8R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 4.12" for 25 YEAR event
Inflow = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af
Outflow = 7.31 cfs @ 12.59 hrs, Volume= 2.070 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.74 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 4.17 fps, Avg. Travel Time= 0.6 min

Peak Storage= 148 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.42' , Surface Width= 3.51'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

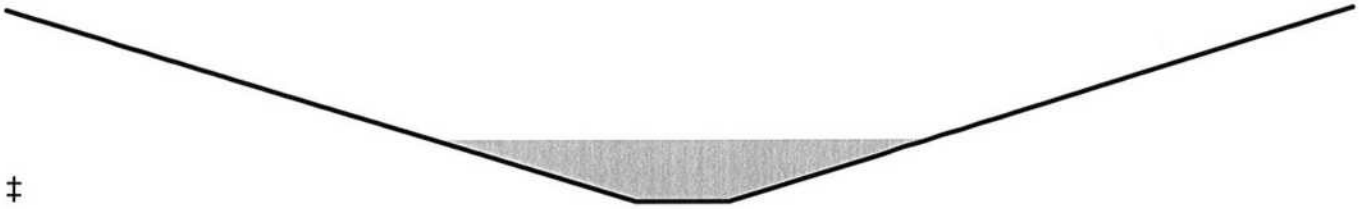
Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 3.75" for 25 YEAR event
Inflow = 47.36 cfs @ 12.26 hrs, Volume= 6.719 af
Outflow = 46.70 cfs @ 12.29 hrs, Volume= 6.714 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.75 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 3.41 fps, Avg. Travel Time= 1.9 min

Peak Storage= 2,319 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 15.85'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'



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Summary for Pond 1P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.432 ac, 71.98% Impervious, Inflow Depth > 4.80" for 25 YEAR event
Inflow = 6.77 cfs @ 12.09 hrs, Volume= 0.573 af
Outflow = 3.32 cfs @ 12.27 hrs, Volume= 0.572 af, Atten= 51%, Lag= 11.1 min
Primary = 3.32 cfs @ 12.27 hrs, Volume= 0.572 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.77' @ 12.27 hrs Surf.Area= 5,904 sf Storage= 3,757 cf

Plug-Flow detention time= 11.9 min calculated for 0.572 af (100% of inflow)
Center-of-Mass det. time= 10.9 min (777.3 - 766.4)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.32 cfs @ 12.27 hrs HW=309.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.32 cfs @ 4.23 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 3.52" for 25 YEAR event
Inflow = 5.29 cfs @ 12.13 hrs, Volume= 0.478 af
Outflow = 3.04 cfs @ 12.36 hrs, Volume= 0.476 af, Atten= 43%, Lag= 14.0 min
Primary = 3.04 cfs @ 12.36 hrs, Volume= 0.476 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.77' @ 12.36 hrs Surf.Area= 3,969 sf Storage= 3,867 cf

Plug-Flow detention time= 19.2 min calculated for 0.476 af (100% of inflow)
Center-of-Mass det. time= 16.7 min (840.8 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.04 cfs @ 12.36 hrs HW=326.77' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.04 cfs @ 3.94 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 7P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 3.63" for 25 YEAR event
Inflow = 54.09 cfs @ 12.11 hrs, Volume= 4.188 af
Outflow = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af, Atten= 29%, Lag= 6.3 min
Primary = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 355.68' @ 12.22 hrs Surf.Area= 16,553 sf Storage= 38,816 cf

Plug-Flow detention time= 32.7 min calculated for 4.169 af (100% of inflow)
Center-of-Mass det. time= 30.9 min (852.1 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=37.43 cfs @ 12.22 hrs HW=355.67' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.73 cfs @ 9.84 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 29.70 cfs @ 2.20 fps)

Summary for Pond 8P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 4.12" for 25 YEAR event
Inflow = 23.50 cfs @ 12.17 hrs, Volume= 2.071 af
Outflow = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af, Atten= 69%, Lag= 24.4 min
Primary = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 346.74' @ 12.58 hrs Surf.Area= 15,568 sf Storage= 21,543 cf

Plug-Flow detention time= 18.9 min calculated for 2.067 af (100% of inflow)
Center-of-Mass det. time= 18.7 min (833.1 - 814.4)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=7.31 cfs @ 12.58 hrs HW=346.74' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.31 cfs @ 9.31 fps)
└—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

POSTDEVELOPMENT

Summary for Subcatchment 11S: POSTDEV FLOW FROM PARKING AREA

Runoff = 6.03 cfs @ 12.08 hrs, Volume= 0.490 af, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 12S: POSTDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 1.05 cfs @ 12.16 hrs, Volume= 0.091 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
860	74	>75% Grass cover, Good, HSG C
200	61	>75% Grass cover, Good, HSG B
20,125	63	Weighted Average
17,212		85.53% Pervious Area
2,913		14.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 13S: POSTDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 5.36 cfs @ 12.36 hrs, Volume= 0.625 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
12,321	70	Woods, Good, HSG C
24,459	70	Woods, Good, HSG C
16,779	55	Woods, Good, HSG B
2,590	55	Woods, Good, HSG B
4,373	55	Woods, Good, HSG B
22,514	61	>75% Grass cover, Good, HSG B
19,561	74	>75% Grass cover, Good, HSG C
780	98	Roofs, HSG B
916	61	>75% Grass cover, Good, HSG B
121	55	Woods, Good, HSG B
4,473	74	>75% Grass cover, Good, HSG C
15,520	70	Woods, Good, HSG C
124,407	66	Weighted Average
123,627		99.37% Pervious Area
780		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 14S: OVERLAND FLOW TO ROUTE 9

Runoff = 10.92 cfs @ 12.26 hrs, Volume= 1.114 af, Depth> 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

	Area (sf)	CN	Description
*	48,435	55	Woods, Good, HSG B(-5624 TO PARKING)
	24,068	55	Woods, Good, HSG B
	36,060	70	Woods, Good, HSG C
	33,500	61	>75% Grass cover, Good, HSG B
	1,900	74	>75% Grass cover, Good, HSG C
	42,307	98	Paved parking, HSG B
	2,250	98	Paved parking, HSG B
	4,349	98	Paved parking, HSG C
	665	61	>75% Grass cover, Good, HSG B
	193,534	70	Weighted Average
	144,628		74.73% Pervious Area
	48,906		25.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
18.3	1,366	Total			

Summary for Subcatchment 15S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 2.54 cfs @ 12.09 hrs, Volume= 0.185 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 16S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 3.31 cfs @ 12.18 hrs, Volume= 0.293 af, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 17S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 42.58 cfs @ 12.12 hrs, Volume= 3.317 af, Depth> 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 18S: POSTDEV FLOW ON EAGLE LEASING

Runoff = 23.50 cfs @ 12.17 hrs, Volume= 2.071 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 19S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 12.06 cfs @ 12.09 hrs, Volume= 0.871 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Subcatchment 25S: FRONT AND BACK PARKING AREAS

Runoff = 8.01 cfs @ 12.23 hrs, Volume= 0.806 af, Depth> 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
56,961	98	Paved parking, HSG C
5,900	61	>75% Grass cover, Good, HSG B
14,594	55	Woods, Good, HSG B
15,197	74	>75% Grass cover, Good, HSG C
92,652	85	Weighted Average
35,691		38.52% Pervious Area
56,961		61.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.3	169	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	15	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	134	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.1	368	Total			

Summary for Subcatchment 26S: PARKING AND AISLE AT ENTRANCE

Runoff = 1.69 cfs @ 12.06 hrs, Volume= 0.123 af, Depth> 5.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25 YEAR Rainfall=6.27"

Area (sf)	CN	Description
2,891	74	>75% Grass cover, Good, HSG C
9,207	98	Paved parking, HSG C
12,098	92	Weighted Average
2,891		23.90% Pervious Area
9,207		76.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	41	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	185	0.0560	4.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.3	226	Total			

Summary for Reach 11R: PARKERVILLE ROAD

Inflow Area = 6.717 ac, 38.23% Impervious, Inflow Depth > 2.96" for 25 YEAR event
Inflow = 9.64 cfs @ 12.37 hrs, Volume= 1.658 af
Outflow = 9.64 cfs @ 12.37 hrs, Volume= 1.658 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 14R: ROUTE 9

Inflow Area = 25.964 ac, 27.87% Impervious, Inflow Depth > 3.62" for 25 YEAR event
Inflow = 57.46 cfs @ 12.29 hrs, Volume= 7.828 af
Outflow = 57.46 cfs @ 12.29 hrs, Volume= 7.828 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

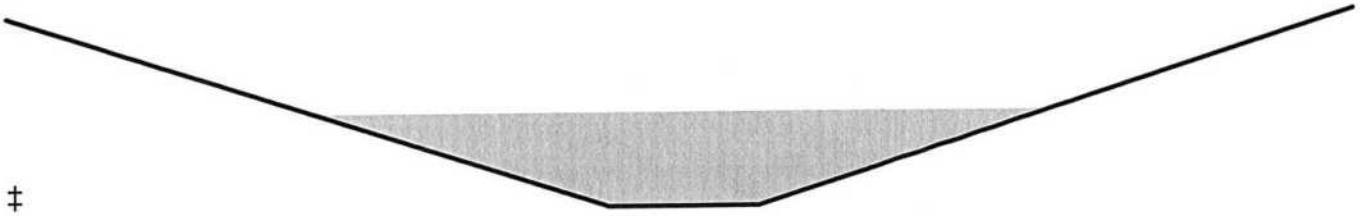
Summary for Reach 17R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 3.62" for 25 YEAR event
Inflow = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af
Outflow = 37.57 cfs @ 12.26 hrs, Volume= 4.172 af, Atten= 2%, Lag= 2.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 6.51 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 2.4 min

Peak Storage= 2,298 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.98' , Surface Width= 9.83'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'



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Summary for Reach 18R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 4.12" for 25 YEAR event
Inflow = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af
Outflow = 7.31 cfs @ 12.59 hrs, Volume= 2.070 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.74 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 4.17 fps, Avg. Travel Time= 0.6 min

Peak Storage= 148 cf @ 12.58 hrs
Average Depth at Peak Storage= 0.42' , Surface Width= 3.51'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 3.75" for 25 YEAR event
Inflow = 47.36 cfs @ 12.26 hrs, Volume= 6.719 af
Outflow = 46.70 cfs @ 12.29 hrs, Volume= 6.714 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.75 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 3.41 fps, Avg. Travel Time= 1.9 min

Peak Storage= 2,319 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 15.85'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Reach 26R: FLOW PATH FROM OUTLET TO PARKERVILLE

Inflow Area = 2.405 ac, 63.17% Impervious, Inflow Depth = 2.26" for 25 YEAR event
Inflow = 1.55 cfs @ 12.80 hrs, Volume= 0.453 af
Outflow = 1.54 cfs @ 12.88 hrs, Volume= 0.453 af, Atten= 0%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 4.3 min

Peak Storage= 246 cf @ 12.83 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 9.52'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 232.32 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 46.00'
Length= 360.0' Slope= 0.0375 '/'
Inlet Invert= 318.00', Outlet Invert= 304.50'

‡

Summary for Pond 11P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.456 ac, 70.77% Impervious, Inflow Depth > 4.78" for 25 YEAR event
Inflow = 6.85 cfs @ 12.09 hrs, Volume= 0.581 af
Outflow = 3.35 cfs @ 12.28 hrs, Volume= 0.580 af, Atten= 51%, Lag= 11.3 min
Primary = 3.35 cfs @ 12.28 hrs, Volume= 0.580 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 309.79' @ 12.28 hrs Surf.Area= 5,966 sf Storage= 3,836 cf

Plug-Flow detention time= 12.0 min calculated for 0.580 af (100% of inflow)
Center-of-Mass det. time= 11.0 min (778.3 - 767.3)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.35 cfs @ 12.28 hrs HW=309.79' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 3.35 cfs @ 4.27 fps)
└—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 3.52" for 25 YEAR event
Inflow = 5.29 cfs @ 12.13 hrs, Volume= 0.478 af
Outflow = 3.04 cfs @ 12.36 hrs, Volume= 0.476 af, Atten= 43%, Lag= 14.0 min
Primary = 3.04 cfs @ 12.36 hrs, Volume= 0.476 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.77' @ 12.36 hrs Surf.Area= 3,969 sf Storage= 3,867 cf

Plug-Flow detention time= 19.2 min calculated for 0.476 af (100% of inflow)
Center-of-Mass det. time= 16.7 min (840.8 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.04 cfs @ 12.36 hrs HW=326.77' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 3.04 cfs @ 3.94 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 3.63" for 25 YEAR event
Inflow = 54.09 cfs @ 12.11 hrs, Volume= 4.188 af
Outflow = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af, Atten= 29%, Lag= 6.3 min
Primary = 38.15 cfs @ 12.22 hrs, Volume= 4.176 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 355.68' @ 12.22 hrs Surf.Area= 16,553 sf Storage= 38,816 cf

Plug-Flow detention time= 32.7 min calculated for 4.169 af (100% of inflow)
Center-of-Mass det. time= 30.9 min (852.1 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=37.43 cfs @ 12.22 hrs HW=355.67' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.73 cfs @ 9.84 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 29.70 cfs @ 2.20 fps)

Summary for Pond 18P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 4.12" for 25 YEAR event
Inflow = 23.50 cfs @ 12.17 hrs, Volume= 2.071 af
Outflow = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af, Atten= 69%, Lag= 24.4 min
Primary = 7.31 cfs @ 12.58 hrs, Volume= 2.070 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 346.74' @ 12.58 hrs Surf.Area= 15,568 sf Storage= 21,543 cf

Plug-Flow detention time= 18.9 min calculated for 2.067 af (100% of inflow)
Center-of-Mass det. time= 18.7 min (833.1 - 814.4)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=7.31 cfs @ 12.58 hrs HW=346.74' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.31 cfs @ 9.31 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 24P: INFILTRATION STRUCTURE UNDER PARKING

Inflow Area = 2.127 ac, 61.48% Impervious, Inflow Depth > 4.55" for 25 YEAR event
Inflow = 8.01 cfs @ 12.23 hrs, Volume= 0.806 af
Outflow = 1.64 cfs @ 12.84 hrs, Volume= 0.760 af, Atten= 79%, Lag= 36.4 min
Discarded = 0.26 cfs @ 9.76 hrs, Volume= 0.337 af
Primary = 1.38 cfs @ 12.84 hrs, Volume= 0.423 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 326.47' @ 12.84 hrs Surf.Area= 4,656 sf Storage= 15,447 cf

Plug-Flow detention time= 167.2 min calculated for 0.760 af (94% of inflow)
Center-of-Mass det. time= 136.8 min (944.3 - 807.5)

Volume	Invert	Avail.Storage	Storage Description
#1	322.00'	2,966 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,264 cf Overall - 22,848 cf Embedded = 7,416 cf x 40.0% Voids
#2	322.50'	17,021 cf	**retain_it retain_it 5.0'** x 63 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 1,329.9 cf perimeter wall
		19,987 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
322.00	4,656	0	0
328.50	4,656	30,264	30,264

Device	Routing	Invert	Outlet Devices
#1	Discarded	322.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	326.00'	**8.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 326.00' / 319.00' S= 0.3889 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

#3	Primary	323.00'	**4.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 323.00' / 320.00' S= 0.1667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.26 cfs @ 9.76 hrs HW=322.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=1.38 cfs @ 12.84 hrs HW=326.47' (Free Discharge)
├**2=Culvert** (Inlet Controls 0.62 cfs @ 2.34 fps)
└**3=Culvert** (Inlet Controls 0.76 cfs @ 8.75 fps)

Summary for Pond 25P: INFILTRATION NORTH OF FLAG B24

Inflow Area =	0.278 ac, 76.10% Impervious, Inflow Depth > 5.33"	for 25 YEAR event		
Inflow =	1.69 cfs @	12.06 hrs, Volume=	0.123 af	
Outflow =	0.51 cfs @	12.36 hrs, Volume=	0.098 af, Atten= 70%, Lag= 18.0 min	
Discarded =	0.05 cfs @	9.32 hrs, Volume=	0.068 af	
Primary =	0.46 cfs @	12.36 hrs, Volume=	0.030 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 321.49' @ 12.36 hrs Surf.Area= 880 sf Storage= 2,096 cf

Plug-Flow detention time= 187.1 min calculated for 0.098 af (79% of inflow)
Center-of-Mass det. time= 111.7 min (885.6 - 774.0)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	821 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 4,400 cf Overall - 2,347 cf Embedded = 2,053 cf x 40.0% Voids
#2	318.50'	1,640 cf	**retain_it retain_it 3.0'** x 10 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 66.1 cf perimeter wall
		2,461 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
318.00	880	0	0
323.00	880	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 321.00' / 317.50' S= 0.1029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 9.32 hrs HW=318.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.46 cfs @ 12.36 hrs HW=321.49' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.46 cfs @ 2.37 fps)

100 YEAR STORM

PREDEVELOPMENT

Summary for Subcatchment 1S: PREDEV FLOW FROM PARKING AREA

Runoff = 7.73 cfs @ 12.08 hrs, Volume= 0.634 af, Depth> 7.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 2S: PREDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 1.52 cfs @ 12.16 hrs, Volume= 0.130 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
19,065	62	Weighted Average
16,152		84.72% Pervious Area
2,913		15.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 3S: PREDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 14.51 cfs @ 12.35 hrs, Volume= 1.673 af, Depth> 3.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
144,569	70	Woods, Good, HSG C
63,690	55	Woods, Good, HSG B
16,200	61	>75% Grass cover, Good, HSG B
780	98	Roofs, HSG B
225,239	65	Weighted Average
224,459		99.65% Pervious Area
780		0.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 4S: OVERLAND FLOW TO ROUTE 9

Runoff = 16.69 cfs @ 12.25 hrs, Volume= 1.693 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
54,059	55	Woods, Good, HSG B
24,068	55	Woods, Good, HSG B
36,060	70	Woods, Good, HSG C
33,500	61	>75% Grass cover, Good, HSG B
1,900	74	>75% Grass cover, Good, HSG C
42,307	98	Paved parking, HSG B
2,250	98	Paved parking, HSG B
4,349	98	Paved parking, HSG C
198,493	70	Weighted Average
149,587		75.36% Pervious Area
48,906		24.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides

18.3 1,366 Total

Summary for Subcatchment 5S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 3.43 cfs @ 12.09 hrs, Volume= 0.254 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 6S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 4.88 cfs @ 12.18 hrs, Volume= 0.431 af, Depth> 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 7S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 59.36 cfs @ 12.12 hrs, Volume= 4.667 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 8S: PREDEV FLOW ON EAGLE LEASING

Runoff = 32.38 cfs @ 12.17 hrs, Volume= 2.884 af, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 9S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 18.23 cfs @ 12.09 hrs, Volume= 1.306 af, Depth> 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Reach 1R: PARKERVILLE ROAD

Inflow Area = 6.603 ac, 15.88% Impervious, Inflow Depth > 4.42" for 100 YEAR event
Inflow = 18.40 cfs @ 12.35 hrs, Volume= 2.435 af
Outflow = 18.40 cfs @ 12.35 hrs, Volume= 2.435 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 4R: ROUTE 9

Inflow Area = 26.078 ac, 27.75% Impervious, Inflow Depth > 5.16" for 100 YEAR event
Inflow = 92.67 cfs @ 12.22 hrs, Volume= 11.205 af
Outflow = 92.67 cfs @ 12.22 hrs, Volume= 11.205 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 7R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 5.16" for 100 YEAR event
Inflow = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af
Outflow = 67.27 cfs @ 12.19 hrs, Volume= 5.952 af, Atten= 10%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.61 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 2.2 min

Peak Storage= 3,662 cf @ 12.17 hrs
Average Depth at Peak Storage= 1.29' , Surface Width= 12.32'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'

‡

Summary for Reach 8R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 5.74" for 100 YEAR event
Inflow = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af
Outflow = 13.65 cfs @ 12.49 hrs, Volume= 2.883 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 9.10 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 4.50 fps, Avg. Travel Time= 0.6 min

Peak Storage= 236 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 4.36'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 5.31" for 100 YEAR event
Inflow = 77.89 cfs @ 12.19 hrs, Volume= 9.518 af
Outflow = 76.38 cfs @ 12.22 hrs, Volume= 9.512 af, Atten= 2%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 8.82 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.69 fps, Avg. Travel Time= 1.7 min

Peak Storage= 3,385 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.80' , Surface Width= 19.04'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Pond 1P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.432 ac, 71.98% Impervious, Inflow Depth > 6.40" for 100 YEAR event
Inflow = 8.95 cfs @ 12.09 hrs, Volume= 0.763 af
Outflow = 3.89 cfs @ 12.32 hrs, Volume= 0.762 af, Atten= 57%, Lag= 13.9 min
Primary = 3.89 cfs @ 12.32 hrs, Volume= 0.762 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 310.06' @ 12.32 hrs Surf.Area= 6,999 sf Storage= 5,636 cf

Plug-Flow detention time= 13.6 min calculated for 0.762 af (100% of inflow)
Center-of-Mass det. time= 12.6 min (776.0 - 763.4)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.89 cfs @ 12.32 hrs HW=310.06' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.89 cfs @ 4.96 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 5.04" for 100 YEAR event
Inflow = 7.56 cfs @ 12.13 hrs, Volume= 0.685 af
Outflow = 4.02 cfs @ 12.38 hrs, Volume= 0.683 af, Atten= 47%, Lag= 15.3 min
Primary = 4.02 cfs @ 12.38 hrs, Volume= 0.683 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 327.28' @ 12.38 hrs Surf.Area= 4,147 sf Storage= 5,932 cf

Plug-Flow detention time= 20.3 min calculated for 0.683 af (100% of inflow)
Center-of-Mass det. time= 18.0 min (832.5 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.02 cfs @ 12.38 hrs HW=327.27' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.02 cfs @ 5.12 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 7P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 5.17" for 100 YEAR event
Inflow = 76.71 cfs @ 12.11 hrs, Volume= 5.973 af
Outflow = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af, Atten= 3%, Lag= 2.9 min
Primary = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 356.15' @ 12.16 hrs Surf.Area= 18,050 sf Storage= 44,275 cf

Plug-Flow detention time= 30.6 min calculated for 5.947 af (100% of inflow)
Center-of-Mass det. time= 28.8 min (840.1 - 811.3)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=73.98 cfs @ 12.16 hrs HW=356.15' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 8.15 cfs @ 10.38 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 65.83 cfs @ 2.86 fps)

Summary for Pond 8P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 5.74" for 100 YEAR event
Inflow = 32.38 cfs @ 12.17 hrs, Volume= 2.884 af
Outflow = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af, Atten= 58%, Lag= 18.8 min
Primary = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 347.28' @ 12.48 hrs Surf.Area= 19,484 sf Storage= 31,008 cf

Plug-Flow detention time= 23.4 min calculated for 2.879 af (100% of inflow)
Center-of-Mass det. time= 23.2 min (828.4 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=13.66 cfs @ 12.48 hrs HW=347.28' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.82 cfs @ 9.96 fps)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.84 cfs @ 1.74 fps)

POSTDEVELOPMENT

Summary for Subcatchment 11S: POSTDEV FLOW FROM PARKING AREA

Runoff = 7.73 cfs @ 12.08 hrs, Volume= 0.634 af, Depth> 7.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
41,985	98	Paved parking, HSG B
280	74	>75% Grass cover, Good, HSG C
1,049	61	>75% Grass cover, Good, HSG B
43,314	97	Weighted Average
1,329		3.07% Pervious Area
41,985		96.93% Impervious Area

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

Summary for Subcatchment 12S: POSTDEV OVERLAND FLOW TO DETENTION BASIN

Runoff = 1.66 cfs @ 12.16 hrs, Volume= 0.141 af, Depth> 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
2,913	98	Water Surface, HSG B
1,161	70	Woods, Good, HSG C
14,991	55	Woods, Good, HSG B
860	74	>75% Grass cover, Good, HSG C
200	61	>75% Grass cover, Good, HSG B
20,125	63	Weighted Average
17,212		85.53% Pervious Area
2,913		14.47% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	58	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	108	Total			

Summary for Subcatchment 13S: POSTDEV OVERLAND FLOW TO PARKERVILLE ROAD

Runoff = 8.26 cfs @ 12.35 hrs, Volume= 0.951 af, Depth> 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
12,321	70	Woods, Good, HSG C
24,459	70	Woods, Good, HSG C
16,779	55	Woods, Good, HSG B
2,590	55	Woods, Good, HSG B
4,373	55	Woods, Good, HSG B
22,514	61	>75% Grass cover, Good, HSG B
19,561	74	>75% Grass cover, Good, HSG C
780	98	Roofs, HSG B
916	61	>75% Grass cover, Good, HSG B
121	55	Woods, Good, HSG B
4,473	74	>75% Grass cover, Good, HSG C
15,520	70	Woods, Good, HSG C
124,407	66	Weighted Average
123,627		99.37% Pervious Area
780		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.9	754	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	243	0.0370	4.76	57.07	**Channel Flow, 2' WIDE BOTTOM, 10:1 SIDE SLOPES,1'DEEP** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
24.6	1,047	Total			

Summary for Subcatchment 14S: OVERLAND FLOW TO ROUTE 9

Runoff = 16.27 cfs @ 12.25 hrs, Volume= 1.650 af, Depth> 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

	Area (sf)	CN	Description
*	48,435	55	Woods, Good, HSG B(-5624 TO PARKING)
	24,068	55	Woods, Good, HSG B
	36,060	70	Woods, Good, HSG C
	33,500	61	>75% Grass cover, Good, HSG B
	1,900	74	>75% Grass cover, Good, HSG C
	42,307	98	Paved parking, HSG B
	2,250	98	Paved parking, HSG B
	4,349	98	Paved parking, HSG C
	665	61	>75% Grass cover, Good, HSG B
	193,534	70	Weighted Average
	144,628		74.73% Pervious Area
	48,906		25.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
1.1	242	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
9.1	709	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.9	365	0.0160	3.13	37.53	**Channel Flow,** Area= 12.0 sf Perim= 22.1' r= 0.54' n= 0.040 Earth, cobble bottom, clean sides
18.3	1,366	Total			

