Special Permit Application

STRADA

On South Main

Applicant: BLVD Reading, LLC

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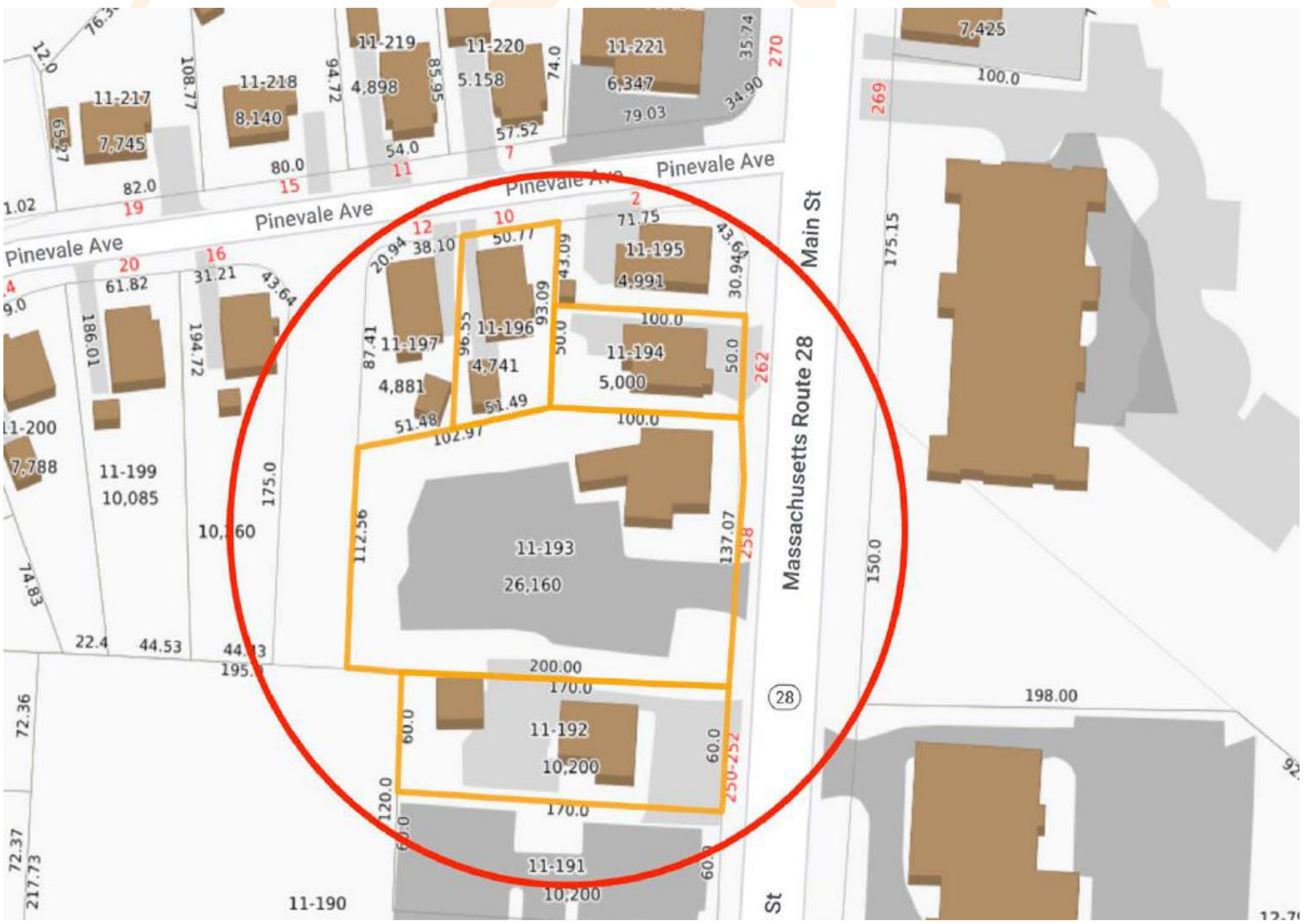
Background

While the environment for mixed-use construction is volatile and unfavorable, the Applicant is proposing a complex assemblage as a first of its kind development in the South Main corridor. The result will consolidate underutilized lots, enliven the corridor, generate commerce, add affordable housing, improve the housing mix and create much needed, high quality, high visibility commercial space.

As stated in Reading's Housing Production Plan (2023): "*In 2019 the Town proposed and adopted a Mixed-Use Bylaw for its Business-A Zoning District. The Mixed-Use Bylaw allows mixed-use development through a Special Permit granted by the CPDC…*"

The Applicant, BLVD Reading, LLC, is seeking a Special Permit to construct a mixed-use project along the South Main Street corridor (referred to as PDA 2), featuring 40 residential units, and 8,100 SF of street-level, commercial space on an assemblage of 4 properties primarily zoned Business A, referred to as ***252, 258 and 262 Main St and 10 Pinevale Ave.*** The following narrative is organized in 4 parts:

1. **Application & Site Overview (including existing conditions)**
2. **Project Overview**
3. **Summary of Zoning & Design Compliance**
4. **Construction Summary**



Part 1: Application & Site Overview

The Applicant: BLVD Reading, LLC

BLVD Reading, LLC, is a family-owned, Massachusetts LLC whose members have developed properties in Reading, as well as having been residents of the community. Most recently, members of the applicant LLC completed The Chronicle located at 531 Main St.

- BLVD Reading, LLC currently owns 258 Main St, 262 Main St and 10 Pinevale Avenue
- BLVD Reading, LLC is the contract purchaser of 250-252 Main Street

Project Summary

The proposed development will consist of a 4-story, Mixed-Use structure featuring:

- 8,100 SF of street level commercial space with dedicated patio space, creating an engaging use along an important corridor
- 40 residential units, over Floors 2 – 4, of which 4 units will be added to the community's affordable housing inventory
- 78 Parking spaces, of which 28% are designated compact and at least 2 will provide public, EV charging
- 2 points of access: The current 3, Main St curb cuts will be reduced to 1 on Main St and 1, additional curb cut along Pinevale Ave
- No fossil fuels – the building will be powered by solely by electricity

Zoning History

In 2019 the community adopted an amendment to the Zoning Bylaws allowing Mixed-Use development within Business A District and PDA 2B, via Special Permit. The intended, Mixed-Use project seeks to support the goals of the 2019 bylaw amendment in several ways:

- To improve pedestrian and vehicular engagement along South Main Street, investing in the enlivenment of the corridor.
- To create affordable housing and add to the diversity of available housing mix and quality.
- To add modern, high quality commercial space which will attract commerce to the community and provide community amenities.
- To consolidate several, non-conforming, obsolete properties into a single, compact, mixed-use development.
- To add energy efficient housing and commercial space which furthers the community's energy goals.

Summary of Community Benefits

The project supports the community's objectives of improving underutilized property, promoting diversity in housing types, and introducing mixed use, utilizing the recent Mixed-Use Bylaw amendment. The project achieves several community planning goals:

Supports the Community's Housing Production Plan:
- *Housing inventory: This project will create (40) housing units, of which (4) will be added to the town's affordable housing inventory.*
- *Transit-oriented housing: The project is located just 0.7 miles (or a 13-minute walk) from the train.*

Supports the Community's Economic Development Plan:
- *New retail space: The project will create 8,100 SF of new, Class A, commercial space, in community focal area, PDA 2.*

Safety, infrastructure, engagement and aesthetic improvements:
- *Consolidation of several lots along the South Main Street corridor will reduce curbs cuts along Main St, improving safety*
- *Lowering the elevation of the site will result in better engagement with Main St, as well as improved aesthetics and access*
- *Public EV Charging along the Main Street corridor will improve the charging network within the community*

This first-of-its-kind project helps to support Reading's housing needs and generates modern, Class A retail space, while providing meaningful engagement of the South Main corridor. The project provides infrastructure upgrades and replaces vacant land with vibrancy.

Challenges

A project of this magnitude faces several challenges in the current climate, in addition to challenges that are specific to this site.

A volatile banking environment and economic uncertainty

A volatile banking and interest rate environment, paired with economic uncertainty: At submission, Prime Rate is 8.5%, a rate that we have not experienced since 2001.

Cost & complexity of multi-owner assemblages

Assembling 4, separate properties is a complex and expensive endeavor, but it will result in consolidating several, underutilized parcels.

Complexity of topographical assemblage

This project poses design challenges and added cost relative to the assemblage of 4 lots with varying topography, positioned above Main.

Zoning challenges

As the first Applicant to pursue this type of project along the Corridor, the bylaws are untested or applied, leaving no precedents. The 2019 Bylaw amendment which added Mixed-Use via Special Permit, outlines several qualifying conditions including the requirement that 25% of the building's gross area be allocated as commercial space. This creates 2 throttles to density – 1 in the form of parking, and the other in the form of gross area allowed for residential units. Each time the Applicant attempts to expand the commercial offering, they lose parking available for residential units and so on. Moreover, this creates some limitations in designing the massing of the structure, which must look to maintain its vertical lines to meet the standard, while balancing the need for residential space.

Challenging demand conditions for commercial space

Historically, demand for commercial space in Reading has been low, with recent, downtown 40R projects struggling to fill commercial space and maintain tenancy. This results is low rental rates, in the face of continued, rising costs to construction space, and the need for significant tenant contribution to compel occupancy.

Affordable Housing…

The project will contribute 4 units toward the town's affordable housing inventory, at or below 80% of Area Median Income. While this is a tremendous benefit to the community, affordable units are often built at a "loss" to the developer, particularly in the face of high interest rates and continued pressure on construction costs.

Competitive Landscape & Amenity Level Challenges

Due to the nature of the requirements outlined in the zoning bylaws, there is very little opportunity to create common use amenity spaces within the structure (such as meeting rooms or clubhouses, gym/fitness facilities, etc). This puts the resulting project at a disadvantage when competing with other, recently constructed projects.

Community Goals

The proposed project was designed to align with the goals of the community's ***Master Plan, Housing Production Plan, and Economic Development Goals*** while utilizing the ***South Main Street Design Best Practices***.

Housing Production Plan

The Community's Housing Production Plan (2023) highlights the following needs assessment:

1. *The **demand for rental housing is likely to continue increasing** as the population continues aging and this aging population is likely to include many who are looking to down-size or spend less on housing related costs.*
2. ***Reading has a large stock of older** and historic homes. Over half of the housing units were constructed prior to 1960 and of that 33% were constructed prior to 1940. The production numbers have been on a steady decline since 1970…*
3. *…In comparison 760 of the 6,070 (125%) households who earn more than 100% AMI are housing cost burdened. This indicates **a need for more housing in Reading** that is affordable to low-income households, so they do not experience such a substantial level of cost burden.*

The community has developed the following goals:

- *Increase, diversify and promote a mix of housing options in Reading for low- to middle-income households.*
- *Create and maintain housing that is available and accessible to aging and disabled populations. Support housing development needs for most vulnerable residents.*
- *Provide equitable access to housing opportunities, public spaces, green spaces and healthy/safe environments.*
- *Maintain Reading's Safe Harbor designation by retaining pace of Affordable Housing development in order to remain above 10% on Subsidized Housing Inventory.*

To support these goals, the Housing Product Plan outlines several strategies, of which include:

- *Identify Zoning Districts/Geographies in which current regulations can be modified to allow the development of SHI eligible housing units, including previously identified Priority Development Area's (PDA's).*
- *Require open space, trails and/or path connection (sidewalk, bike path, trails, transit-oriented improvements) in new residential, multi-family and mixed-use developments.*

The Plan outlines the creation of **Priority Development Areas** and the 2019 adoption of a Mixed-Use Bylaw for the Business A District.

> *Priority Development Area Considerations: As part of the Reading Economic Development Action Plan 2016- 2022 (EDA Plan), the town identified four regionally significant Priority Development Areas (PDAs). As described in the EDA Plan, redevelopment in these areas will help meet projected regional demands for housing and commercial uses and strengthen existing places by improving the mix of development types in areas where development already exists. The PDAs are sited in areas defined as having **major growth potential and near existing transportation resources including public transit, bike, and trail facilities, thus contributing to the creation of more walkable communities.***

South Main Street is identified as one of the four PDA's.

> *PDA #2 is a 26-acre area consisting of 82 parcels located south of the downtown on South Main Street. PDA #2A presently contains primarily low-density commercial development and underutilized parcels. PDA #2B consists primarily of low-density residential development. The Town is interested in facilitating more retail and mixed-use development and implement streetscape and road reconfigurations that will enhance safety and the street's overall connectivity to downtown. In 2019 the Town proposed and adopted a Mixed-Use Bylaw in the Business-A Zoning District, included in PDA #2A and #2B. The Mixed-Use Bylaw allows a mixed-use development through a Special Permit granted by the CPDC and requires both commercial floor area and affordable units for projects 10 units or more. Affordable units are required for 10% of the project units and required for at least 80% AMI.*

The project seeks to support these strategies by creating an assemblage within the South Main Street PDA, which adds to the community's mix of housing, and affordable housing inventory, while replacing underutilized, economically obsolete properties with new, energy efficient, mixed-use development that improves infrastructure and engagement/connectivity along South Main.

Economic Development Goals

The proposed project supports the vision outlined in the Town's 2015-2022 Economic Development Action Plan:

> *Reading is a vibrant suburban town where businesses can thrive and different generations can meet, connect, and build community. Reading's assets include quality schools, a walkable downtown, bike lanes, transit options including Commuter Rail service and access to major roads, and a lively downtown with retail shops and restaurants.*
>
> *Reading is committed to* ***strengthening existing businesses, attracting new ones, and expanding the resident base that is needed to support a growing local economy.*** *Reading and community partners will work together to implement this Action Plan of policy changes, infrastructure investments, and programmatic activities that aims to place the Town on firm financial footing and maximize quality of life for current and future generations of people who choose Reading as a place to live, work, study, and play.*

In supporting this vision, the Plan identifies **PDA #2B, aka the central and southern sections of the South Main St corridor,** where the proposed project will be located, as a ***critical area of importance for multifamily and mixed-use development.***

> *Parcels in PDA #2B in the central and southern sections of the corridor are suitable for multifamily development; additional mixed use could be phased in as more residential is added over time, generating the customer base needed to support a growing commercial environment.*

The Plan also outlines Strategies & Actions which the proposed project seeks to enhance and support, such as:

- *(1B) Facilitate more compact, mixed-use development in PDAs #2, #3 and #4.*
- *(2) Enhance walkability and connectivity within and between the priority redevelopment areas.*
- *(5B) Engage with local and regional entities and groups with access to businesses, developers, and investors to market redevelopment potential in Reading.*
- *(5C) Facilitate redevelopment opportunities that require* ***parcel consolidation*** *with multiple owners.*

The Economic Development Strategies & Actions calls for compact, mixed-use development in PDA 2B, and facilitation of parcel consolidation. This compact and engaging, mixed-use development will attract new businesses, create community amenities, facilitate connectivity and consolidate key parcels. The Applicant has gone to great lengths, over several years, to consolidate several parcels.

South Main Street Design Best Practices

The South Main Street Design Best Practices were issued in 2012, before the creation of the Mixed-Use Bylaw, however, the Applicant has designed the project with the Design Best Practices in mind. The stated goals of the Best Practices Guide include:

> *The South Main Street corridor is one of the Gateways to Reading and therefore represents the character of Reading to residents, visitors, employees and business customers.*
>
> *Unfortunately, much of the South Main Street corridor in the past has been characterized by a varied commercial mix, lack of investment, business turnover, and unappealing aesthetics. South Main Street is a major element of the commercial corridor in Reading and a gateway to the downtown and central core of the community.*

The applicant is proposing an assemblage of 4, underutilized parcels which will consolidate commercial and residential uses in a more visually appealing, impactful and useful way to support the goals of enhancing this gateway corridor as stated Design Best Practices.

Property Overview

Site Introduction

The proposed project is the result of an assemblage of four, contiguous lots, totaling ***1.059 Acres of primarily Business A zoned*** land with frontage along Main Street and Pinevale Ave referred to as: 252 Main St, 258 Main St, 262 Main St and 10 Pinevale Ave, located in PDA 2B. The properties vary in use, conformity, height, scale, topography and even architecture, creating a challenging assemblage. They are accessed by 3 curb cuts along Main Street, as well as 1 along Pinevale. The proposed project will serve to consolidate these lots, providing a more cohesive and visually appealing, compact, mixed-use development which will better engage with the streetscape.

Site History

Historically, the properties featured a mix of uses, with structures averaging 96 years of age, but offered ***no affordable housing, insufficient commercial space, while necessitating 3 curb cuts along Main.***

	252 Main St	258 Main St	262 Main St	10 Pinevale Ave	Total
Existing Use:	Mixed-use (2 units)	N/A Razed	N/A vacant structure	Single Family	
Prior Use:	N/A	Office	Mixed-use (2 units)	N/A	
Assessor's ID	11-192	11-193	11-194	11-196	
Lot Size (Acres)	0.234	0.601 (26,160 SF)	0.115 (5,000 SF)	0.109	1.059 Acres
Zoning (primary)	Business A	Business A	Business A	S-15	
Structures on lot	2	0	1	2	5
Year Built (if appl.)	1930	N/A	1926	1925	Avg Age 96 years
Curb Cuts on Main	1	1	1	0	3
Commercial GSF	+/- 700 SF	0 SF	+/- 200 SF	0 SF	+/- 900 SF
Residential Units	1	0	1	1	3
Affordable Units	0	0	0	0	0

252 Main Street

This property is improved by two structures, where the primary structure is currently used as a 2-unit, mixed-use building occupied at the lower level by *Prestige Real Estate*, while the upper level features a 1 bedroom, 1 bath apartment. The secondary structure is a detached, 2-car garage. The property is accessed by a curb cut along Main Street, and features parking in front of the structure, and at the rear of the property. The property features 1 post and panel sign at the southeast corner.

258 Main Street

The prior structure was razed, and the current use is as vacant land. The property is accessed by a curb cut along Main Street and is primary paved, but sits perched above Main St. The prior structure was used as an office building formerly home to *Valerie's Bridal*.

262 Main Street

This property is improved by a vacant, single story, raised-Cape style structure featuring a 2-bedroom apartment and a business space previously used as a skin care business, *European Skincare*. The property features a post and panel sign at the southeast corner.

10 Pinevale Ave

The property is used as a single-family home with a detached garage.

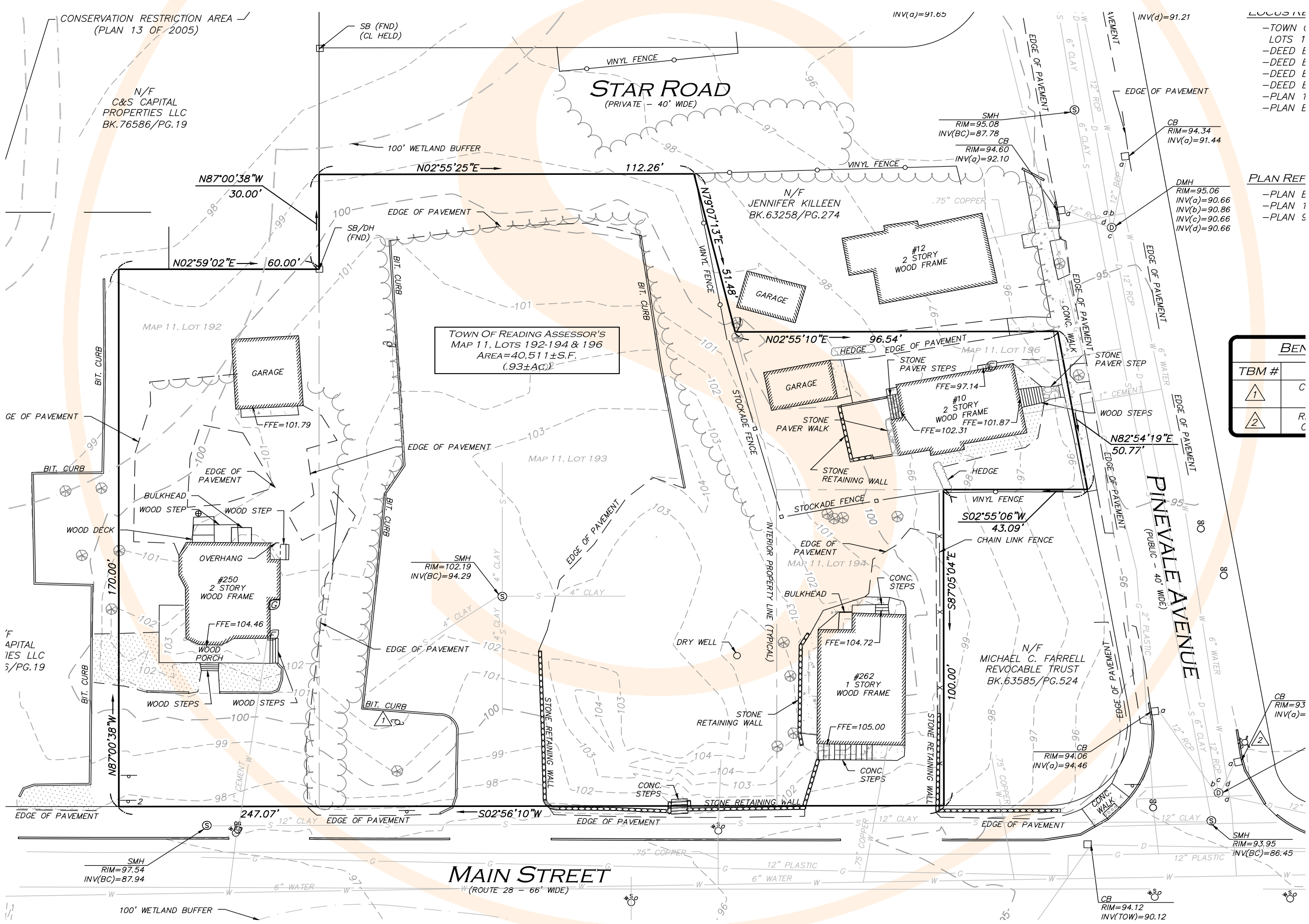
Existing Conditions Survey

The assembled properties are bordered along the west side by the private way Star Road and the parcel identified as 242 Main St which features a 3-story office building, as well as 12 Pinevale Ave which features a single-family home. At the south, the properties are bordered by 242 Main St, and at the north, the properties are bordered by 12 Pinevale Ave and 2 Pinevale Ave. The existing conditions created several design challenges, but solving those challenges provides tremendous benefit to the community and this corridor.

FRONTAGE & ACCESS → Several, disjointed curb cuts become one, cohesive property. The assemblage totals <u>+247 feet of frontage along Main Street</u> and nearly 51 feet of frontage along Pinevale Avenue, using 4, inconsistent curb cuts. The project will reduce 3 curb cuts along Main to just 1.

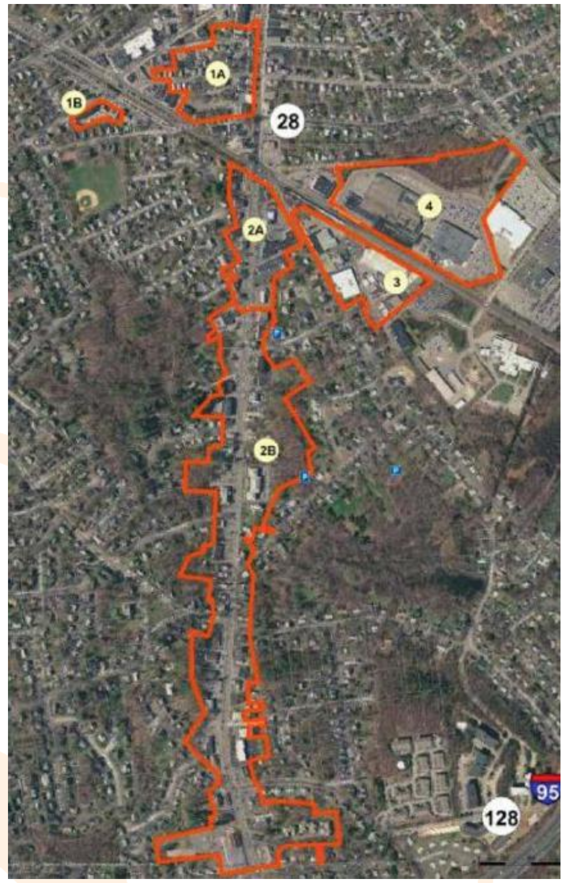
TOPOGRAPHY → The project will lower the overall elevation to better engage with the streetscape. Elevation contours vary throughout the property, creating a design challenge. Along Main, contours reach as low as **<u>96 feet,</u>** while the lots reach as high as **<u>104 feet</u>**.