Summary for Subcatchment 15S: DRAINAGE COLLECTED BY CB'S SW OF SELF STORAGE BUILDING

Runoff = 3.43 cfs @ 12.09 hrs, Volume= 0.254 af, Depth> 6.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
6,345	61	>75% Grass cover, Good, HSG B
3,301	74	>75% Grass cover, Good, HSG C
6,254	98	Paved parking, HSG B
5,860	98	Paved parking, HSG C
21,760	84	Weighted Average
9,646		44.33% Pervious Area
12,114		55.67% Impervious Area

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

Summary for Subcatchment 16S: OVERLAND FLOW TO EXISTING DETENTION BASIN

Runoff = 4.88 cfs @ 12.18 hrs, Volume= 0.431 af, Depth> 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
46,762	70	Woods, Good, HSG C
2,500	98	Water Surface, HSG C
49,262	71	Weighted Average
46,762		94.93% Pervious Area
2,500		5.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0450	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	324	0.0800	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.7	374	Total			

Summary for Subcatchment 17S: RUNOFF COLLECTED BY SARSEN STONE WAY

Runoff = 59.36 cfs @ 12.12 hrs, Volume= 4.667 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
317,393	84	1 acre lots, 20% imp, HSG D
125,360	68	1 acre lots, 20% imp, HSG B
442,753	79	Weighted Average
354,202		80.00% Pervious Area
88,551		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
2.0	214	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	175	0.1000	4.74		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.5	210	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	649	Total			

Summary for Subcatchment 18S: POSTDEV FLOW ON EAGLE LEASING

Runoff = 32.38 cfs @ 12.17 hrs, Volume= 2.884 af, Depth> 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
24,658	98	Paved parking, HSG B
8,220	61	>75% Grass cover, Good, HSG B
104,681	98	Paved parking, HSG C
34,894	74	>75% Grass cover, Good, HSG C
235	98	Paved parking, HSG D
6,197	80	>75% Grass cover, Good, HSG D
30,530	61	>75% Grass cover, Good, HSG B
5,140	98	Paved parking, HSG B
48,076	55	Woods, Good, HSG B
262,631	81	Weighted Average
127,917		48.71% Pervious Area
134,714		51.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0600	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
4.2	413	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.9	360	0.0440	2.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
12.4	823	Total			

Summary for Subcatchment 19S: OVERLAND FLOW TO DET BASIN BEHIND 5 & 7 SARSEN STONE

Runoff = 18.23 cfs @ 12.09 hrs, Volume= 1.306 af, Depth> 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
20,407	70	Woods, Good, HSG C
3,300	98	Water Surface, HSG B
36,775	55	Woods, Good, HSG B
13,560	85	1/2 acre lots, 25% imp, HSG D
87,016	70	1/2 acre lots, 25% imp, HSG B
161,058	68	Weighted Average
132,614		82.34% Pervious Area
28,444		17.66% Impervious Area

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

Summary for Subcatchment 25S: FRONT AND BACK PARKING AREAS

Runoff = 10.79 cfs @ 12.23 hrs, Volume= 1.100 af, Depth> 6.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
56,961	98	Paved parking, HSG C
5,900	61	>75% Grass cover, Good, HSG B
14,594	55	Woods, Good, HSG B
15,197	74	>75% Grass cover, Good, HSG C
92,652	85	Weighted Average
35,691		38.52% Pervious Area
56,961		61.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	50	0.0600	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.20"
2.3	169	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.1	15	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	134	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
17.1	368	Total			

Summary for Subcatchment 26S: PARKING AND AISLE AT ENTRANCE

Runoff = 2.19 cfs @ 12.06 hrs, Volume= 0.163 af, Depth> 7.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100 YEAR Rainfall=8.01"

Area (sf)	CN	Description
2,891	74	>75% Grass cover, Good, HSG C
9,207	98	Paved parking, HSG C
12,098	92	Weighted Average
2,891		23.90% Pervious Area
9,207		76.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	41	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.20"
0.6	185	0.0560	4.80		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.3	226	Total			

Summary for Reach 11R: PARKERVILLE ROAD

Inflow Area = 6.717 ac, 38.23% Impervious, Inflow Depth > 4.41" for 100 YEAR event
Inflow = 14.63 cfs @ 12.41 hrs, Volume= 2.466 af
Outflow = 14.63 cfs @ 12.41 hrs, Volume= 2.466 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

Summary for Reach 14R: ROUTE 9

Inflow Area = 25.964 ac, 27.87% Impervious, Inflow Depth > 5.16" for 100 YEAR event
Inflow = 92.27 cfs @ 12.22 hrs, Volume= 11.163 af
Outflow = 92.27 cfs @ 12.22 hrs, Volume= 11.163 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs

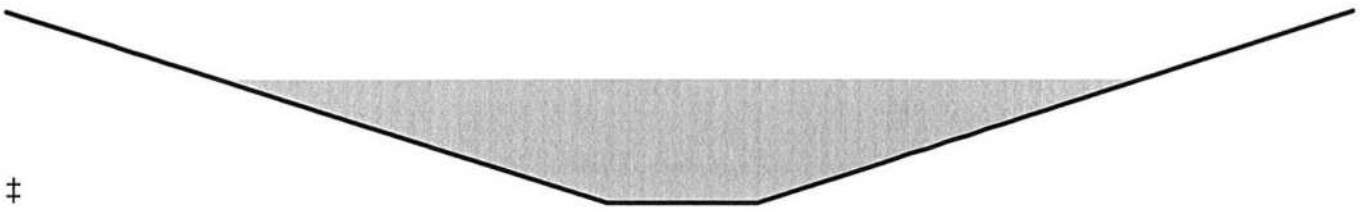
Summary for Reach 17R: FLOW PATH FROM SARSEN STONE BASIN TO OUTLET OF BASIN ON SITE

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 5.16" for 100 YEAR event
Inflow = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af
Outflow = 67.27 cfs @ 12.19 hrs, Volume= 5.952 af, Atten= 10%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 7.61 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 2.2 min

Peak Storage= 3,662 cf @ 12.17 hrs
Average Depth at Peak Storage= 1.29' , Surface Width= 12.32'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 198.41 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 397.0' Slope= 0.0642 '/'
Inlet Invert= 349.00', Outlet Invert= 323.50'



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Summary for Reach 18R: FLOW PATH FROM EAGLE LEASING BASIN TO DET BASIN ON SITE

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 5.74" for 100 YEAR event
Inflow = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af
Outflow = 13.65 cfs @ 12.49 hrs, Volume= 2.883 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 9.10 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 4.50 fps, Avg. Travel Time= 0.6 min

Peak Storage= 236 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 4.36'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 271.03 cfs

1.00' x 2.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 3.0 '/' Top Width= 13.00'
Length= 157.0' Slope= 0.1025 '/'
Inlet Invert= 342.10', Outlet Invert= 326.00'

Summary for Reach 22R: FLOW PATH FROM BASIN OUTLET TO ROUTE 9

Inflow Area = 21.521 ac, 28.41% Impervious, Inflow Depth > 5.31" for 100 YEAR event
Inflow = 77.89 cfs @ 12.19 hrs, Volume= 9.518 af
Outflow = 76.38 cfs @ 12.22 hrs, Volume= 9.512 af, Atten= 2%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 8.82 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.69 fps, Avg. Travel Time= 1.7 min

Peak Storage= 3,385 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.80' , Surface Width= 19.04'
Bank-Full Depth= 2.00' Flow Area= 46.0 sf, Capacity= 707.92 cfs

3.00' x 2.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 10.0 '/' Top Width= 43.00'
Length= 383.0' Slope= 0.0888 '/'
Inlet Invert= 349.00', Outlet Invert= 315.00'

‡

Summary for Reach 26R: FLOW PATH FROM OUTLET TO PARKERVILLE

Inflow Area = 2.405 ac, 63.17% Impervious, Inflow Depth = 3.70" for 100 YEAR event
Inflow = 3.68 cfs @ 12.60 hrs, Volume= 0.742 af
Outflow = 3.66 cfs @ 12.68 hrs, Volume= 0.742 af, Atten= 0%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Max. Velocity= 2.95 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.53 fps, Avg. Travel Time= 3.9 min

Peak Storage= 448 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 11.64'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 232.32 cfs

6.00' x 1.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 20.0 '/' Top Width= 46.00'
Length= 360.0' Slope= 0.0375 '/'
Inlet Invert= 318.00', Outlet Invert= 304.50'

‡

Summary for Pond 11P: EXISTING DETENTION BASIN NEAR PARKERVILLE ROAD

Inflow Area = 1.456 ac, 70.77% Impervious, Inflow Depth > 6.38" for 100 YEAR event
Inflow = 9.07 cfs @ 12.09 hrs, Volume= 0.775 af
Outflow = 3.93 cfs @ 12.33 hrs, Volume= 0.774 af, Atten= 57%, Lag= 14.1 min
Primary = 3.93 cfs @ 12.33 hrs, Volume= 0.774 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 310.08' @ 12.33 hrs Surf.Area= 7,011 sf Storage= 5,770 cf

Plug-Flow detention time= 13.8 min calculated for 0.774 af (100% of inflow)
Center-of-Mass det. time= 12.7 min (776.9 - 764.2)

Volume	Invert	Avail.Storage	Storage Description
#1	308.50'	20,440 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
308.50	0	0	0
310.00	6,960	5,220	5,220
312.00	8,260	15,220	20,440

Device	Routing	Invert	Outlet Devices
#1	Primary	308.50'	**12.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 308.50' / 308.10' S= 0.0133 '/' Cc= 0.900

n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2 Primary 311.50' **20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.93 cfs @ 12.33 hrs HW=310.08' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.93 cfs @ 5.00 fps)
└**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15P: EXISTING DETENTION BASIN SOUTH OF SELF STORAGE BUILDING

Inflow Area = 1.630 ac, 20.58% Impervious, Inflow Depth > 5.04" for 100 YEAR event
Inflow = 7.56 cfs @ 12.13 hrs, Volume= 0.685 af
Outflow = 4.02 cfs @ 12.38 hrs, Volume= 0.683 af, Atten= 47%, Lag= 15.3 min
Primary = 4.02 cfs @ 12.38 hrs, Volume= 0.683 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 327.28' @ 12.38 hrs Surf.Area= 4,147 sf Storage= 5,932 cf

Plug-Flow detention time= 20.3 min calculated for 0.683 af (100% of inflow)
Center-of-Mass det. time= 18.0 min (832.5 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	325.50'	12,719 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
325.50	0	0	0
326.00	3,700	925	925
328.00	4,400	8,100	9,025
328.75	5,450	3,694	12,719

Device	Routing	Invert	Outlet Devices
#1	Primary	325.50'	**12.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 325.50' / 325.25' S= 0.0066 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	328.25'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.02 cfs @ 12.38 hrs HW=327.27' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.02 cfs @ 5.12 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 17P: EXISTING DET BASIN ON 5 & 7 SARSEN STONE WAY

Inflow Area = 13.862 ac, 19.38% Impervious, Inflow Depth > 5.17" for 100 YEAR event
Inflow = 76.71 cfs @ 12.11 hrs, Volume= 5.973 af
Outflow = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af, Atten= 3%, Lag= 2.9 min
Primary = 74.33 cfs @ 12.16 hrs, Volume= 5.957 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 356.15' @ 12.16 hrs Surf.Area= 18,050 sf Storage= 44,275 cf

Plug-Flow detention time= 30.6 min calculated for 5.947 af (100% of inflow)
Center-of-Mass det. time= 28.8 min (840.1 - 811.3)

Volume	Invert	Avail.Storage	Storage Description
#1	351.00'	44,275 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
351.00	0	0	0
352.00	6,070	3,035	3,035
354.00	8,560	14,630	17,665
356.00	18,050	26,610	44,275

Device	Routing	Invert	Outlet Devices
#1	Primary	351.00'	**12.0" Round Culvert** L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 351.00' / 349.00' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	355.00'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=73.98 cfs @ 12.16 hrs HW=356.15' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.15 cfs @ 10.38 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 65.83 cfs @ 2.86 fps)

Summary for Pond 18P: DET BASIN ON EAGLE LEASING

Inflow Area = 6.029 ac, 51.29% Impervious, Inflow Depth > 5.74" for 100 YEAR event
Inflow = 32.38 cfs @ 12.17 hrs, Volume= 2.884 af
Outflow = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af, Atten= 58%, Lag= 18.8 min
Primary = 13.68 cfs @ 12.48 hrs, Volume= 2.883 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 347.28' @ 12.48 hrs Surf.Area= 19,484 sf Storage= 31,008 cf

Plug-Flow detention time= 23.4 min calculated for 2.879 af (100% of inflow)
Center-of-Mass det. time= 23.2 min (828.4 - 805.2)

Volume	Invert	Avail.Storage	Storage Description
#1	342.50'	46,903 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
342.50	0	0	0
344.00	1,030	773	773
346.00	10,200	11,230	12,003
348.00	24,700	34,900	46,903

Device	Routing	Invert	Outlet Devices
#1	Primary	342.50'	**12.0" Round Culvert** L= 33.0' Ke= 0.500 Inlet / Outlet Invert= 342.50' / 342.10' S= 0.0121 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Primary	347.00'	**12.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 4.5' Crest Height

Primary OutFlow Max=13.66 cfs @ 12.48 hrs HW=347.28' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 7.82 cfs @ 9.96 fps)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.84 cfs @ 1.74 fps)

Summary for Pond 24P: INFILTRATION STRUCTURE UNDER PARKING

Inflow Area = 2.127 ac, 61.48% Impervious, Inflow Depth > 6.21" for 100 YEAR event
Inflow = 10.79 cfs @ 12.23 hrs, Volume= 1.100 af
Outflow = 3.60 cfs @ 12.66 hrs, Volume= 1.038 af, Atten= 67%, Lag= 25.8 min
Discarded = 0.26 cfs @ 8.92 hrs, Volume= 0.358 af
Primary = 3.34 cfs @ 12.66 hrs, Volume= 0.680 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 328.35' @ 12.66 hrs Surf.Area= 4,656 sf Storage= 19,704 cf

Plug-Flow detention time= 147.4 min calculated for 1.038 af (94% of inflow)
Center-of-Mass det. time= 116.8 min (915.8 - 799.0)

Volume	Invert	Avail.Storage	Storage Description
#1	322.00'	2,966 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 30,264 cf Overall - 22,848 cf Embedded = 7,416 cf x 40.0% Voids
#2	322.50'	17,021 cf	**retain_it retain_it 5.0'** x 63 Inside #1 Inside= 84.0"W x 60.0"H => 36.41 sf x 8.00'L = 291.3 cf Outside= 96.0"W x 68.0"H => 45.33 sf x 8.00'L = 362.7 cf 1 Rows adjusted for 1,329.9 cf perimeter wall
		19,987 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
322.00	4,656	0	0
328.50	4,656	30,264	30,264

Device	Routing	Invert	Outlet Devices
#1	Discarded	322.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	326.00'	**8.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 326.00' / 319.00' S= 0.3889 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

#3	Primary	323.00'	**4.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 323.00' / 320.00' S= 0.1667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf

Discarded OutFlow Max=0.26 cfs @ 8.92 hrs HW=322.07' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=3.34 cfs @ 12.66 hrs HW=328.34' (Free Discharge)
├**2=Culvert** (Inlet Controls 2.38 cfs @ 6.83 fps)
└**3=Culvert** (Inlet Controls 0.96 cfs @ 10.95 fps)

Summary for Pond 25P: INFILTRATION NORTH OF FLAG B24

Inflow Area =	0.278 ac, 76.10% Impervious, Inflow Depth > 7.05"		for 100 YEAR event	
Inflow =	2.19 cfs @	12.06 hrs, Volume=	0.163 af	
Outflow =	1.17 cfs @	12.18 hrs, Volume=	0.134 af, Atten= 47%, Lag= 6.9 min	
Discarded =	0.05 cfs @	8.52 hrs, Volume=	0.072 af	
Primary =	1.12 cfs @	12.18 hrs, Volume=	0.062 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Peak Elev= 322.66' @ 12.18 hrs Surf.Area= 880 sf Storage= 2,343 cf

Plug-Flow detention time= 146.3 min calculated for 0.133 af (82% of inflow)
Center-of-Mass det. time= 75.6 min (842.8 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	318.00'	821 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 4,400 cf Overall - 2,347 cf Embedded = 2,053 cf x 40.0% Voids
#2	318.50'	1,640 cf	**retain_it retain_it 3.0'** x 10 Inside #1 Inside= 84.0"W x 36.0"H => 21.33 sf x 8.00'L = 170.6 cf Outside= 96.0"W x 44.0"H => 29.33 sf x 8.00'L = 234.7 cf 2 Rows adjusted for 66.1 cf perimeter wall
		2,461 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
318.00	880	0	0
323.00	880	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	318.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	321.00'	**6.0" Round Culvert** L= 34.0' Ke= 0.500 Inlet / Outlet Invert= 321.00' / 317.50' S= 0.1029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.05 cfs @ 8.52 hrs HW=318.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.12 cfs @ 12.18 hrs HW=322.64' (Free Discharge)
└**2=Culvert** (Inlet Controls 1.12 cfs @ 5.69 fps)

Soil Map—Worcester County, Massachusetts, Northeastern Part

Map Scale: 1:4,210 if printed on A landscape (11" x 8.5") sheet.

N

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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 1:20,000.

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: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 16, Sep 3, 2021

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

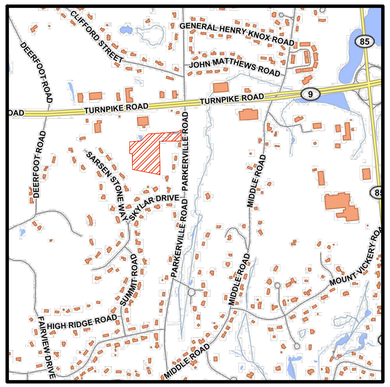
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	3.2	3.8%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.1	0.1%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	6.0	7.3%
102D	Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes	1.6	2.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.7	2.1%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	16.2	19.5%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	9.2	11.1%
420B	Canton fine sandy loam, 3 to 8 percent slopes	13.9	16.7%
420C	Canton fine sandy loam, 8 to 15 percent slopes	22.2	26.7%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	6.7	8.1%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	2.3	2.7%
Totals for Area of Interest		**83.1**	**100.0%**

SITE PLAN OF LAND
AT 250 TURNPIKE ROAD

IN

SOUTHBOROUGH, MASSACHUSETTS



LOCUS MAP

ZONING COMPLIANCE TABLE

THE SITE IS LOCATED IN THE RESIDENCE A ZONING DISTRICT. THE FOLLOWING TABLE COMPARES THE RESIDENCE A ZONING REQUIREMENTS AND DIMENSIONS PROPOSED AT THIS SITE:

DIMENSION	REQUIREMENT	PROPOSED
MIN. LOT AREA	43,560	212,526 S.F.
MIN. FRONTAGE	150'	150.00'
MIN. FRONT YARD	35'	412'(TO PARKERVILLE RD)
MIN. SIDE YARD	25'	45'
MIN. REAR YARD	50'	151'
MAX. FLOOR AREA RATIO	0.18	0.42
MAX. BUILDING HEIGHT	35'	44'

PROPOSED SCOPE:
RESIDENTIAL:
- ONE BEDROOM FLATS: 36
- TWO BEDROOM FLATS: 14
- THREE BEDROOM FLATS: 6
- TOTAL UNITS: 56
- TOTAL BEDROOMS: 82

OFF-STREET PARKING:
PARKING SPACES PROVIDED - RESIDENTIAL 94
PARKING SPACES PROVIDED
- GARAGES 0
- SURFACE SPACES 94

TOTAL: 94
TOTAM:
HC SPACES REQUIRED: 4
HC SPACES PROVIDED: 4(ALL VAN ACCESSIBLE)

UNIT SUMMARY

STYLE	BEDROOMS	BATHROOMS	AREA(S.F.)	DISTRIBUTION BY AREA	NUMBER	DISTRIBUTION BY TYPE
UNIT A	1	1	949	54.7%	36	64.3%
UNIT B	2	2	1,270	6.1%	3	5.4%
UNIT C	2	2	1,381	6.6%	3	14.3%
UNIT D	2	2	1,382	17.7%	8	5.0%
UNIT E	3	2	1,547	7.4%	3	5.4%
UNIT F	3	2	1,549	7.4%	3	5.4%
TOTAL	82	76	62,461	--	56	--

OWNER & APPLICANT:

FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MASSACHUSETTS 01772

CLIENT NUMBER: 502
JOB NUMBER: 245-502
DRAWING : 250TURNPIKECURRENT.dwg

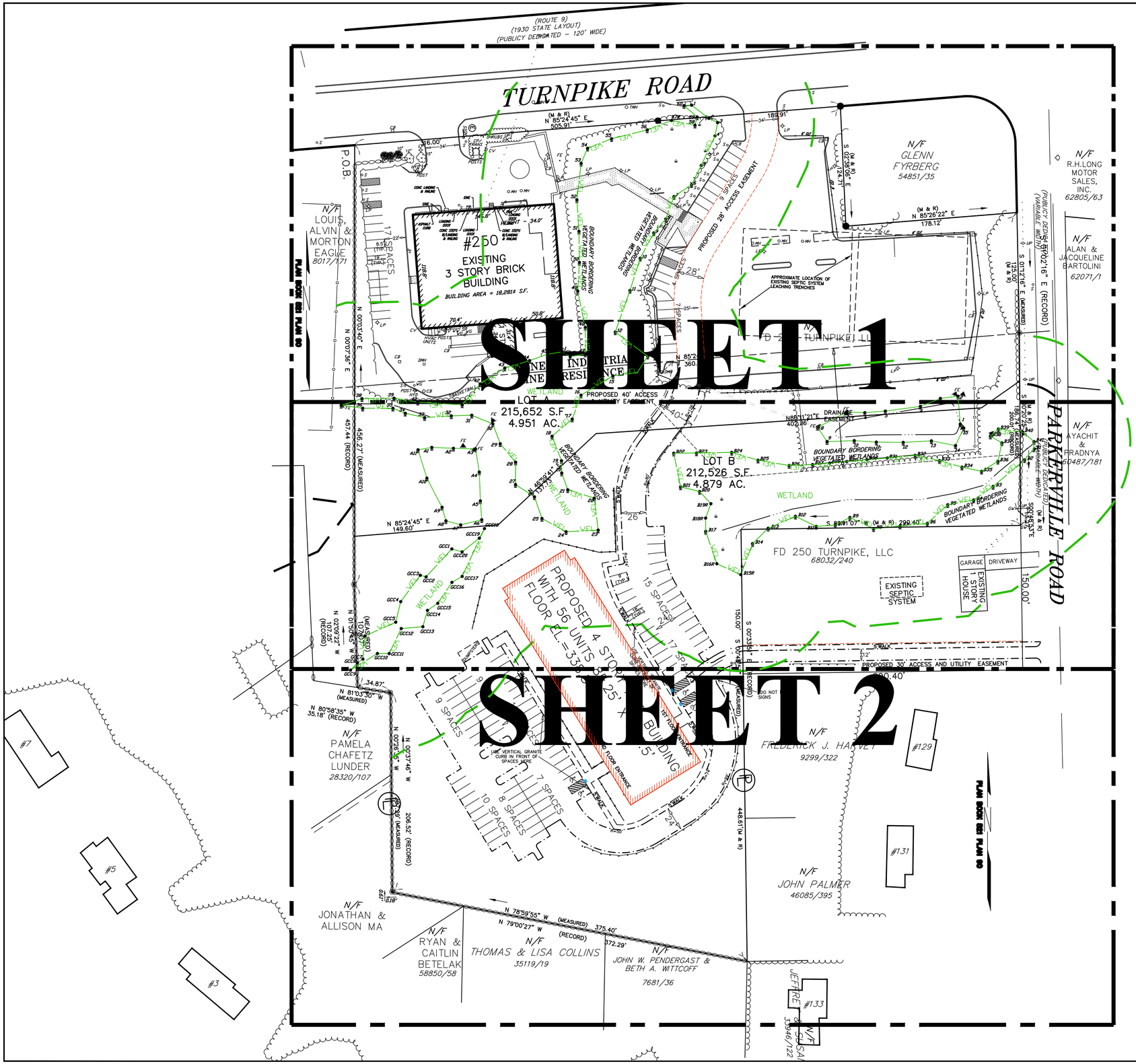
PREPARED BY

AZIMUTH LAND DESIGN, LLC
118 TURNPIKE ROAD, SUITE 200
SOUTHBOROUGH, MASSACHUSETTS 01772
TELEPHONE (508) 485-0137
EMAIL: jamest@azimuthlanddesign.co

DATE:
APRIL 15, 2024

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

SHEET DIRECTORY



COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

DATE:	DESCRIPTION

SCALE: 1 INCH = 50 FEET

FEET 0 25 50 100 150

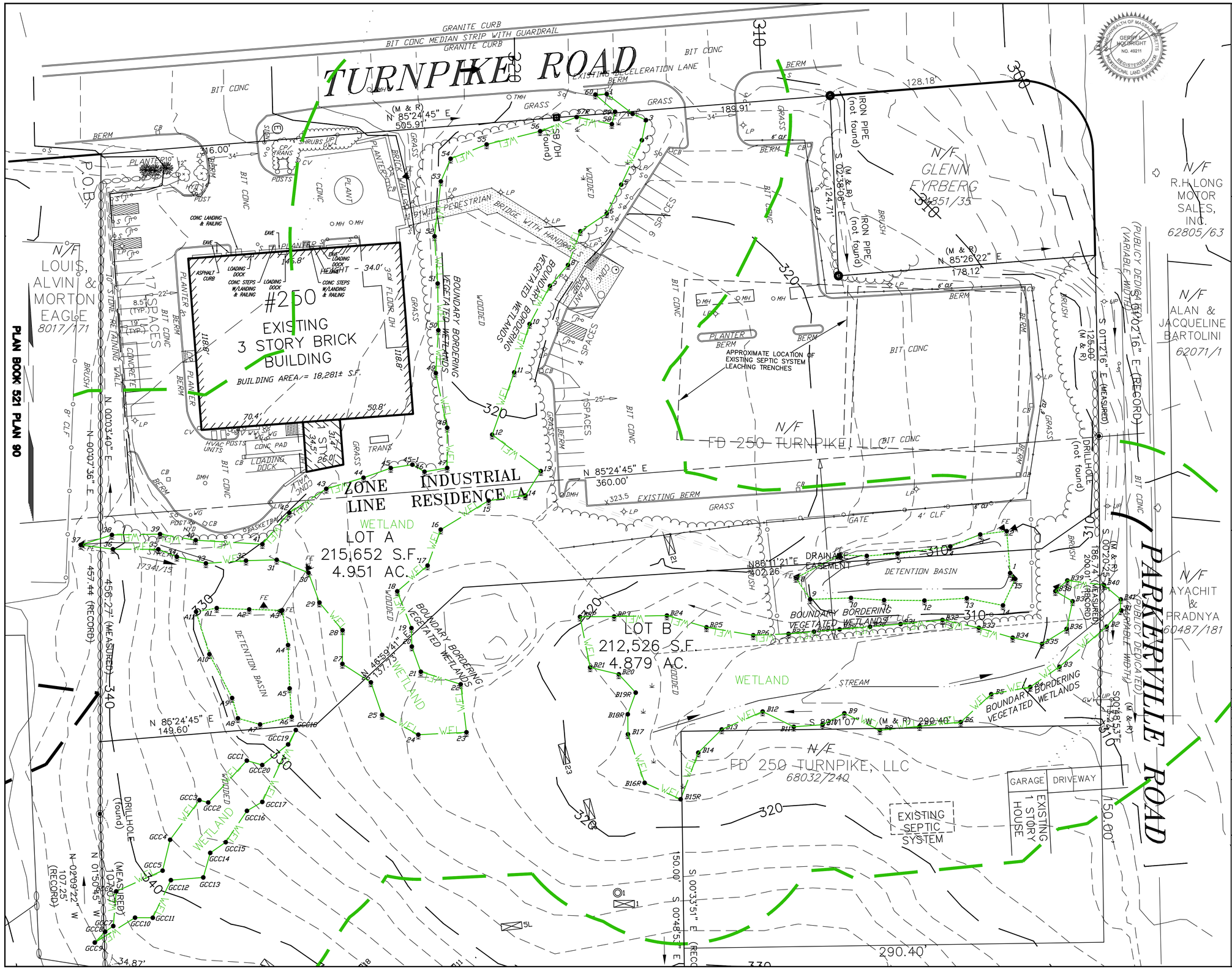
METERS 0 30 50

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

KEY



KEY

- 320 — 2' CONTOUR
- 320 — 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- OHW — UTILITY POLE
- OVERHEAD WIRES
- WEL WEL WEL — WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- 4 — OFFICIAL DEEP OBSERVATION HOLE
- OFFICIAL PERCOLATION TEST

NOTES:

1) THE DEED TO THE PROPERTY SHOWING FD 250 TURNPIKE, LLC AS THE OWNER IS RECORDED AT BOOK 67212 PAGE 69 AT THE WORCESTER DISTRICT REGISTRY OF DEEDS.
2) THE PROPERTY BOUNDARIES, TOPOGRAPHY AND EXISTING FEATURE SHOWN ON THIS PLAN ARE THE WORK PRODUCT OF CONTROL POINT ASSOCIATES, INC. THE LOT DIVISION SHOWN ON THIS PLAN, WAS CREATED WITH THE RECORDING OF AN APPROVAL NOT REQUIRED PLAN OF LAND AT PLAN BOOK 964 PLAN 51.
3) THE BOUNDARIES OF WETLAND RESOURCE AREAS SHOWN ON THIS PLAN WERE CONFIRMED BY AN ORDER OF RESOURCE AREA DELINEATION ISSUED TO THE APPLICANT FOR WORK ON LOT A UNDER DEP FILE#290-1091 AND RECORDED AT THE WORCESTER DISTRICT REGISTRY OF DEEDS AT BOOK 69428 PAGE 113.

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508) 485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS	
DATE:	DESCRIPTION

SCALE: 1 INCH = 30 FEET

FEET: 0 15 30 60 90

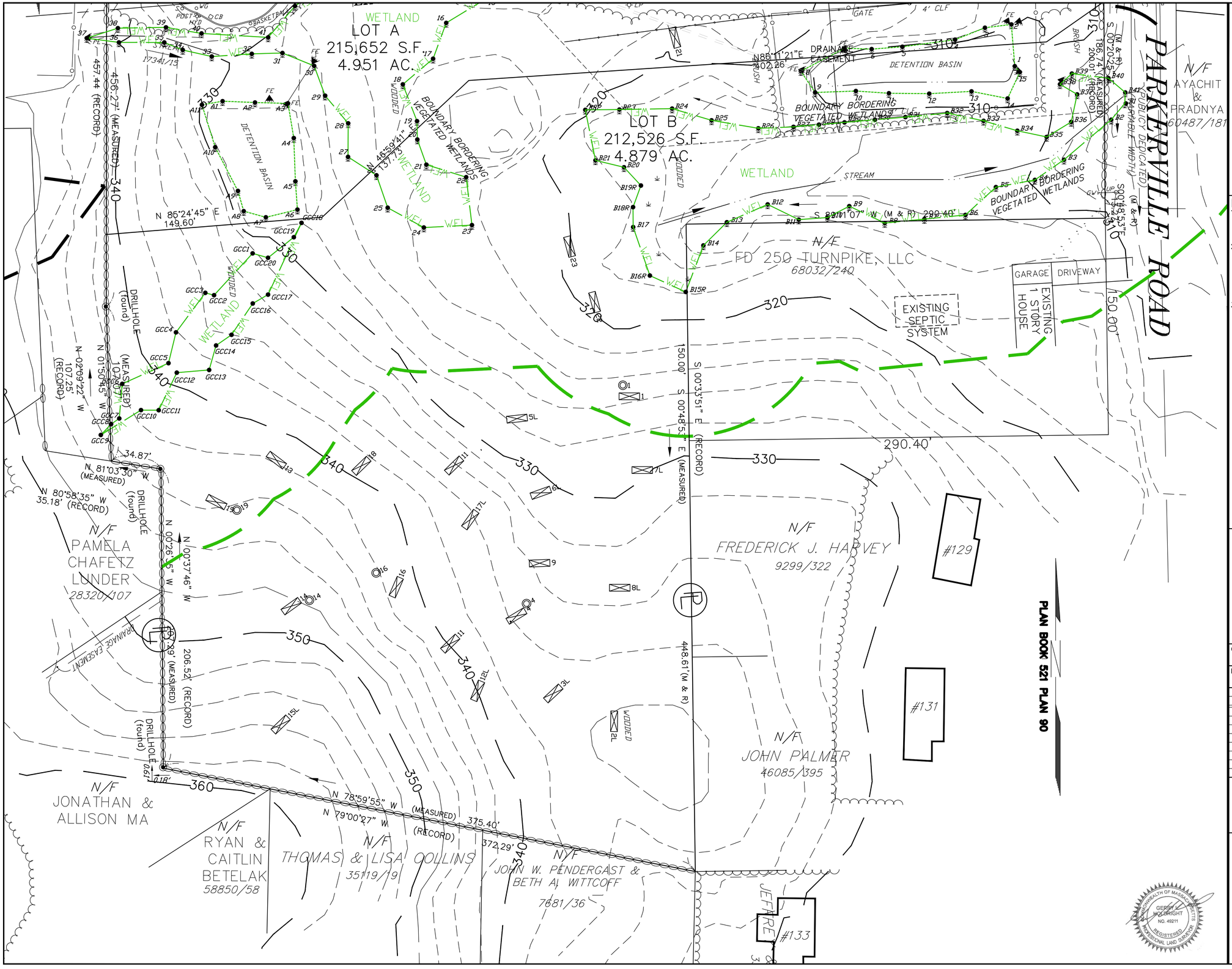
METERS: 0 15 30

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

EXISTING CONDITIONS E1



KEY

- 320 — 2' CONTOUR
- 320 — 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- UTILITY POLE
- OHW — OVERHEAD WIRES
- WEL WEL WEL — WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- 4 — OFFICIAL DEEP OBSERVATION HOLE
- OFFICIAL PERCOLATION TEST

NOTES:

1) THE DEED TO THE PROPERTY SHOWING FD 250 TURNPIKE, LLC AS THE OWNER IS RECORDED AT BOOK 67212 PAGE 69 AT THE WORCESTER DISTRICT REGISTRY OF DEEDS.
2) THE PROPERTY BOUNDARIES, TOPOGRAPHY AND EXISTING FEATURE SHOWN ON THIS PLAN ARE THE WORK PRODUCT OF CONTROL POINT ASSOCIATES, INC. THE LOT DIVISION SHOWN ON THIS PLAN, WAS CREATED WITH THE RECORDING OF AN APPROVAL NOT REQUIRED PLAN OF LAND AT PLAN BOOK 964 PLAN 51.
3) THE BOUNDARIES OF WETLAND RESOURCE AREAS SHOWN ON THIS PLAN WERE CONFIRMED BY AN ORDER OF RESOURCE AREA DELINEATION ISSUED TO THE APPLICANT FOR WORK ON LOT A UNDER DEP FILE#290-1091 AND RECORDED AT THE WORCESTER DISTRICT REGISTRY OF DEEDS AT BOOK 69428 PAGE 113.

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

DATE:	DESCRIPTION

SCALE: 1 INCH = 30 FEET

FEET 0 15 30 60 90

METERS 0 15 30

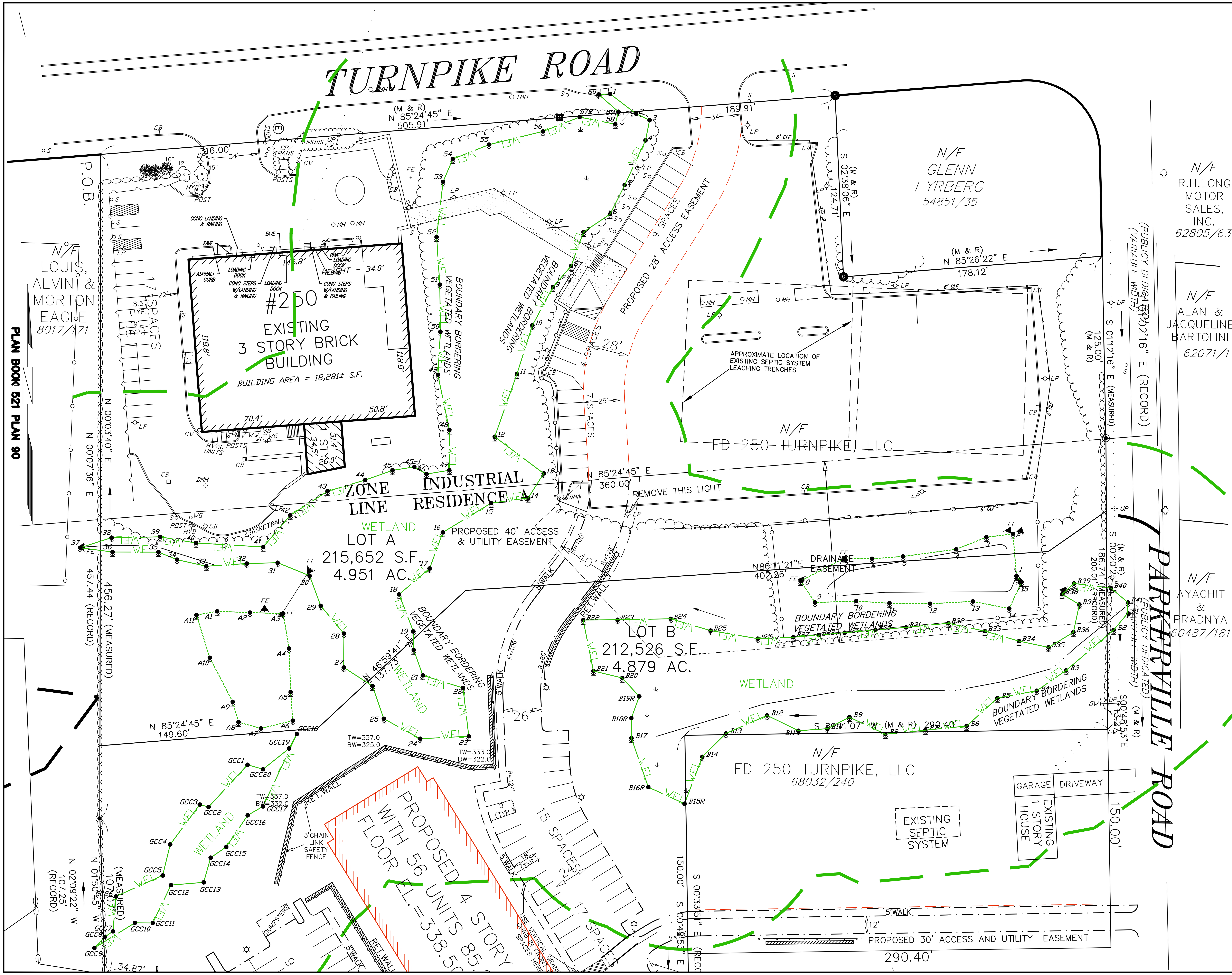
SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

EXISTING CONDITIONS E2

COMMONWEALTH OF MASSACHUSETTS
GERRY L. MCDRIGHT
NO. 49211
REGISTERED PROFESSIONAL LAND SURVEYOR



KEY

- 320 — 2' CONTOUR / 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- UTILITY POLE
- OHW — OVERHEAD WIRES
- WEL — WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- PROPOSED EDGE OF PAVEMENT

NOTES:

1) THE PROPOSED APARTMENT BUILDING WILL BE LOCATED ON LOT B. THE LOT DIVISION SHOWN ON THIS PLAN, WAS CREATED WITH THE RECORDING OF AN APPROVAL NOT REQUIRED PLAN OF LAND AT PLAN BOOK 971 PLAN 88.
2) THE APPLICANT AND OWNER, FD 250 TURNPIKE, LLC, PROPOSES TO CONSTRUCT AN APARTMENT BUILDING WITH 56 RENTAL UNITS, UNDER THE AUSPICES OF MGL CHAPTER 40B. 25% OF THE UNITS WILL QUALIFY AS AFFORDABLE UNDER STATE GUIDELINES.
3) A TOTAL OF 94 PARKING SPACES WILL BE CREATED, 1.68 TIMES THE NUMBER OF UNITS, INCLUDING 4 VAN ACCESSIBLE HANDICAPPED PARKING SPACES.
4) LESSEES WILL ACCESS THIS SITE THROUGH A 28 FOOT WIDE DRIVEWAY EASEMENT THROUGH THE EXISTING PARKING AREA ON LOT A. THIS ACCESS WILL ENTER ONTO ROUTE 9 AT AN EXISTING DRIVEWAY ACCESS AT A POINT IN THE MIDDLE OF AN EXISTING DECELERATION LANE.

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON ____________

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

COMMONWEALTH OF MASSACHUSETTS — JAMES L. TETREAULT CIVIL No. 38548 PROFESSIONAL ENGINEER

CLT. NO. 502	JOB NO. 245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

DATE:	DESCRIPTION

SCALE: 1 INCH = 30 FEET

FEET 0 15 30 60 90

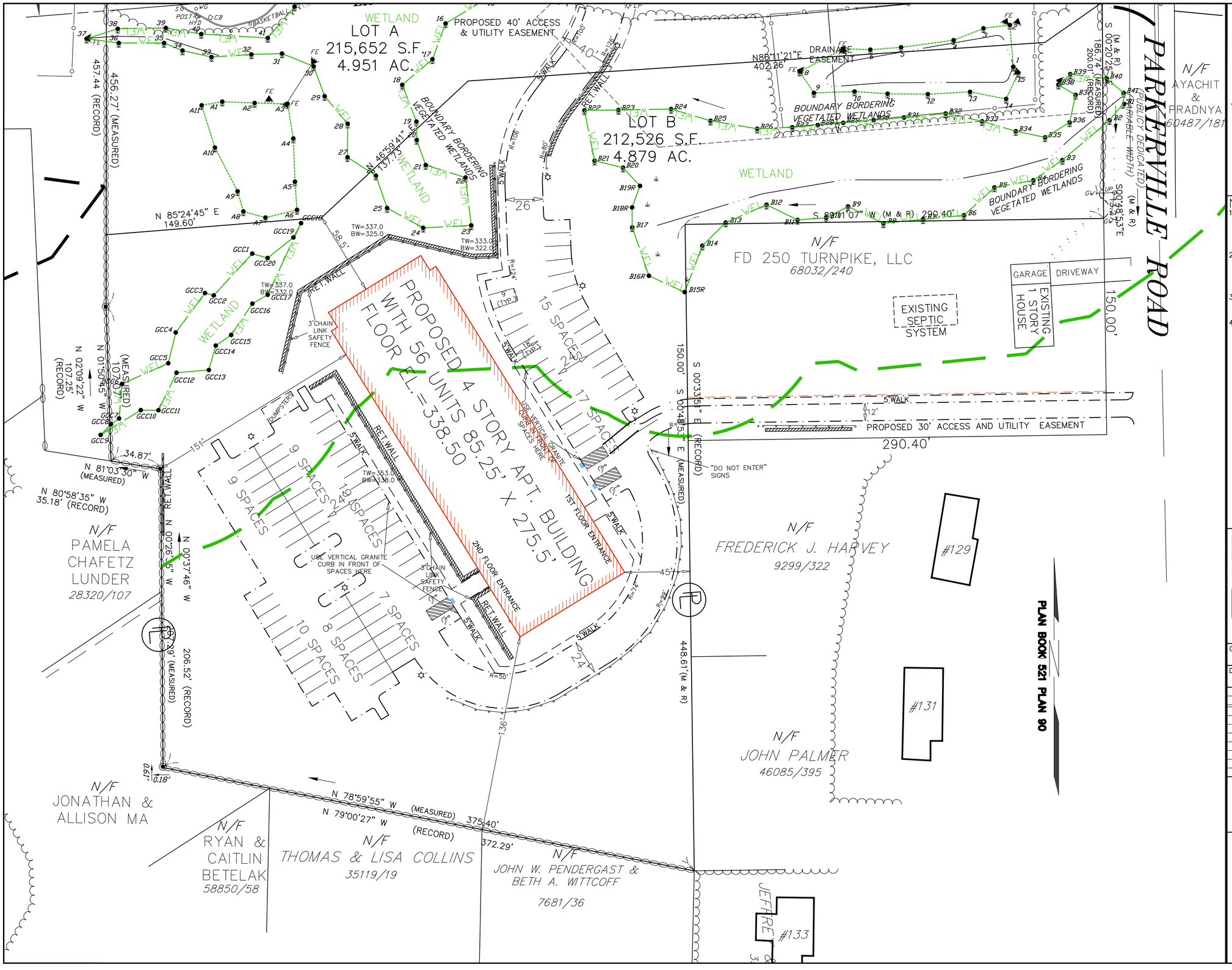
METERS 0 15 30

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

SITE LAYOUT S1



KEY

- 320 — 2' CONTOUR / 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- UTILITY POLE
- OHW — OVERHEAD WIRES
- WEL WEL WEL — WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- PROPOSED EDGE OF PAVEMENT

NOTES:

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COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

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JAMES L TETREAULT CIVIL No. 38548 COMMONWEALTH OF MASSACHUSETTS PROFESSIONAL ENGINEER

CLT. NO.	JOB NO.
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DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

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METERS 0 15 30

SITE PLAN OF LAND

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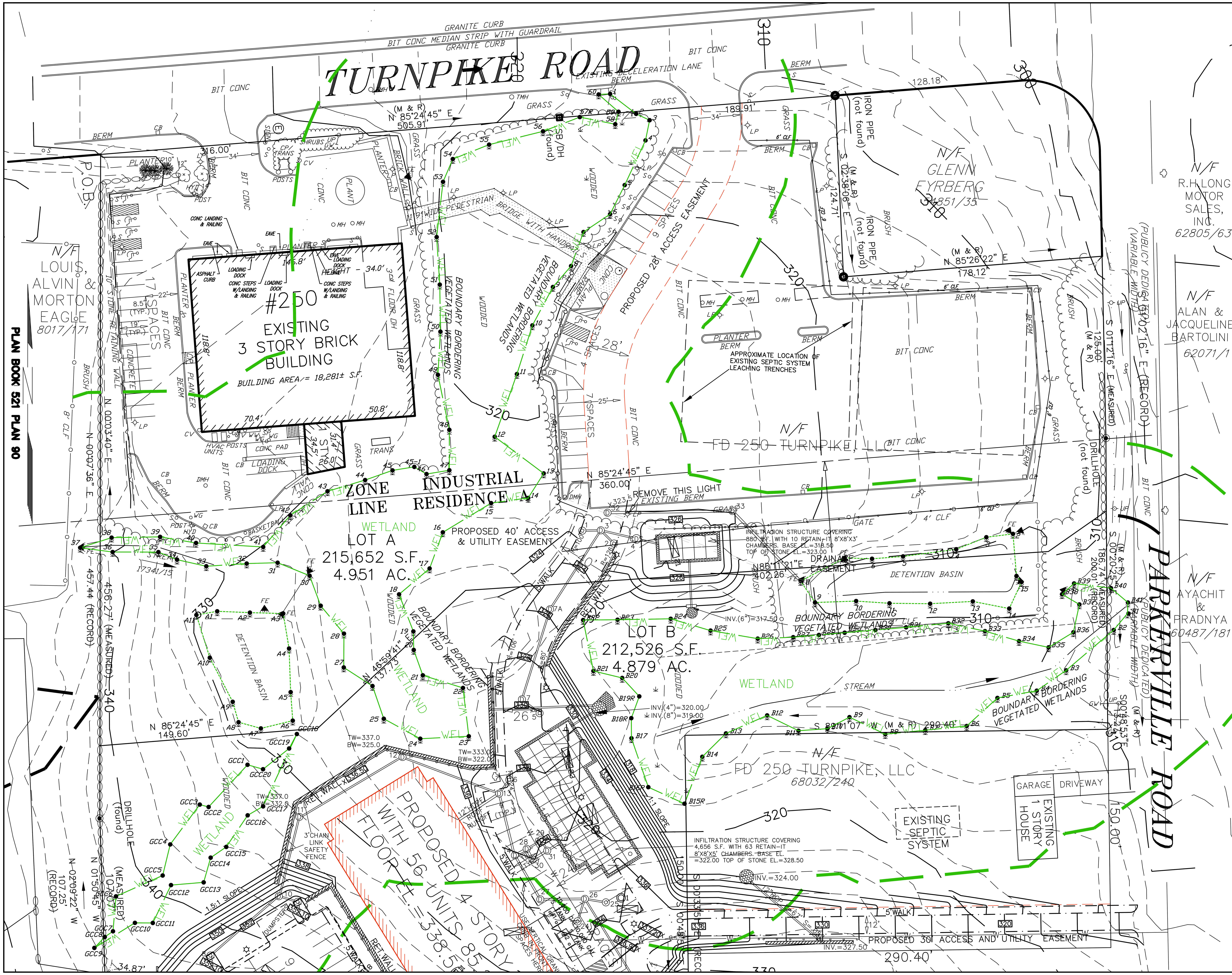
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

SITE LAYOUT S2


TURNPIKE ROAD
GRANITE CURB
BIT CONC MEDIAN STRIP WITH GUARDRAIL
EXISTING DECELERATION LANE
N 85°24'45" E 505.91'
189.91'
128.18'
N/F GLENN EYRBERG 34851/35
N/F R.H.LONG MOTOR SALES, INC. 62805/63
N/F LOUIS, ALVIN & MORTON EAGLE 8017/171
PLAN BOOK 521 PLAN 90
P.O.B.
#250 EXISTING 3 STORY BRICK BUILDING
BUILDING AREA = 18,281± S.F.
PROPOSED 28' ACCESS EASEMENT
APPROXIMATE LOCATION OF EXISTING SEPTIC SYSTEM LEACHING TRENCHES
N/F FD 250 TURNPIKE, LLC
N/F ALAN & JACQUELINE BARTOLINI 62071/1
(PUBLICY DEDICATED) (VARIABLE WIDTH)
S 01°12'16" E (MEASURED)
N 85°24'45" E 360.00'
REMOVE THIS LIGHT
ZONE LINE
INDUSTRIAL RESIDENCE A
WETLAND
LOT A 215,652 S.F. 4.951 AC.
PROPOSED 40' ACCESS & UTILITY EASEMENT
BOUNDARY BORDERING VEGETATED WETLANDS
INFILTRATION STRUCTURE COVERING 880 S.F. WITH 10 RETAIN-IT 8'X8'X3' CHAMBERS. BASE EL.=316.50 TOP OF STONE EL.=323.00
DRAINAGE EASEMENT
DETENTION BASIN
N/F AYACHIT & PRADNYA 60487/181
PARKERVILLE ROAD
LOT B 212,526 S.F. 4.879 AC.
STREAM
N/F FD 250 TURNPIKE, LLC 68032/240
GARAGE
DRIVEWAY
EXISTING 1 STORY HOUSE
EXISTING SEPTIC SYSTEM
INFILTRATION STRUCTURE COVERING 4,656 S.F. WITH 63 RETAIN-IT 8'X8'X5' CHAMBERS. BASE EL. =322.00 TOP OF STONE EL.=328.50
PROPOSED 4 STORY WITH 56 UNITS 85 FLOOR EL.=338.5
PROPOSED 30' ACCESS AND UTILITY EASEMENT
290.40'
N 85°24'45" E 149.60'
457.44' (RECORD)
456.27' (MEASURED)
DRILLHOLE (found)
3' CHAIN LINK SAFETY FENCE

KEY

- 2' CONTOUR
- 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- UTILITY POLE
- OVERHEAD WIRES
- WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- PROPOSED ELEV. CONTOUR
- PROPOSED SPOT GRADE
- OFFICIAL DEEP OBSERVATION HOLE
- OFFICIAL PERCOLATION TEST
- PROPOSED CATCH BASIN
- PROPOSED DRAIN MANHOLE
- PROPOSED EDGE OF PAVEMENT

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON ____________

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

COMMONWEALTH OF MASSACHUSETTS — JAMES L. TETREAULT — CIVIL — No. 38548 — PROFESSIONAL ENGINEER

CLT. NO. 502	JOB NO. 245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

DATE:	DESCRIPTION

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SITE PLAN OF LAND

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IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

GRADING & DRAINAGE G1

WETLAND
LOT A
215,652 S.F.
4.951 AC.