STRUCTURES → 5 disconnected structures will become one, compact, mixed-use structure. The lots are currently improved by <u>5 structures,</u> featuring just 3 housing units and roughly 900 SF of commercial space.



The Location

The proposed project is located in PDA 2B. The property sits in a prime location for commercial and residential uses. It is located on state highway Route 28, providing prime visibility and immediate access to major highways, but just a few minutes' walk to the Commuter rail, and adjacent to the Pinevale hiking trails.



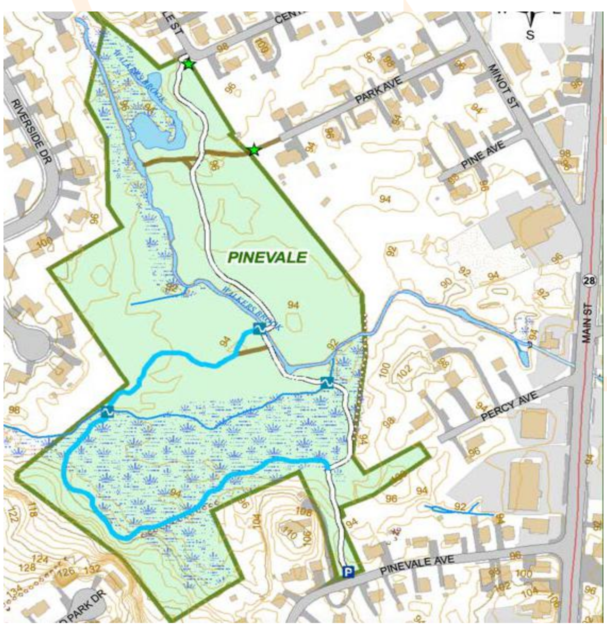
- This location is friendly to commuters who are either driving or accessing municipal transportation.
- Retail tenants gain prime visibility in a community gateway, that is both visible and accessible with on-site parking.
- Pinevale serves as entry to 17 acres of trails
- This location is part of the Summer-Main Walking Loop

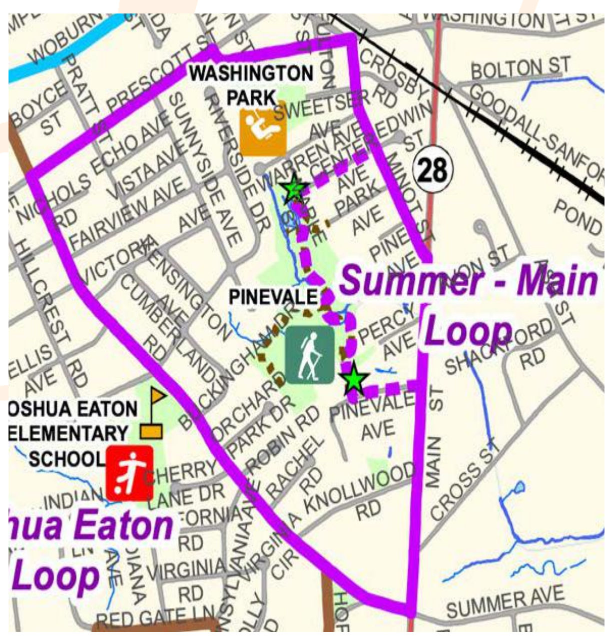
The property is located minutes from important landmarks, thoroughfares, and entertainment:

- Route 128 onramps: 0.6 miles or 1 min drive
- Commuter Rail: 0.7 miles or a 13-minute walk
- Reading Memorial HS: 4.1 miles or a 12 min drive
- Lake Quannapowitt: 3.7 miles or a 6-minute drive
- Breakheart Reservation: 4.0 miles or a 11-minute drive
- Redstone Shopping Center: 1.5 miles or a 5-minute drive
- Market Street Shopping Center: 6.5 miles or a 10-minute drive (Burlington Mall: 7.0 miles or a 8-minute drive)

Walking, Hiking and Trail…blazing

The properties are near the Pinveale trails as well as being a part of the Summer-Main Walking Loop, making this a great location for walkers, hiking enthusiasts and residents with outdoor interests.





The Neighborhood & Streetscape

The team is mindful of the project's placement within the fabric of the neighborhood. As the South Main Design Guidelines state:

> *Unfortunately, **much of the South Main Street corridor in the past has been characterized by a varied commercial mix, lack of investment, business turnover, and unappealing aesthetics.** South Main Street is a major element of the commercial corridor in Reading and **a gateway** to the downtown and central core of the community.*

In PDA 2B, the neighboring properties along Main St vary in scale, use and style.

Streetscape: North

Abutting the subject property, northerly, heading toward downtown, 2 Pinevale features 2 dwelling units, while the opposite corner of Pinevale is home to a single-story commercial building housing a dental practice, and at 274 Main Street, we find a 3-story, brick and glass office building constructed in the mid-1970's. Across from the subject property, we see the recent development of 24 dwelling units as well as a small, colonial style structure used as a dog care facility.

Adjacent to the proposed project, at the corner of Pinevale & Main, we see a Garrison style, 2-unit dwelling.

Across Main, we see the recent, 4-story multi-family, as well as a dog groomer to its left, housed in a 2-story, single use, structure.

Further north, we see the 3-story, brick, multi-tenant office building located at 274 Main.

Streetscape: South

Heading south, adjacent to the proposed project, we find a 2-story, multi-tenant office building.

Across from the subject property, as you begin to head south, you see a 2-story, redbrick apartment building in the A-40 Zone.

In immediate proximity, the theme is single use structures with varying architectural styles, from housing to offices to service uses.

Zoning & Table of Use Regulations

The properties are zoned primarily **Business A** and have several by-right and Special Permit uses. Through the adoption of the 2019 bylaw amendment, the intended, Mixed-Use project is allowed via SPP as listed in the **Other Uses**.

Section 5.3.1 Table of Use Regulations

Alternatively, the Business A district allows for several by-right and SPP uses including restaurants, retail stores, offices, fast food, health clubs, retail services, convenience stores, pet groomers, financial institutions, and funeral establishments. Automotive uses such as the sale/lease, servicing and repair of vehicles are also allowed within the Business A. The Business A district also allows several public and institutional uses by-right or through a Special Permit Process, such as childcare, medical facilities, and nursing homes.

Business and Service Uses	
Restaurant	Yes
Fast Food Restaurant	Yes
Restaurant with Drive-through Window	SPP
Bar or Tavern	No
Retail Store, up to 35,000 square feet	Yes
Retail Store, more than 35,000 square feet	No
Retail Store with Drive-through Window	SPP
Convenience Store	Yes
Marijuana Establishment	No
Office	Yes
Health, Exercise or Fitness Club	Yes
Place of Assembly	SPP
Retail Services	Yes
Consumer Service Retail Establishment	Yes
Professional Services	Yes
Facility for skilled trades	Yes [3]
Financial Institution	Yes
Computer Services Facility	Yes
Hotel or Motel	SPP
Tourist or Trailer Camp	No
Funeral Establishment	Yes
Animal Hospital	Yes
Animal Kennel	SPP
Pet Grooming	Yes
Self-Service Storage Facility	No
Wholesale Business with No Warehouse	Yes
Wholesale Business with Warehouse	No
Junkyard	No

PRINCIPAL USES	BUS A
Short-Term Rental of Motor Vehicles or mobile equipment	Yes
Service Station	Yes
Service Station Minimart	Yes
Automotive Repair	Yes
Car Wash, Self-Service	SPP
Car Wash with mechanical equipment for cleaning automobiles and/or other vehicles	SPP
Commercial Parking Facility	Yes

PRINCIPAL USES	BUS A
Public and Institutional Uses	
Child Care Facility	Yes
Adult Day Care	Yes
Religious or Educational Use Eligible for the Protection of Massachusetts General Laws Chapter 40A Section 3	Yes
Other Religious or Educational Use	Yes
Medical Facility	SPP
Nursing Home	SPP
Assisted Living Facility or Senior Independent Living Facility	SPP
Non-Profit Philanthropic Institution or Cultural Facility	SPP
Civic or Private Club	Yes
Community Center	Yes

Part 2: The Proposed Project

Project Overview

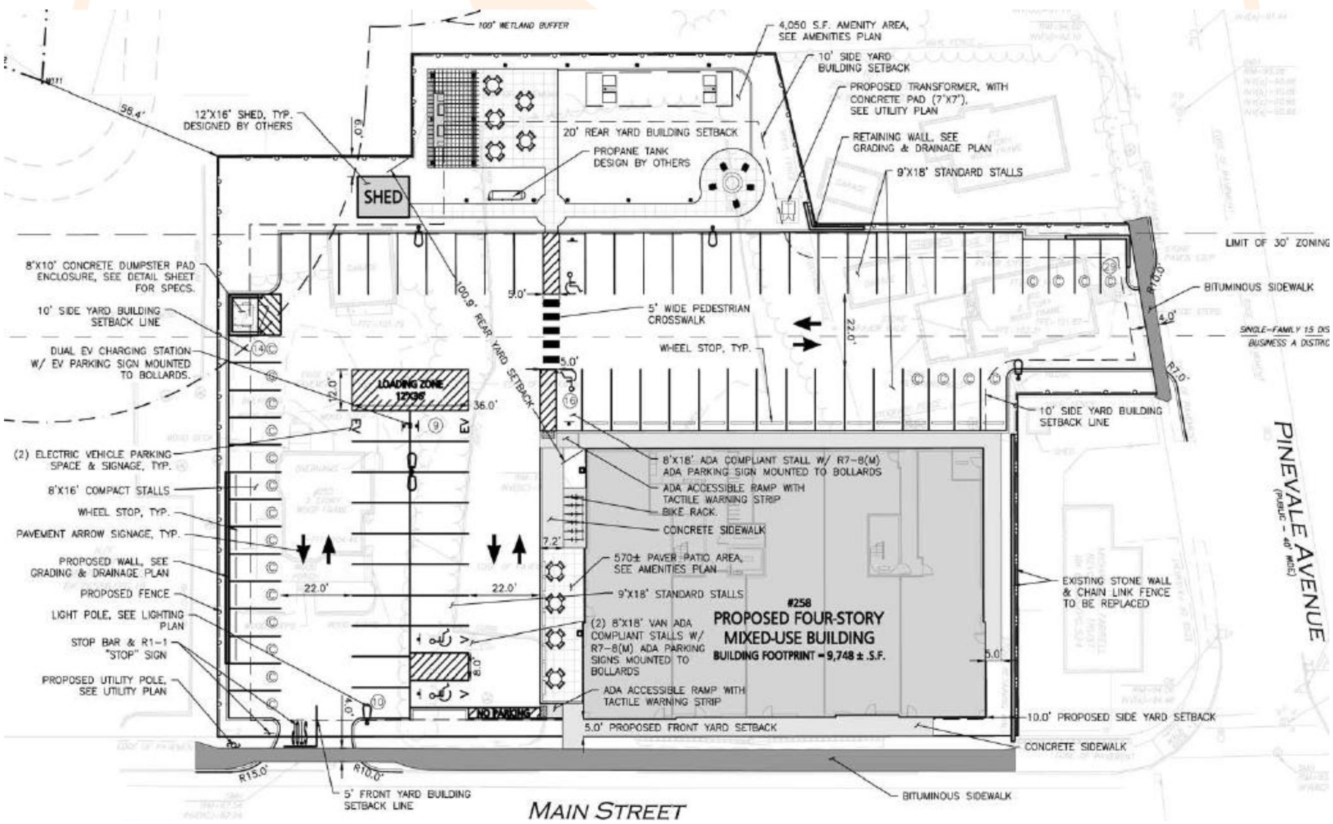
The applicant is seeking to develop a 4-story, mixed use project, featuring street level retail and 40 residential units on floors 2 through 4, by assembling 4 properties along Main Street and Pinevale Avenue. In summary, the project features:

- 8,100 SF of street level commercial space with dedicated patio space, creating an engaging use along an important corridor
- 40 residential units, over Floors 2 – 4, of which 4 units will be added to the community's affordable housing inventory.
- 78 Parking spaces, of which 28% are designated compact and at least 2 will provide public, EV charging.
- 2 points of access: The current 3, Main St curb cuts will be reduced to 1 on Main St and 1, additional curb cut along Pinevale Ave.
- No fossil fuels – the building will be powered solely by electricity.

Site Plan Summary

The consolidation of 4, separate properties creates a set of challenges, particularly in the topography and elevation of the properties relative to Main St and abutting parcels. The team endeavored to lower the site to better engage with the streetscape. Summarizing the proposed Site Plan below:

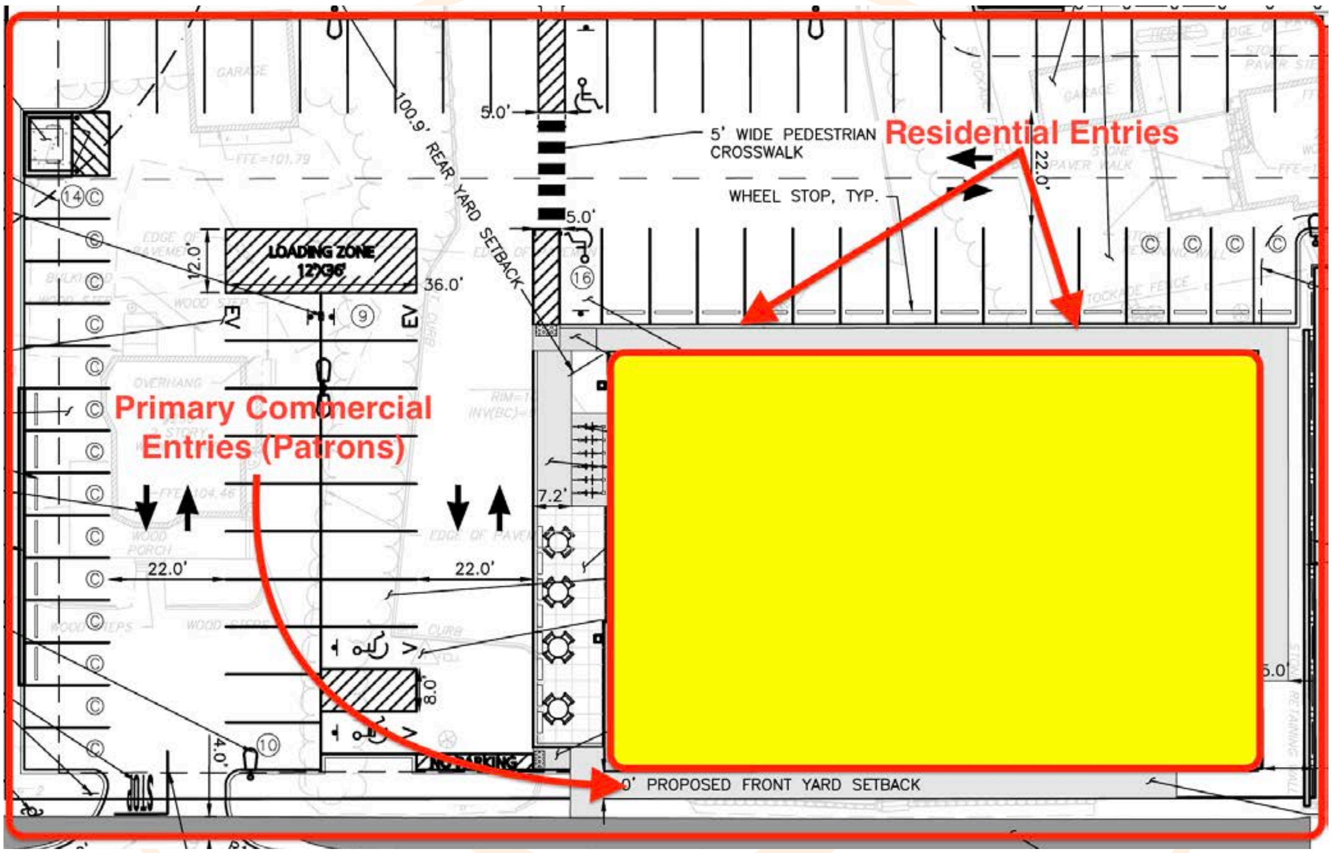
- The site will be accessed via 2 points of access, 1 along Main and 1 along Pinevale, which improves circulation within the lot, access to the property and circulation around the structure for public safety such as fire truck access.
- The applicant proposes to lower the overall elevation of the site to better engage with the streetscape and adjacent properties.
- 570 SF of dedicated patio seating adds street-level engagement.
- The rear of the lot will provide 4,050 SF of outdoor amenities space.



Building Location on Site & Access

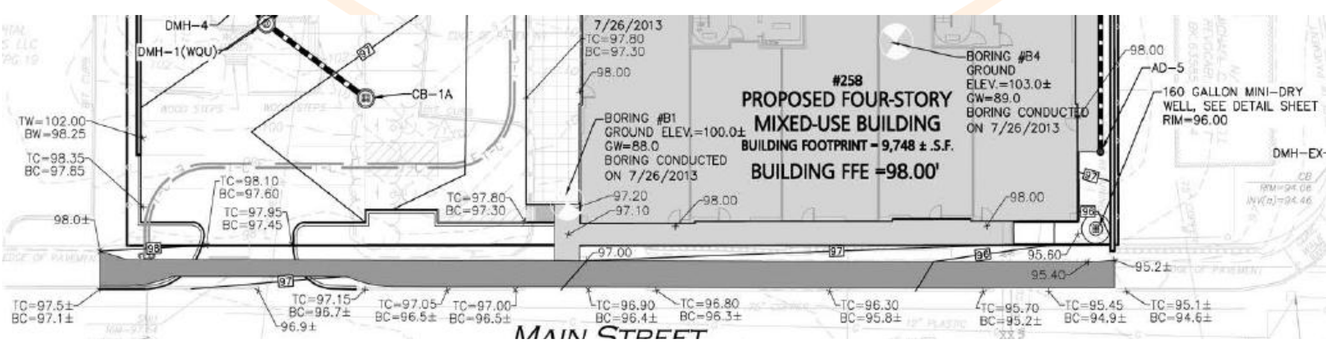
The building is positioned toward the northeast corner. This positioning provides several benefits:

- This allows for circulation around the structure through 2 access points, Main & Pinevale, reducing the impact of access
- The positioning results in screening nearly half of the parking from Main Street visibility.
- The primary entry/exit for residential units is located at the rear of the structure, which should lead to most residents parking at the rear, while patrons of the commercial spaces are more likely to park in the areas to the south of the structure
- The site is able to accommodate patio seating along the south side of the structure



Topography

A goal of the proposed project is to improve *engagement & connectivity*, despite challenging topography. Currently, portions of the land at 258 Main sit as high as 104'. However, under the proposed plan, pedestrians enter the building at 98' while we see TOC vary from 95.1' to 97.5' across Main. This provides a significant improvement over the existing conditions, improving engagement with Main St.



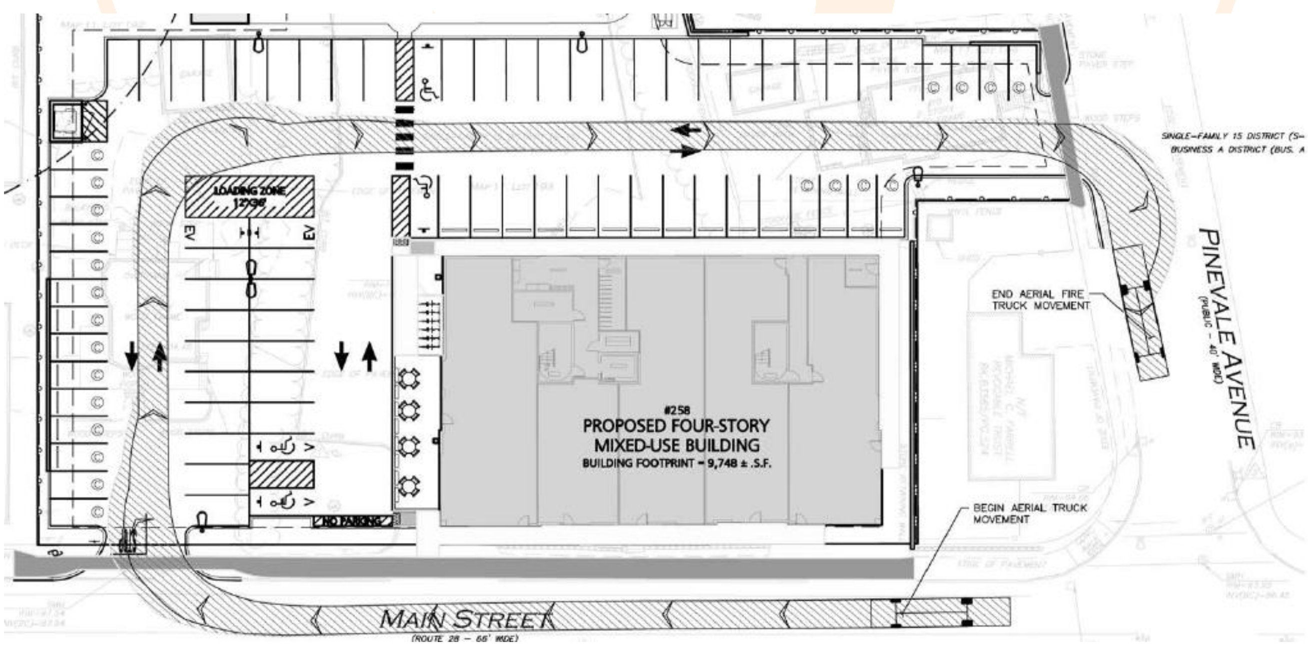
Driveways

The property is accessed via 2 curb cuts, 1 along Main and 1 along Pinevale, replacing the current 4 curb cuts the individual properties require. This creates a <u>safer & more efficient distribution of traffic,</u> while improving circulation within the property. The design, and building placement, in particular, consider distance to adjacent curb cuts and corners. In the diagram below:

- There is nearly 130' between the proposed curb cut on Main St and the immediate abutter
- The curb cut on Pinevale is nearly 152' from Main St
- Traffic turning onto Main St from Pinevale, would travel +305' to the proposed Main St entry to the property

Emergency Access

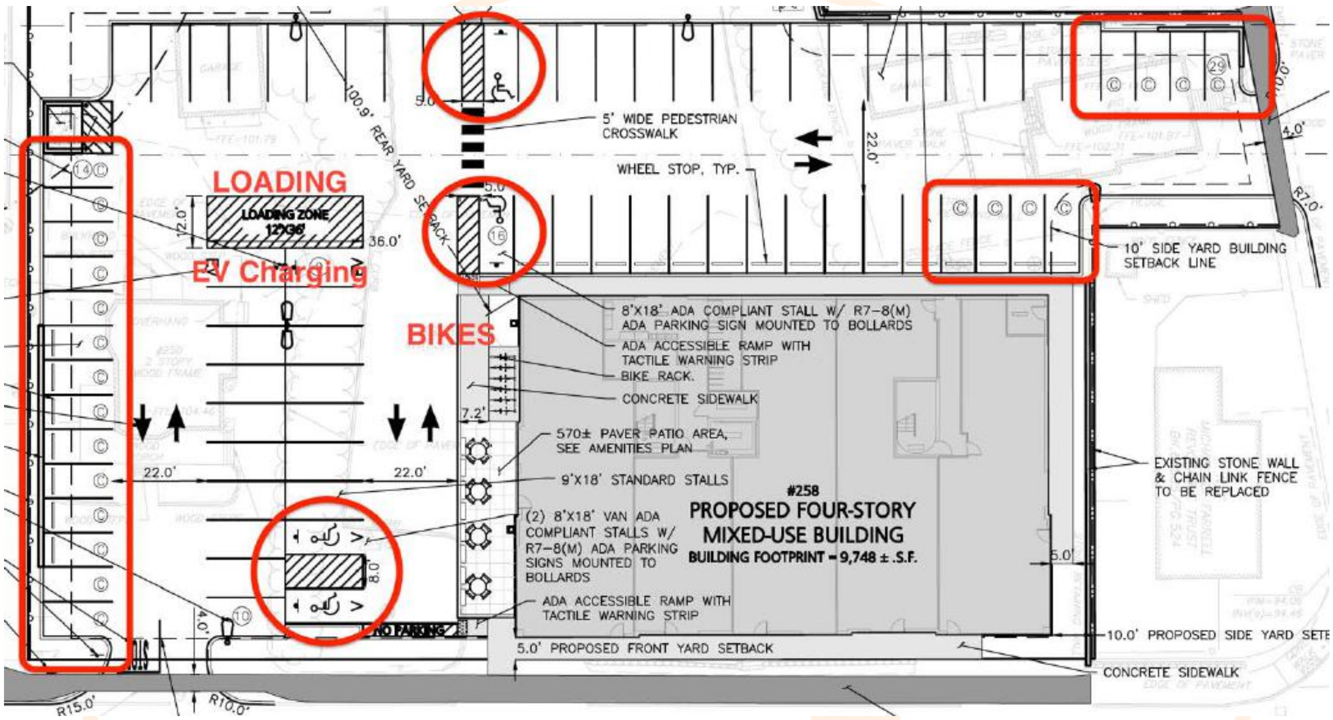
Emergency vehicles can easily service the property and circulate around the structure in the event of an emergency, without needing 2 curb cuts along Main St. The Fire Truck Turning Plan exhibits the circulation of a 40' fire truck.