PROPOSED 40' ACCESS & UTILITY EASEMENT

LOT B
212,526 S.F.
4.879 AC.

WETLAND

PROPOSED 4-STORY 85.25' X 275.5' BUILDING WITH 56 UNITS FLOOR EL.=338.50

PROPOSED 301 ACCESS AND UTILITY EASEMENT

PARKERVILLE ROAD

N/F
FD 250 TURNPIKE, LLC
68032/240

EXISTING SEPTIC SYSTEM

GARAGE | DRIVEWAY

EXISTING 1 STORY HOUSE

INFILTRATION STRUCTURE COVERING 880 S.F. WITH 10 RETAIN-IT 8'X8'X3' CHAMBERS. BASE EL.=318.50 TOP OF STONE EL.=323.00

INFILTRATION STRUCTURE COVERING 4,656 S.F. WITH 63 RETAIN-IT 8'X8'X5' CHAMBERS. BASE EL. =322.00 TOP OF STONE EL.=328.50

DETENTION BASIN

BOUNDARY BORDERING VEGETATED WETLANDS

STREAM

N/F
PAMELA CHAFETZ LUNDER
28320/107

N/F
JONATHAN & ALLISON MA

N/F
RYAN & CAITLIN BETELAK
58850/58

N/F
THOMAS & LISA COLLINS
35119/19

N/F
JOHN W. PENDERGAST & BETH A. WITTCOFF
7681/36

N/F
FREDERICK J. HARVEY
9299/322

N/F
JOHN PALMER
46085/395

N/F
AYACHIT & PRADNYA
60487/181

#129
#131
#133

PLAN BOOK 521 PLAN 90

KEY

- 320 — 2' CONTOUR
- 320 — 10' CONTOUR
- EXISTING EDGE OF PAVEMENT
- UTILITY POLE
- OHW — OVERHEAD WIRES
- WEL WEL WEL — WETLAND EDGE
- 100' BUFFER ZONE EDGE
- STONE WALL
- EXISTING TREE LINE
- 352 — PROPOSED ELEV. CONTOUR
- X 352.70 — PROPOSED SPOT GRADE
- 4 — OFFICIAL DEEP OBSERVATION HOLE
- 4 — OFFICIAL PERCOLATION TEST
- PROPOSED CATCH BASIN
- PROPOSED DRAIN MANHOLE
- PROPOSED EDGE OF PAVEMENT

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

COMMONWEALTH OF MASSACHUSETTS
JAMES L. TETREAULT
CIVIL
No. 38548
PROFESSIONAL ENGINEER

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	245-502
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

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FEET 0 15 30 60 90
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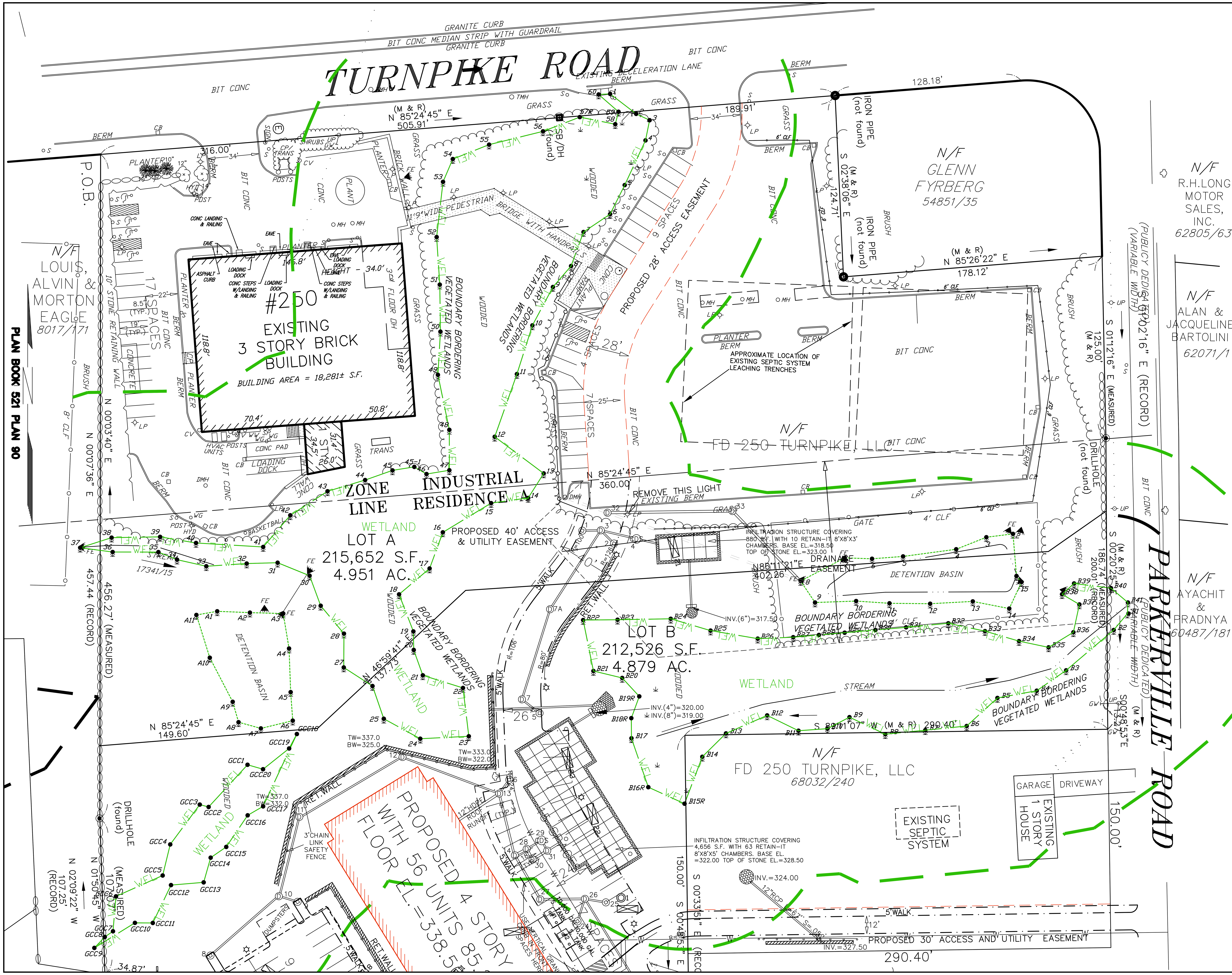
SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

GRADING & DRAINAGE G2


TURNPIKE ROAD
PARKERVILLE ROAD
GRANITE CURB
BIT CONC MEDIAN STRIP WITH GUARDRAIL
EXISTING DECELERATION LANE
P.O.B.
PLAN BOOK 521 PLAN 90
N/F LOUIS, ALVIN & MORTON EAGLE 8017/171
N/F GLENN FYRBERG 54851/35
N/F R.H.LONG MOTOR SALES, INC. 62805/63
N/F ALAN & JACQUELINE BARTOLINI 62071/1
N/F AYACHIT & PRADNYA 60487/181
N/F FD 250 TURNPIKE, LLC
N/F FD 250 TURNPIKE, LLC 68032/240
#250 EXISTING 3 STORY BRICK BUILDING
BUILDING AREA = 18,281± S.F.
PROPOSED 28' ACCESS EASEMENT
APPROXIMATE LOCATION OF EXISTING SEPTIC SYSTEM LEACHING TRENCHES
ZONE LINE
INDUSTRIAL
RESIDENCE A
REMOVE THIS LIGHT
LOT A 215,652 S.F. 4.951 AC.
LOT B 212,526 S.F. 4.879 AC.
WETLAND
PROPOSED 40' ACCESS & UTILITY EASEMENT
BOUNDARY BORDERING VEGETATED WETLANDS
DETENTION BASIN
DRAINAGE EASEMENT
INFILTRATION STRUCTURE COVERING 880 S.F. WITH 10 RETAIN-IT 8'X8'X3' CHAMBERS. BASE EL.=318.50 TOP OF STONE EL.=323.00
INFILTRATION STRUCTURE COVERING 4,656 S.F. WITH 63 RETAIN-IT 8'X8'X5' CHAMBERS. BASE EL. =322.00 TOP OF STONE EL.=328.50
PROPOSED 4 STORY WITH 56 UNITS FLOOR EL.=338.5
EXISTING SEPTIC SYSTEM
EXISTING 1 STORY HOUSE
GARAGE
DRIVEWAY
PROPOSED 30' ACCESS AND UTILITY EASEMENT
3' CHAIN LINK SAFETY FENCE
STREAM
N 85°24'45" E 505.91'
N 85°24'22" E 178.12'
N 85°24'45" E 360.00'
N 85°24'45" E 149.60'
N 86°11'21" E 402.26'
S 02°38'06" E 124.71'
S 01°12'16" E 125.00'
S 00°20'25" E 186.74' (MEASURED) 200.01' (RECORD)
S 84°11'07" W (M & R) 290.40'
N 00°03'40" E
N 00°07'36" E
457.44' (RECORD) 456.27' (MEASURED)
N 02°09'22" W 107.25' (RECORD)
N 01°50'45" W 107.37' (MEASURED)
150.00'
290.40'
128.18'
189.91'
IRON PIPE (not found)
DRILLHOLE (found)
DRILLHOLE (not found)

KEY

- 2' CONTOUR
- 10' CONTOUR
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- UTILITY POLE
- OVERHEAD WIRES
- WETLAND EDGE
- 100' BUFFER ZONE EDGE
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- EXISTING TREE LINE
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- OFFICIAL PERCOLATION TEST
- PROPOSED CATCH BASIN
- PROPOSED DRAIN MANHOLE
- PROPOSED EDGE OF PAVEMENT

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON ____________

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118 Turnpike Road, Suite 200, Southborough, MA 01772
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COMMONWEALTH OF MASSACHUSETTS JAMES L. TETREAULT CIVIL No. 38548 PROFESSIONAL ENGINEER

CLT. NO. 502	JOB NO. 245-502
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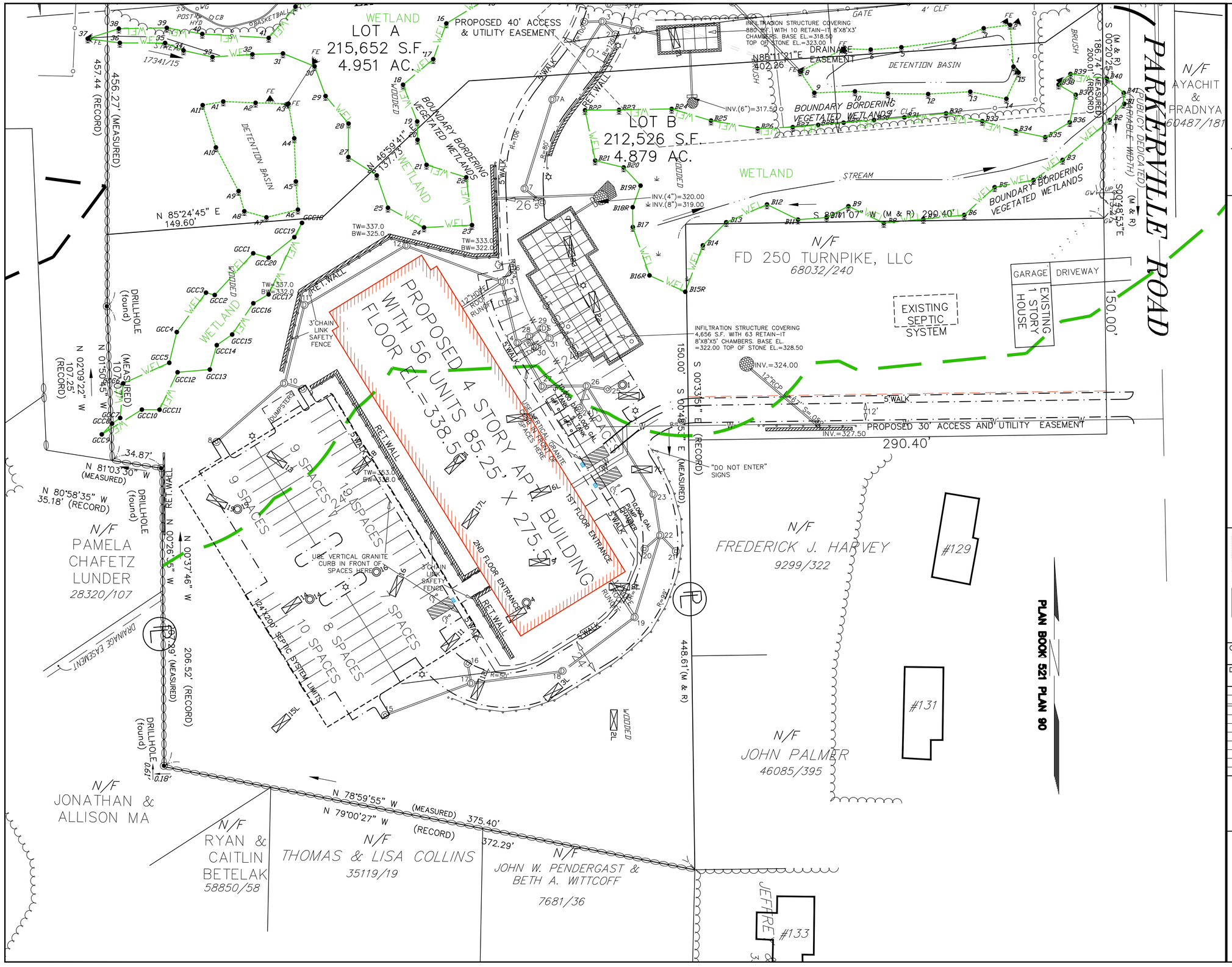
SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

UTILITY U1



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OWNER & APPLICANT:
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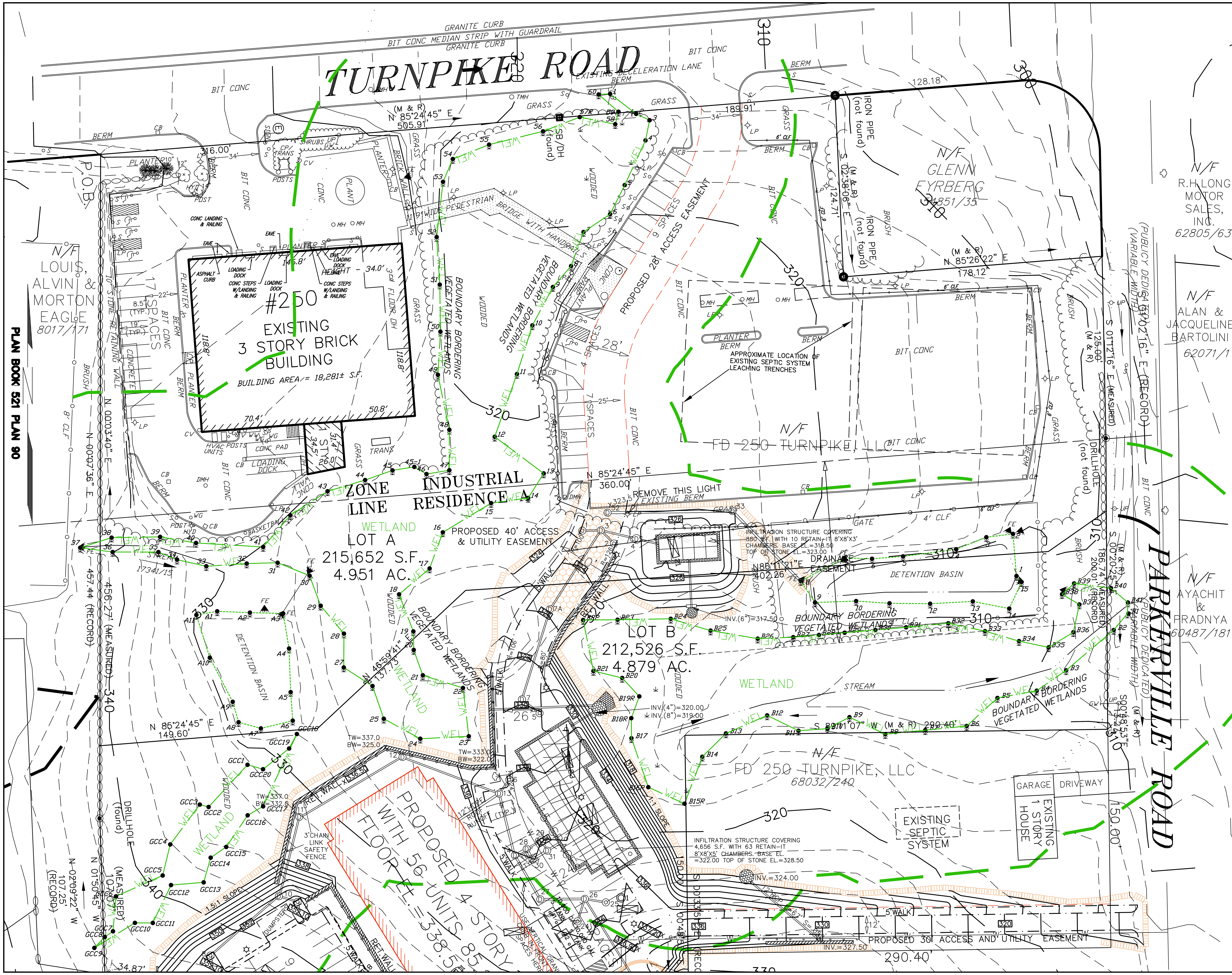
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

UTILITY U2


TURNPIKE ROAD
PARKERVILLE ROAD
PLAN BOOK 521 PLAN 90
#250 EXISTING 3 STORY BRICK BUILDING
BUILDING AREA = 18,281± S.F.
LOT A 215,652 S.F. 4.951 AC.
LOT B 212,526 S.F. 4.879 AC.
ZONE LINE
INDUSTRIAL RESIDENCE A
PROPOSED 40' ACCESS & UTILITY EASEMENT
PROPOSED 28' ACCESS EASEMENT
PROPOSED 30' ACCESS AND UTILITY EASEMENT
PROPOSED 4 STORY WITH 56 UNITS FLOOR EL.=338.5
DETENTION BASIN
BOUNDARY BORDERING VEGETATED WETLANDS
WETLAND
APPROXIMATE LOCATION OF EXISTING SEPTIC SYSTEM LEACHING TRENCHES
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N 46°59'41" E 137.73'
457.44 (RECORD)
456.27 (MEASURED)
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128.18'
189.91'
DRILLHOLE (not found)
IRON PIPE (not found)
STREAM
DRAINAGE EASEMENT

KEY

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	10' CONTOUR
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	OFFICIAL PERCOLATION TEST
	PROPOSED CATCH BASIN
	PROPOSED DRAIN MANHOLE
	PROPOSED EDGE OF PAVEMENT
	PROPOSED EROSION CONTROL BARRIER

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON ____________

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
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COMMONWEALTH OF MASSACHUSETTS
JAMES L. TETREAULT
CIVIL
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PROFESSIONAL ENGINEER

CLT. NO.	JOB NO.
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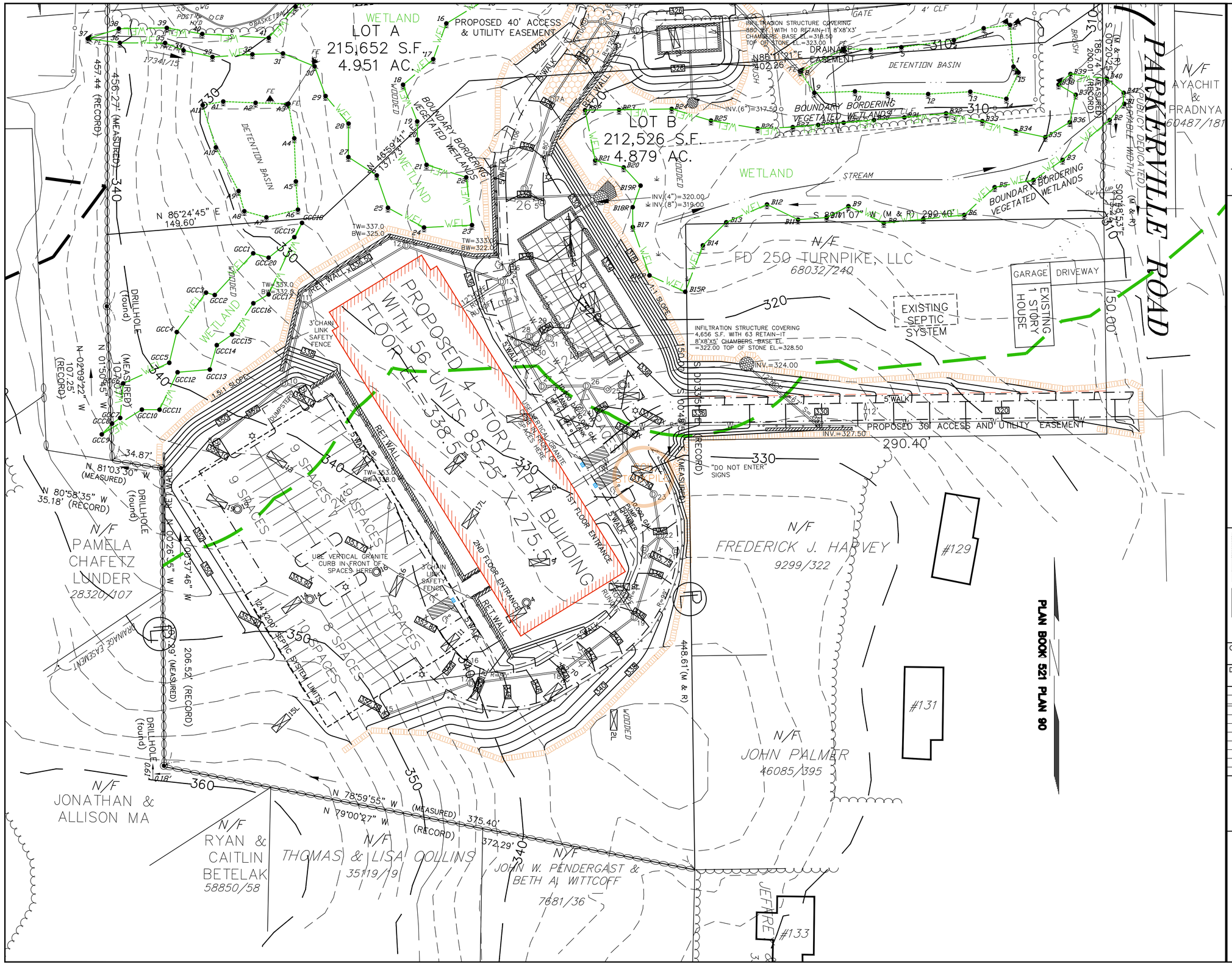
OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

EROSION & SEDIMENT CONTROL ESC1



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- 352 — PROPOSED ELEV. CONTOUR
- X 352.70 — PROPOSED SPOT GRADE
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- (P) — PROPOSED CATCH BASIN
- (D) — PROPOSED DRAIN MANHOLE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EROSION CONTROL BARRIER

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____

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JAMES L TETREAULT CIVIL No. 38548 COMMONWEALTH OF MASSACHUSETTS PROFESSIONAL ENGINEER

CLT. NO.	JOB NO.
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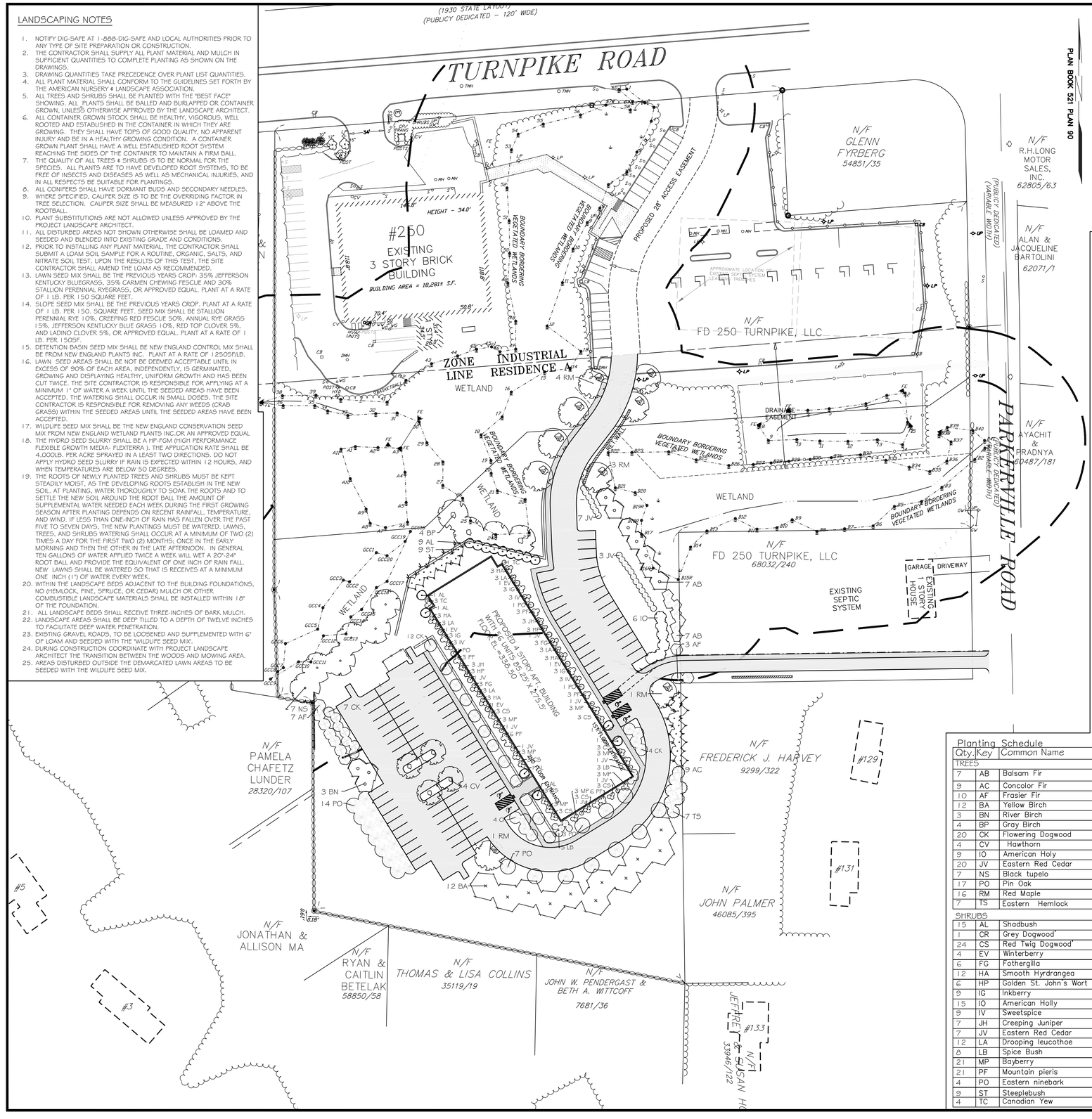
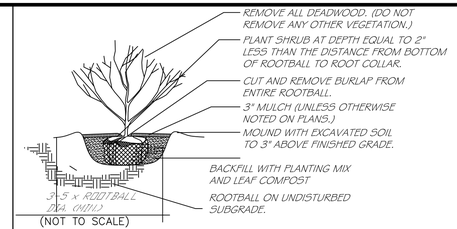
OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

EROSION & SEDIMENT CONTROL ESC2

LANDSCAPING NOTES

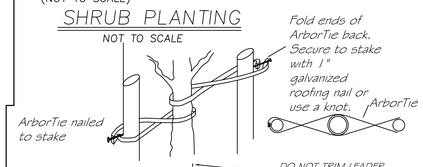
1. NOTIFY DIG-SAFE AT 1-888-DIG-SAFE AND LOCAL AUTHORITIES PRIOR TO ANY TYPE OF SITE PREPARATION OR CONSTRUCTION.
2. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIAL AND MULCH IN SUFFICIENT QUANTITIES TO COMPLETE PLANTING AS SHOWN ON THE DRAWINGS.
3. DRAWING QUANTITIES TAKE PRECEDENCE OVER PLANT LIST QUANTITIES.
4. ALL PLANT MATERIAL SHALL CONFORM TO THE GUIDELINES SET FORTH BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
5. ALL TREES AND SHRUBS SHALL BE PLANTED WITH THE "BEST FACE" SHOWING. ALL PLANTS SHALL BE BALLED AND BURLAPPED OR CONTAINER GROWN, UNLESS OTHERWISE APPROVED BY THE LANDSCAPE ARCHITECT.
6. ALL CONTAINER GROWN STOCK SHALL BE HEALTHY, VIGOROUS, WELL ROOTED AND ESTABLISHED IN THE CONTAINER IN WHICH THEY ARE GROWING. THEY SHALL HAVE TOPS OF GOOD QUALITY, NO APPARENT INJURY AND BE IN A HEALTHY GROWING CONDITION. A CONTAINER GROWN PLANT SHALL HAVE A WELL ESTABLISHED ROOT SYSTEM REACHING THE SIDES OF THE CONTAINER TO MAINTAIN A FIRM BALL.
7. THE QUALITY OF ALL TREES & SHRUBS IS TO BE NORMAL FOR THE SPECIES. ALL PLANTS ARE TO HAVE DEVELOPED ROOT SYSTEMS, TO BE FREE OF INSECTS AND DISEASES AS WELL AS MECHANICAL INJURIES, AND IN ALL RESPECTS BE SUITABLE FOR PLANTINGS.
8. ALL CONIFERS SHALL HAVE DORMANT BUDS AND SECONDARY NEEDLES.
9. WHERE SPECIFIED, CALIPER SIZE IS TO BE THE OVERRIDING FACTOR IN TREE SELECTION. CALIPER SIZE SHALL BE MEASURED 12" ABOVE THE ROOTBALL.
10. PLANT SUBSTITUTIONS ARE NOT ALLOWED UNLESS APPROVED BY THE PROJECT LANDSCAPE ARCHITECT.
11. ALL DISTURBED AREAS NOT SHOWN OTHERWISE SHALL BE LOAMED AND SEEDED AND BLENDED INTO EXISTING GRADE AND CONDITIONS.
12. PRIOR TO INSTALLING ANY PLANT MATERIAL, THE CONTRACTOR SHALL SUBMIT A LOAM SOIL SAMPLE FOR A ROUTINE, ORGANIC, SALTS, AND NITRATE SOIL TEST. UPON THE RESULTS OF THIS TEST, THE SITE CONTRACTOR SHALL AMEND THE LOAM AS RECOMMENDED.
13. LAWN SEED MIX SHALL BE THE PREVIOUS YEARS CROP. 35% JEFFERSON KENTUCKY BLUEGRASS, 35% CARMEN CHEWING FESCUE AND 30% STALLION PERENNIAL RYEGRASS, OR APPROVED EQUAL. PLANT AT A RATE OF 1 LB. PER 150 SQUARE FEET.
14. SLOPE SEED MIX SHALL BE THE PREVIOUS YEARS CROP. PLANT AT A RATE OF 1 LB. PER 150. SQUARE FEET. SEED MIX SHALL BE STALLION PERENNIAL RYE 10%, CREEPING RED FESCUE 50%, ANNUAL RYE GRASS 15%, JEFFERSON KENTUCKY BLUE GRASS 10%, RED TOP CLOVER 5%, AND LADINO CLOVER 5%, OR APPROVED EQUAL. PLANT AT A RATE OF 1 LB. PER 150SF.
15. DETENTION BASIN SEED MIX SHALL BE NEW ENGLAND CONTROL MIX SHALL BE FROM NEW ENGLAND PLANTS INC. PLANT AT A RATE OF 125OSF/LB.
16. LAWN SEED AREAS SHALL BE NOT BE DEEMED ACCEPTABLE UNTIL IN EXCESS OF 90% OF EACH AREA, INDEPENDENTLY, IS GERMINATED, GROWING AND DISPLAYING HEALTHY, UNIFORM GROWTH AND HAS BEEN CUT TWICE. THE SITE CONTRACTOR IS RESPONSIBLE FOR APPLYING AT A MINIMUM 1" OF WATER A WEEK UNTIL THE SEEDED AREAS HAVE BEEN ACCEPTED. THE WATERING SHALL OCCUR IN SMALL DOSES. THE SITE CONTRACTOR IS RESPONSIBLE FOR REMOVING ANY WEEDS (CRAB GRASS) WITHIN THE SEEDED AREAS UNTIL THE SEEDED AREAS HAVE BEEN ACCEPTED.
17. WILDLIFE SEED MIX SHALL BE THE NEW ENGLAND CONSERVATION SEED MIX FROM NEW ENGLAND WETLAND PLANTS INC.OR AN APPROVED EQUAL
18. THE HYDRO SEED SLURRY SHALL BE A HP-FGM (HIGH PERFORMANCE FLEXIBLE GROWTH MEDIA- FLEXTERRA). THE APPLICATION RATE SHALL BE 4,000LB. PER ACRE SPRAYED IN A LEAST TWO DIRECTIONS. DO NOT APPLY HYDRO SEED SLURRY IF RAIN IS EXPECTED WITHIN 12 HOURS, AND WHEN TEMPERATURES ARE BELOW 50 DEGREES.
19. THE ROOTS OF NEWLY PLANTED TREES AND SHRUBS MUST BE KEPT STEADILY MOIST, AS THE DEVELOPING ROOTS ESTABLISH IN THE NEW SOIL. AT PLANTING, WATER THOROUGHLY TO SOAK THE ROOTS AND TO SETTLE THE NEW SOIL AROUND THE ROOT BALL THE AMOUNT OF SUPPLEMENTAL WATER NEEDED EACH WEEK DURING THE FIRST GROWING SEASON AFTER PLANTING DEPENDS ON RECENT RAINFALL, TEMPERATURE, AND WIND. IF LESS THAN ONE-INCH OF RAIN HAS FALLEN OVER THE PAST FIVE TO SEVEN DAYS, THE NEW PLANTINGS MUST BE WATERED. LAWNS, TREES, AND SHRUBS WATERING SHALL OCCUR AT A MINIMUM OF TWO (2) TIMES A DAY FOR THE FIRST TWO (2) MONTHS- ONCE IN THE EARLY MORNING AND THEN THE OTHER IN THE LATE AFTERNOON. IN GENERAL TEN GALLONS OF WATER APPLIED TWICE A WEEK WILL WET A 20"-24" ROOT BALL AND PROVIDE THE EQUIVALENT OF ONE INCH OF RAIN FALL. NEW LAWNS SHALL BE WATERED SO THAT IS RECEIVES AT A MINIMUM ONE INCH (1") OF WATER EVERY WEEK.
20. WITHIN THE LANDSCAPE BEDS ADJACENT TO THE BUILDING FOUNDATIONS, NO (HEMLOCK, PINE, SPRUCE, OR CEDAR) MULCH OR OTHER COMBUSTIBLE LANDSCAPE MATERIALS SHALL BE INSTALLED WITHIN 18" OF THE FOUNDATION.
21. ALL LANDSCAPE BEDS SHALL RECEIVE THREE-INCHES OF BARK MULCH.
22. LANDSCAPE AREAS SHALL BE DEEP TILLED TO A DEPTH OF TWELVE INCHES TO FACILITATE DEEP WATER PENETRATION.
23. EXISTING GRAVEL ROADS, TO BE LOOSENED AND SUPPLEMENTED WITH 6" OF LOAM AND SEEDED WITH THE "WILDLIFE SEED MIX.
24. DURING CONSTRUCTION COORDINATE WITH PROJECT LANDSCAPE ARCHITECT THE TRANSITION BETWEEN THE WOODS AND MOWING AREA.
25. AREAS DISTURBED OUTSIDE THE DEMARCATED LAWN AREAS TO BE SEEDED WITH THE WILDLIFE SEED MIX.





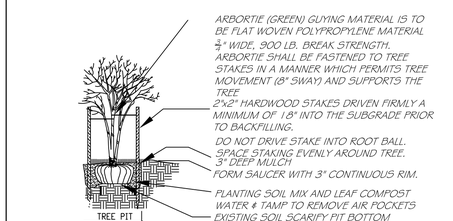
SHRUB PLANTING

NOT TO SCALE



EVERGREEN TREE PLANTING

NOT TO SCALE



DECIDUOUS TREE PLANTING

NOT TO SCALE

Planting Schedule

Qty.	Key	Common Name	Botanical Name	Size	Remarks
TREES					
7	AB	Balsam Fir	*Abies balsamea*	8' Ht.	B&B
9	AC	Concolor Fir	*Abies concolor*	8' Ht.	B&B
10	AF	Frasier Fir	*Abies fraseri*	8' Ht.	B&B
12	BA	Yellow Birch	*Betula alleghaniensis*	3" Cal.	B&B
3	BN	River Birch	*Betula nigra*	3" Cal.	B&B
4	BP	Gray Birch	*Betula populifolia*	3" Cal.	B&B
20	CK	Flowering Dogwood	*Cornus florida*	3" Cal.	B&B
4	CV	Hawthorn	*Crataegus viridis*	3" Cal.	B&B
9	IO	American Holy	*Ilex opaca*	8' Ht.	B&B
20	JV	Eastern Red Cedar	*Juniperus virginiana*	8' Ht.	B&B
7	NS	Black tupelo	*Nyssa Sylvatica*	3" Cal.	B&B
17	PO	Pin Oak	*Quercus palustris*	3" Cal.	B&B
16	RM	Red Maple	*Acer rubrum*	3" Cal.	B&B
7	TS	Eastern Hemlock	*Tsuga canadensis*	8' Ht.	B&B
SHRUBS					
15	AL	Shadbush	*Amelanchier laevis*	8' Ht.	B&B-singlestem
1	CR	Grey Dogwood'	*Cornus racemosa*	24"Ht.	B&B
24	CS	Red Twig Dogwood'	*Cornus sericea*	24"Ht.	B&B
4	EV	Winterberry	*Ilex verticillata*	24"Ht.	B&B
6	FG	Fothergilla	*Fothergilla gardenii*	24"Ht.	B&B
12	HA	Smooth Hyrdrangea	*Hydrangea arborescends*	24"Ht.	B&B
6	HP	Golden St. John's Wort	*Hypericum prolificum*	24"Ht.	B&B
9	IG	Inkberry	*Ilex glabra*	36"Ht.	B&B
15	IO	American Holly	*Ilex opaca*	36"Ht.	B&B
9	IV	Sweetspice	*Itea virginica*	24"Ht.	B&B
7	JH	Creeping Juniper	*Juniperus horizontalis*	#3 Pot	Container Grown
7	JV	Eastern Red Cedar	*Juniperus virginiana*	60" Ht.	B&B
12	LA	Drooping leucothoe	*Leucothoe fontanesiana*	24"Ht.	B&B
8	LB	Spice Bush	*Lindera benzion*	24"Ht.	B&B
21	MP	Bayberry	*Myrica pensylvanica*	36" Ht.	B&B
21	PF	Mountain pieris	*Pieris floribunda*	24"Ht.	B&B
4	PO	Eastern ninebark	*Physocarpus opulifolius*	24"Ht.	B&B
9	ST	Steeplebush	*Spirea tomentosa*	#3 Pot	Container Grown
4	TC	Canadian Yew	*Taxus canadensis*	36" Ht.	B&B

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

_____

_____

_____

_____

_____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	**245-502**
DATE: **MAY 28, 2023**	DWG NO. **250TURNPIKECURRENT**

REVISIONS

DATE:	DESCRIPTION
8/17/23	REVISED FOR ALTERNATIVE GRADING
2/28/24	REVISED FOR TOWN SUBMITTAL
4/15/24	REVISED FOR TOWN SUBMITTAL

SCALE: 1 INCH = 50 FEET

FEET 0 25 50 100 150

METERS 0 30 50

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD

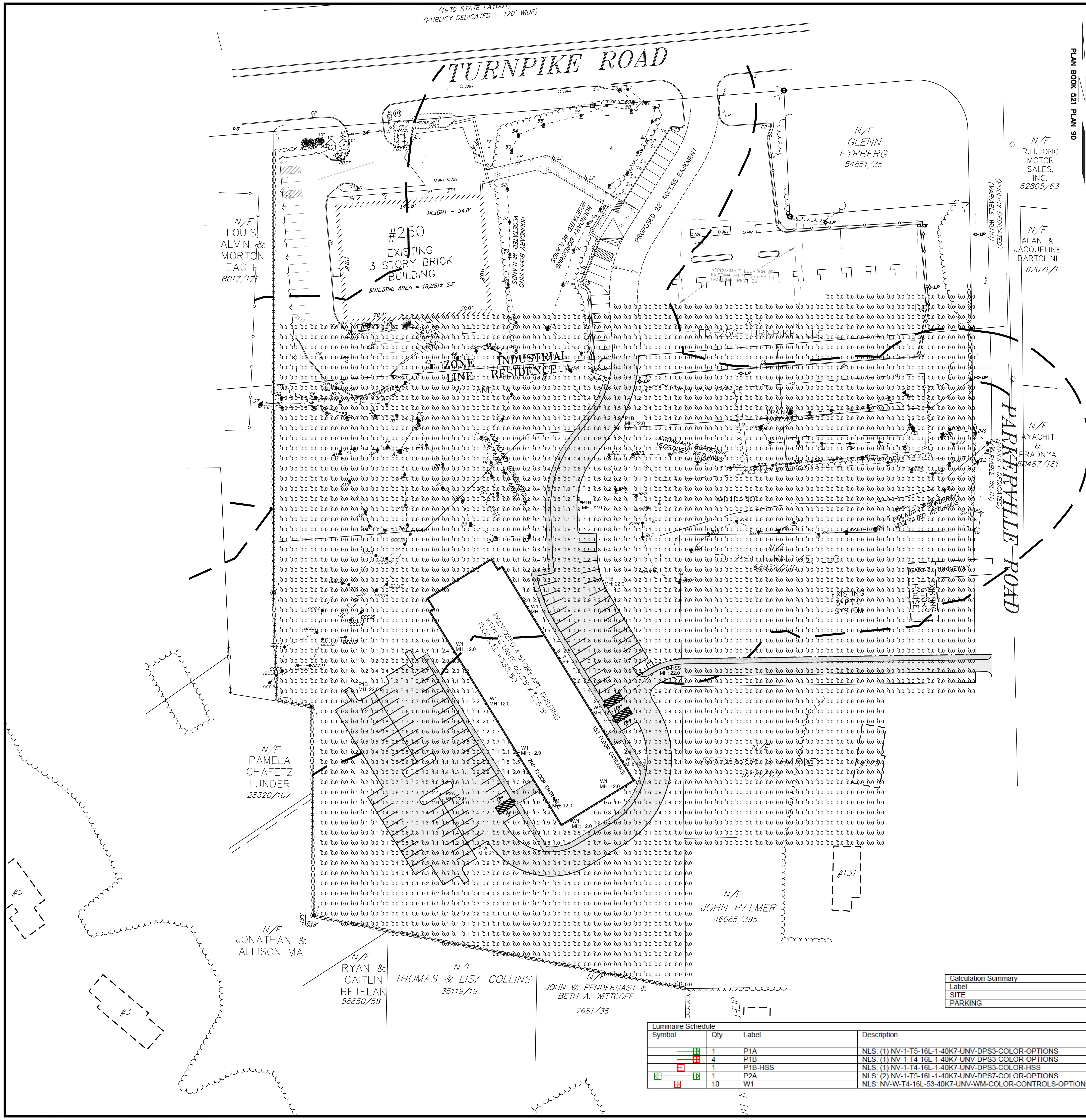
IN

SOUTHBOROUGH, MASS.

OWNER & APPLICANT:

FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

LANDSCAPE PLAN



Calculation Summary						
Label	Units	Avg	Max	Min	Avg/Min	Max/Min
SITE	Fc	0.19	3.8	0.0	N.A.	N.A.
PARKING	Fc	0.87	2.4	0.1	8.70	24.00

Luminaire Schedule							
Symbol	Qty	Label	Description	LLF	Luminaire Lumens	Luminaire Watts	Mounting Height
	1	P1A	NLS: (1) NV-1-T5-16L-1-40K7-UNV-DPS3-COLOR-OPTIONS	0.900	6944	56	22
	4	P1B	NLS: (1) NV-1-T4-16L-1-40K7-UNV-DPS3-COLOR-OPTIONS	0.900	6776	56	22
	1	P1B-HSS	NLS: (1) NV-1-T4-16L-1-40K7-UNV-DPS3-COLOR-HSS	0.900	3812	56	22
	1	P2A	NLS: (2) NV-1-T5-16L-1-40K7-UNV-DPS7-COLOR-OPTIONS	0.900	6944	56	22
	10	W1	NLS: NV-W-T4-16L-53-40K7-UNV-WM-COLOR-CONTROLS-OPTIONS	0.900	3756	29	12

PROPOSED PARKING LOT FIXTURE

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON ____________________.

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

CLT. NO.	JOB NO.
502	245-502
DATE: MAY 28, 2023	DWG NO. 250TURNPIKECURRENT

REVISIONS	
DATE:	DESCRIPTION
8/17/23	REVISED FOR ALTERNATIVE GRADING
2/28/24	REVISED FOR TOWN SUBMITTAL
4/15/24	REVISED FOR TOWN SUBMITTAL

SCALE: 1 INCH = 50 FEET

FEET 0 25 50 100 150

METERS 0 30 50

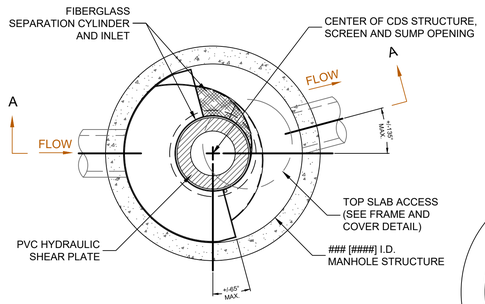
SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

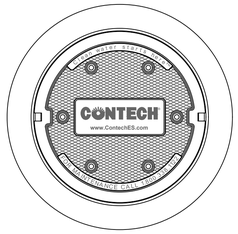
OWNER & APPLICANT:

FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

LIGHTING PLAN

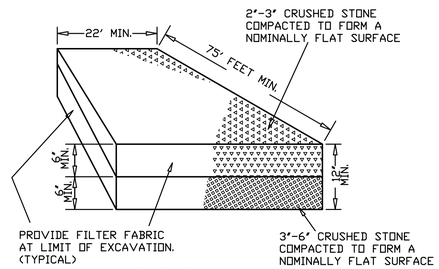


PLAN VIEW B-B
N.T.S.

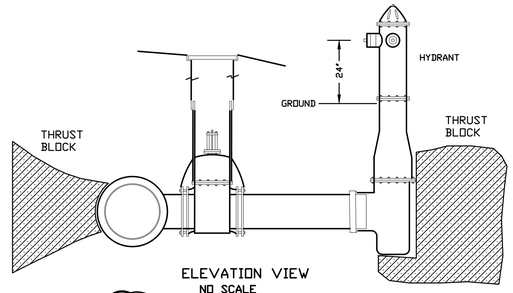


FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

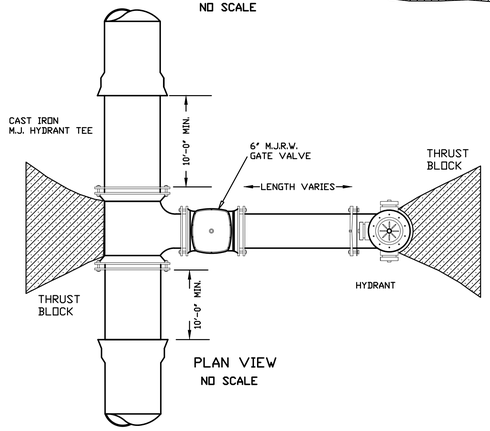
NOTE:
THE PROPOSED LOCATION OF THE SITE ENTRANCE MAT WILL BE IN THE LOCATION OF THE BEGINNING OF THE ACCESS DRIVE AT ITS ENTRANCE OFF THE SOUTHWEST CORNER OF THE EXISTING PARKING AREA.



SITE ENTRANCE MAT
(NOT TO SCALE)
THE PARKING AREA WILL BE SWEPT DAILY IF HAULING IS IN PROGRESS.



ELEVATION VIEW
NO SCALE



PLAN VIEW
NO SCALE

TYPICAL HYDRANT W/GATE
(NOT TO SCALE)

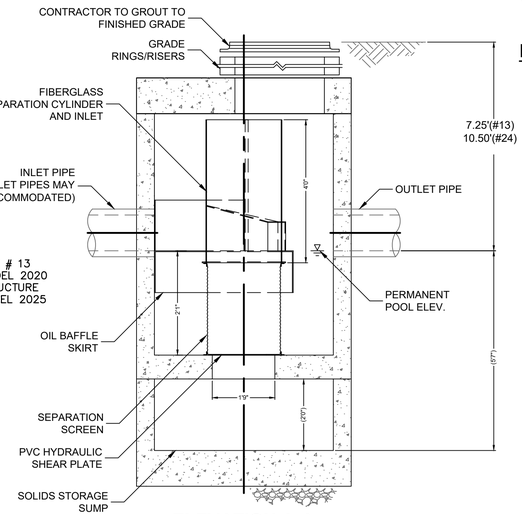
COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

GENERAL NOTES:

1) THERE ARE NO FEMA FLOOD ZONES ON THE NEW 8 ACRE PARCEL.
2) ACCORDING TO THE MASSMAPPER WEB SITE, THERE ARE NO ENDANGERED SPECIES HABITATS AND NO VERNAL POOLS ON OR ADJACENT TO THIS SITE.
3) THE PROJECT SITE IS SHOWN AS PARCEL 46 ON ASSESSOR MAP 27.
4) TOTAL SITE ALTERATION IS EXPECTED TO BE 3.1 ACRES.
5) TOPSOIL WILL BE STOCKPILED IN THE AREA EAST OF THE PROPOSED BUILDING AS SHOWN ON SHEET ESC2.
6) ALL PROPOSED RETAINING WALLS SHALL BE CONIGLIARO BLOCK USING 2'X2'X4' BLOCKS.

DIG SAFE:

EXCEPT FOR VISIBLE STRUCTURES (MANHOLES, GATES, POLES, ETC.) LOCATED BY THE PROJECT SURVEYOR, ALL UNDERGROUND UTILITIES SHOWN WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE DESIGNING, EXCAVATING, BLASTING OR INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION, OR REPAIRING.
ALL UTILITY COMPANIES, PUBLIC & PRIVATE, MUST BE CONTACTED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN.
AZIMUTH LAND DESIGN, LLC ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
CALL "DIG SAFE" AT 811 or 1-888-DIG-SAFE.



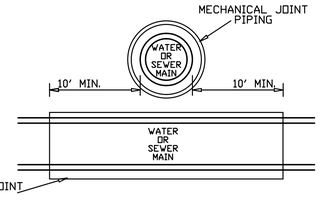
NOTE:
DRAINAGE STRUCTURE # 13 SHALL BE A CDS MODEL 2020 UNIT. DRAINAGE STRUCTURE #24 SHALL BE A MODEL 2025 UNIT.

ELEVATION A-A
N.T.S.

CONTECH CDS MODEL 2025 STORMWATER FILTRATION UNIT
(NOT TO SCALE)

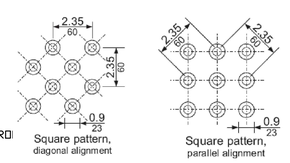
NOTE:
THE SEPTIC SYSTEM SHALL BE INSTALLED WITH A MINIMUM HORIZONTAL SEPARATION OF 10 FEET TO ALL WATER SUPPLY LINES. WHEN A 10 FOOT HORIZONTAL SEPARATION BETWEEN THE SEPTIC SYSTEM PIPING AND A WATER LINE CANNOT BE MAINTAINED, THE WATER MAIN SHALL BE INSTALLED IN A SEPARATE TRENCH ABOVE THE SEWER WITH AN 18 INCH VERTICAL SEPARATION BETWEEN THE CROWN OF THE SEWER AND THE INVERT OF THE WATER MAIN.