Parking & Loading Design

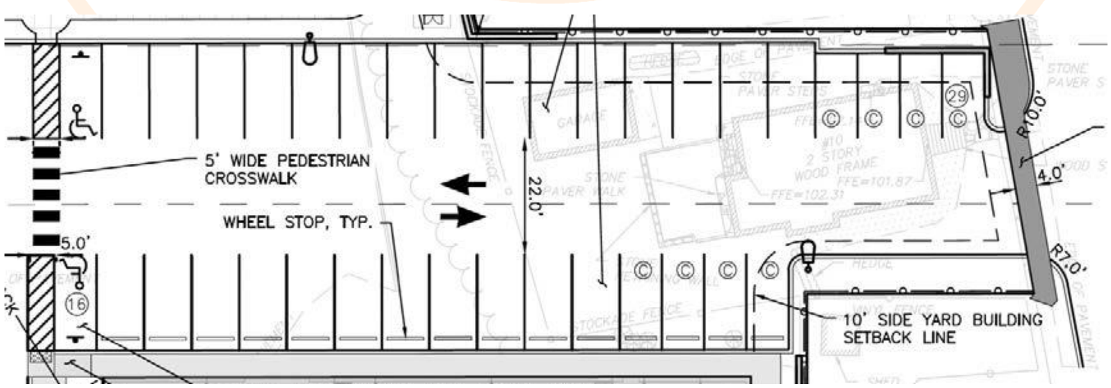
The parking is designed with efficiency, accessibility and aesthetics in mind. The design includes the following efficient parking measures:

- The plan features a total of 78 total parking spaces which are sufficient to meet the requirements of the zoning bylaws.
- 28% of the spaces, or 22, are designed as compact stalls sized 8' x 16' and are efficiently clustered in 3 locations throughout the site.
- 4 ADA accessible spaces are provided, of which, all 4 spaces are van accessible – exceeding the required standard
- The lot provides for public EV charging, as well as on-site parking for bicycles, encouraging other forms of mobility
- Where possible, landscaping is used to screen parking areas, such as along Main and Pinevale



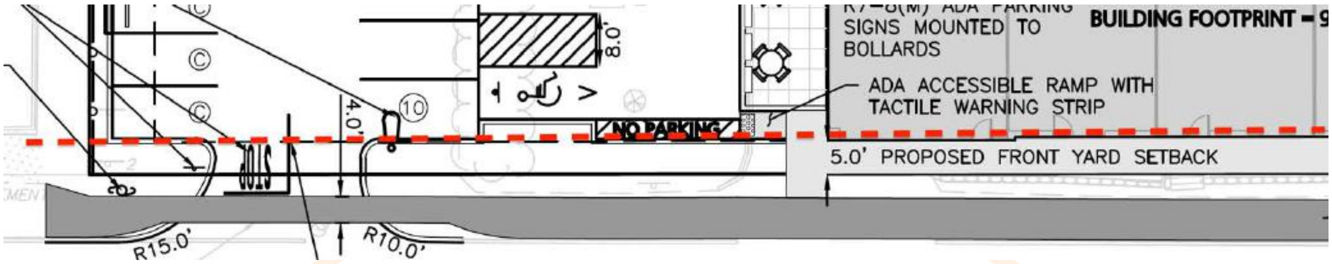
Screening from Main

Nearly half of the spaces, 36/78 (46%), are located immediately behind the structure and fencing along 2 Pinevale, screening them from visibility. These spaces are likely to be occupied by residents since they are closest to the residential entrance at the rear of the structure.



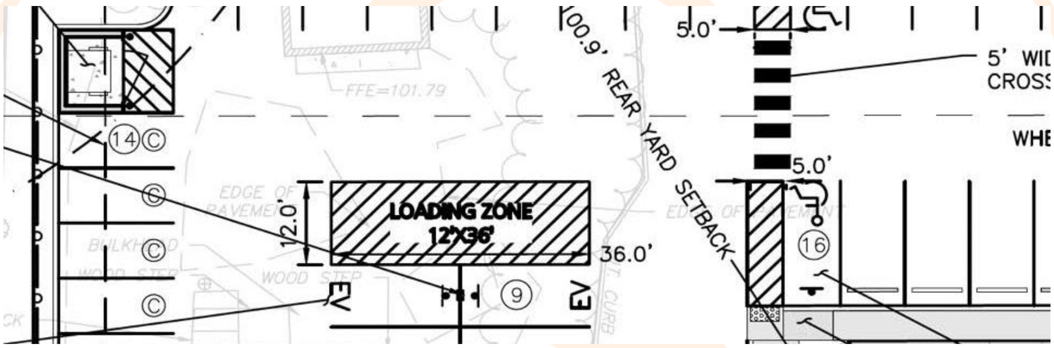
Parking Set Back

All parking spaces are placed no closer to Main Street than the building's front setback, as shown below.

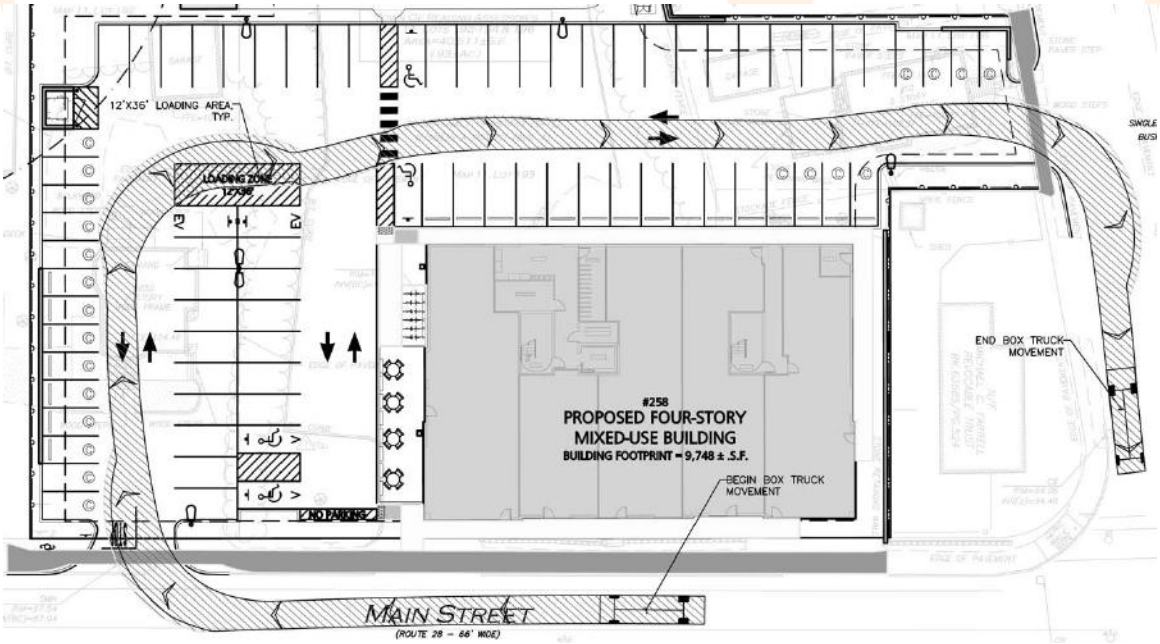


Loading

- A 12' x 36' loading space is strategically placed to allow circular access to the property for easy loading and unloading.
- Deliveries will be managed to occur during off-peak traffic hours and whenever possible, utilizing vans and smaller delivery trucks.

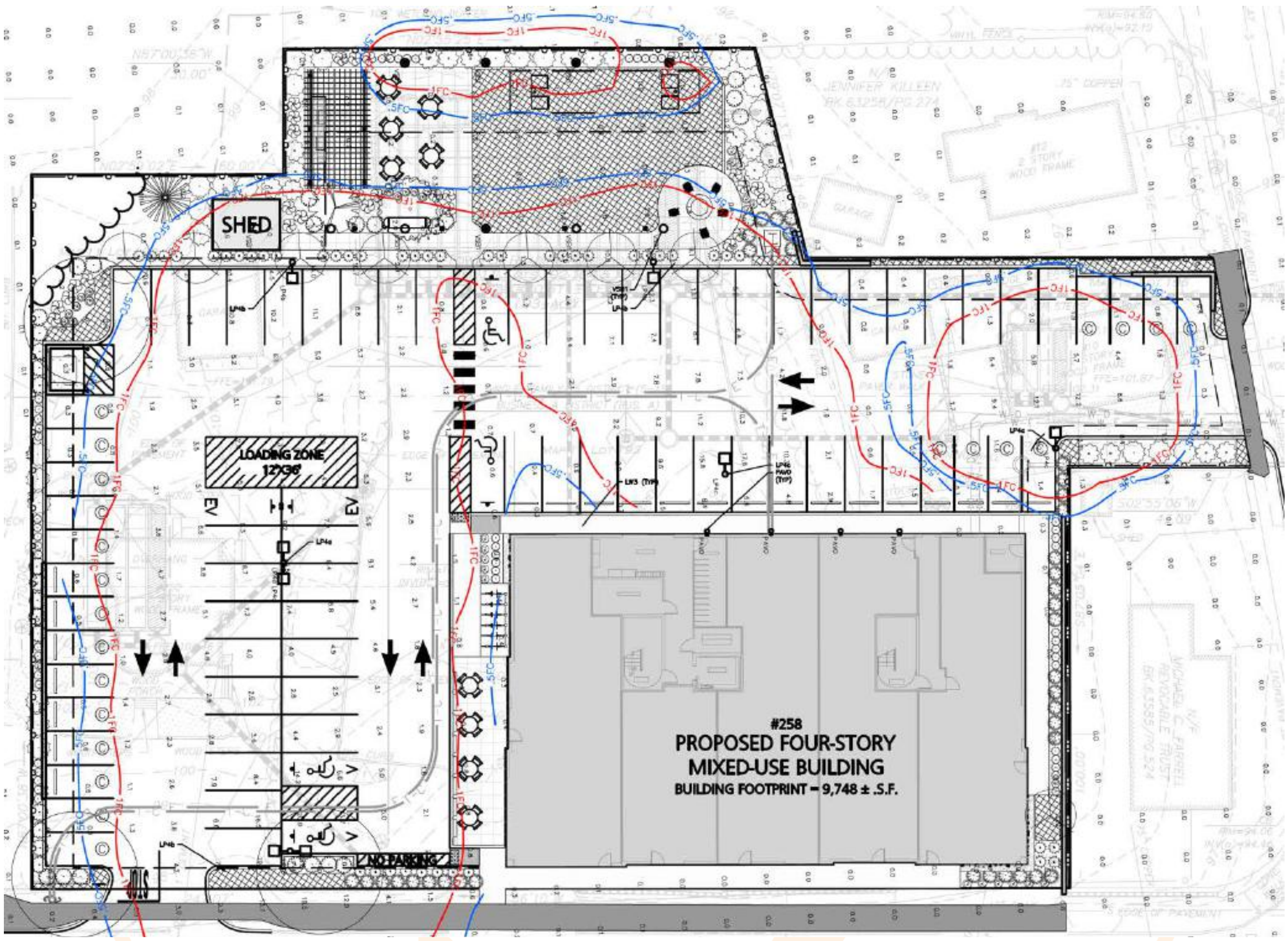


- To support circulation within the property and access to the site, 2 accessways are proposed.
- A vehicle movement plan illustrates the ease of movement of 30' delivery vehicles

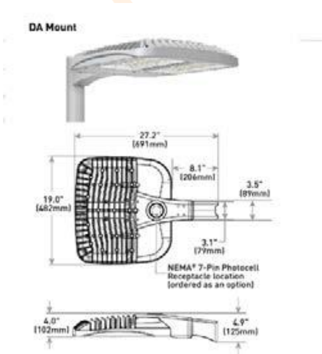


Site Illumination & Fixtures

The site is illuminated by 3 types of fixtures: pole & wall mount lighting fixtures, as well as pathway bollards. The fixtures are dark sky compliant and energy efficient. The team has endeavored to provide safety and aesthetic appeal, while mitigating impact to abutters. The diagram below illustrates the impact of lighting.

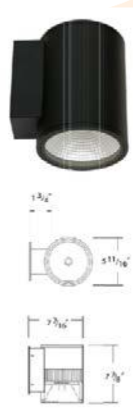


Site Light Fixtures



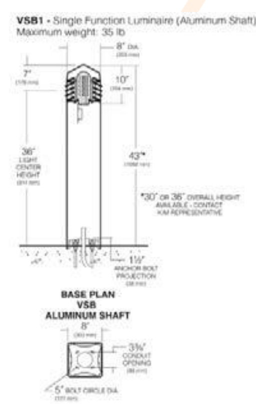
LIGHT FIXTURE - OSQ LED AREA - LARGE
CREE LIGHTING - OSQ SERIES

LED pole mount fixtures are used to illuminate the parking areas.



WALL MOUNT
ALCON LIGHTING - PAVO

LED downlights are affixed to the structure.



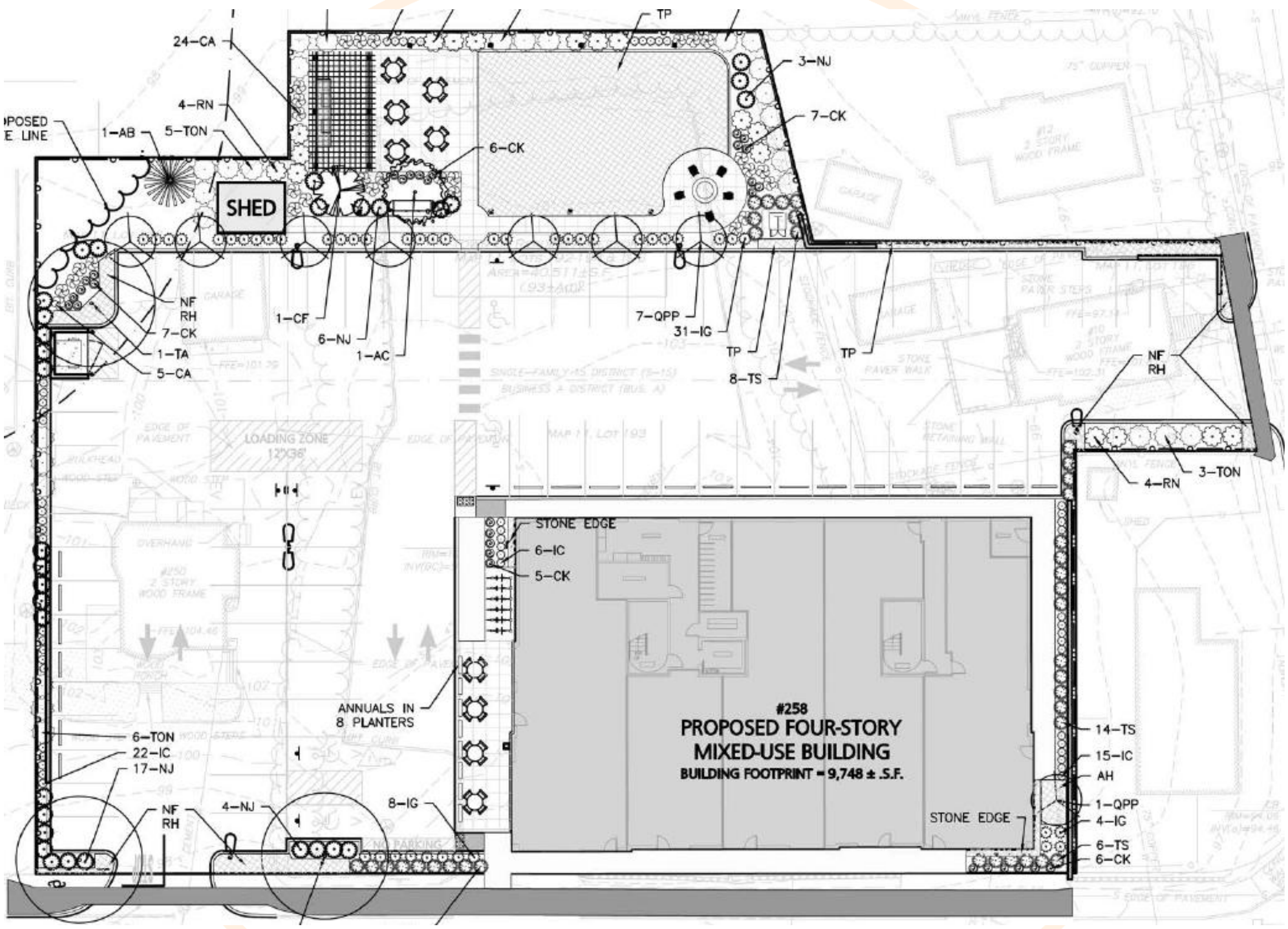
WALKWAY BOLLARD LIGHT FIXTURE
KIM LIGHTING, VSB1 LED

LED bollards are used to illuminate hardscaped walkways at the rear.

Landscaping & Amenities

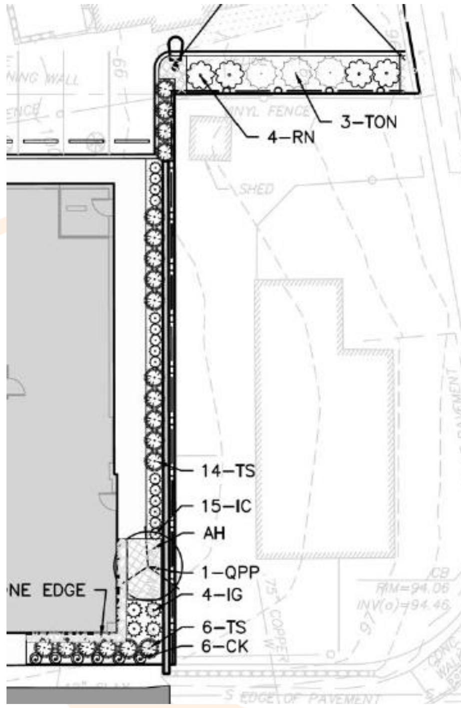
While the zoning bylaws do not stipulate any landscaping or "open area" requirements for mixed-use projects, the Applicant has endeavored to maximize open space to provide screening, sound mitigation, improve curb appeal and provide amenity space for tenants.

- In total, the site features 28% open space. This exceeds the standards of even multi-family development, as required in the Bylaws.
- Varied plant types are used throughout, including deciduous, evergreen and flowering trees, as well as shrubs, and perennials.
- Planting beds are used along Main Street to add appeal as well as act as screening for the parking area.
- Landscape screening is applied along lot lines, with a focus on providing screening and sound mitigation for the abutter.
- A 4,050 SF area is delineated at the rear as outdoor amenity space.
- The robust landscaping plan utilizes 23 types of trees, shrubs, groundcover, and perennials.

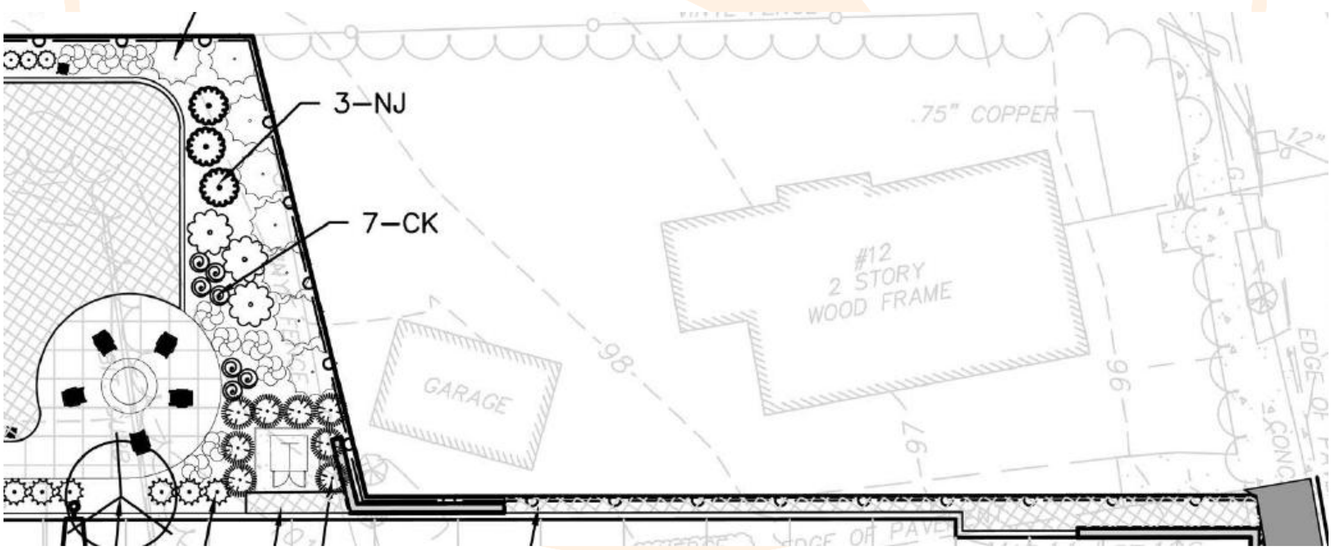


Abutter Screening

Along 2 Pinevale, +50 plantings are used in conjunction with a 6’ fence to create robust screening, light filtration, and sound mitigation.