HOWEVER, WHEN THE ELEVATION OF THE SEWER CANNOT BE VARIED TO MEET THIS REQUIREMENT, THE WATER MAIN SHOULD BE RELOCATED TO PROVIDE THIS SEPARATION OR CONSTRUCTED WITH MECHANICAL-JOINT PIPE FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE SEWER. ONE FULL LENGTH OF WATER MAIN SHOULD BE CENTERED OVER THE SEWER SO THAT BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE. SEE DETAIL.



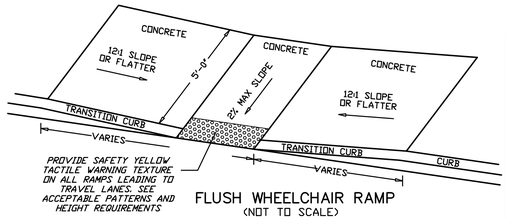
MECHANICAL JOINT PIPING OF BOTH WATER AND SEWER SHALL EXTEND FOR 10 FEET FROM THE INTERSECTION OF THE MAINS AND ALONG EACH MAIN, CENTER ONE FULL PIPE LENGTH OF BOTH WATER AND SEWER OVER THE INTERSECTION.

WATER MAIN/SEWER MAIN CROSSING
WHERE 18" VERTICAL CLEARANCE IS NOT PROVIDED
(NOT TO SCALE)

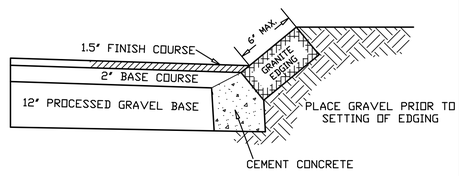


Detectable warnings shall consist of raised truncated domes with a diameter of nominal 0.9 in (23 mm), a height of nominal 0.2 in (5 mm) and a center-to-center spacing of nominal 2.35 in (60 mm) and shall contrast visually with adjoining surfaces, either light-on-dark or dark-on-light.

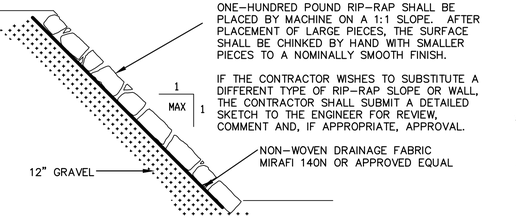
The material used to provide contrast shall be an integral part of the walking surface. Detectable warnings used on interior surfaces shall differ from adjoining walking surfaces in resiliency or sound-on-cane contact. ADAAG 4.29.2



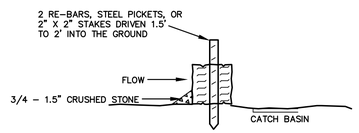
FLUSH WHEELCHAIR RAMP
(NOT TO SCALE)



SETTING SLOPED GRANITE CURBING
(NOT TO SCALE)

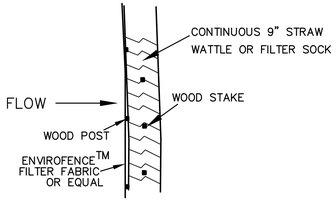


1:1 RIP-RAP SLOPE
(NOT TO SCALE)

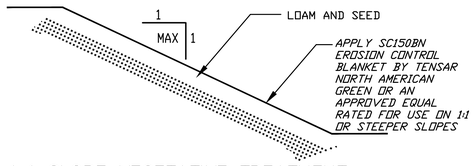


TO BE PLACED AROUND CATCH BASINS DURING CONSTRUCTION

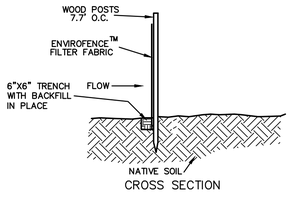
STRAW BALE DIKE
(NOT TO SCALE)



PLAN VIEW

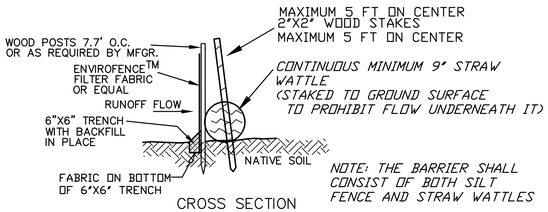


3:1 TO 1:1 SLOPE VEGETATIVE TREATMENT
(NOT TO SCALE)



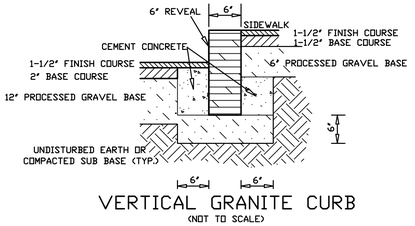
CROSS SECTION

SEDIMENTATION CONTROL FENCING
(NOT TO SCALE)



CROSS SECTION

DETAIL OF SEDIMENT CONTROL BARRIER
(NOT TO SCALE)



VERTICAL GRANITE CURB
(NOT TO SCALE)
NOTE: ONLY TO BE USED WHERE THERE IS SIDEWALK AGAINST THE CURB

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

COMMONWEALTH OF MASSACHUSETTS
JAMES L TETREAULT CIVIL No. 38548
PROFESSIONAL ENGINEER

CLT. NO.	JOB NO.
504	290-504
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS	
DATE:	DESCRIPTION

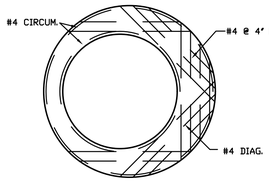
SCALE: AS NOTED

SITE PLAN OF LAND

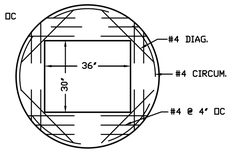
AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

DETAIL SHEET D1



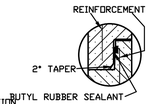
8' TOP SLAB



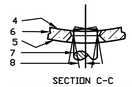
CONTRACTOR SHALL VERIFY DIMENSIONS AND SUBMIT SHOP DRAWINGS

6' TOP RING

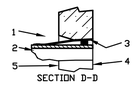
1. KOR-N-SEAL RESILIENT CONNECTION - SIZED TO MEET CLASS AND TYPE OF PIPE
2. PIPE SECTION
3. BEVEL TO ALLOW FOR MISALIGNMENT
4. INNER SURFACE OF PRECAST CONCRETE MANHOLE
5. OUTER SURFACE OF PRECAST CONCRETE MANHOLE
6. PRECAST CONCRETE MANHOLE (A.S.T.M. C478-68)
7. PVC, CLAY, CAST IRON OR CONCRETE PIPE
8. 9" ALLOWABLE MISALIGNMENT OFF CENTER IN ANY DIRECTION



JOINT DETAIL

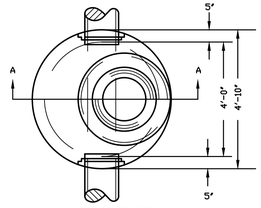


SECTION C-C
(RESILIENT SEAL OMITTED)



SECTION D-D
THRU RESILIENT SEAL AND MANHOLE

DETAILS
(NOT TO SCALE)
(SEE NOTES TO LEFT)



PLAN VIEW OF
TYPICAL PRE-CAST MANHOLE
(NOT TO SCALE)

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

_____

_____

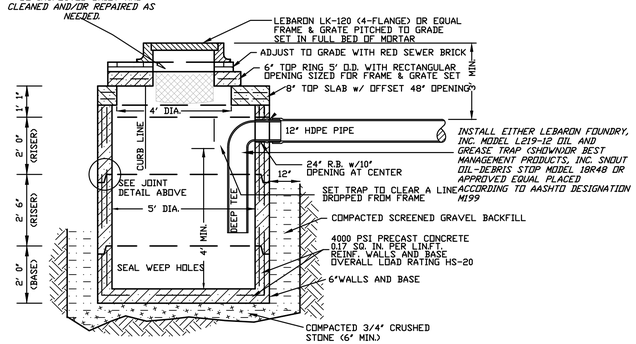
_____

_____

_____

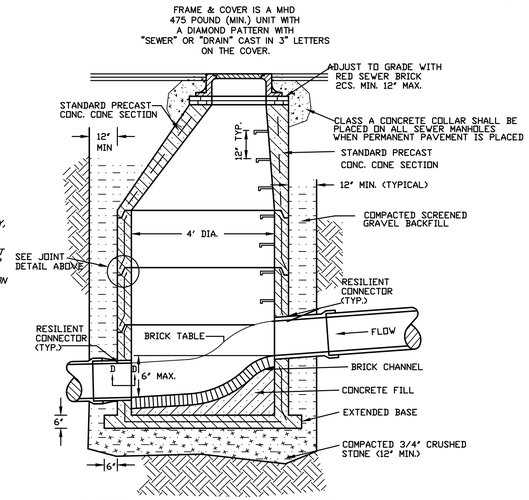
IF NECESSARY, PROVIDE "STREAMGUARD" OR "SILT SAC" FILTERS IN ALL PROPOSED CATCHBASINS DURING CONSTRUCTION. FILTERS SHALL BE INSPECTED DAILY AND CLEANED AND/OR REPAIRED AS NEEDED.

NOTE:
THIS TYPE OF CATCH BASIN IS TO BE USED FOR CB'S #'S 24 & 25.

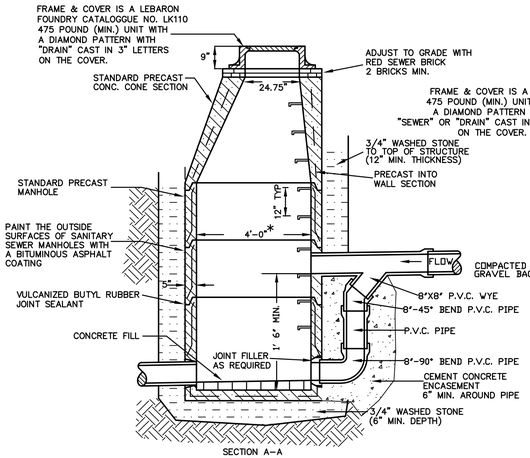


INSTALL EITHER LEBARON FOUNDRY, INC. MODEL L219-12 OIL AND GREASE TRAP (SHOWNDOR BEST MANAGEMENT PRODUCTS, INC. SNOUT OIL-DEBRIS STOP MODEL 18R48 OR APPROVED EQUAL PLACED ACCORDING TO AASHTO DESIGNATION M199

TYPICAL 4 FLANGE GRATE PRE-CAST CATCH BASIN
(NOT TO SCALE)

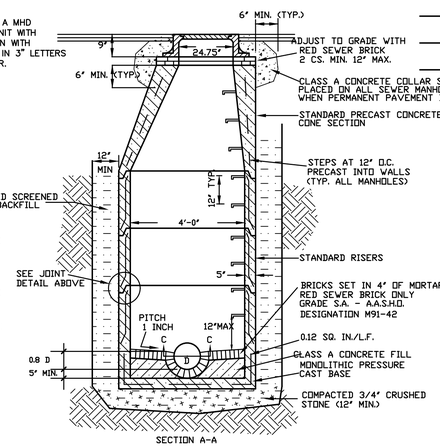


TYPICAL STEP DRAIN MANHOLE
(NOT TO SCALE)



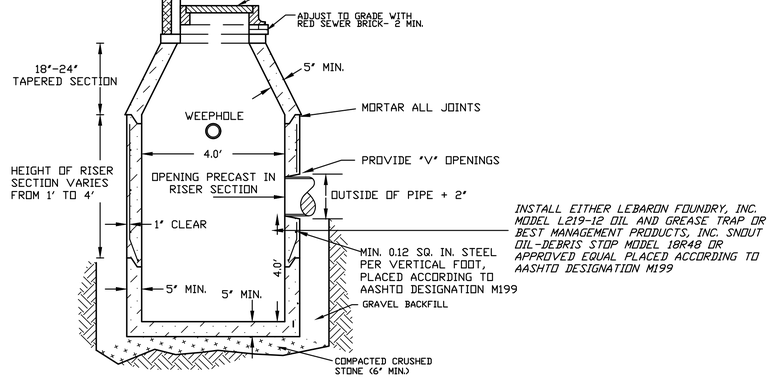
SECTION A-A

TYPICAL DROP MANHOLE
(NOT TO SCALE)



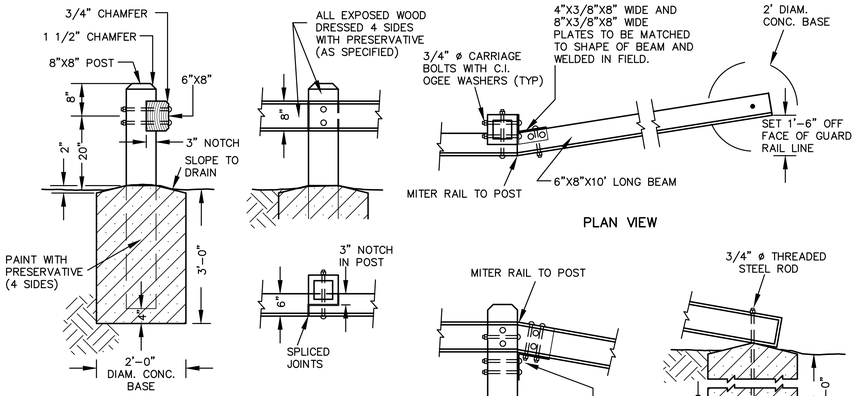
SECTION A-A

TYPICAL PRE-CAST MANHOLE
(NOT TO SCALE)



INSTALL EITHER LEBARON FOUNDRY, INC. MODEL L219-12 OIL AND GREASE TRAP OR BEST MANAGEMENT PRODUCTS, INC. SNOUT OIL-DEBRIS STOP MODEL 18R48 OR APPROVED EQUAL PLACED ACCORDING TO AASHTO DESIGNATION M199

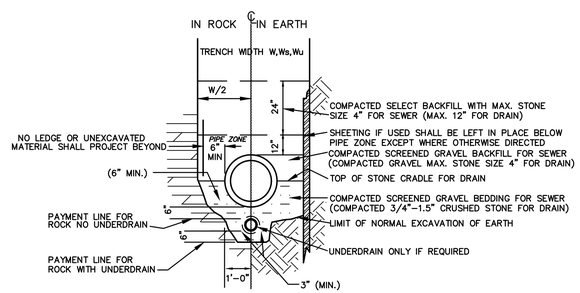
PRECAST CATCHBASIN W. GRANITE THROAT INLET
(NOT TO SCALE)



NOTE:
1. POST SPACING OF 7'-4" ALLOWS USE OF 8'-0" LENGTH TIMBER RAILS FOR CONSTRUCTION. USE THIS AS MAXIMUM SPACING.
2. FOR CONCRETE BASES OVER CULVERTS USE 2' DIAMETER AND 2' DEEP.
3. NICK THREADS ON BOLTS.
4. USE C.I. OGEE WASHERS WITH ALL NUTS.

TIMBER GUARD RAIL
NOT TO SCALE

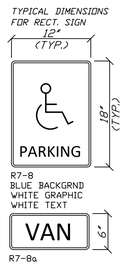
GUARD RAIL END TRANSITION
NOT TO SCALE



TYPICAL TRENCH SECTION
ONE PIPE
(NOT TO SCALE)

TRENCH DEPTH TO INVERT	TRENCH WIDTH, W FOR SEWER
0'-12'	5'
12'-20'	7'
>20'	9'

TYPICAL DIMENSIONS FOR RECT. SIGN



NOTES:
THE SIGN SHALL BE PERMANENTLY LOCATED AT A HEIGHT OF NOT LESS THAN FIVE FEET NOR MORE THAN EIGHT FEET TO THE TOP OF THE SIGN.

THE SIGN SHALL BE LOCATED AT THE HEAD OF THE SPACE AND NO MORE THAN TEN FEET AWAY FROM THE SPACE. THE SIGN SHALL BE MOUNTED ON A NOMINAL 2"X2" GALVANIZED STEEL POST.

THE PROPOSED ACCESS AISLE NEXT TO THE SPACE SHALL BE 8 FEET WIDE.

HC PARKING SIGN
(NOT TO SCALE)

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

COMMONWEALTH OF MASSACHUSETTS
JAMES L TETREAULT CIVIL No. 38548
PROFESSIONAL ENGINEER

CLT. NO. 504	JOB NO. 290-504
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS	
DATE:	DESCRIPTION

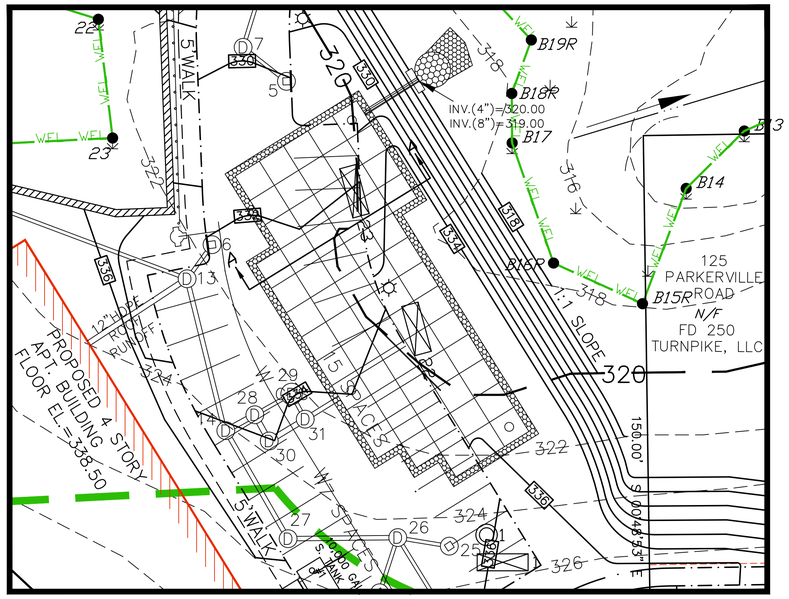
SCALE: AS NOTED

SITE PLAN OF LAND

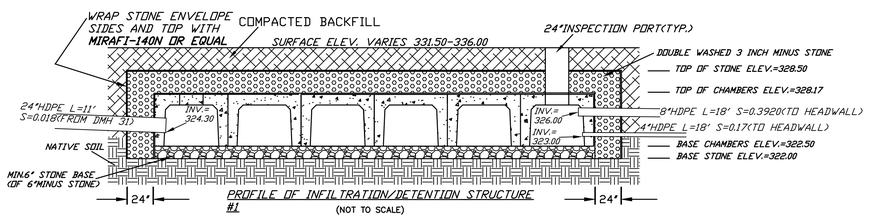
AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

DETAIL SHEET D2



PLAN VIEW OF INFILTRATION STRUCTURE #1
(SCALE: 1" = 20')

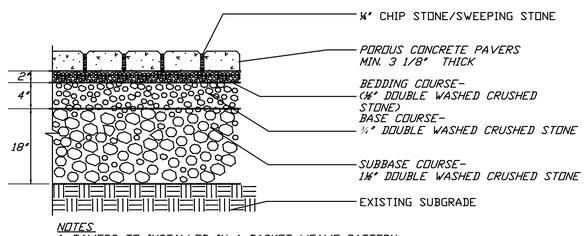


SEASONAL HIGH GROUNDWATER FROM IH 23'42" DOWN FROM 320.0)=316.5

DETENTION/INFILTRATION STRUCTURE #1 SHALL CONSIST OF 63 8'x8'x5' HIGH RETAIN-IT CONCRETE MODULES (60"INSIDE HEIGHT, 68"TOP OF MODULE HEIGHT) WITHIN A STONE ENVELOPE 6.5 FEET HIGH AND HAVING A POLYGON SHAPED FOOTPRINT OF 4,656 SQUARE FEET.

THE UNITS SHALL BE OPEN BOTTOMED EXCEPT FOR THE MODULE AT THE POINT WHERE FLOW IS DISCHARGED INTO THE STRUCTURE, WHICH SHALL HAVE A FLOOR TO ALLOW FOR POSSIBLE ADDITIONAL CLEANOUT. THERE SHALL BE 6 INCHES OF STONE BENEATH THE MODULES AND 24 INCHES OF STONE OUTSIDE OF THEM.

ALL TOPSOIL("A" HORIZON SOIL) AND SUBSOIL("B" HORIZON SOIL) SHALL BE REMOVED FROM BENEATH THE STONE ENVELOPE AND ANY OTHER DELETERIOUS MATERIAL. ADDITIONAL STONE BASE SHALL BE PLACED BENEATH THE CHAMBERS TO REPLACE SUCH MATERIAL. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO AVOID COMPACTING THE SOIL WITHIN THE FOOTPRINT OF THE INFILTRATION STRUCTURE IN THE COURSE OF CONSTRUCTION.

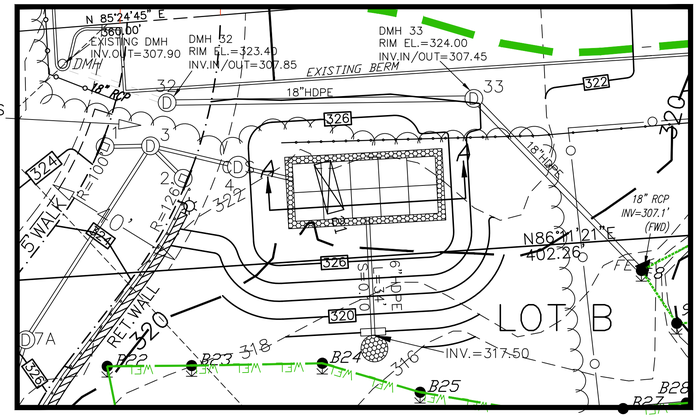


NOTES:
1. PAVERS TO INSTALLED IN A BASKET WEAVE PATTERN
2. JOINT BETWEEN THE PAVERS SHALL BE BETWEEN 1/16"-3/16" JOINT
3. THE ENTRANCE DRIVE FROM PARKERVILLE ROAD AND THE SIDEWALK BESIDE IT SHALL BE HAVE PICP SURFACES

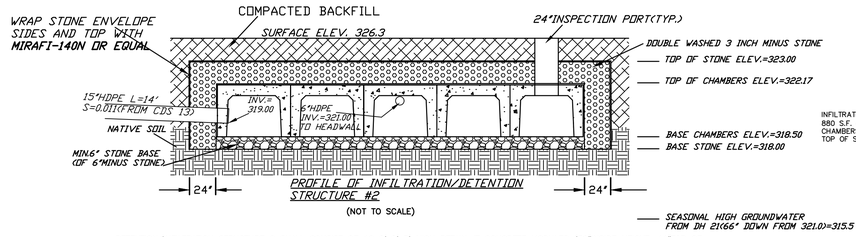
PERMEABLE INTERLOCKING CONCRETE PAVER DETAIL

NOT TO SCALE

PROPOSED 40' ACCESS & UTILITY EASEMENT



PLAN VIEW OF INFILTRATION STRUCTURE #2
(SCALE: 1" = 20')



INFILTRATION STRUCTURE COVERING 880 S.F. WITH 10 RETAIN-IT 8'x8'x3' CHAMBERS. BASE EL.=318.50
TOP OF STONE EL.=323.00

DETENTION/INFILTRATION STRUCTURE 2 SHALL CONSIST OF 10 8'x8'x3' HIGH RETAIN-IT CONCRETE MODULES (36"INSIDE HEIGHT, 44"TOP OF MODULE HEIGHT) WITHIN A RECTANGULAR STONE ENVELOPE 5 FEET HIGH, MEASURING 44'X20' AND HAVING A FOOTPRINT OF 880 SQUARE FEET.

THE UNITS SHALL BE OPEN BOTTOMED EXCEPT FOR THE MODULE AT THE POINT WHERE FLOW IS DISCHARGED INTO THE STRUCTURE, WHICH SHALL HAVE A FLOOR TO ALLOW FOR POSSIBLE ADDITIONAL CLEANOUT. THERE SHALL BE 6 INCHES OF STONE BENEATH THE MODULES, 10 INCHES OVER THEM 24 INCHES OF STONE OUTSIDE OF THEM.

ALL TOPSOIL("A" HORIZON SOIL) AND SUBSOIL("B" HORIZON SOIL) SHALL BE REMOVED FROM BENEATH THE STONE ENVELOPE AND ANY OTHER DELETERIOUS MATERIAL. ADDITIONAL STONE BASE SHALL BE PLACED BENEATH THE CHAMBERS TO REPLACE SUCH MATERIAL. THE CONTRACTOR SHALL MAKE EVERY EFFORT TO AVOID COMPACTING THE SOIL WITHIN THE FOOTPRINT OF THE INFILTRATION STRUCTURE IN THE COURSE OF CONSTRUCTION.