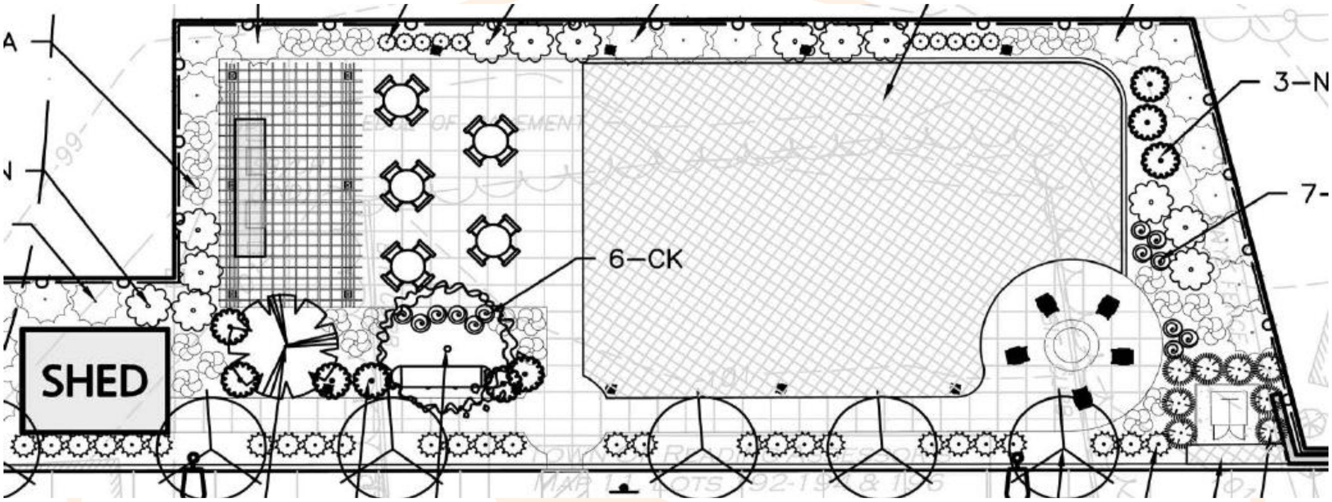
At 12 Pinevale, a dense, landscaped area helps create a significant buffer and the transformer pad is screened by plantings on 3 sides.

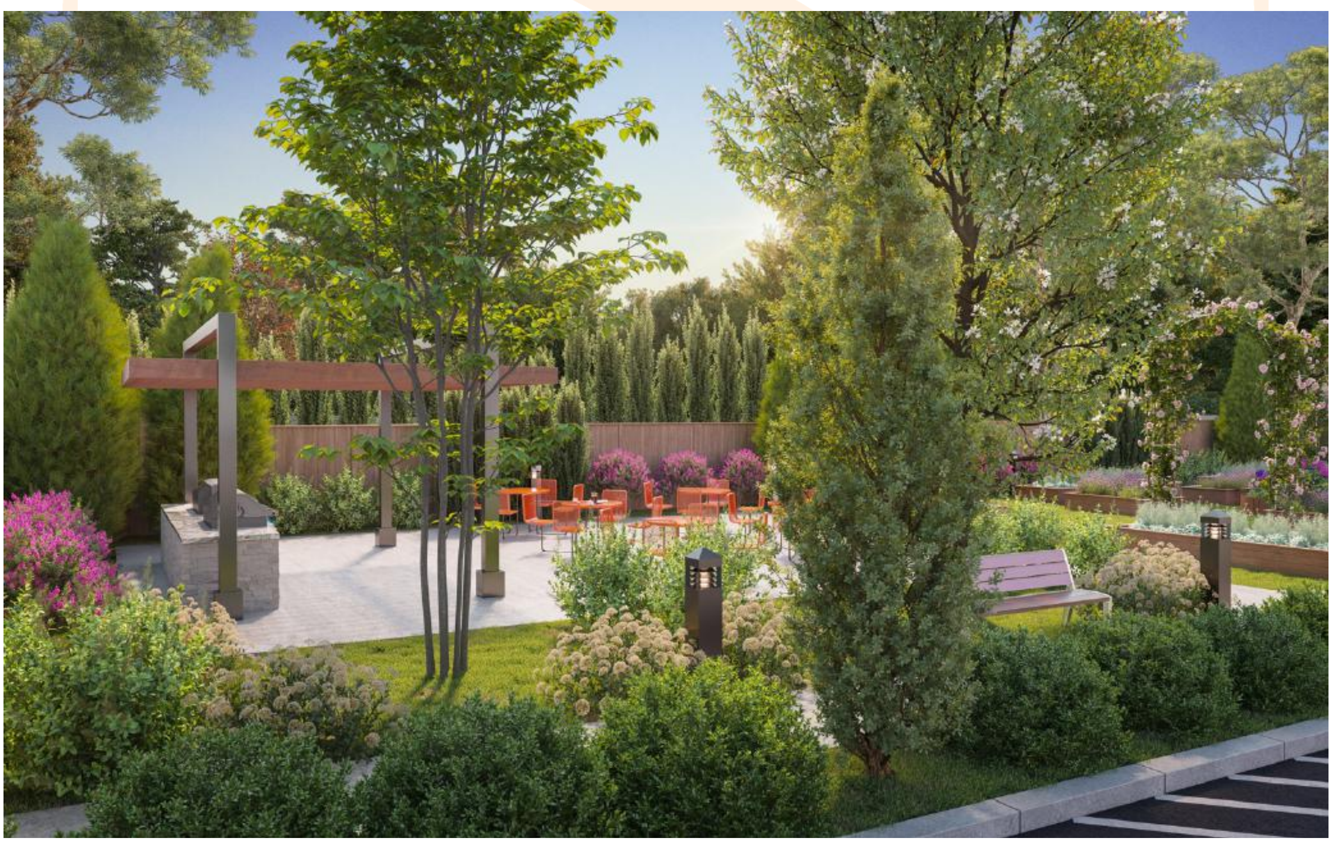


Amenity Space

A 4,050 SF area at the rear of the site is adorned with plantings, hardscape, and pathway lights, and will serve as recreational space. The bylaws create challenges in creating common amenity spaces within the structure; this area serves as much needed outdoor space. It is primarily abutted by the private way, Star Road and connected to the building through a pedestrian walkway. The space consists of:

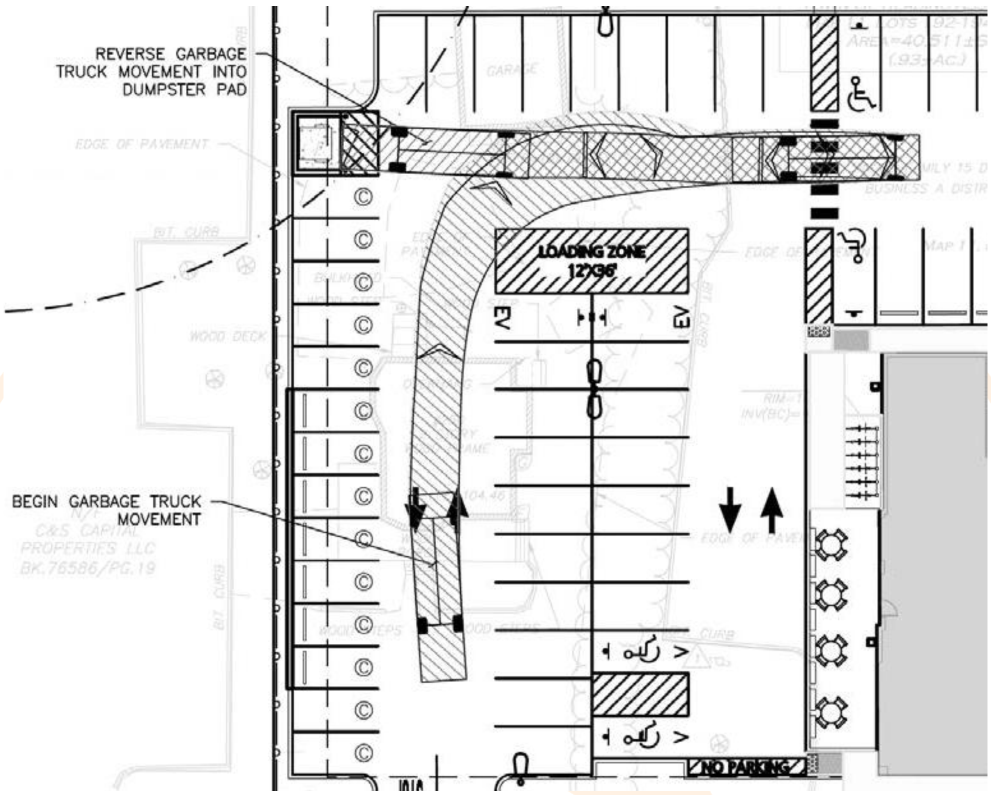
- 2 seating areas which can be used for lounging and eating and an open space which can be used for yard games
- A BBQ area, partially covered by a pergola
- A shed will provide storage for outdoor furnishings during winter months
- A landscaping buffer along the abutter at 12 Pinevale





Solid Waste Disposal (Trash Removal)

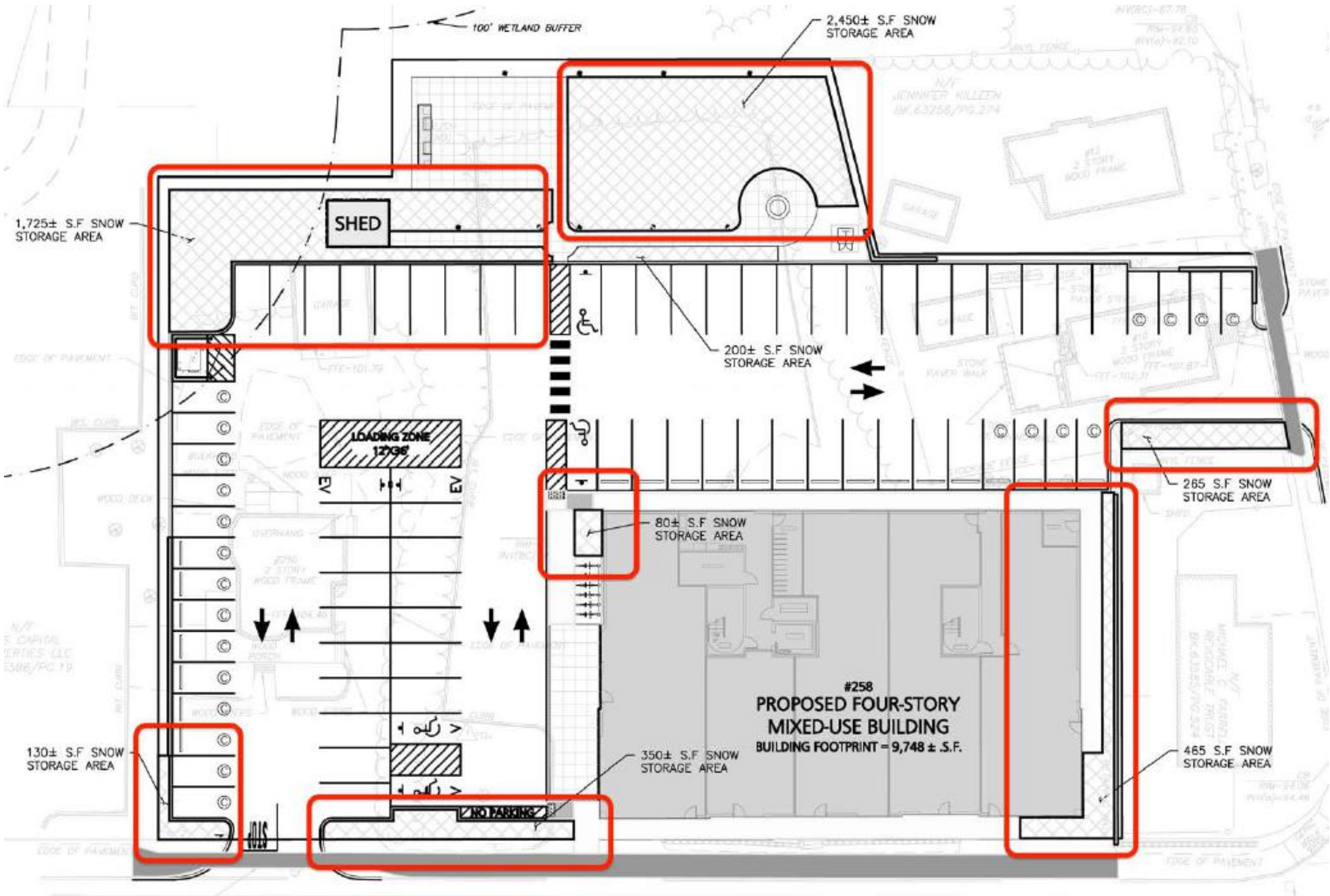
Waste will be collected at the south of the site at an enclosed trash collection structure, positioned on the site to support easy access. A third-party vendor will be utilized for off-hours pick up. The diagram illustrates the ease of access for a 35’ rear loading truck.



The dumpster enclosure will be 8’ x 10’ or large enough to accommodate an 8-yard dumpster, holding up to 1,600 pounds of waste or 96 kitchen-sized trash bags. Initially, service will be provided on a weekly basis and frequency will be adjusted as needed.

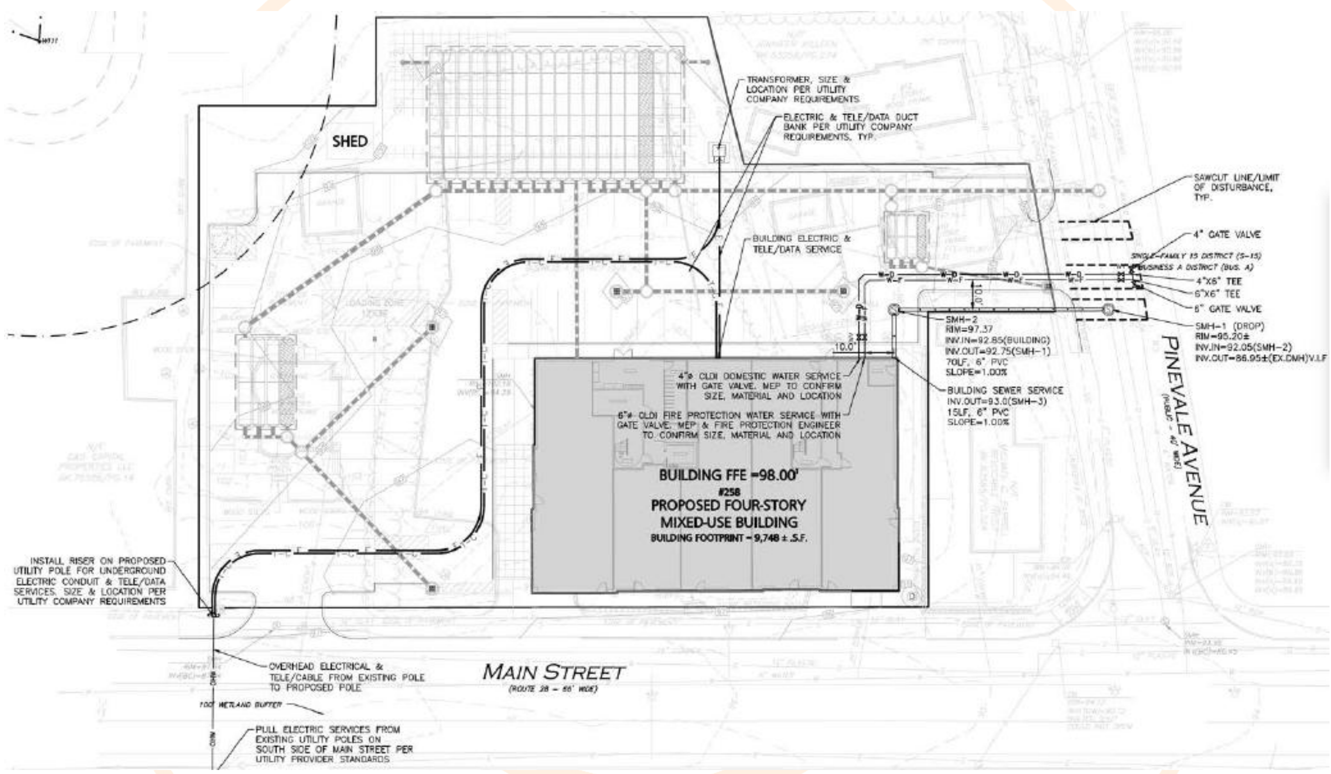
Snow Loading

There are 7 snow loading areas, totaling 5,465 SF of snow loading space. If applicable, any excess will be hauled off site.



Utilities & Stormwater Management

- Existing utilities for each property will be removed, as applicable.
- The existing sanitary sewer will be cut and capped at the main within the public right-of-way and replaced.
- Electric, communications, phone and fiber optic services will be extended from Main Street.
- The pad mount transformer will be located at the rear of the site and screened by landscaping so as to limit visibility.
- The domestic water service and sewer will be tapped from Pinevale.
- Natural gas will not be made available to this site as the property will be *powered exclusively via electricity.*
- A complete stormwater management plan has been included with the application. The stormwater management system for the site will incorporate Best Management Practices "BMP" and Low Impact Development "LID" strategies in accordance with the RZB and MassDEP Stormwater Management Handbook "SMH". LID measures incorporated into the design will include an infiltration system that improves the natural runoff rate from the existing conditions.



Building Summary

Overview of the Building Design

The neighborhood consists of single use structures of varying architectural style, scale and use, from dwelling uses to offices and services. Since the proposed project is the first of its kind in this corridor, the immediate streetscape lacks similar projects. This created a design challenge in putting forth a structure which cohesively blends the mix of commercial and residential uses into a single aesthetic without harsh delineation of commercial vs residential uses. The team juggled several goals and challenges:

- Provide a cohesive yet compelling aesthetic which blends into an environment dominated by single use structures;
- Create compelling retail store fronts that maximize visibility along Main Street, and result in a stable and dynamic tenant mix
- Connect elements of the downtown to support cohesion, while contributing to make the corridor unique and compelling;
- Balance the requirements of **5.6.7.2 Commercial Component** while finding compelling ways to articulate the massing and façade

Façade Design & Massing

The proposed structure is a forty-five-foot tall, 4-story building, utilizing a flat roof. Three styles of materials are used to showcase changes in the massing throughout the façade, and a series of overhangs and canopies further articulate the massing. Rather than a design that is "grounded" in retail store fronts with a "stack" of housing above, the design proposes to seamlessly blend the residential and commercial uses by manipulating materials, sources of light, window openings, and canopies to focus on vertical interplay.

Front Elevation

- Three types of material wrap the façade in a long-lasting, composite which mimic wood and masonry, in vertical sections.
- The street-level store fronts use varying widths of glass, rather than continuous glass which would "ground" the design.
- The vertical interplay of materials creates distinct and compelling storefront sections.
- Masonry-style material is placed centrally as the 'star of the show' serving to connect the structure to elements of the downtown.
- Banding is selectively interwoven below windows to provide cohesion and connection across the façade.
- Two styles of windows are interchanged across the façade to provide variation and interest, while enhancing the vertical language
- The facade utilizes 3 types of lighting - gooseneck are used to illuminate the first-floor storefronts, while the overhangs feature downlighting, and at the center section of the second floor, you will find wall mount downlight.

Side Elevation (South)

- At the south elevation, you will note that the glass storefront treatment used at the front elevation has been continued. The intention is to create engagement at the south side, where patrons will approach the building from the parking lot.
- The use of gooseneck lighting and a signage band continues at the south elevation, activating the south corner approach.
- Along this side, the building will feature a outdoor seating area. A storefront door has been placed along this side.
- It should be noted that the rendering below omits the plantings along the parking area in order show case this elevation.

Side Elevation (North)

- At the north, the building will be screened along the first floor through landscaping and fencing. However, the storefront system has been continued to allow patron access along the setback.
- Along this side, we see more window banding used to enliven this section of the building's massing.
- Darker materials along this side will help absorb light rather than reflect it, in consideration of the proximate abutter.

Rear Elevation

- At the rear we find the residential entries (which also serve as secondary exits for commercial spaces)
- Eight of the rear facing residential units feature balconies
- Again, we see an interplay of 2 materials along with continued use of gooseneck light fixtures

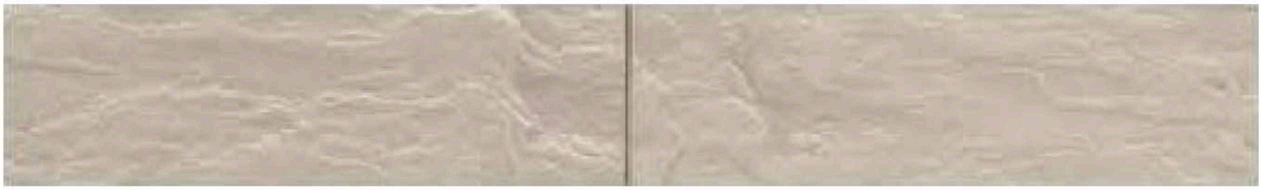
Materials

The facade utilizes 3 types of composite panels:

1. ***Vintage Wood Composite Panel*** – The cedar panels add character and warmth to the structure while also providing a reference to the building's proximity to surrounding wood structures, wet lands and acres of public hiking space.
2. ***Masonry Composite Panel*** – A masonry look material is used as a focal point in the center of the façade to create connection with the downtown, where we often see the use of masonry materials.
3. ***Concrete Corbosa Composite Panel*** – This material adds texture and depth to the façade.

The fiber cement construction resists rotting, warping and pests, and will maintain color vibrancy long-term.

3 EXTERIOR SIDING COLOR C: Nichiha Concrete Corbosa Series Composite Panel - Color "Shadow"



2 EXTERIOR SIDING COLOR B: Nichiha Masonry Series Composite Panel - Color "Desert Beige"

1 EXTERIOR SIDING COLOR A: Nichiha Vintage Wood Composite Panel - Color "Cedar"

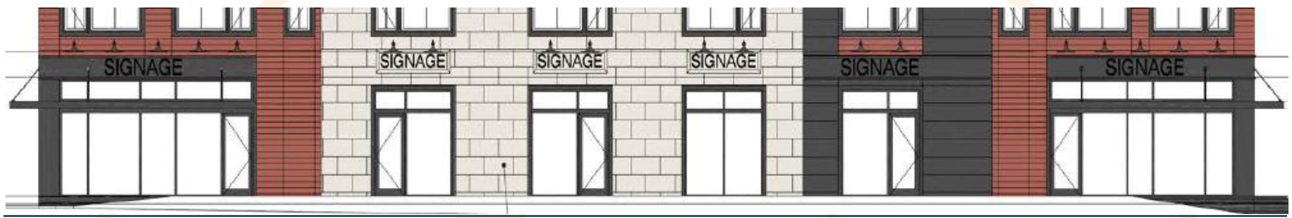
Lighting

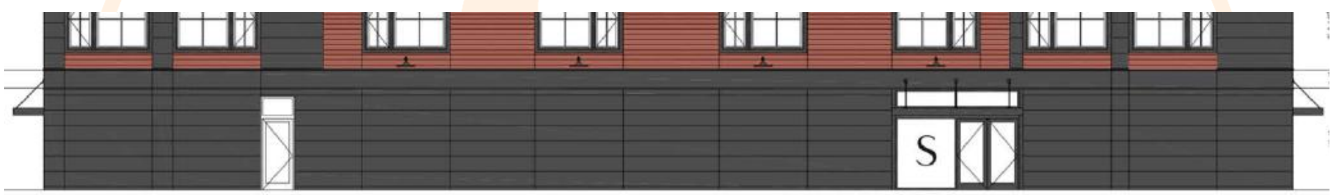
The structure will be illuminated by a mix of energy efficient, LED fixtures including gooseneck fixtures, soffit, and wall mount downlighting. For illustrative purposes, the following fixtures have been selected, subject to availability.

Kichler, Elias Outdoor LED Wall Sconce

- Textured black with gold interior, an elegant question mark curve, with chic metallic finish in aluminum construction
- Round backplate
- LED Built-in provides 3000 Color Temp, 90 CRI

The goosenecks are used along the front, rear and south side of the façade.