SANITARY SEWER PIPE AND INVERT TABLE

FROM			PIPE				TO	
STRUCTURE	RIM/GRATE	INVERT OUT	LENGTH (FT.)	SIZE (IN.)	SLOPE (FT/FT)	TYPE	STRUCTURE	INVERT IN
BUILDING	N/A	334.00	17'	6"	0.024	PVC	SEPTIC TANK1	333.60
S.TANK 1	335.80	333.35	6'	6"	0.033	PVC	SEPTIC TANK 2	333.15
S.TANK 2	336.10	332.90	63'	6"	0.083	PVC	PUMP CHAMBER	332.00
PUMP CHAMBER	337.00	331.75	227'	3"FM	N/A	PVC	MANIFOLD	349.00

DRAINAGE PIPE AND INVERT TABLE

FROM			PIPE				TO	
STRUCTURE	RIM/GRATE	INVERT OUT	LENGTH (FT.)	SIZE (IN.)	SLOPE (FT/FT)	TYPE	STRUCTURE	INVERT IN
TO INFILTRATION STRUCTURE 2 NORTH OF WL FLAG B24								
CB 5	330.00	326.00	11'	8"	0.018	HDPE	DMH 7	325.80
DMH 7	329.80	324.30	61'	12"	0.041	HDPE	DMH 7A	321.80
DMH 7A	325.80	321.60	61'	12"	0.037	HDPE	DMH 3	319.35
CB 1	323.25	319.65	9'	8"	0.022	HDPE	DMH 3	319.45
CB 2	323.25	319.65	9'	8"	0.022	HDPE	DMH 3	319.45
DMH 3	323.45	319.35	21'	15"	0.010	HDPE	CDS 4	319.15
CDS 4	325.80	319.15	14'	15"	0.011	HDPE	INFILTRATION 2	319.00
TO INFILTRATION STRUCTURE 1 WEST OF WL FLAG B16R								
CB 6	332.00	328.20	8'	8"	0.025	HDPE	DMH 13	328.00
CB 8	352.10	348.10	58'	8"	0.010	HDPE	DMH 10	347.50
CB 9	352.10	348.00	10'	8"	0.050	HDPE	DMH 10	347.50
DMH 10	350.00	334.50	53'	12"	0.038	HDPE	DMH 11	332.50
DMH 11	337.00	332.00	78'	15"	0.018	HDPE	DMH 12	330.60
DMH 12	336.40	330.40	67'	15"	0.028	HDPE	DMH 13	328.50
BLDG ROOF	N/A	334.50	32'	12"	0.188	HDPE	DMH 13	328.50
DMH 13	332.80	327.50	40'	18"	0.015	HDPE	DMH 14	326.90
CB 15	352.10	347.00	60'	8"	0.013	HDPE	DMH 17	346.20
CB 16	350.80	346.80	10'	8"	0.060	HDPE	DMH 17	346.20
DMH 17	350.35	342.10	60'	12"	0.038	HDPE	DMH 18	339.80
DMH 18	344.00	336.30	56'	12"	0.041	HDPE	DMH 19	334.00
BLDG ROOF	N/A	334.50	29'	12"	0.035	HDPE	DMH 19	333.50
DMH 19	338.20	332.70	56'	18"	0.021	HDPE	DMH 22	331.50
CB 20	335.50	331.50	11'	8"	0.018	HDPE	DMH 22	331.30
CB 21	335.50	331.50	12'	8"	0.017	HDPE	DMH 22	331.30
DMH 22	335.95	330.80	25'	18"	0.016	HDPE	DMH 23	330.40
DMH 23	337.20	330.20	85'	18"	0.014	HDPE	DMH 26	329.00
CB 24	335.50	331.50	12'	8"	0.021	HDPE	DMH 26	331.30
CB 25	335.50	331.50	12'	8"	0.028	HDPE	DMH 26	331.30
DMH 26	335.35	328.80	27'	18"	0.015	HDPE	DMH 27	328.40
DMH 27	335.20	328.20	31'	18"	0.016	HDPE	DMH 14	327.70
DMH 14	334.10	326.40	6'	24"	0.017	HDPE	DMH 28	326.30
DMH 28	333.80	326.10	8'	10"	0.025	HDPE	CDS4040 29	325.90
DMH 28	333.80	326.80	6'	18"	0.016	HDPE	DMH 30	326.70
CDS4040 29	334.00	325.90	6'	10"	0.033	HDPE	DMH 31	325.70
DMH 30	334.00	326.50	8'	18"	0.025	HDPE	DMH 31	326.30
DMH 31	334.20	324.50	11'	24"	0.018	HDPE	INFILTRATION	324.30

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

_____
_____
_____
_____
_____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

JAMES L TETREAULT CIVIL No. 38548 PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

CLT. NO.	JOB NO.
504	290-504
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS

DATE:	DESCRIPTION

SCALE: AS NOTED

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:

FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

DETAIL SHEET D3

POLLUTION PREVENTION PLAN
FOR
250 TURNPIKE ROAD, SOUTHBOROUGH, MA

PROJECT DESCRIPTION

This is a proposal to develop this site and construct an apartment building having 56 units along with associated parking and driving aisles and necessary utility infrastructure on this 4.9 acre site.

Construction will take place in a single phase and is expected to last from the summer 2024 into the fall of 2026. Total site alteration will be approximately 3.1 acres.

Construction Process
Before construction begins, erosion control barriers consisting of silt fencing attached to posts and backed by staked straw wattles will be placed at the limit of work as shown on the Erosion & Sediment Control Plans, Sheets ESC1-ESC2.

The first step of the construction process will be the cutting of trees within the limits of proposed development. After this has been accomplished in the demarcated areas, clearing and grubbing will take place and loam will be stockpiled in the area indicated on sheet ESC2. Stumps will be ground on site to use the grindings as temporary stabilization. Temporary settling basins will be installed downgradient of work in the locations shown on sheets ESC1 and ESC2.

The time of construction requiring the most attention and care occurs between the stripping of natural overburden and the stabilization of construction areas. Cut and fill areas create additional risk by increasing the possibility of stormwater runoff causing erosion.

The contractor will, to the extent possible, leave natural cover untouched at the edges of the property and surrounding the wetland. The contractor will limit to the shortest time possible the time that areas are exposed. The landscaping will be completed as early as weather and building construction allow. During the times between clearing and landscaping, soils will be stabilized with a combination of stump grindings, wood chips, hay/straw mulch, temporary grass seeding and other measures as necessary to prevent any significant erosion of soils.

Soil stockpile areas will be kept out of the 100 foot buffer zone associated with the delineated wetland on site. Soil stockpiles shall be surrounded by staked silt fence placed at least 5 foot off the toe of slope of the stockpile. One suitable stockpile location is in the area east of the proposed building.

In conjunction with the site grading process, a number of sedimentation control procedures will be followed. The object of the procedures is to prevent the erosion of soils and the transport of sediments to adjacent properties and eventually to wetland resource areas off site.

Stabilization
Temporary and permanent stabilization of disturbed surfaces is the most reliable method of preventing the erosion and transport of site soils. Toward that end, the areas that are disturbed will be provided temporary stabilization within two weeks after the last disturbance when:
- Work is not complete in that area,
- Work will remain incomplete for a period of three weeks or more, and
- The planting season has not been reached in areas which will be re-vegetated.

Permanent stabilization will take place when:
- Work is complete in that area and
- The planting season has been reached and areas can be revegetated.

Best Management Practices Employed
To guard against the transport of soils offsite several Best Management Practices (BMP's) may be employed. Sediment control barriers, sediment sumps, temporary settling basins, straw bale check dikes, swales, a site entrance mat, flocculants in both crystal and block forms, and organic media for capture of silt below flocculants may be used on this site as appropriate. All of these measures are temporary. The site's permanent protection against erosion and the deposition of sediment off site at resource areas is the permanent stabilization of formerly exposed surfaces with pavement, lawn and other landscaping.

Soils
According to the MassMapper web site the soils underlying this site are Woodbridge series soils which are categorized as hydrologic soil group C soils. and Canton series soils which are categorized as hydrologic soil group B soils.

Resource Areas
There are bordering vegetated wetlands associated with intermittent stream flows on site. The boundaries of these wetlands were confirmed by the Order of Conditions issued by the Southborough Conservation Commission under DEP File #290-1109 and recorded at the Worcester District Registry of Deeds at Book 69915 Page 137.

SITE PLAN DEVELOPMENT
As part of the Site Plans submitted to the Town of Southborough, Azimuth Land Design, LLC has prepared this erosion and sediment control plans calling for permanent and temporary erosion control measures. The site drains almost entirely to Turnpike Road (Rt. 9) and to Parkerville Road. The aim of the erosion and sediment control measures is to ensure that there is no degradation of the wetlands associated with the stream draining to each design point.

PHASING
Construction of the project will take place in one phase. Total site alteration will be approximately 3.1 acres.

POLLUTION PREVENTION SITE PLAN
The Site Plans prepared by Azimuth Land Design, LLC contain Erosion & Sediment Control Plans. Various Best Management Practices (BMP's) are described herein and/or shown on the Erosion & Sediment Control Plans or the Detail Sheets and will be used to prevent or to mitigate erosion and pollution.

INSPECTION AND MAINTENANCE OF EROSION CONTROLS
1. At all times, siltation fabric fencing, straw wattles or straw bales and stakes sufficient to construct an erosion control barrier a minimum 25 feet long will be stockpiled on the site in order to repair established barriers which may have been damaged or breached.

2. The Developer will designate as Inspector a person or entity other than the site supervisor The Inspector must be accessible seven days a week and be responsible for inspecting and coordinating the maintenance and repair of all erosion control systems on the site.

3. An inspection of all erosion control measures shall be conducted by the Inspector at least once each week until the completion of construction of the subdivision. The Contractor shall inspect all erosion control systems daily and shall notify the Inspector of any breaches or failures. In case of any noted breach or failure, the Contractor shall immediately make appropriate repairs.

4. The Inspector shall inspect all erosion control systems on the site before, during and after any storm event reaching one of the following thresholds:
   a. Any storm in which rain is predicted to last for 12 consecutive hours or more.
   b. Any storm for which a flash flood watch or warning is issued.
   c. Any single storm predicted to have a cumulative rainfall greater than 1/2 inch.
   d. Any storm event not meeting the previous three thresholds but which would mark the third consecutive day of measurable rainfall.

5. The Inspector shall inspect erosion control measures at times of significant increase in runoff due to rapid thawing when the risk of failure of those measures is significant.

6. In such instances as remedial action is necessary, the Inspector shall cause to be repaired within seven days, any and all significant deficiencies in erosion control measures.

7. The Southborough Conservation Commission shall be notified of any significant failure of erosion or sediment control measures and shall be notified of any release of pollutants.

SEPTIC SYSTEM DESIGN:

1) THE 56 PROPOSED UNITS WILL HAVE A TOTAL OF 82 BEDROOMS. UNDER TITLE 5, THIS CREATES A SEWAGE FLOW GENERATION OF 82X110=9,020 GALLONS PER DAY.
2) PERCOLATION TESTS #'S 14, 16 AND 19 IN THE PROPOSED SOIL ABSORPTION SYSTEM AREA, HAD OFFICIALLY OBSERVED PERCOLATION RATES OF 5, 6 AND 20 MINUTES PER INCH. THE SYSTEM DESIGN WILL BE BASED ON A 20 MINUTE PER INCH PERCOLATION RATE WHICH, ACCORDING TO THE TABLE AT 310CMR 15.242(1) GIVES A LONG TERM ACCEPTANCE RATE OF 0.53 GPD/S.F. TO THE PROPOSED SOIL ABSORPTION SYSTEM.
3) 9,020 GPD REQUIRES A SYSTEM SURFACE AREA OF 9,020/0.53 =17,019 S.F. USING 2' WIDE AND 2' DEEP TRENCHES, EACH 1' LENGTH OF TRENCH HAS 6 S.F. OF SURFACE AREA. SO 17,019/6=2,837 FEET OF TRENCH THAT IS REQUIRED.
4) SO, OUR DESIGN WILL PROPOSE 50 TRENCHES EACH 57 FEET LONG, SPLIT HALF NORTH AND HALF SOUTH OF A CENTRAL MANIFOLD THAT WILL BE FED FROM A PUMP CHAMBER. WITH RESERVE TRENCHES IN BETWEEN, 25 TRENCHES REQUIRES A WIDTH OF 200 FEET. WITH A SPACE OF 10 FEET IN BETWEEN EACH GROUP OF TRENCHES, EAST AND WEST, THE REQUIRED AREA FOR THE SOIL ABSORPTION SYSTEM IS 124'X200'.

EROSION CONTROL DEVICES OR PROCESSES

1. Sediment Control Barrier
The sediment control barrier will consist of an approved siltation fabric fencing installed on posts according to the manufacturer's instructions and backed by staked straw wattles. The barriers will be placed in a manner that prevents the passage of soil materials under, around or over it. Sediment will be removed from against the barrier when the accumulated sediment has reached one third of the original installed height of the barrier.

2. Straw Bale Diversion Dike
Straw bales will be placed in other locations on the site in order to further prevent the flow of sediment from the site or reduce the velocity of runoff crossing open land or running off stockpile or fill areas. Straw bale diversion dikes will also be placed within developing rills to reduce surface runoff velocities and to shift the path of the water flow. The locations where straw bale diversion dikes are installed will be determined in the field at the Inspector's discretion.

3. Slope Stabilization
Slopes or surfaces that are created due to excavation or filling along the edge of the parking or loading areas will be temporarily stabilized with one or more of the following:
- Hay or straw mulch with tackifier
- Soft wood and hard wood chips or stump grindings.

Permanent stabilization of slopes and surfaces will employ one or more of the following:
- 6 inches of loam and grass
- Sod
- Riprap
- Erosion control blankets such as Tensar North American Green SC150BN or approved equal and vegetation
- Mulch and landscaping plantings
- A combination of grasses, riprap and/or plants and shrubbery
- In areas that will be steeper than 2:1, after construction, the slope will be stabilized by the placement of heavy riprap or by the installation of erosion control matting specifically rated by the manufacturer for use on a 1:1 slope. The riprap slope will be formed by placing stone on a one foot thick layer of gravel that is covered by an approved filter fabric.

4. Straw Swales
Runoff diversion swales may be provided in order to intercept sheet and concentrated flows above areas of cut, above abutting properties or Rice Road. The swales will direct runoff to sediment sumps or temporary settling basins. The swales will be approximately 5 feet wide and one foot deep. Straw bale diversion dikes may be installed on the downhill side of the swales to assist in containing the water flow.

5. Sediment Sumps
Sediment sumps are excavated depressions of 10 foot diameter and 2 foot depth. The sumps will collect runoff from unfinished drives and slopes and will allow sediment to settle out before flow continues to a detention area or siltation control barrier. Sediment sumps will be cleaned whenever the accumulated sediment has reached one half of the original depth of the sump.

6. Temporary Settling Basins
Temporary settling basins (TSB's)are larger excavations made at locations that will receive significant stormwater runoff flow. They are used to capture and detain stormwater in the construction phase to settle out some eroded material and to lessen the rate of flow of stormwater from construction phase work areas. Temporary settling basins are larger than sediment sumps and shall have silt fence or straw bale dikes at their entrance and exit to control flow. They shall be sized according to the DEP Stormwater management standards which requires that they have sufficient capacity to hold 1 inch of runoff from the watershed contributing flow to them. For example, a TSB receiving flow from 1 acre of land should have a volume capacity of at least 3,630 square feet. TSB's should have flocculant blocks and at least three layers of jute mesh matting at their outlet. TSB's should be cleaned out whenever the accumulated sediment has reached more than 6 inches deep. No TSB shall be located where the proposed infiltration structures are proposed. Expected locations for TSB's are shown on the Erosion & Sediment Control Plans.

7. Flocculants
If the capture of flows in sediment sumps and temporary settling basins does not sufficiently reduce the turbidity of runoff before it leaves the site, flocculant blocks shall be installed at the outlet of any sediment sump, TSB or swale discharge flow to the site's drainage system. Immediately downstream of the flocculant blocks, a suitable organic media such as jute mesh matting shall be installed over stone for runoff that has contacted the flocculant blocks to flow. This will allow capture of silts.

In addition, crystal flocculants may be used to reduce turbidity of captured runoff in sediment sumps and temporary settling basins.

SEQUENCE OF INSTALLATION AND CONSTRUCTION

The following is a sequence for the construction of the project. The actual schedule may vary somewhat from that stated if site or weather conditions require.

An example of a logical change to the schedule would be deviating from the sequence below to allow the laying of berms prior to a freeze in order to better control the site drainage.

1. The Developer will hold a preconstruction meeting with representatives of the Town of Southborough in order to review permits, procedures and construction methods.

2. The Developer will hold a preconstruction meeting with the Engineer, Contractor's employees and the Inspector in order to review permits, procedures and construction methods.

3. Establish the construction entrance to the site off the south end of the existing access drive running north to Turnpike Road.

4. Install the site entrance mat in the location of the proposed entrance off the southwest corner of the existing lower parking area and install sediment control barriers at the limit of work as shown on the Erosion & Sediment Control Plans.

5. Cut trees as necessary for the proposed development but no further. Chip wood and then remove existing pavement and dispose of it at an appropriate facility. Then, clear and grub where trees were cut. Grind stumps for use of the grindings as a temporary stabilization cover.

6. Stockpile and compact excavated loam in an area surrounded by staked straw bales or siltation fencing. We suggest a location east of the proposed building. Place the straw bales or fencing at least five feet from the base of the loam pile.

7. Begin earthwork to bring grades to the subgrade elevations for the proposed driving aisles and parking areas and to fill and compact to slab foundation grades in the location of the proposed building.

8. Begin construction of the apartment building and install the utility connections to the proposed apartment building.

9. Install the new drainage system, new septic system, new water line services to the building and new electric connections and, when complete, lay the binder course of pavement.

10. Continue construction of the building.

11. Permanently stabilize exposed slopes with riprap, 6 inches of loam and grass, other vegetation and landscaping.

12. Finish interior construction of the proposed building and lay a finish course of pavement. Install new sidewalks from the beginning of the new driveway north to the entrance off the existing parking area and east to Parkerville Road.

13 Remove accumulated sediment and temporary erosion control measures after all slopes have been permanently stabilized and the risk of erosion has passed.

14. Prepare and submit an as-built survey of the work to the Town of Southborough.

PARKING

56 UNITS ARE PROPOSED, CONSISTING OF 36 ONE BEDROOM UNITS, 14 TWO BEDROOM UNITS AND 6 THREE BEDROOM UNITS. 94 PARKING SPACES ARE PROPOSE(INCLUDING 4 VAN ACCESSIBLE HC SPACES), A RATIO OF 1.68 PER UNIT.

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

_____
_____
_____
_____
_____

AZIMUTH LAND DESIGN, LLC
Professional Engineers & Erosion Control Specialists
118 Turnpike Road, 200, Southborough, MA 01772
Telephone (508)-485-0137 jamest@azimuthlanddesign.co

COMMONWEALTH OF MASSACHUSETTS
JAMES L TETREAULT
CIVIL
No. 38548
PROFESSIONAL ENGINEER

CLT. NO.	JOB NO.
504	290-504
DATE: APRIL 15, 2024	DWG NO. 250TURNPIKECURRENT

REVISIONS	
DATE:	DESCRIPTION

SCALE: AS NOTED

SITE PLAN OF LAND

AT 250 TURNPIKE ROAD
IN
SOUTHBOROUGH, MASS.

OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

DETAIL SHEET D4

LIST OF WAIVERS FROM TOWN REGULATIONS:

ZONING

THE APPLICANT IS REQUESTING SEVERAL WAIVERS FROM THE ZONING BYLAW FOR THE CONSTRUCTION
OF THIS PROJECT. THEY ARE AS FOLLOWS:

1) SECTION 174-8.2.B(9) ALLOWING MULTIFAMILY HOUSING ONLY WITH A SPECIAL PERMIT AS PART OF A MAJOR RESIDENTIAL DEVELOPMENT.
THIS COMPREHENSIVE PERMIT PROJECT WOULD NOT BE POSSIBLE UNDER THAT REGULATION.
2) SECTION 174-8.2.D(4) REQUIRING BUILDING HEIGHTS NO MORE THAN 35 FEET OR 2.5 STORIES
THE PROPOSED BUILDING WILL BE 44 FEET AND 4 STORIES TALL TO MINIMIZE ITS FOOTPRINT AND FIT WITH PARKING AND UTILITIES ON THIS SITE WITHOUT ALTERING WETLANDS.
3) SECTION 174-8.2.D(5) REQUIRING A MAXIMUM FLOOR AREA RATIO OF 0.18
THE PROPOSED DEVELOPMENT WILL HAVE A FLOOR AREA RATIO OF 0.40 AS PART OF CREATING THIS DEVELOPMENT WHICH HAS ADEQUATE SPACE FOR PARKING AND UTILITY INFRASTRUCTURE ON THIS PROPERTY.
4) SECTION 174-12.C(2) REQUIRING THAT PARKING SPACES MEASURE 9.5'WIDE AND 18'DEEP.
THE PROPOSED SPACES ARE 9 FEET WIDE. THIS IS A COMMON STANDARD WHICH SAVES SOME SPACE WITHOUT COMPROMISING SAFETY OR CONVENIENCE.
5) SECTION 174-12.E(1) REQUIRING 2 PARKING SPACES FOR EACH 1 OR 2 BR UNIT AND 3 FOR EACH 3 BR UNIT.
THE PROJECT WILL PROVIDE PARKING SPACES AT A RATIO OF 1.68 PER UNIT AND THIS HAS PROVED ADEQUATE ON OTHER DEVELOPMENTS ALLOWING US TO MINIMIZE THE DEVELOPMENT'S FOOTPRINT.
6) SECTION 174-13 LANDSCAPING STANDARDS
THE PROJECT'S LANDSCAPE ARCHITECT HAS PREPARED A DETAILED LANDSCAPING PLAN THAT HE BELIEVES IS APPROPRIATE TO THIS SITE THOUGH IT DEVIATES IN SOME WAYS FROM THOSE STANDARDS.

SUBDIVISION DESIGN STANDARDS

THE APPLICANT IS REQUESTING A WAIVER FROM THE SUBDIVISION DESIGN STANDARDS FOR THE CONSTRUCTION OF THIS PROJECT. IT IS AS FOLLOWS:

1) SECTION 244-16.B(2) REQUIRING THAT THE MINIMUM SIZE OF A STREET DRAIN PIPE BE 12 INCHES.
THE APPLICANT PROPOSES 8 INCH HDPE PIPES TO CONVEY FLOW FROM CATCH BASINS TO DRAIN MANHOLES AS THEY ARE MORE THAN ADEQUATE TO CONVEY THE FLOW THAT CAN ENTER THE CATCH BASIN GRATES.

SOUTHBOROUGH WETLANDS BYLAW

THE APPLICANT IS REQUESTING A WAIVER FROM THE SOUTHBOROUGH WETLANDS BYLAW STANDARDS FOR
THE CONSTRUCTION OF THIS PROJECT AS FOLLOWS:

1) SECTION 170 OF THE SOUTHBOROUGH ADMINISTRATIVE CODE, THE SOUTHBOROUGH WETLANDS BYLAW AND ITS VARIOUS REQUIREMENTS INCLUDING A 20 FOOT NO DISTURB ZONE OUTSIDE OF WETLAND RESOURCE AREAS.
THE APPLICANT WILL NOT ALTER ANY WETLAND RESOURCE AREAS, WILL MEET DEP'S STORMWATER MANAGEMENT STANDARDS AND OTHER REQUIREMENTS WHICH PROVIDE ADEQUATE PROTECTION.

COMPREHENSIVE PERMIT PLAN APPROVED BY THE SOUTHBOROUGH ZONING BOARD OF APPEALS ON _____.

_____

_____

_____

_____

_____

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COMMONWEALTH OF MASSACHUSETTS
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IN
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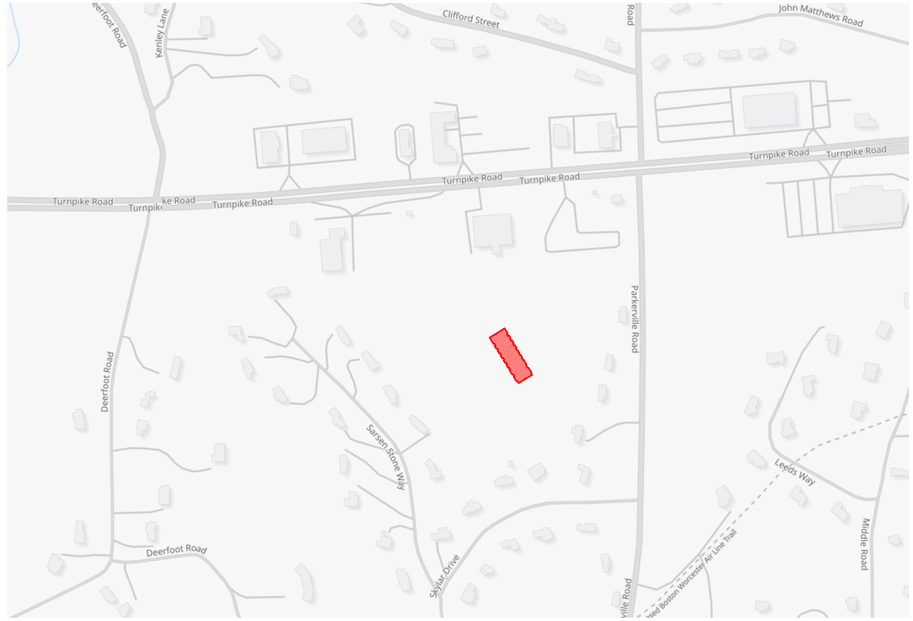
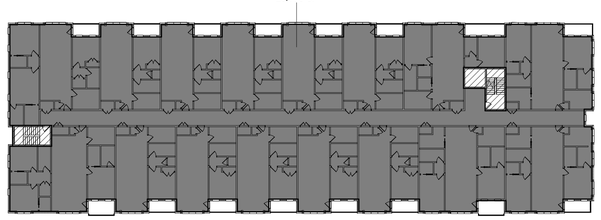
OWNER & APPLICANT:
FD 250 TURNPIKE, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772

DETAIL SHEET D5

LOCATION MAP

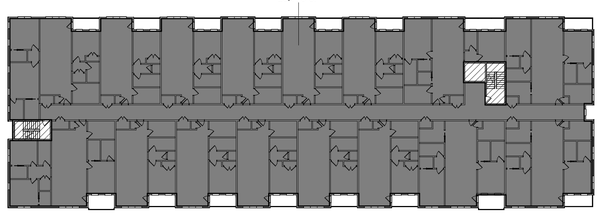


4TH FLOOR
20,180 SF



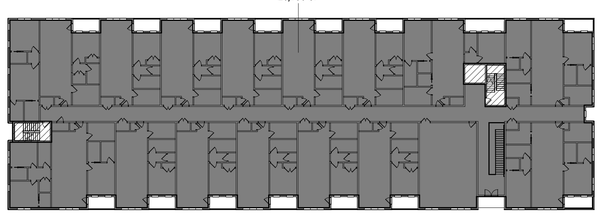
4 4TH FLOOR
SCALE: 1/32" = 1'-0"

3RD FLOOR
20,180 SF



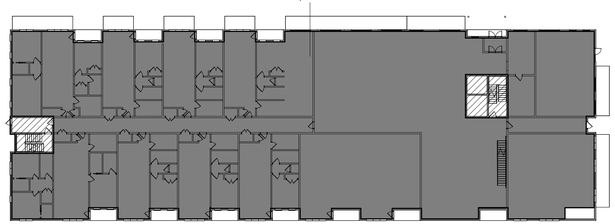
3 3RD FLOOR
SCALE: 1/32" = 1'-0"

2ND FLOOR
20,180 SF



2 2ND FLOOR
SCALE: 1/32" = 1'-0"

1ST FLOOR
20,350 SF



1 1ST FLOOR
SCALE: 1/32" = 1'-0"

PROJECT SUMMARY AND ZONING ANALYSIS

PROJECT NARRATIVE:

THE PROPOSED NEW CONSTRUCTION PROJECT IS A FOUR STORY, TYPE V CONSTRUCTION COMPOSED OF 56 UNITS. THE UNITS WILL BE A MIX OF ONE, TWO, AND THREE BEDROOM UNITS. SURFACE PARKING WILL BE PROVIDED AT THE EXTERIOR OF THE BUILDING TO ACCOMODATE 98 SPACES IN TOTAL, 4 OF WHICH WILL BE HANDICAP.