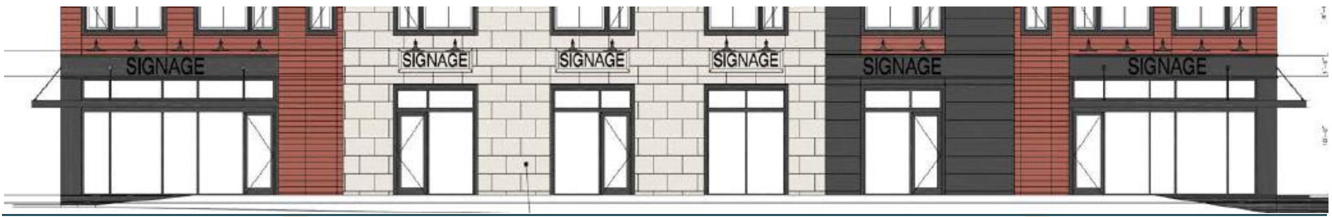
Alcon Architectural Cylinder

Cylinder downlights are used along the front façade at the 2nd level, as best showcased in the rendering below.

- Round, one piece design with high grade aluminum with corrosion-resistant finish
- Tempered glass and silicone -ring
- Dark sky compliant

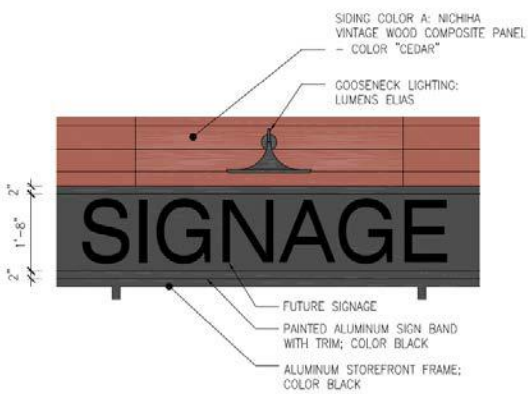
Signage

- The signage areas have been designed to allow tenants to create a distinct storefront presence, illuminated by gooseneck lighting.
- Tenants will be responsible for seeking approvals for signage.
- The applicant is not requesting any pylon signage on site.

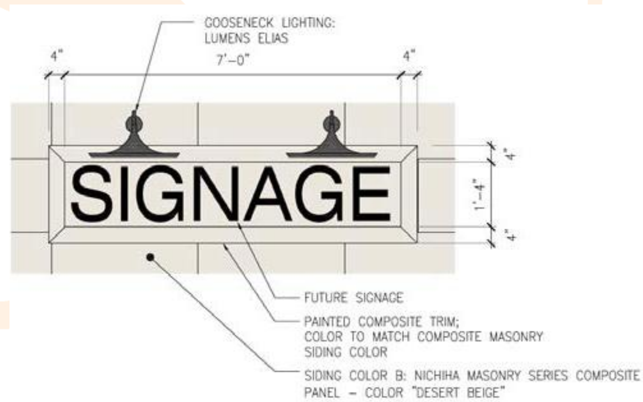


Building branding appears at the south side of the structure.

There are 2 types of signage bands, where Type A is mounted to an area using Material C, and the other is applied over Material B. The available signage area is roughly 7’ x 2’



2 Signage Type "A"
Scale: 1" = 1'-0"



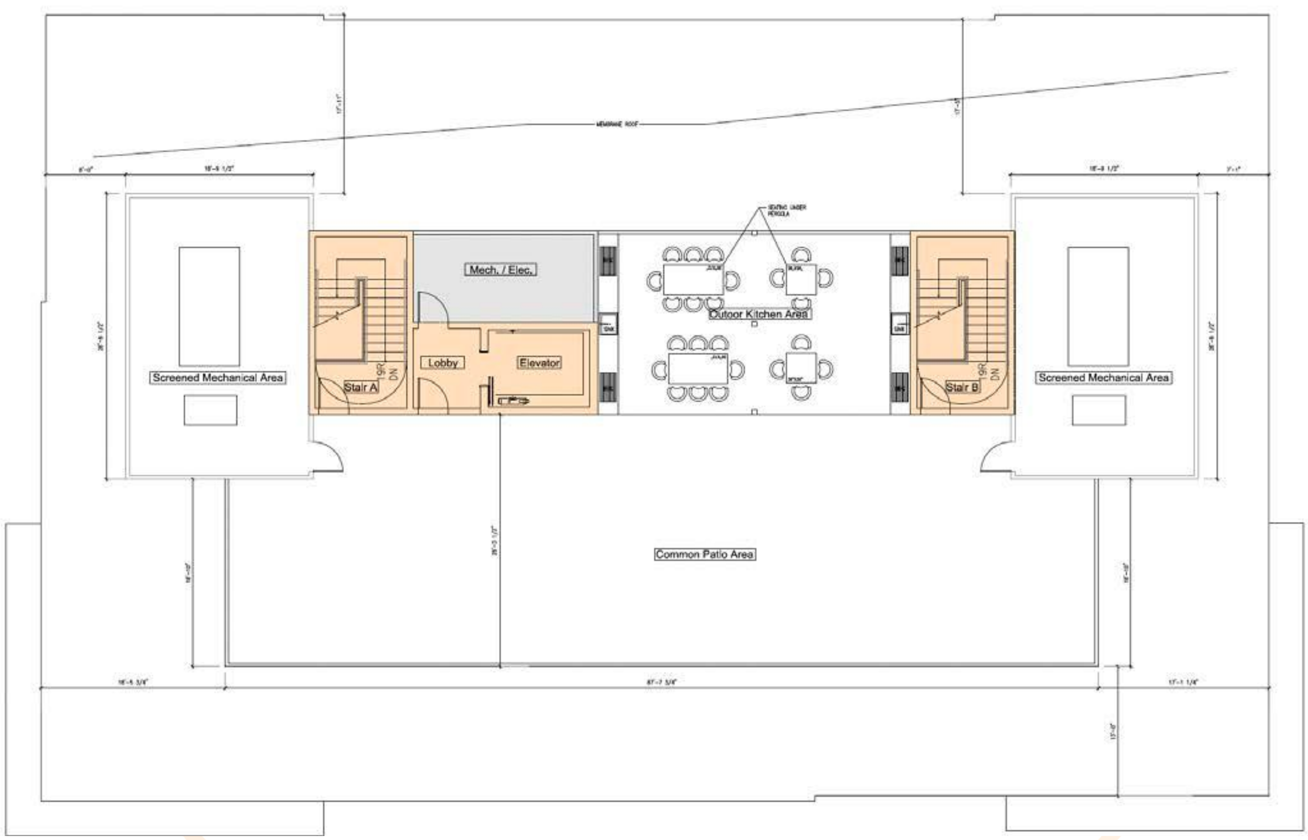
3 Signage Type "B"
Scale: 1" = 1'-0"

Roof / Mechanical Systems

Roof Layout

With the requirements of **5.6.7.2** creating limitations on amenity space within the structure, only 8 balconies available throughout the property, and growing demand for outdoor space, the roof offers an opportunity to enrich resident experiences.

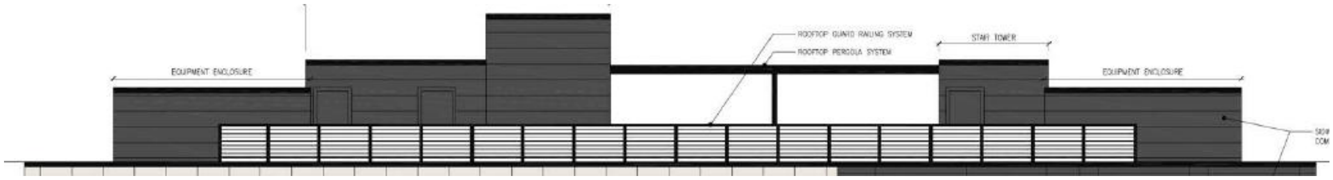
- The roof will be accessed via two stairwells and an elevator.
- The roof will feature outdoor space, as well as housing mechanical equipment.
- The space is set back 13’ from the front edge and more than 17’ from the north & south edge, excluding canopy overhangs.
- Mechanical systems are screened using façade-matching walls, which will also serve to reduce any sound transmission.
- The primary use area has been strategically placed between the stairwells to limit visibility from Main St.

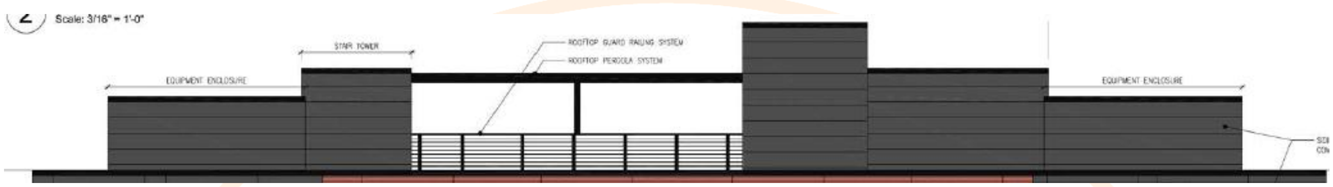


Rooftop Amenity Area

The rooftop amenity area will provide much-needed outdoor space. The set-back-design limits visibility at the street level. Use of the rooftop will be administrated by property managers, with limited hours of access and rules of use required with every Lease.

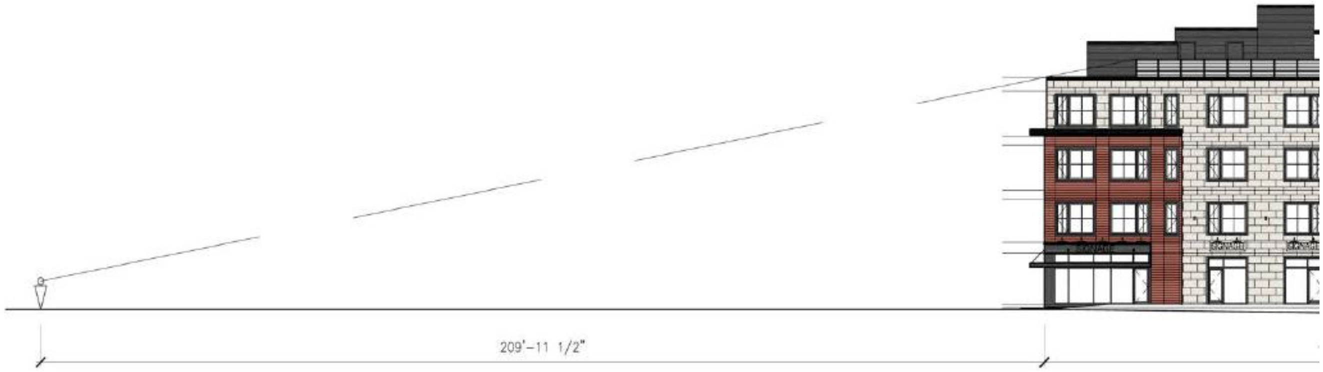
* A railing system is utilized along the rooftop space, avoiding any solid walls resulting from the rooftop use.
* Over the eating area, which is located between the stairway tower, a pergola system helps maximize the usability of the space.

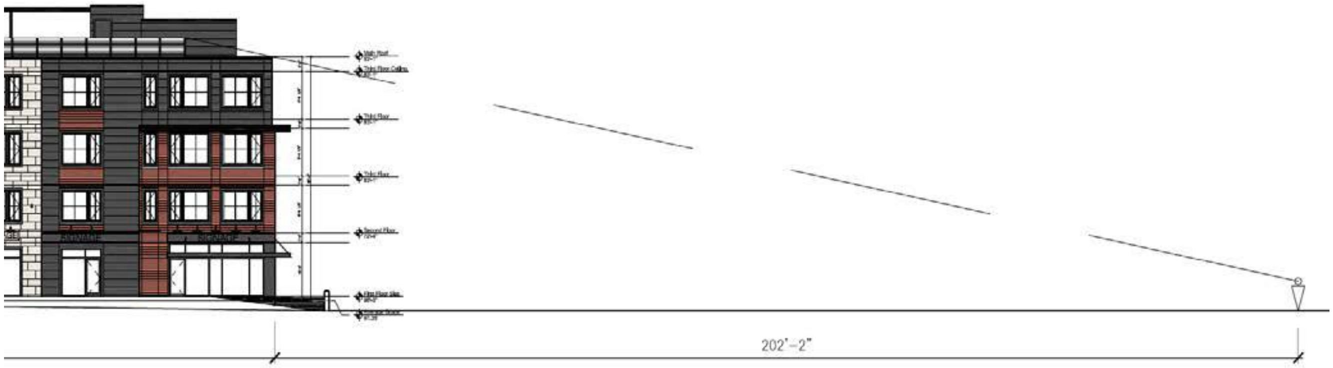




Rooftop Railing View Distances

Rooftop railing view distances show that pedestrians will only be to see the edge of the roof deck railings from at least +202' away.





Shadow Study

A shadow study illustrates the impact of the project on its immediate abutters at various dayparts at both Summer and Winter Solstice. Aside from the 12 PM Winter Solstice study, there is very little adverse impact on the adjacent structures.

Summer Solstice, 8 AM

Summer Solstice, 12 PM

Summer Solstice, 4 PM

Winter Solstice, 8 AM

Winter Solstice, 12 PM

Winter Solstice, 4 PM

Traffic & Parking Study

A Transportation Impact Assessment has been generated by Vanasse & Associates. It concludes:

As documented in this study, Project-related traffic increases result in minor delay increases at area intersections; however, there is no change in vehicle queuing so it is unlikely that Project-related traffic increases will be noticeable. Further, Project-related traffic increases will not result in significant increases on overall traffic volumes or traffic delays within the study area. The site driveways will provide efficient access to and from the development. In general, Project-related traffic can be adequately accommodated within the existing infrastructure with minimal impact on the traffic operations within the study area.

It also provides the following recommendations which have been incorporated into the plans:

Project Access

Access to the Project site will be provided via two curb cuts; one onto Main Street and one onto Pinevale Avenue. As the site currently has four curb cuts, the Project will decrease the number of curb cuts onto Main Street by two, reducing conflicts with pedestrians and bicyclists. The following recommendations are offered with respect to the design and operation of the Project site driveway:

- *The driveways should be placed under STOP-sign (Manual on Uniform Traffic Control Devices (MUTCD)1 R1-1) control, with a painted STOP-bar included.*
- *All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current MUTCD.*
- *Signs and landscaping adjacent to the Project site driveways should be designed and maintained so as not to restrict lines of sight.*
- *Snow windrows within sight triangle areas of the Project site driveways should be promptly removed where such accumulations would impede sightlines.*

Transportation Demand Management (TDM) Plan

To encourage use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented:

- *Information regarding the proximity of the Reading Depot station, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents and employees;*
- *A "welcome packet" should be provided to residents and employees detailing available public transportation services, bicycle, micro-mobility devices, walking alternatives, and available commuter options;*
- *Two Electric Vehicle (EV) charging stations will be provided on-site;*
- *Bicycle racks will be provided on-site.*

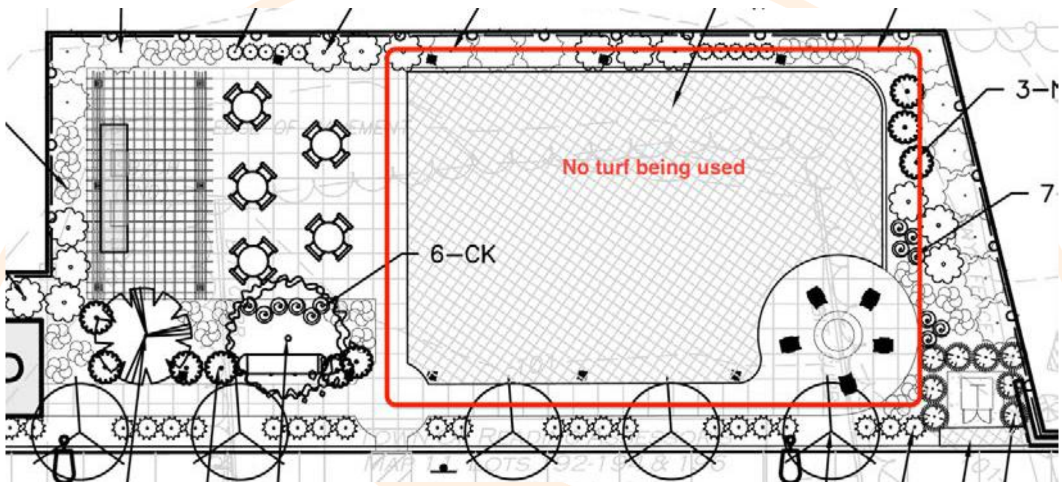
Design Review Team Meeting – Feedback & Modification Summary

On September 13, 2023, the Applicant participated in a DRT Meeting, led by Andrew MacNichols. Utilizing the feedback collected during the meeting, the Applicant made a slew of changes. The following serves to paraphrase the feedback and describe resulting revisions.

Conservation Feedback

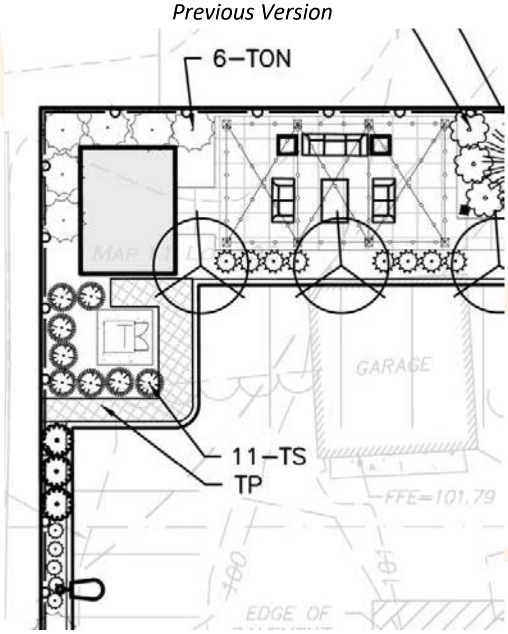
Conservation shared a few suggestions…

- Preference to avoid turf in the rear amenity area – turf has been removed from the plan and replaced with seeded grass.

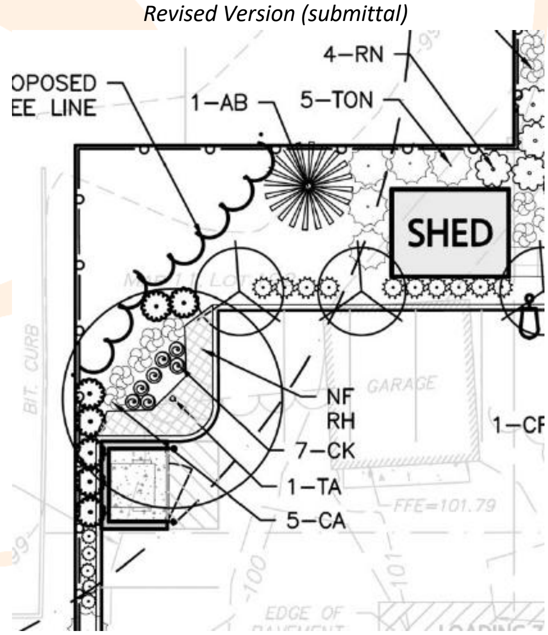


- Expressed preference to reduce use within the 100' buffer to the extent possible – the area has been revised as follows:

Previous Version



Revised Version (submittal)



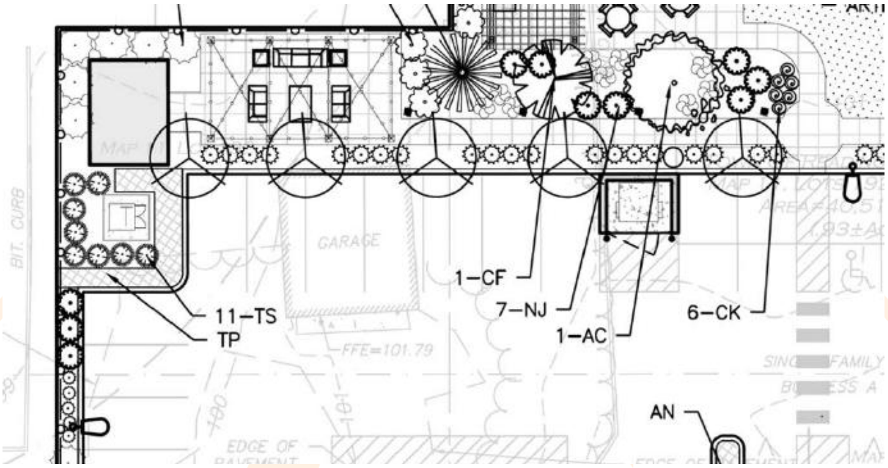
Previously, the shed, transformer, and a seating area, as well as 5 parking spaces were located within the 100' buffer.

In the revised plan, only 3 parking spaces and the dumpster pad are now located within the 100' buffer. The shed and transformer have been moved, and the planting schedule has been revised

Economic Development

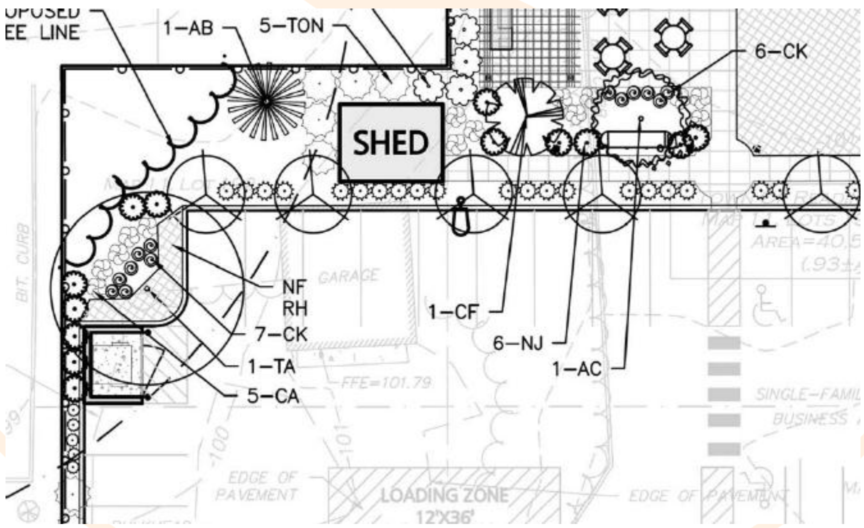
Ben Cares provided several suggestions including moving the trash area away from the amenity area.

Original Trash Location



Revised Trash Location

The revised location helps improve access for our trash removal vendor and keeps the trash away from the amenity space and walkway.



Engineering Feedback

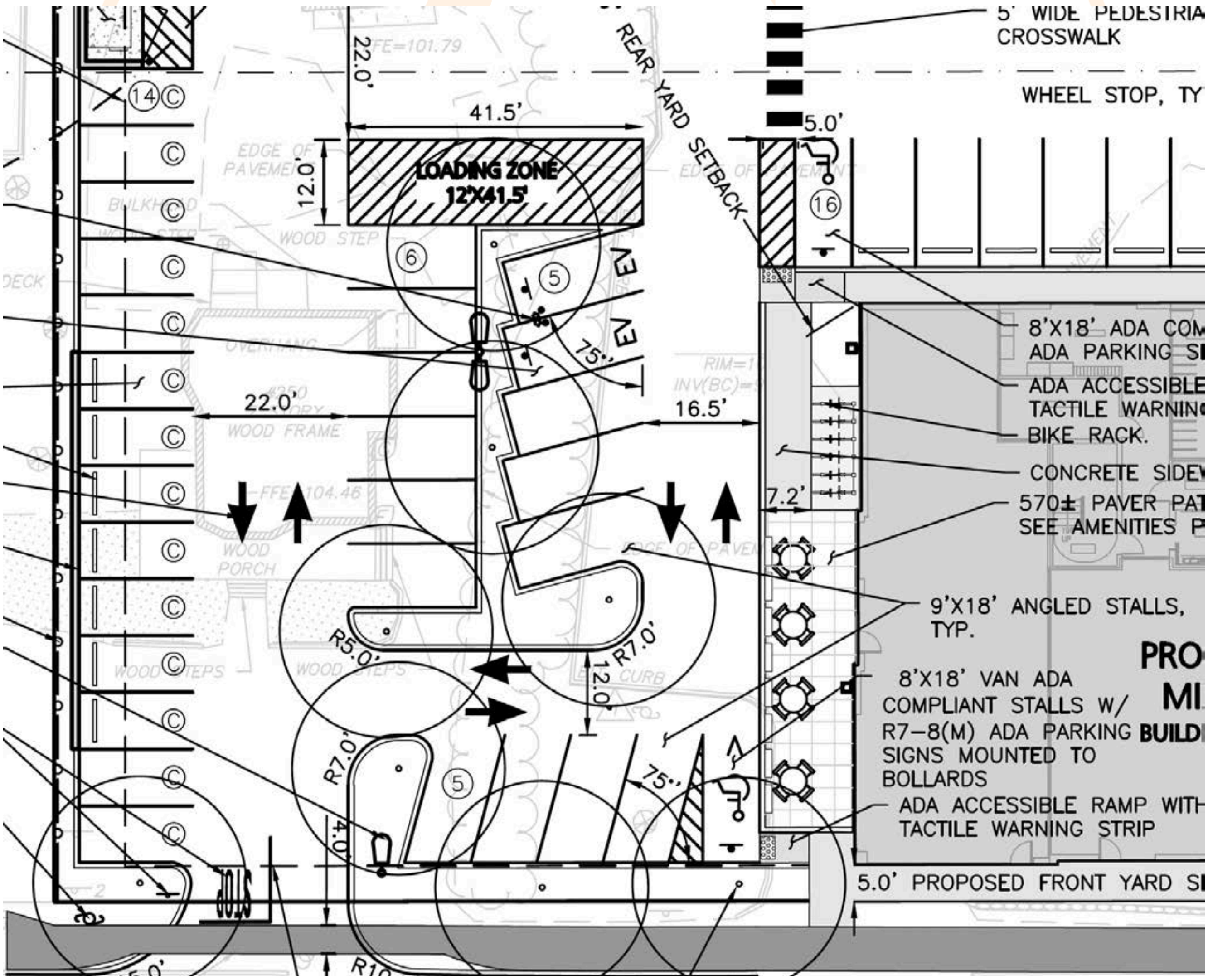
On behalf of engineering, Ryan Percival provided several insights.

Stormwater management – It was stated that the town would prefer to have stormwater management designed to the 25-year standard. In response, the Applicant has revised the design to meet the 100-year standard.

Heat Island effect / Parking Lot Design – Concerns were raised about the need to design parking areas to reduce heat island effect and improve circulation. Ryan mentioned his preference to see the dead-end parking aisle improved. It was suggested by Andrew that perhaps parking relief would be appropriate to help support efforts to improve the parking layout. The Applicant has included an alternative, conceptual plan which could be achieved if parking relief were provided. It should be noted that the current plan is compliant with the zoning bylaws, and meets or exceeds all standards. In the Alternative Plan below (and included in the application package):

- The "dead end" has been replaced with a pass through
- The use of angled parking allows for circular access and planting space
- The loading zone increases to 41.5' long
- Total handicap spaces are reduced from 4 to 3
- The layout creates opportunity for additional landscaping, particularly in the form of trees to provide shade. In the screen shot below, 8 trees are planted in close proximity.

As a result of this design, the total parking spaces *would decrease from 78 spaces to 75 spaces, where 77 are required.*



Part 3: Summary of Zoning & Design Compliance

SPP Entitlement Criteria

The Special Permit Granting Criteria

The proposed development will require a Special Permit, which, per Section 4.4.2, is granted by the Community Planning and Development Commission (CPDC), through a vote of at least four members (4.4.9). The following serves as a review of the Special Permit Granting Criteria as outlined in the Town's Zoning Bylaws and as it pertains to the proposed development.

4.4.5 The SPGA may grant a Special Permit if it finds that:

4.4.5.1 The proposed use will be suitably located in the neighborhood in which it is proposed and in relation to the entire Town.

> ***Applicant Comments:*** The Applicant has designed its project within the context of the existing neighborhood and the historical uses of the assembled properties, considering its impact to its surroundings to provide continuity and positive impact. The community's stated goals via its Master Plan, Economic Development Action Plan and Housing Product Plan, note this location as a priority area for the development of compact and engaging mixed-use properties. In particular, the bylaw amendment of 2019, served to spur the type of development the Applicant is proposing.

4.4.5.2 The proposed use will be compatible with existing uses and other uses permitted by right in the same district.

> ***Applicant Comments***: The South Main corridor consists of a mix of housing and commercial uses. The proposed development seeks to combine commercial and residential uses in a more efficient, compact design which enhances engagement along Main Street. Street level retail space will be made available for uses compatible with the Table of Use Regulations.

4.4.5.3 The proposed use will not constitute a nuisance due to air and water pollution, flood, noise, dust, vibration, lights, or visually offensive structures and accessories.

> ***Applicant Comments:*** The project replaces 5, obsolete structures as well as vacant, overgrown land, with 1, new structure which seeks to maximize energy efficiency, beautify the streetscape, improve engagement, as well as pedestrian and vehicular access to the Main Street connection.

4.4.5.4 The proposed use will not be a substantial inconvenience or hazard to abutters, vehicles, or pedestrians.

> ***Applicant Comments:*** The project will reduce the number of curb cuts along RT 28 from 3 down to 1, providing improved safety and managed access to the site. The project will lower the elevation of the existing lots to improve the site's pedestrian engagement, and the efficient, compact nature of the project will not create any inconvenience or hazard to abutters.

4.4.5.5 Adequate and appropriate facilities will be provided for the proper operation of the proposed use.

> ***Applicant Comments:*** The intended project will comply with this section. The proposed project complies with parking and access standards and is engineered with best practices in mind. Additionally, an Operations & Management Plan will be put in place to address the long-term operation of the project's systems.

4.4.5.6 Adjoining premises will be reasonably protected against any possible detrimental or offensive uses on the site, including unsightly or obnoxious appearance.

> ***Applicant Comments:*** The intended project will comply with this section by replacing unsightly, obsolete structures with a single structure which will improve appeal along Main Street.

4.4.5.7 The proposed use will be in conformance with the sign regulations of Section 8 of the Zoning Bylaw.

> ***Applicant Comments:*** Prospective tenants will be responsible for requesting signage approvals for their spaces.

4.4.5.8 The proposed use will provide convenient and safe vehicular and pedestrian movement within the site in relation to adjacent streets, property or improvements.

> ***Applicant Comments:*** Within the site, the project utilizes best practice standards, along with the review of a 3rd party traffic/transportation engineer to assess movement. Pedestrian crosswalks along with ramped sidewalk access points ensure

efficient pedestrian movement within the site, while the utilization of 2 access points in and out of the property create safe, convenient vehicle access.

4.4.5.9 Adequate space will be provided for the off-street loading and unloading of vehicles, goods, products, materials, and equipment incidental to the normal operation of the proposed use.

Applicant Comments: The intended project exceeds the off-street loading requirement outlined in Section 5.6.7.5 of the Zoning Bylaws. The civil engineering plans include a truck and loading circulation diagram illustrating turning radiuses and access which meets best practice standards. The allowance of 2-access ways to the property, help support ease of access and circulation.

4.4.5.10 Adequate methods of disposal and storage will be provided for sewage, refuse and other wastes resulting from the proposed uses, and adequate methods of drainage will be provided for surface water.

Applicant Comments: Drainage/sewer designs will comply with requirements and engineered with best practices in mind. Refuge removal will be handled through a trash removal vendor, and the site has been designed with a trash enclosure which is easily accessed for loading and unloading.

4.4.5.11 The proposed uses will ensure protection from flood hazards, considering such factors as elevation of buildings, drainage, adequacy of sewage disposal, erosion and sedimentation control, equipment location, refuse disposal, storage of buoyant materials, extent of paving, effect of fill, roadways, or other encroachments on flood runoff and flow.

Applicant Comments: Designs will comply with requirements and will be engineered with best practices in mind.

4.4.5.12 The proposed use will ensure protection of water quality in both public and private supplies.

Applicant Comments: The project will comply with requirements and will be engineered with best practices in mind.

Summary of Zoning Compliance

The proposed project seeks to meet and, whenever possible, exceed, zoning standards.

Summary of Zoning Compliance

The following summary of the proposed Mixed-Use project illustrates that the project meets or exceeds the standards set forth:

Dimensional Requirements

	REQUIRED	PROVIDED	
LOT AREA (MIN.)	N/A	1.05 +/- Acres or 46,094 SF	
LOT FRONTAGE (MIN.)	N/A	247	
FRONT YARD BUILDING SETBACK	5'	5'	MEETS
SIDE YARD BUILDING SETBACK	10'	10'	MEETS
REAR YARD BUILDING SETBACK	20'	20'	MEETS
BUILDING LOT COVERAGE	60%	21.1%	EXCEEDS
BUILDING GLA	N/A	38,835 GSF	
LANDSCAPING / OPEN SPACE	Not required	28%	EXCEEDS
BUILDING HEIGHT	45'	45'	MEETS

Off-Street Parking Summary

	REQUIRED	PROVIDED
PARKING: COMMERCIAL SPACES	1:300 SF	8,100 SF / 300 SF = 27 spaces
PARKING: RESIDENTIAL UNITS	1.25: Unit	40 units * 1.25 = 50 spaces
PARKING: TOTAL REQUIRED	77	78
PARKING: COMPACT %	Up to 30%	28%
PARKING: ADA ACCESSIBLE	3 (1 Van accessible space)	4 (4 Van accessible spaces)
LOADING SPACES REQUIRED	1	1

Zoning Analysis

Section 5.6.7 Mixed-Use Regulations

Section 5.6.7 states that "The CPDC may, by Special Permit, authorize a Mixed-Use project within the Business A or Business C zoning districts provided that the following requirements are met…"

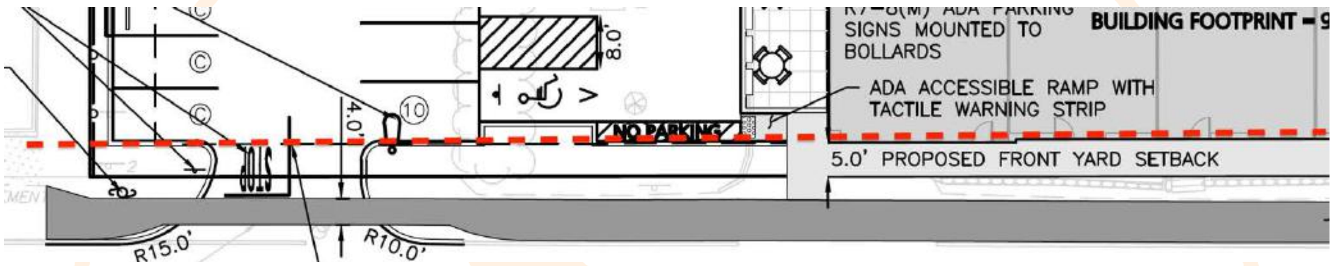
5.6.7.1 Dimensional Requirements

The Intensity Regulations of Section 6.0 and the Dimensional Requirements of Table 6.3 shall apply, with the following exceptions:

a) Mixed-Use project proposed on a corner lot shall have a minimum 5' setback from both streets.

b) A Mixed-Use project with a permanent shared parking arrangement with any abutting non-residentially zoned property may have a 0' setback from said abutting property.

Applicant Comments: The property is not on a corner lot and will not have a shared parking arrangement. The structure will be setback 5' along Main Street, per the diagram below.



5.6.7.2 Commercial Component

a) The gross floor area dedicated to commercial space within a Mixed-Use project shall be not less than 25% of the gross floor area of the structure or structures comprising the project, after spaces for access, circulation, egress, mechanicals, and utilities are netted out.

b) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides space for existing commercial tenants, to maintain current viable businesses on the premises post-redevelopment.

Applicant Comments: The property is designed to feature street-level retail space totaling 25% of the gross floor area of the structure.

RESIDENTIAL / COMMERCIAL PERCENT RATIO CALCULATION
TOTAL FIRST FLOOR COMMERCIAL GROSS FLOOR AREA= 8,100 GSF
TOTAL SECOND FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,132 GSF TOTAL THIRD FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,149 GSF TOTAL FOURTH FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,067 GSF
TOTAL RESIDENTIAL GROSS FLOOR AREA= 24,348 GSF
TOTAL RESIDENTIAL / COMMERCIAL PERCENT = 75.00% / 25.00%

TOTAL GROSS FLOOR AREA
TOTAL FIRST FLOOR GROSS FLOOR AREA= 9,748 GSF TOTAL SECOND FLOOR GROSS FLOOR AREA= 9,714 GSF TOTAL THIRD FLOOR GROSS FLOOR AREA= 9,714 GSF TOTAL FOURTH FLOOR GROSS FLOOR AREA= 9,659 GSF TOTAL ROOF FLOOR GROSS FLOOR AREA= 731 GSF
TOTAL GROSS FLOOR AREA = 39,566

5.6.7.3 Residential Component

a) In the portion of a Mixed-Use project that fronts on Main Street, residential units shall be located at the rear or on upper floors only.

b) Affordable units shall be provided in projects of ten (10) or more residential units, as follows:

1. A minimum of 10% of units shall be made affordable to households earning at or below 80% of Area Median Income, as determined annually by the United States Department of Housing and Urban Development (HUD).
2. Fractional numbers shall always be rounded up (i.e., 1.4 shall be rounded up to 2).
3. The CPDC may waive or allow flexibility for certain dimensional requirements of Section 6.0 and Table 6.3 for a Mixed-Use project that provides at least 10% of units affordable to households earning at or below 50% of Area Median Income, OR that provides at least 15% of units affordable to households earning at 80% of Area Median Income.

Applicant Comments: All residential units will be located on the upper floors, 2 through 4. Of the proposed units, 10% will be dedicated to households earning at or below 80% of the Area Median Income. Since the project features 40 residential units, 4 shall be "affordable."

5.6.7.4 Parking

a) Parking for residential units shall be provided at a minimum ratio of 1.25 per unit.

b) Parking for commercial uses shall be provided at a minimum ratio of 1 per 300 square feet. Shared parking arrangements between sites are encouraged for commercial uses.

c) Up to 30% of the total required parking spaces for a Mixed-Use project may be striped and marked as compact spaces (8' X 16').

d) A comprehensive parking plan shall be submitted that shows that the parking for the Mixed-Use project is sufficient in terms of the residential use, as well as the commercial use, detailing how both would work together and be managed and how overflow parking of employees and customers will be mitigated.

e) Bicycle parking shall be provided in any residential parking garage, and on-site for commercial uses.

f) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides one or more electric vehicle charging stations, or accommodations for car-sharing (e.g. Zip Car), or one or more spaces for App Ride/TNC drop-off and pick-up.

Applicant Comments:

As the Off-Street Parking Summary below illustrates, the proposed project meets or exceeds all of the requirements of this bylaw.

(a & b) The Site Plan provides 78 parking spaces, sufficiently designed for the proposed project.
(c) 29% of the total required spaces are to be striped and marked as compact spaces, using a size of 8' x 16'.
(d) A comprehensive parking plan and traffic study has been prepared submitted in conjunction with the Special Permit Application.
(e) Bicycle parking will be provided on site.
(f) The project will feature several, public EV charging stations.

OFF-STREET PARKING SUMMARY

USE: RETAIL STORES/OFFICES/CONSUMER ESTABLISHMENTS
ONE SPACE PER 300 SQUARE FEET (S.F.) OF GROSS FLOOR AREA

RESIDENTIAL
1.25 SPACES PER DWELLING UNIT

PARKING SUMMARY:
USE: 8,100 S.F. RETAIL (NET)
8,100/300 = 27 REQUIRED SPACES.

USE: 40 UNITS
40*1.25 = 50 REQUIRED SPACES

ADA REQUIRED: THERE ARE BETWEEN 76–100 PROPOSED PARKING SPACES, REQUIRING 4 TOTAL PARKING STALLS TO BE ACCESSIBLE AND ONE VAN ACCESSIBLE.

ADA PROVIDED: 4 TOTAL ACCESSIBLE WITH 2 VAN ACCESSIBLE

EV PROVIDED: 2 EV ACCESSIBLE PARKING SPACES EQUIPPED WITH DUAL CHARING PORT

STANDARD (9'x18')	COMPACT (8'x16') (1)	TANDEM (9'x18')	ACCESSIBLE (8'x18')	TOTAL PROVIDED	TOTAL REQUIRED
52	22 (28%)	0	4	78	77

5.6.7.5 Loading

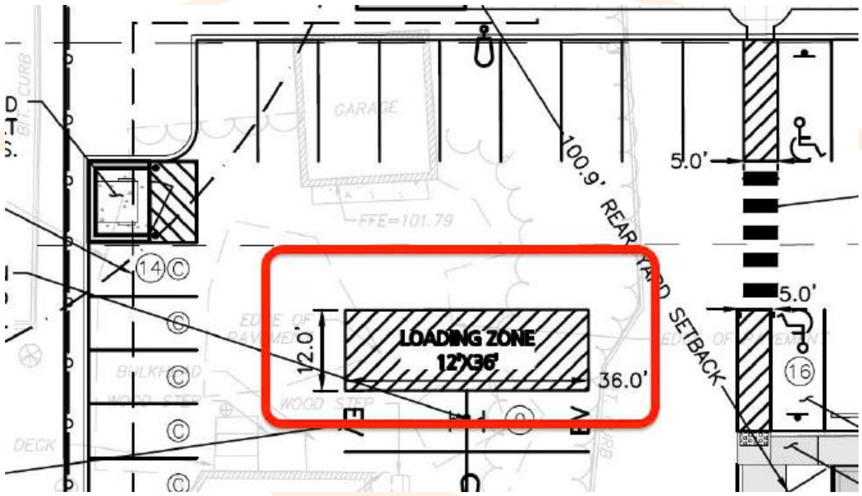
a) Loading shall not be staged on Main Street or on any principal streets, side streets or residential streets.

b) Loading spaces shall be contained entirely on the property of the Mixed-Use project.

c) One (1) loading space shall be provided for each Mixed-Use project.

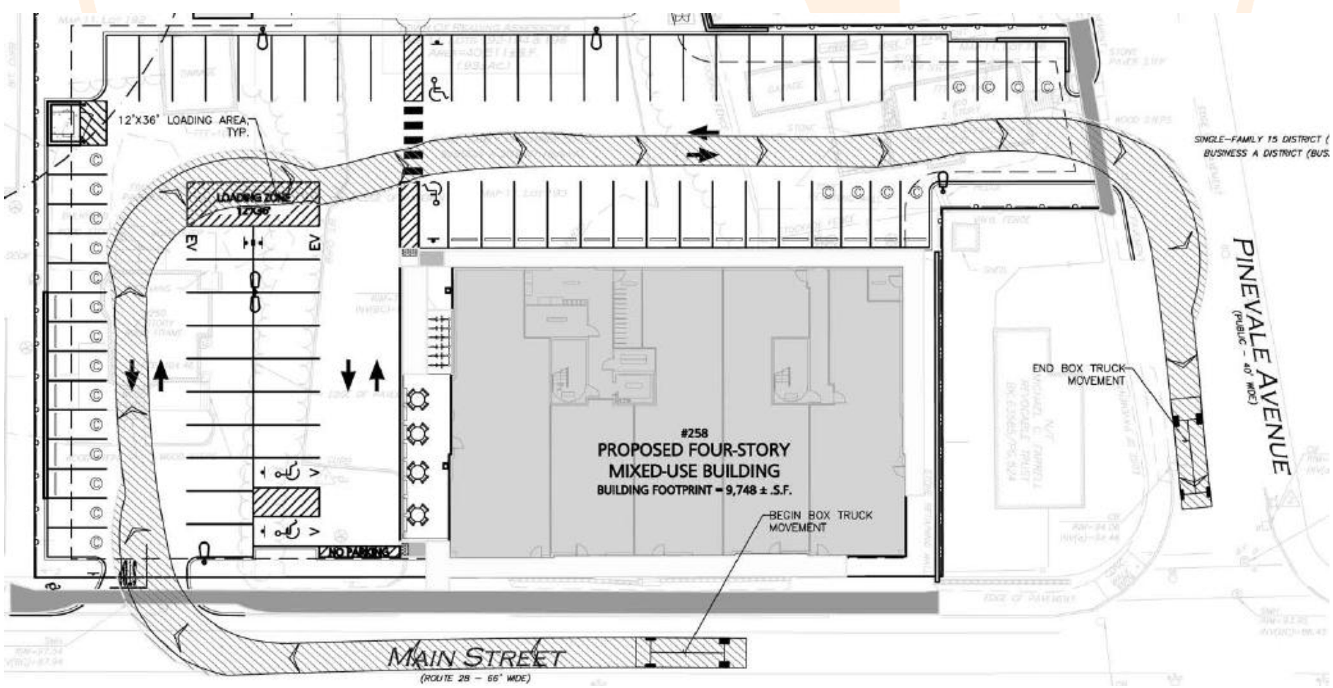
d) An Applicant shall provide a Loading Management Plan that clearly describes how loading for commercial and residential uses will occur and be managed, and how any adverse impacts of such to residential tenants and abutters will be avoided and/or mitigated.

9.1.2.2 Each required off-street surface parking space shall be not less than nine (9) feet in width and eighteen (18) feet in length, exclusive of drives and maneuvering space. For off-street parking spaces in enclosed accessory structures, such spaces shall be not less than eight (8) feet, six (6) inches in width, seventeen (17) feet in length, with twenty-six (26) foot aisle widths. Each off-street loading and unloading space shall be not less than twelve (12) feet wide and thirty-five (35) feet long."



Applicant Comments: The proposed project meets or exceeds both 5.6.7.5 and 9.1.2.2.

- One 12 x 36, Loading Space is designated on site utilizing the description provided in Section 9.1.2.2 (a space not less than 12' x 35').
- The Applicant has also provided supporting circulation diagrams and will utilize a loading management plan which emphasizes the use of off-hour deliveries whenever possible.