ZONING OVERVIEW

				REMARKS
ZONING DISTRICT	RESIDENCE A			
ZONING SUBDISTRICT				
PROPOSED USE	MULTI-FAMILY (56 RESIDENTIAL UNITS)			
LOT AREA	212,572 SF			
PARCEL #s	0603902000			

DIMENSIONAL REGULATIONS

DIMENSIONAL REGULATIONS	REQUIRED	PROPOSED	COMPLIANCE
MINIMUM LOT SIZE	43,560	212,572 SF	COMPLIANT
LOT FRONTAGE MINIMUM	150'	150.00'	COMPLIANT
FLOOR AREA RATIO MAXIMUM	0.18	0.40	REQUEST RELIEF
BUILDING HEIGHT MAXIMUM STORIES	N/A	4	N/A
BUILDING HEIGHT MAXIMUM FEET	35'	45'(TO PARKERVILLE RD)	REQUEST RELIEF
MINIMUM FRONT YARD(1)	35'	415'	COMPLIANT
MINIMUM SIDE YARD(a)	25'	48'	COMPLIANT
MINIMUM REAR YARD	50'	151'	REQUEST RELIEF
OFF STREET PARKING (a)	101 SPACES	98 SPACES	REQUEST RELIEF
Residential Housing	2.0 / 1-Bed & 2-Bed Unit	-	-
	3.0 / 3-Bed Unit	-	-

PROJECT GSF

Level	Area
1ST FLOOR	20,350 SF
2ND FLOOR	20,180 SF
3RD FLOOR	20,180 SF
4TH FLOOR	20,180 SF
TOTAL PROEJCT GSF	80,889 SF

PARKING SUMMARY

Name	Count
STANDARD SPACES	94
ACCESSIBLE SPACES	4
TOTAL SPACES:	98

PARKING RATIO: 1.8 SPACES PER UNIT

TOTAL UNITS

Name	Count
1ST FLOOR	
1 BEDROOM	5
2 BEDROOM	3
2ND FLOOR	
1 BEDROOM	11
2 BEDROOM	3
3 BEDROOM	2
3RD FLOOR	
1 BEDROOM	10
2 BEDROOM	4
3 BEDROOM	2
4TH FLOOR	
1 BEDROOM	10
2 BEDROOM	4
3 BEDROOM	2
TOTAL: 56	

UNIT MIX

UNIT TYPE	QTY
1 BEDROOM	36
2 BEDROOM	14
3 BEDROOM	6
TOTAL: 56	

DRAWING INDEX

NUMBER	NAME	11/01/23 COMPREHENSIVE SET
GENERAL		
G-003	ZONING SUMMARY	●
AS001	ARCHITECTURAL SITE PLAN	●
ARCHITECTURAL		
A-101	1ST FLOOR PLAN	●
A-102	2ND & 3RD FLOOR PLAN	●
A-104	3RD FLOOR CONSTRUCTION PLAN	●
A-105	4TH FLOOR CONSTRUCTION PLAN	●
A-103	4TH & ROOF PLAN	●
A-200	NORTH & SOUTH BUILDING ELEVATION	●
A-201	EAST & WEST BUILDING ELEVATION	●
A-300	BUILDING SECTIONS I	●

MFDS A+P
MONTE FRENCH DESIGN STUDIO (MFDS)
650 COLUMBUS AVE, STE. A
BOSTON MA, 02118
T: 617-606-4496
WWW.MFDS-BOS.COM

OWNER:
FERRIS DEVELOPMENT GROUP, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772
508.281.5600

CIVIL:
AZIMUTH LAND DESIGN, LLC
118 TURNPIKE ROAD, SUITE 200
SOUTHBOROUGH, MA 01772
508.485.0137

ISSURE FOR COMPREHENSIVE PERMIT
(NOT FOR CONSTRUCTION)

DRAFT

ISSUE LOG

MARK	DESCRIPTION	DATE

PROJECT NAME:
250 TURNPIKE RD

ADDRESS:
250 TURNPIKE RD, SOUTHBOROUGH, MA

DATE ISSUED: 11.01.2023
PROJECT #: 23004
SCALE: As indicated
DRAWN BY: ED, MN

ZONING SUMMARY

G-003

MFDS
A+P

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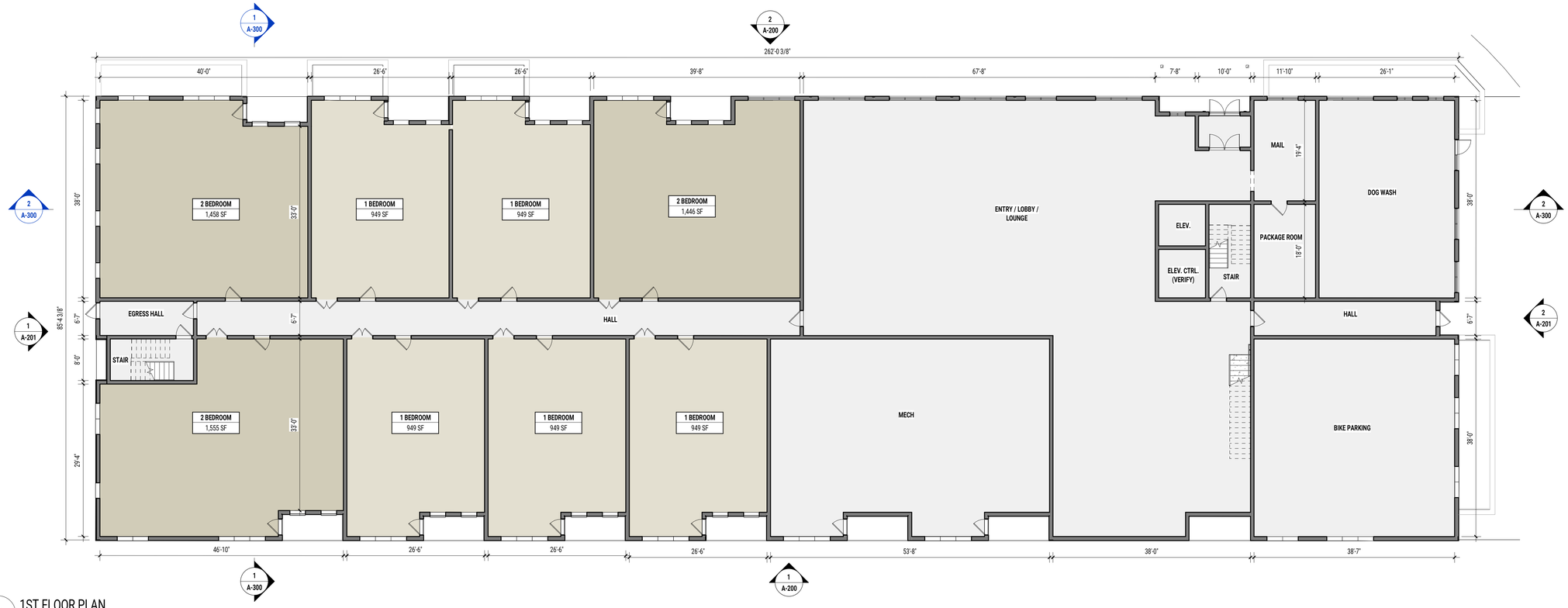
PROJECT NAME:
250 TURNPIKE RD

ADDRESS:
250 TURNPIKE RD, SOUTHBOROUGH, MA

DATE ISSUED: 11.01.2023
PROJECT #: 23004
SCALE: 1" = 30'-0"
DRAWN BY: ED, MN

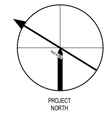
ARCHITECTURAL SITE PLAN

AS001

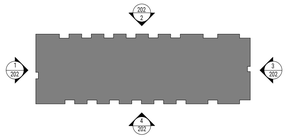


1 1ST FLOOR PLAN

SCALE: 3/32" = 1'-0"



NORTH ARROW



KEY PLAN

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BOSTON MA, 02118
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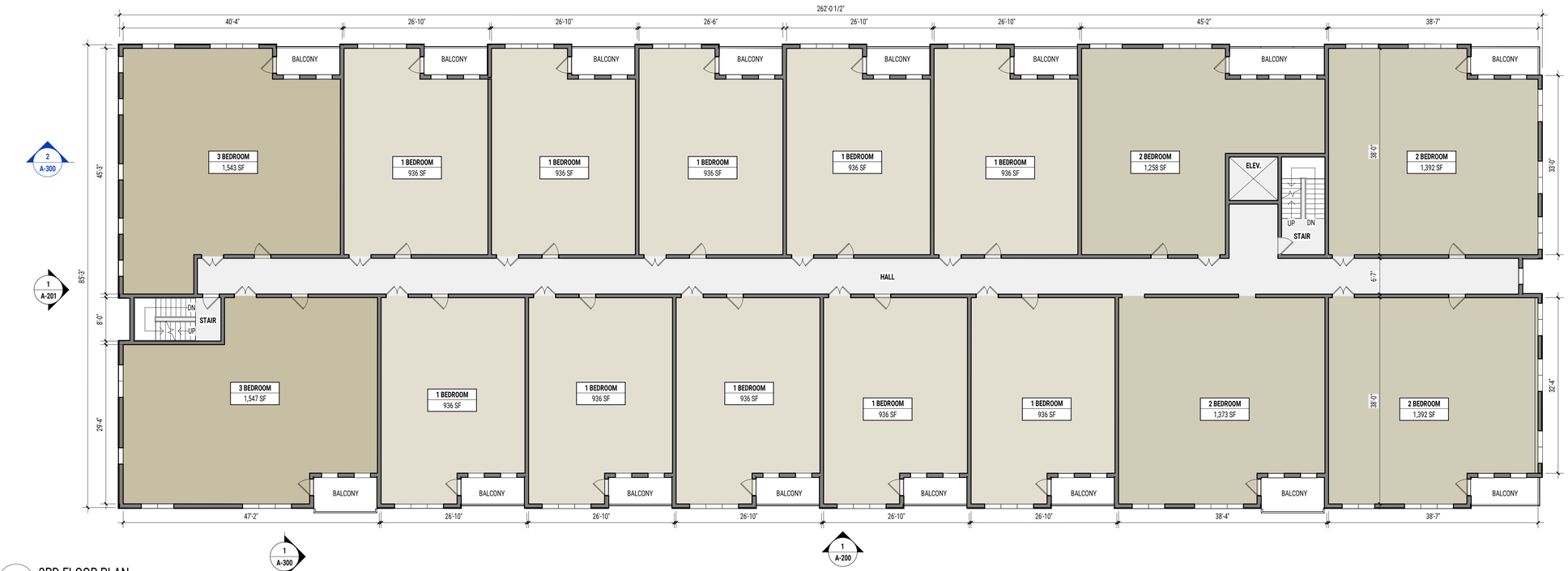
PROJECT #: 23004
SCALE: 3/32" = 1'-0"
DRAWN BY: ED, MN

1ST FLOOR PLAN

A-101



1 3RD FLOOR PLAN

SCALE: 3/32" = 1'-0"

2 2ND FLOOR PLAN

SCALE: 3/32" = 1'-0"

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ADDRESS:
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DATE ISSUED: 11.01.2023
PROJECT #: 23004
SCALE: 3/32" = 1'-0"
DRAWN BY: ED, MN

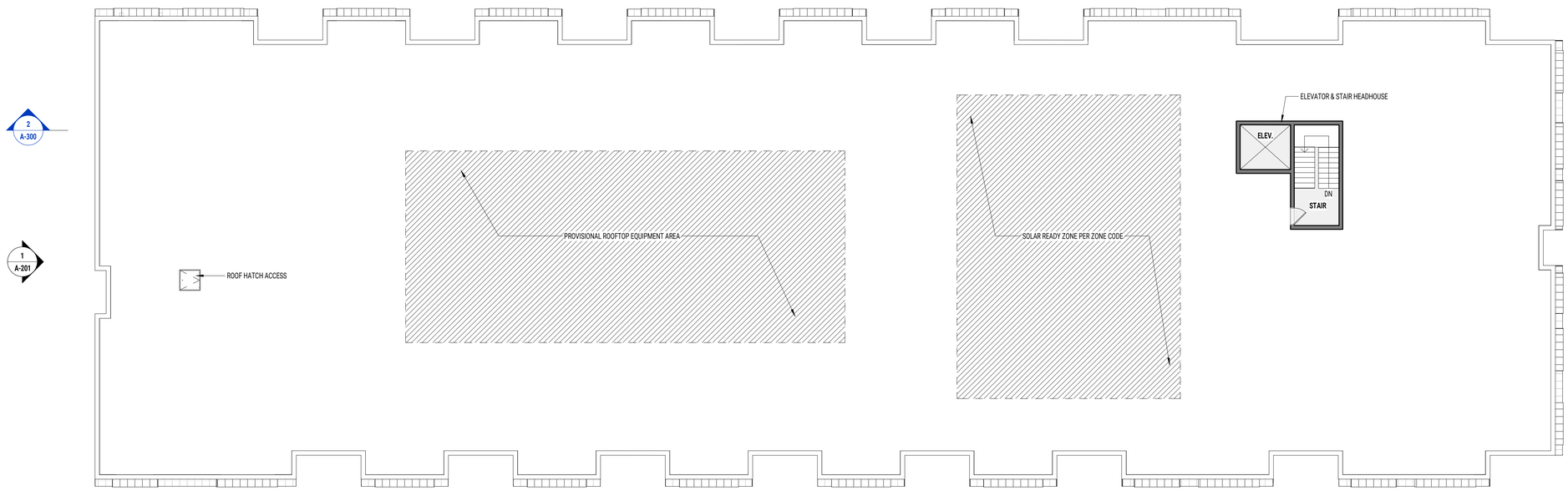
PROJECT NORTH

NORTH ARROW

KEY PLAN

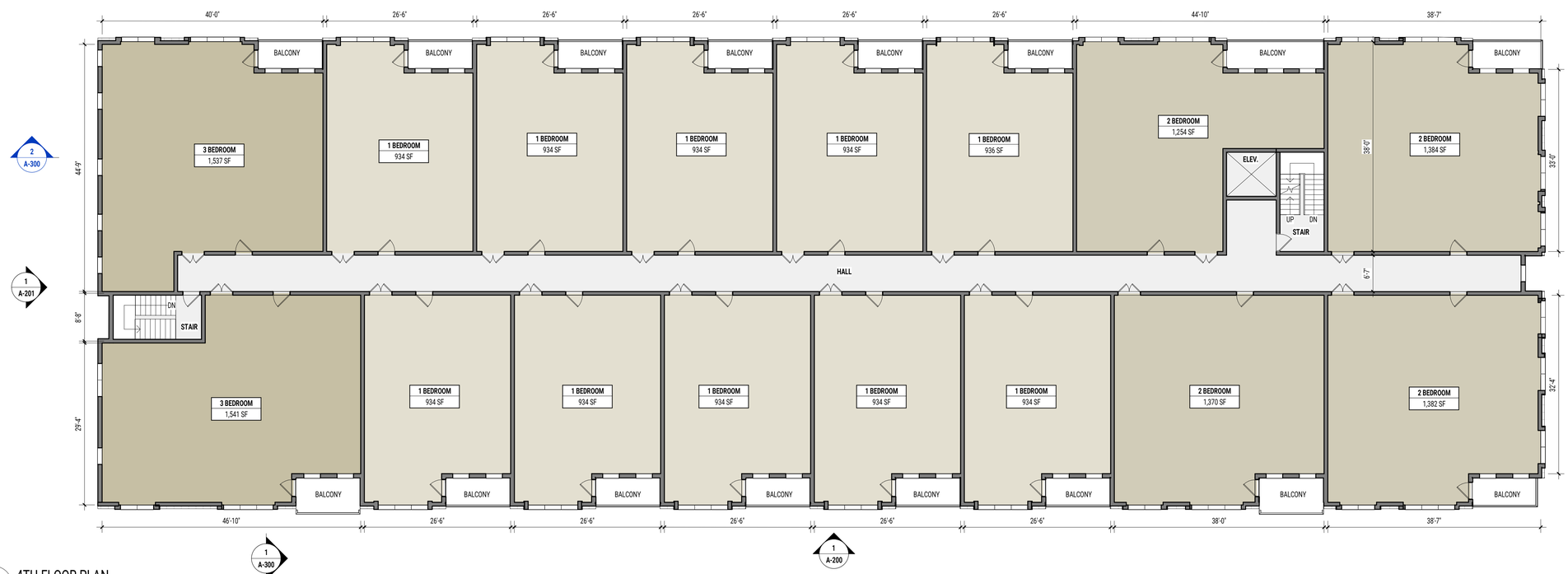
2ND & 3RD FLOOR PLAN

A-102



2 ROOF PLAN

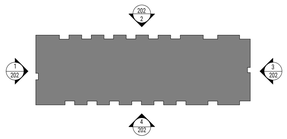
SCALE: 3/32" = 1'-0"



1 4TH FLOOR PLAN

SCALE: 3/32" = 1'-0"

NORTH ARROW



KEY PLAN

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ISSUE FOR COMPREHENSIVE PERMIT
(NOT FOR CONSTRUCTION)

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SCALE: 3/32" = 1'-0"
DRAWN BY: ED, MN

4TH & ROOF PLAN

A-103

2 NORTH BUILDING ELEVATION

SCALE: 3/32" = 1'-0"

1 SOUTH BUILDING ELEVATION

SCALE: 3/32" = 1'-0"

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CIVIL:
AZIMUTH LAND DESIGN, LLC
118 TURNPIKE ROAD, SUITE 200
SOUTHBOROUGH, MA 01772
508.485.0137

ISSUE FOR COMPREHENSIVE PERMIT
(NOT FOR CONSTRUCTION)

DRAFT

ISSUE LOG

MARK	DESCRIPTION	DATE

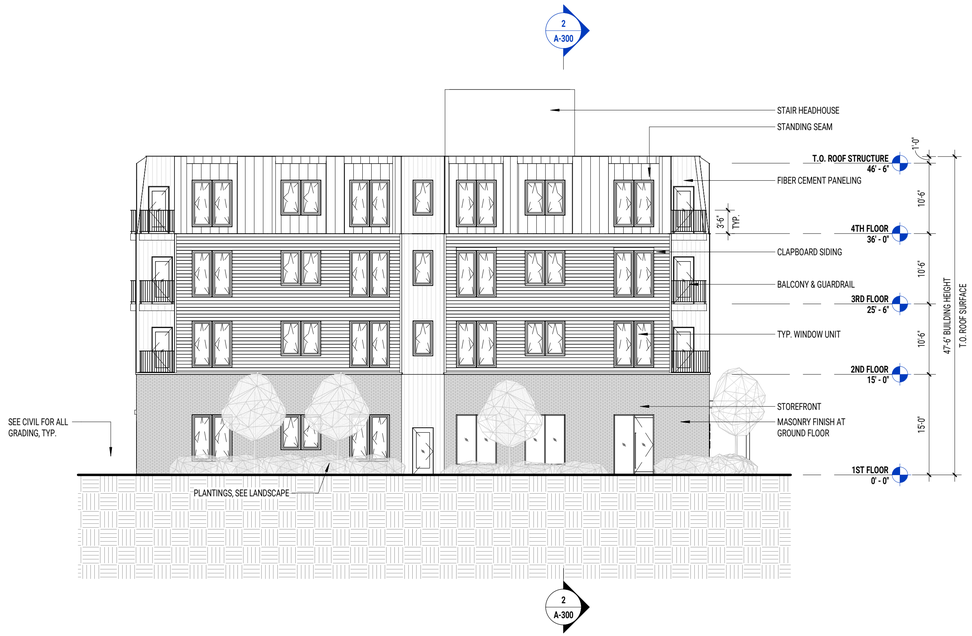
PROJECT NAME:
250 TURNPIKE RD

ADDRESS:
250 TURNPIKE RD, SOUTHBOROUGH, MA

DATE ISSUED: 11.01.2023
PROJECT #: 23004
SCALE: 3/32" = 1'-0"
DRAWN BY: ED, MN

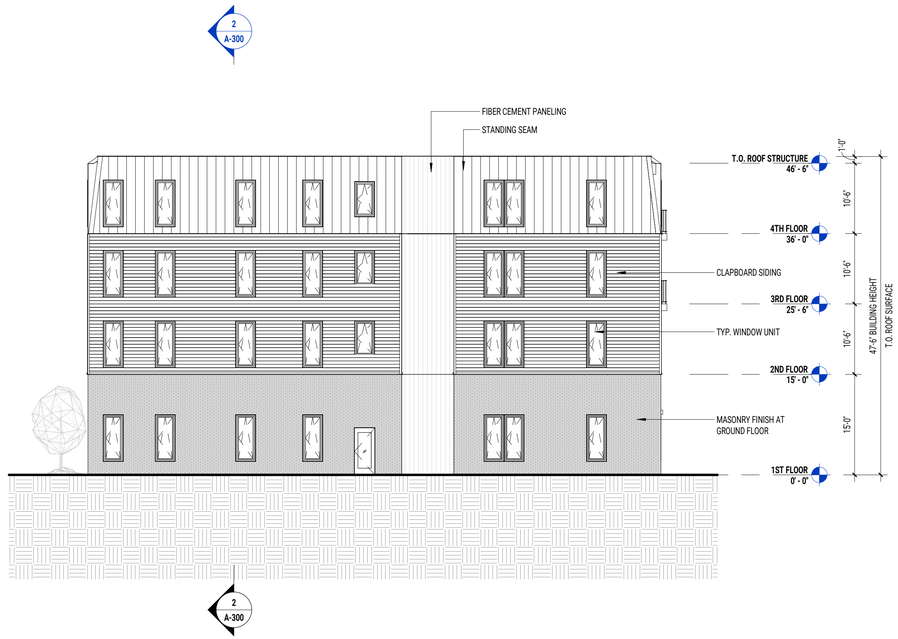
NORTH & SOUTH BUILDING ELEVATION

A-200



2 EAST BUILDING ELEVATION

SCALE: 3/32" = 1'-0"



1 WEST BUILDING ELEVATION

SCALE: 3/32" = 1'-0"

MONTE FRENCH DESIGN STUDIO (MFDS)
650 COLUMBUS AVE, STE. A
BOSTON MA, 02118
T: 617-606-4496
WWW.MFDS-BOS.COM

OWNER:
FERRIS DEVELOPMENT GROUP, LLC
118 TURNPIKE ROAD, SUITE 300
SOUTHBOROUGH, MA 01772
508.281.5600

CIVIL:
AZIMUTH LAND DESIGN, LLC
118 TURNPIKE ROAD, SUITE 200
SOUTHBOROUGH, MA 01772
508.485.0137

ISSURE FOR COMPREHENSIVE PERMIT
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DRAFT

ISSUE LOG

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PROJECT NAME:
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ADDRESS:
250 TURNPIKE RD, SOUTHBOROUGH, MA

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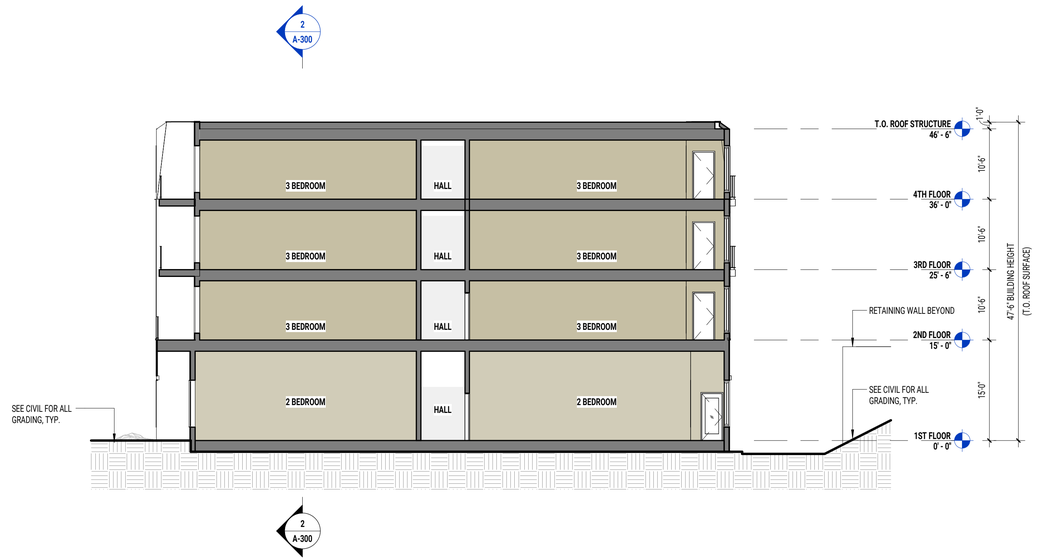
PROJECT #: 23004
SCALE: 3/32" = 1'-0"
DRAWN BY: ED, MN

EAST & WEST BUILDING ELEVATION

A-201

2 BUILDING SECTION - LONG

SCALE: 3/32" = 1'-0"



1 BUILDING SECTION - SHORT

SCALE: 3/32" = 1'-0"

MONTE FRENCH DESIGN STUDIO (MFDS)
650 COLUMBUS AVE, STE. A
BOSTON MA, 02118
T: 617-606-4496
WWW.MFDS-BOS.COM

OWNER:
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118 TURNPIKE ROAD, SUITE 300
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BUILDING SECTIONS I

A-300