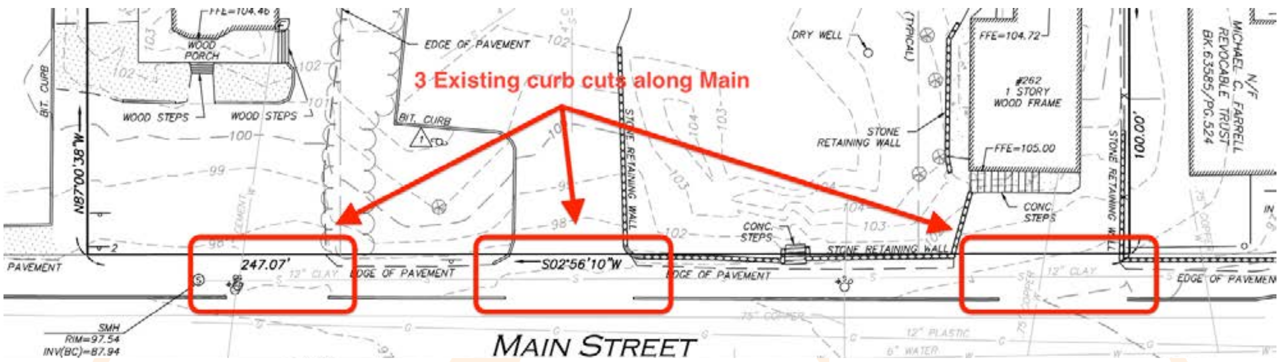


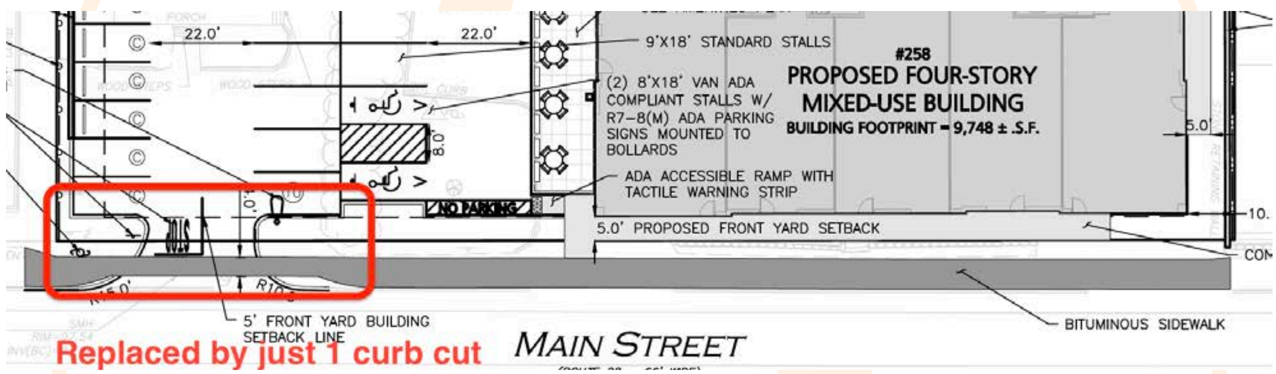
5.6.7.6 Curb Cuts and Driveways

a) A Mixed-Use project should strive to limit the number and length of curb cuts on Main Street. Where feasible, the Site Plan may consider alternative access points from side streets.

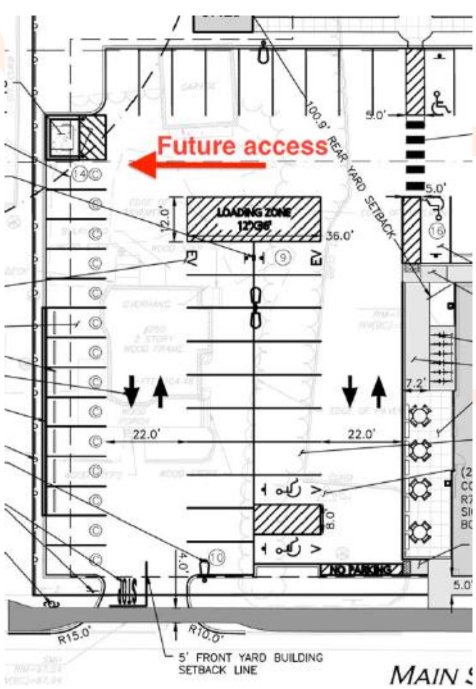
b) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides for a future driveway connection to an adjacent parcel or parcels shall be given favorable consideration on requests for waivers, dimensional or otherwise.

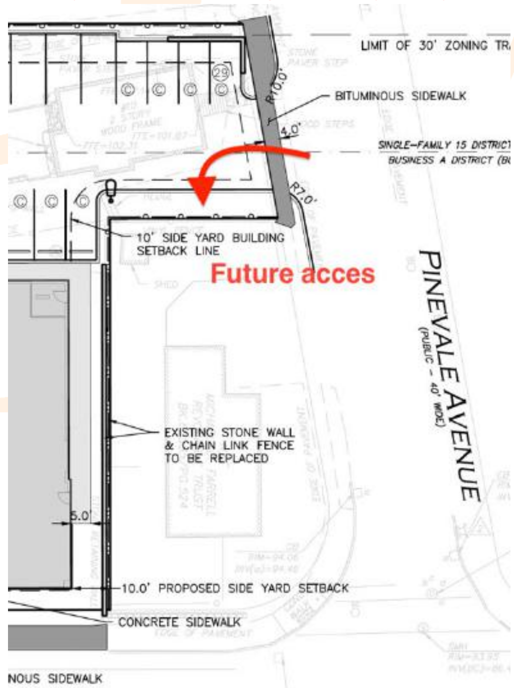
Applicant Comments: The project will result in reduction of curb cuts along Main St from 3 down to 1. Per 5.6.7.6 A, the project limits curb cuts along Main St by using "alternative access points from side streets," or in this case, Pinevale Ave.





Additionally, as suggested in (b), we have planned for potential future driveway connections through both, adjacent parcels.





Section 6: Intensity Regulations

Gross Floor Area & Landscaped Area

6.2.4 Gross Floor Area

- 6.2.4.1 In Apartment 40 and Business A Districts, the gross floor area of a Multi-Family Dwelling, *that is not part of a Mixed-Use* project, shall not exceed forty percent (40%) of the lot area.
- 6.2.4.2 In the Apartment 80 Districts, the gross floor area of a Multi-Family Dwelling shall not exceed the lot area.
- 6.2.4.3 The gross floor area dedicated to commercial space within a Mixed-Use project shall be not less than 25% of the gross floor area of the structure or structures comprising the project, after spaces for access, circulation, egress, mechanicals, and utilities are netted out.

Applicant Comments: While 6.2.4.1 limits Gross Floor Area in a MF project to 40%, MU is explicitly excluded. Section 6.2.4.3 further defines the requirement for 25% of the gross floor area to be dedicated to commercial space. The project complies with this requirement.

6.2.5 Landscaped Area

- 6.2.5.1 In Apartment 40 and Business A Districts, not less than twenty-five percent (25%) of the area of a lot containing a Multi-Family Dwelling, that is not part of a Mixed-Use project, shall be a landscaped area.
- 6.2.5.2 In Apartment 80 Districts, not less than thirty-five percent (35%) of the area of a lot containing a Multi-Family Dwelling shall be a landscaped area.

Applicant Comments: Multi-family properties must meet a 25% landscaping requirement, while Mixed-Use properties are excluded from this requirement. The Applicant has exceeded the multi-family standards by creating 28% of open space.

Section 6.3 Table of Dimensional Controls

The Table of Dimensional Controls provides that there is no Minimum Lot Width, Minimum Area, or Minimum Frontage requirement of lots for Mixed-Use projects in the Business A District. The table of dimensional requirements shows that the proposed plan aligns with all dimensional requirements as set forth in Section 6.3, and the structure, as a 4-story, will be designed to comply with the Maximum Building Height.

Mixed-Use, Bus-A	Min Lot Width (Feet)	Min. Area (Square Feet)	Min Frontage (Feet)	Required Front Yard (Feet)	Required Side Yard (Feet)	Required Rear Yard (Feet)	Max Coverage % of Lot	Max Building Height (Feet)
Required		NA	NA	5	10	20	60	45
Proposed	247	46,094 SF	247	5	10	100.9	21.1%	45

Section 6.4 Special Cases

6.4.1 Transitional Areas

The following additional requirements shall apply to buildings in Business A or Business B Districts located within one hundred fifty (150) feet of a Residence District; to buildings in a Business C District located within one hundred (100) feet of a Residence District; and to buildings in Industrial Districts whose lots share a lot line with a Residence District:

6.4.1.1 Table of Additional Dimensional Controls for Transitional Areas

District	**Distance From Residence District**	**Required Yards**		
		Front Feet	**Side Feet**	**Rear Feet**
Business A and B	Sharing a lot line with	5	10	NA
	Within 150 feet	5	NA	NA

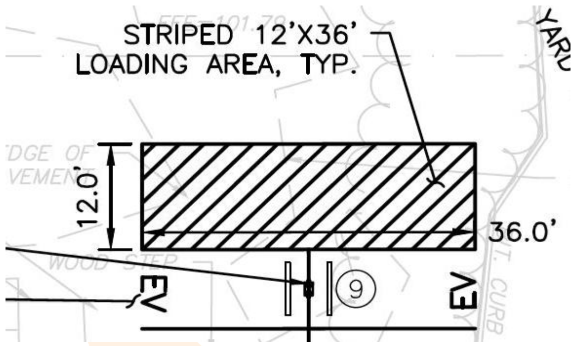
Applicant Comments: The proposed project complies with Table of Additional Dimensional Controls for Transitional Areas.

Section 9.0 Parking

9.1.2.2 Each required off-street surface parking space shall be not less than nine (9) feet in width and eighteen (18) feet in length, exclusive of drives and maneuvering space. For off-street parking spaces in enclosed accessory structures, such spaces shall be not less than eight (8) feet, six (6) inches in width, seventeen (17) feet in length, with twenty-six (26) foot aisle widths. Each off-street loading and unloading space shall be not less than twelve (12) feet wide and thirty-five (35) feet long."

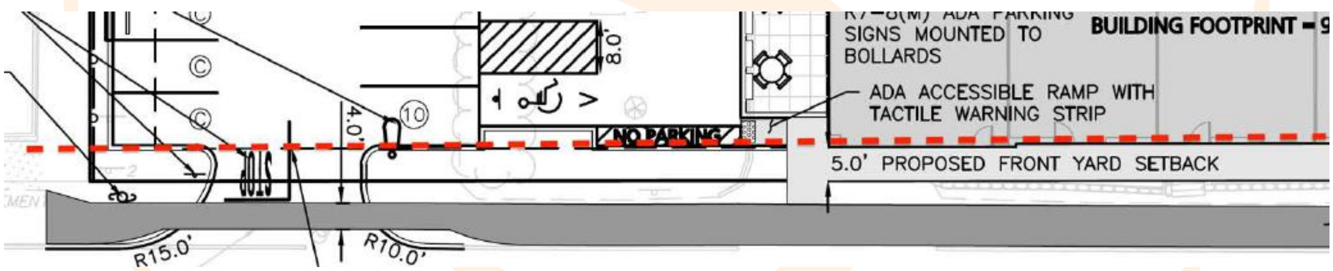
Applicant Comments: The plan complies with all requirements of this bylaw.

- Off-street surface parking spaces have been designed to comply.
- Additionally, the plan exceeds requirements for off-street loading and unloading spaces by providing (1) off-street loading and unloading space of twelve (12) feet wide and thirty-six (36) feet long, as shown below:

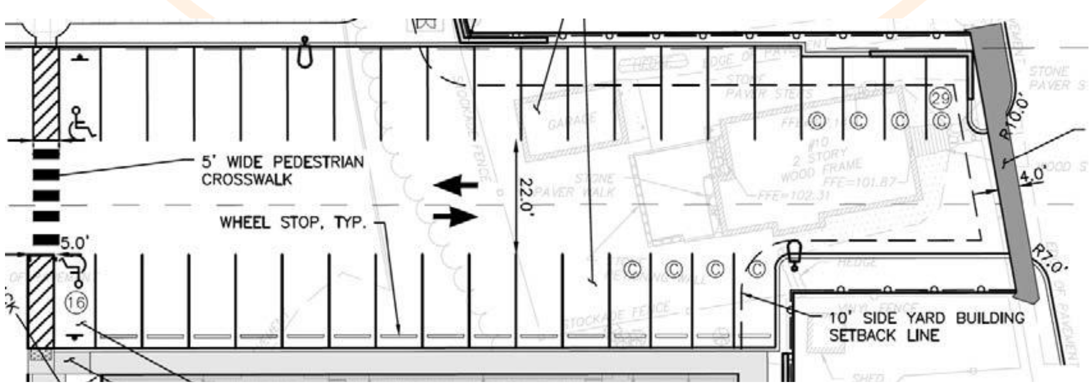


9.1.2.6 In an Apartment 40 and Business A District, all parking for apartments shall be located to the rear of the front building line.

Applicant Comments: As shown, the plan complies with this requirement by setting parking no closer than the front building line.



While note a requirement of 9.1.2.6, nearly half of the spaces, 36/78 (46%), are located immediately behind the structure and fencing along 2 Pinevale, screening them from visibility. These spaces are likely to be occupied by residents since they are closest to the residential entrance at the rear of the structure. It should also be noted that the residential entry to the structure is located at the rear of building which will influence residents to park at the rear of the lot rather than in the side lot. Spaces at the south side of the structure will likely be occupied by patrons of the commercial spaces given the closer proximity to retail entries.



Waivers & Zoning Relief

While the project does not require relief, it qualifies for several, stated mechanisms for relief through waivers including:

5.6.7.2 Commercial Component

c) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides space for existing commercial tenants, to maintain current viable businesses on the premises post-redevelopment.

> ***Applicant Comments:*** The Applicant is not seeking any dimensional relief. The only existing, commercial tenant is located at the property at 252 Main St currently features an office space which is currently occupied by Prestige Properties. At present, the intended development does not feature any office space and the community's stated goals are to generate engaging, amenity uses along South Main which would not align with the current tenancy at 252 Main St.

5.6.7.4 Parking

g) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides one or more electric vehicle charging stations, or accommodations for car-sharing (e.g. Zip Car), or one or more spaces for App Ride/TNC drop-off and pick-up.

> ***Applicant Comments:*** The project will feature at least 2, public EV charging stations.

5.6.7.6 Curb Cuts and Driveways

c) A Mixed-Use project should strive to limit the number and length of curb cuts on Main Street. Where feasible, the Site Plan may consider alternative access points from side streets.

d) CPDC may waive or allow flexible for certain dimensional or the requirements for a Mixed-Use project that provides for a future driveway connection to an adjacent parcel or parcels shall be given favorable consideration on requests for waivers, dimensional or otherwise.

> ***Applicant Comments:*** The proposed projects will improve access/circulation, reduce curb cuts, while also consolidating lots along Main. Specifically, the project limits curb cuts along Main St by using "alternative access points from side streets," or in this case, Pinevale Ave.

5.6.7.7 Waivers

a) Upon request from the Applicant, the CPDC may consider waiving dimensional and/or other requirements from Sections 5.6.8 and 6.0, and Table 6.3, to promote design flexibility and achieve appropriate density, affordability, mix of uses or design quality if it finds such waiver(s) maintain the intent, purpose and objectives of these Sections.

> ***Applicant Comments:*** The Applicant is not seeking a waiver of any requirements in Section 5.6.8, 6.0 or 6.3.

Compliance with South Main Design Best Practices

The South main street design guidelines have been developed to streamline site plan review and shape the nature of new construction and redevelopment occurring along the corridor. Through an established set of stated goals, the guide serves to endorse the goals of the Master Plan. However, it should be noted that the Best Practice Guide was issued in 2012, long before the adoption of mixed use within the zoning bylaws. The following summarizes the goals of the Design Guide, and the project's compliance with those standards.

Through the Master Planning process the community established the following goals for the South Main Street Corridor:

- *Minimize parking in front of the buildings*
- *Encourage landscaping/greenery along the street edge/building fronts*
- *Preserve and enhance residential uses that are interspersed with commercial uses in the corridor*
- *Preserve existing density/intensity of use*
- *Minimize additional overhead utilities/Encourage underground utility connections*
- *Improve pedestrian environment along Main Street*
- *Encourage designs/roadway changes that calm traffic*

Site Design Standards

Sidewalks

Intent: Provide sidewalk and associated facilities along the corridor that make pedestrian and bicycle use a safe and enjoyable way to travel along the corridor.

Applicant Comments: The proposed project intends to connect the assemblage of properties to the South Main corridor, and provide improved pedestrian engagement. In prioritizing this goal, the design seeks to utilize hardscapes, landscaping, dedicated pathways and contextual directives, and on-site bicycle parking to engage pedestrian traffic.

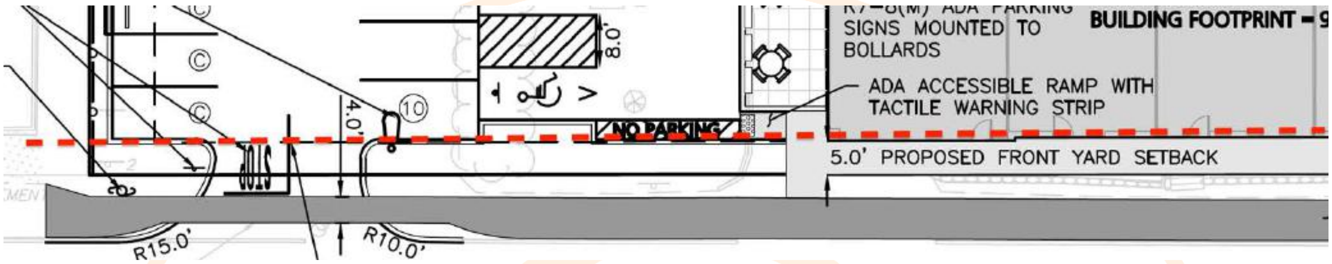
- Sidewalks measuring a minimum of 5' surround the structure, allowing pedestrians to easily traverse the site and access commercial store fronts from both the north and south side of the property, maximizing parking and access flexibility.
- Along Main Street, reducing the current, 3 curb cuts to just 1, results in more cohesive pedestrian access along Main St
- Lowering the overall elevation of the site, the project is more easily accessed by pedestrians, rather than perched over Main St.
- On-site bike racks will encourage alternative modalities of transport
- Sidewalks and pedestrian circulation measures are designed in accordance with 521 CMR Code of the MAAB Regulations and the Reading Zoning Bylaws ("Bylaw").

Parking

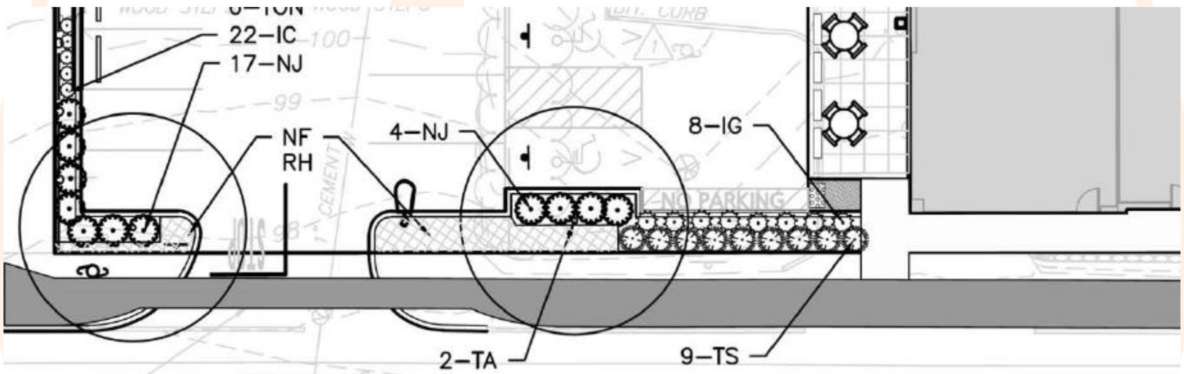
Intent: Minimize the adverse impact of parking on the character of the corridor by minimizing the area and visual impact of parking in the front yard of buildings.

Applicant Comments: The site plan has been designed to minimize the adverse impact of parking on the character of the corridor in several ways:

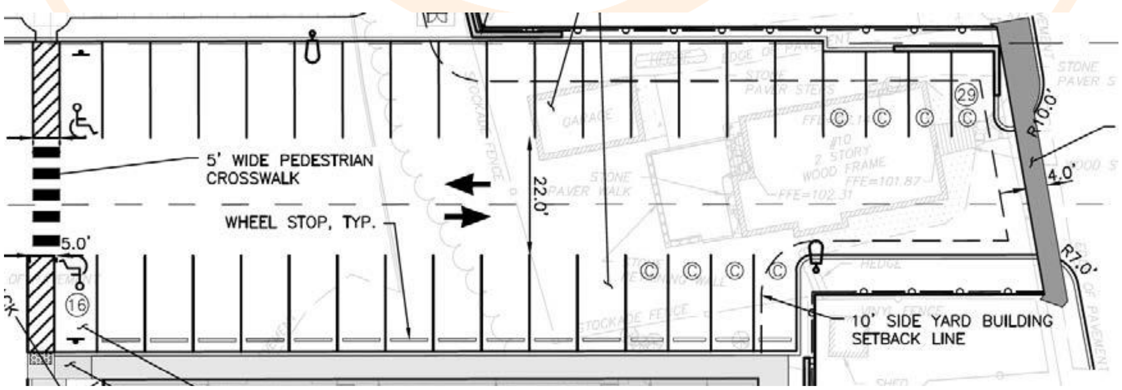
- The parking design has adopted a parking "setback" where no parking spaces are placed closer to Main Street than the building's front setback, as shown below:



- Landscaping is utilized throughout the site, but particularly along Main Street to provide screening and curb appeal.



- Nearly half of the spaces, 36/78 (46%), are located immediately behind the structure and fencing along 2 Pinevale, screening them from visibility (these spaces are likely to be occupied by residents since they are closest to the residential entrance at the rear of the structure). Where additional parking could not be placed at the rear, it has been "located in the rear or side yards to the maximum extent possible."

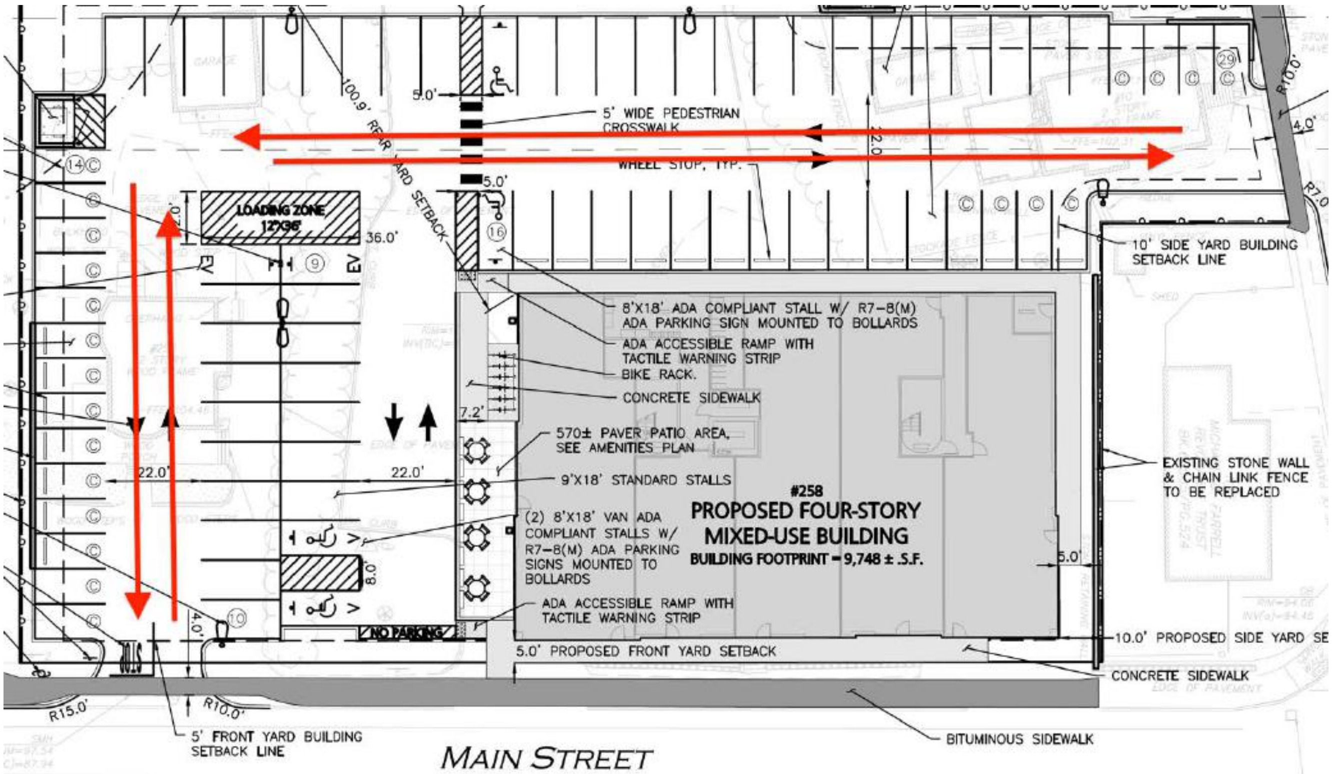


- Bicycle parking is made available on-site to encourage alternative modalities of transportation.
- Landscaping has been used throughout the site to minimize the visual impact of parking.

Driveways

Intent: Minimize the amount of space dedicated to automobile access and circulation.

Applicant Comments: As a result of assembling 4 properties, there is a reduction in the number of curb cuts along Main Street, from 3 to 1. The site will be accessed via one curb cut along Main Street, and to avoid concentrating vehicle traffic on the single Main Street curb cut, an additional driveway is provided along Pinevale Avenue.



Drainage

Intent: To minimize the impact of development and impervious surfaces on the town's stormwater systems.

Applicant Comments: Drainage has been designed with best practices in mind and a drainage plan is provided with the application.

Landscaping Amenities

Intent: To enhance the building site and streetscape. To use unifying elements that link Main Street buildings to each other and to downtown.

Applicant Comments: The team has engaged a Landscape Architect to develop a comprehensive landscape plan which ensures a meaningful connection to Main Street and congruence with nearby properties.

- While the Zoning Bylaws are silent as to the requirements of Mixed-Use properties relative to landscaping, the team has endeavored to maximize open areas and exceed the landscaping requirements of Multi-family properties: 28% of the lot is open area.
- At the entry at Main Street, among other landscaping and placed in planting beds, 2 Redmond American Linden trees are proposed.
- Along the building façade, where applicable, "short native shrubbery and ground cover" is provided.
- The landscaping plan uses a "mix of native species that will require minimal irrigation and fertilizer and that will provide seasonal interest."
- In areas adjacent to residences, landscape buffering has been utilized.
- The landscaping plan utilizes 23 types of trees, shrubs, ground cover and perennials to create robust programming.

PLANTING SCHEDULE -TREES, SHRUBS, GROUNDCOVERS & PERENNIALS

	KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	COMMENTS
DECIDUOUS SHADE AND FLOWERING TREES							
*	QPP	8	QUERCUS PALUSTRIS 'GREEN PILLAR'	GREEN PILLAR OAK	3" CAL.	AS SHOWN	B&B
*	TA	3	TILIA AMERICANA 'REDMOND'	REDMOND AMERICAN LINDEN	3" CAL.	AS SHOWN	B&B
ORNAMENTAL TREES							
*	AC	1	AMELANCHIER CANADENSIS	SHADBLOW SERVICEBERRY	6-7' HT.	AS SHOWN	B&B
*	CF	1	CORNUS FLORIDA	FLOWERING DOGWOOD	3" CAL.	AS SHOWN	B&B
EVERGREEN TREES							
*	AB	1	ABIES BALSAMEA	BALSAM FIR	#10	15' O.C.	POT
*	TON	28	THUJA OCCIDENTALIS 'NIGRA'	AMERICAN ARBORVITAE	7-8' HT.	5' O.C.	B&B
SHRUBS							
*	NJ	30	CEANOTHUS AMERICANUS	NEW JERSEY TEA	2.5'-3' HT.	AS SHOWN	B&B
*	CA	29	CLETHRA ALNIFOLIA	SUMMERSWEET	#5	48" O.C.	POT
	IC	53	ILEX CRENATA 'SKY PENCIL'	SKY PENCIL HOLLY	#15	24" O.C.	POT
*	IG	43	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY	#7	36" O.C.	POT
*	RN	17	RHODODENDRON 'NOVA ZEMBLA'	NOVA ZEMBLA RHODODENDRON	#5	6' O.C.	POT
*	TS	37	THUJA OCCICENTALIS 'SMARAGD'	SMARAGD ARBORVITAE	6-7' HT.	AS SHOWN	B&B
PERENNIALS/GRASSES							
*	AH	TBD	AMSONIA HUBRICHTII	BLUE STAR	#1	36" O.C.	STAGGERED
*	AN	TBD	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	#1	36" O.C.	STAGGERED
*	BA	TBD	BAPTISIA AUSTRALIS	BLUE FALSE INDIGO	#1	48" O.C.	STAGGERED
	CK	TBD	CALAMAGROSTIS 'KARL FOERSTER'	KARL FOERSTER FEATHER REED GRASS	#2	24" O.C	STAGGERED
	MS	TBD	MISCANTHUS SINESIS 'MORNING LIGHT'	SILVER VARIEGATED MAIDEN GRASS	#2	48" O.C.	STAGGERED
	NF	TBD	NEPETA X FAASSENII 'WALKER'S LOW'	WALKER'S LOW CATMINT	#2	36" O.C.	STAGGERED
	PA	TBD	PEROVSKIA ATRIPLICIFOLIA	RUSSIAN SAGE	#1	48" O.C.	STAGGERED
*	RH	TBD	RUDBECKIA FULGIDA	BLACK EYED SUSAN	#1	30" O.C.	STAGGERED
	TP	TBD	THYMUS PRAECOX 'ALBIFLORUS'	STEPABLES CREEPING THYME	QUART	8" O.C.	STAGGERED
*	VL	TBD	VERNONIA LETTERMANNII	IRON BUTTERFLY	#1	36" O.C.	STAGGERED
ANNUALS							
		TBD	"PROVEN WINNERS" BREATHTAKING MIX		FLATS	AS NEEDED	STAGGERED
*	DENOTES NATIVE SPECIES OR NATIVE CULTIVAR						

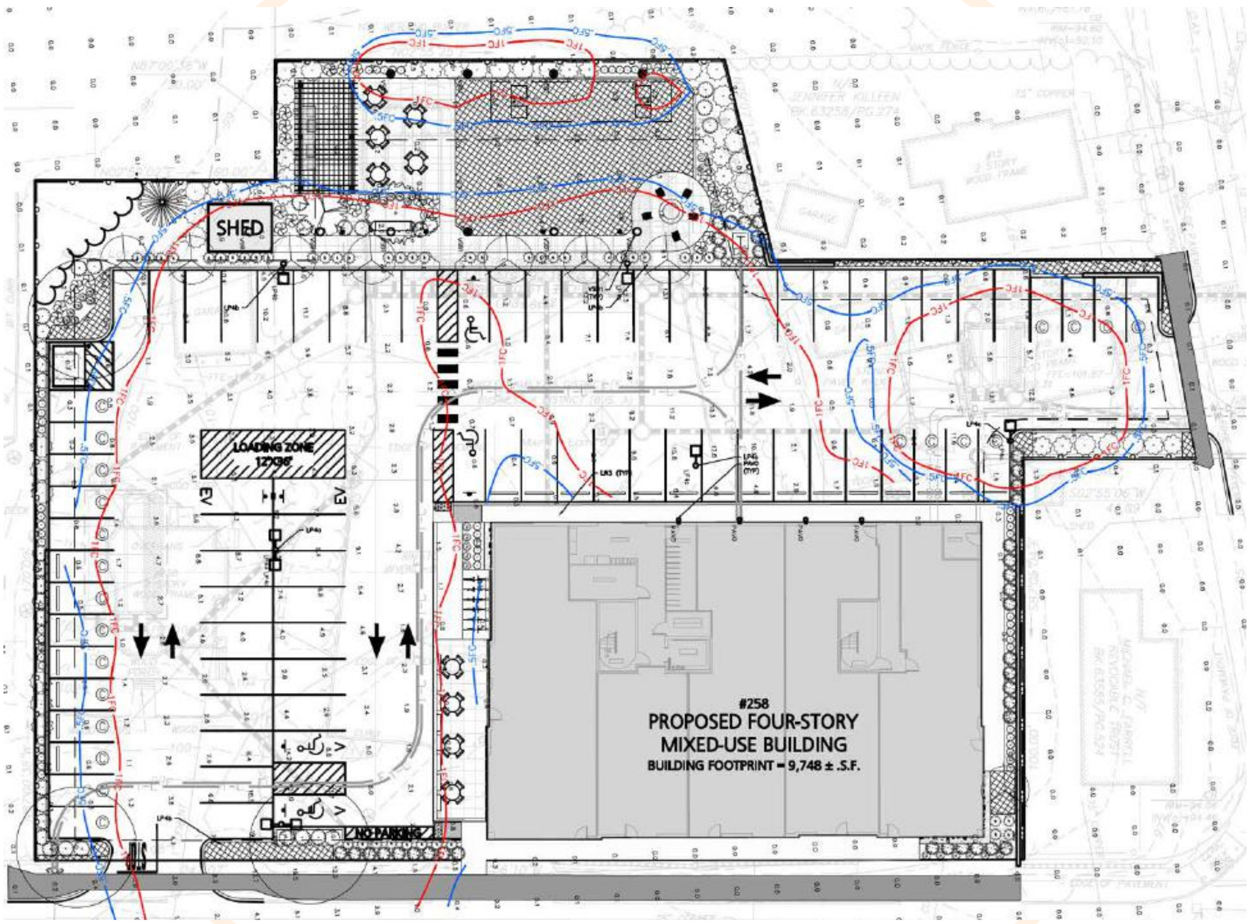
Lighting

Intent: Ensure that site lighting contributes to the character of the neighborhood the site and provides a sense of security and safety as well as energy efficiency.

Applicant Comments: Site and building lighting is consistent with the character of the neighborhood.

- Site lighting posted throughout the property provide safety and security, while balancing the impact to abutters
- Building lighting such as gooseneck fixtures throughout the first floor, offer a soft, chic aesthetic.
- All lighting is dark sky compliant and uses energy efficient LED

A Lighting Plan has been generated to review impact to abutters:



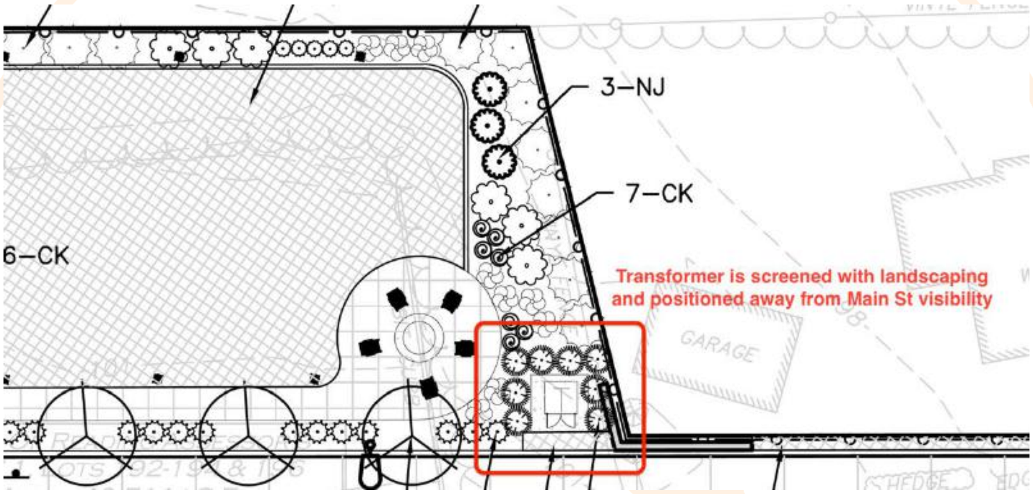
Utility Areas & Utilities

Intent: Reduce the adverse visual impact of service areas by proper location and screening.

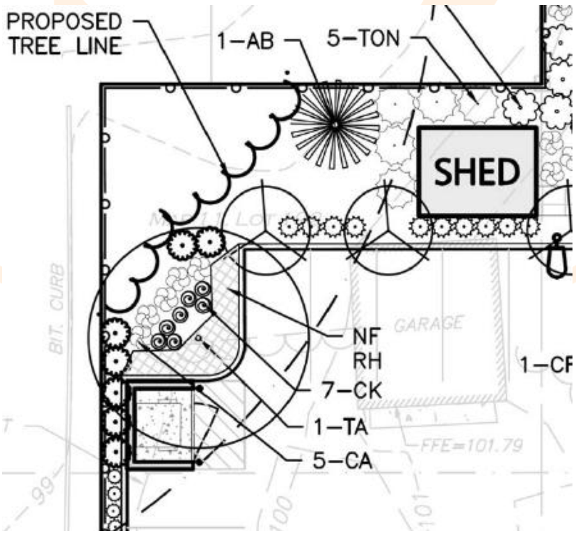
- **Service, Loading Areas, Electrical transformers, and site mechanical equipment should be located and screened to minimize views from public areas and abutting residential areas. Screening should employ good quality plantings and/or construction materials, such as steel, cast iron fencing, brick, wood or stone.**
- **The use of chain link fencing visible from the street is strongly discouraged.**
- **Electrical and communication utilities should be underground for all new development.**

Applicant Comments: The project has been designed with these conditions in mind.

- The electrical transformer has been placed at the rear of the site, away from the street, structure and public areas, screened by landscaping. While this creates a longer distance of travel for the applicant, this helps minimize views from public areas and abutting residential areas. No chain link fences or construction materials are utilized to screen utility equipment.
- Screening along property lines utilizes 6', solid fencing as well as landscaping



- Chain link fencing is not utilized
- Electrical and communication utilities will be underground.
- The trash area is enclosed and surrounded by landscaping



Building Massing Design Standards

Location on site

Intent: Encourage the siting and massing of buildings so that they contribute to, engage and enliven the public way and pedestrian space. Encourage development of a gateway corridor that provides an introduction to Reading and the downtown district.

Applicant Comments: The building's location has been designed in compliance with the zoning bylaws, while managing the goals of the South Main Street Design Best Practices Guide, being mindful that the Guide was issued in 2012, long before the bylaw amendment allowed for the proposed mixed-use development intended by the applicant.

- The building is set back from Main Street by 5' and oriented parallel with the street
- The overall elevation of the site is lower than its current height to allow the structure and site to better engage with the corridor
- The height of the proposed structure complies with the zoning bylaws
- The design utilizes elements seen in the downtown district such as masonry-style material, and gooseneck light fixtures

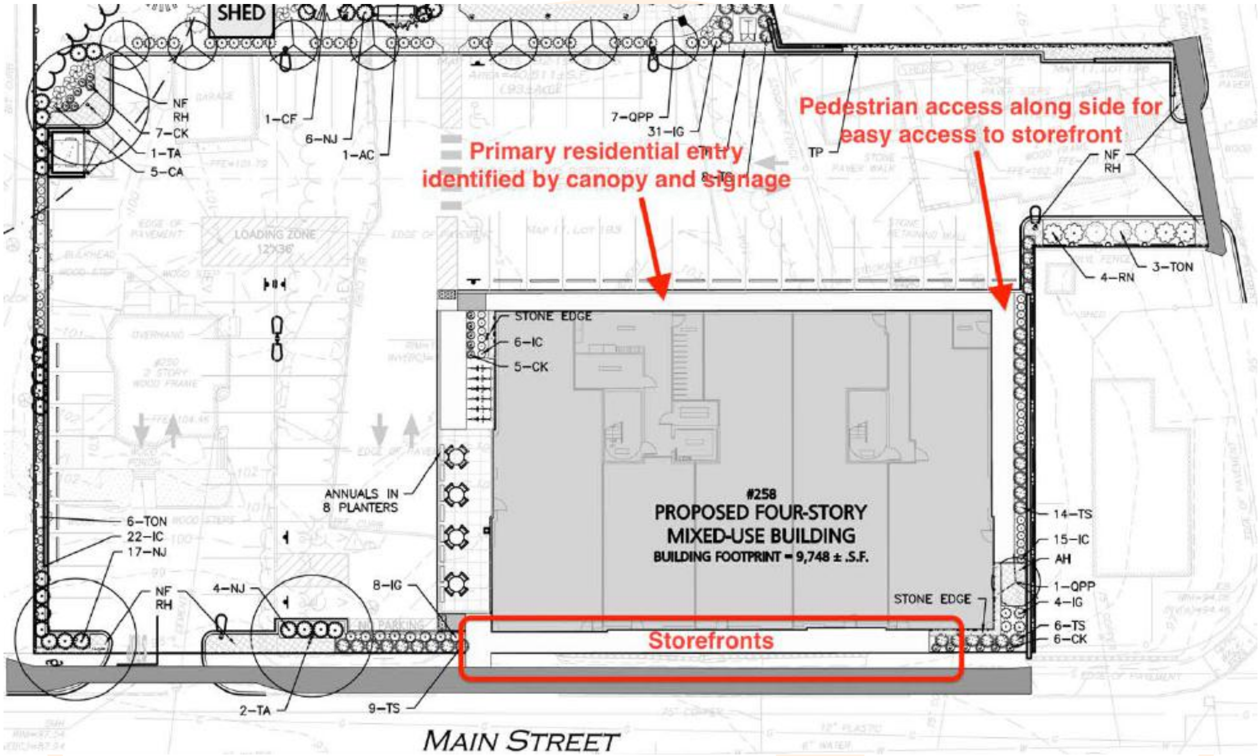
Additionally, the building is positioned toward the northeast. This positioning provides several benefits:

- This creates circulation around the structure through 2 access points - one curb cut along Main and another at Pinevale. This will help reduce the impact of access to and from the property.
- The positioning results in screening nearly half of the parking from Main Street visibility.
- The site is able to accommodate patio seating along the south side of the structure.

Building Entries

Intent: Promote pedestrian comfort, safety and orientation through building entrances that are inviting, logical, easily identifiable and accessible.

Applicant Comments: The commercial spaces are primarily accessed through entries along Main Street, while the upper-level residential spaces are accessible through doors at the rear of the structure. This allows the front of the façade, at street level, to focus on the prominence of the commercial spaces, while making access for residents easy and efficient from the rear parking lot.



Front

South Side & Rear

The image below illustrates improvements in the way the site connects to Main Street to create an enlivened pedestrian walkway.

Façade Design Standards

Building Façade features

Intent: Create building facades that engage and enliven the streetscape. Provide for appropriate façade transparency and 'active wall that connect inside and out.

Applicant Comments: The proposed structure is a forty-five-foot tall, 4-story building utilizing a flat roof, 3 styles of materials to showcase changes in the massing throughout the façade, and a series of overhangs and canopies to articulate the massing. Rather than a design that is "grounded" in retail store fronts, the design proposes to seamlessly blend the residential and commercial uses by manipulating 3, distinct materials to focus on vertical interplay, creating a design which places less emphasis on a residential use "stacked" on top of glass at the first floor.

- The first-floor store fronts consist of a mix of openings rather than a strip of continuous or semi-continuous glass storefronts. This creates a more boutique-shop aesthetic.
- 3, primary materials wrap the façade with an efficient, low maintenance composite which mimics wood and masonry.
- The placement of material serves to enhance the endcap storefronts.
- Masonry-style material serves to connect this project to elements in the downtown.
- Banding is selectively used below windows to soften transitions between materials and vertical sections.
- At the front elevation, you will note 3 types of lighting - gooseneck fixtures are used to illuminate the first-floor storefronts, while the overhangs feature downlighting, and at the center of the second floor, you will find wall mount downlight.

Building Materials

Intent: Encourage the use of building materials that fit with the character and history of the Town of Reading and are native to New England and the existing neighborhood buildings.

Applicant Comments: The façade utilizes 3, distinct materials which recreate the use of masonry, and wood providing references to both the community's New England history, as well as the community's historic downtown structures.

3 EXTERIOR SIDING COLOR C: Nichiha Concrete Corbosa Series Composite Panel - Color "Shadow"

2 EXTERIOR SIDING COLOR B: Nichiha Masonry Series Composite Panel - Color "Desert Beige"

1 EXTERIOR SIDING COLOR A: Nichiha Vintage Wood Composite Panel - Color "Cedar"

Part 4: Construction Management Summary

Construction Management Summary

The Applicant recognizes the impact of construction and is mindful of its impact to the community and our abutters. Given the scope of intended construction and the site's geographic location within proximity to major highways, construction logistics at this site should be simpler than many of the community's more complex, downtown projects. Construction access will be provided through Pinevale, and the site provides sufficient space for material staging areas as well as movement of heavy equipment and provisioning on-site resources.

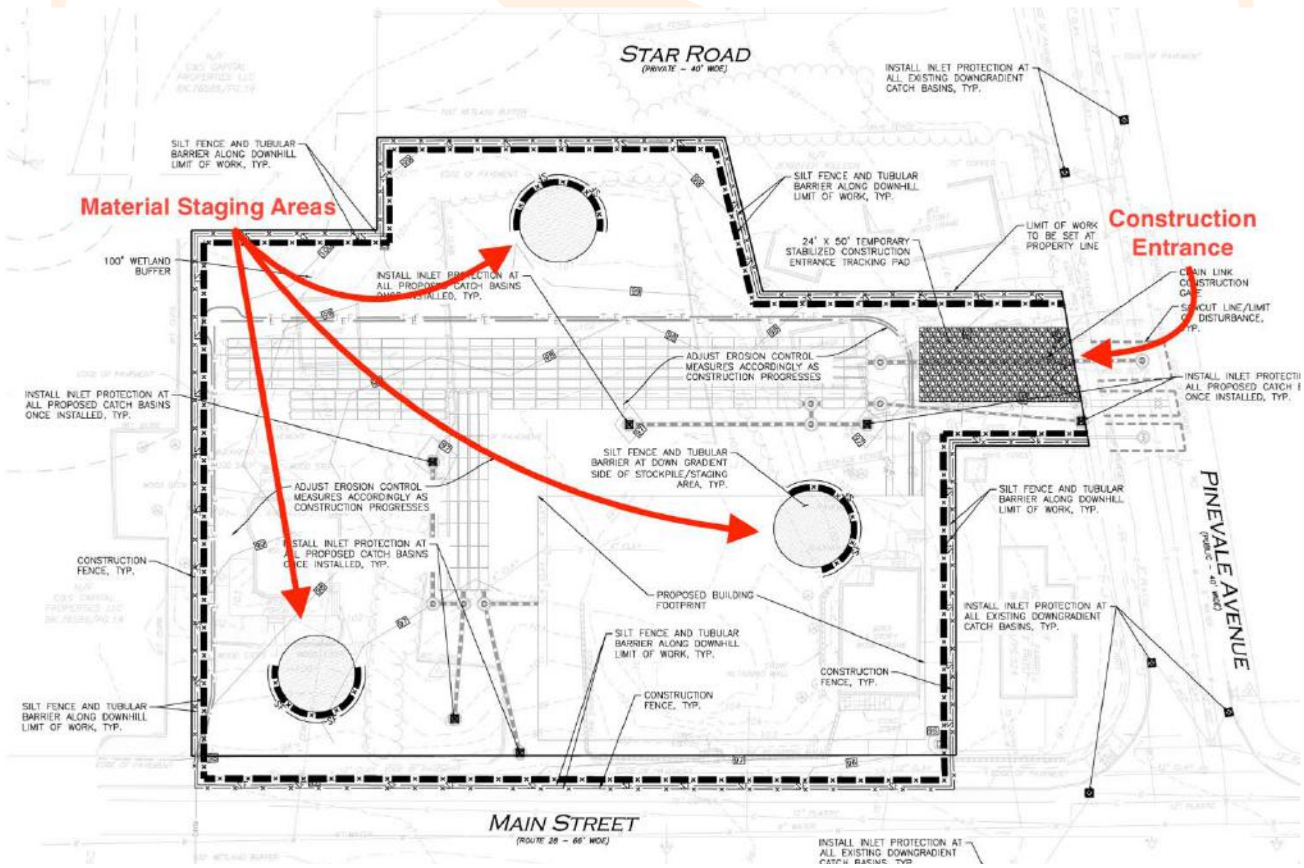
A Construction Management Plan will be submitted as part of the pre-construction meeting. However, in submitting this application, the team has considered construction logistics and has included a brief overview, with a goal of generating dialogue with the community and abutters early in the process. To highlight, the considerations include, but are not limited to:

- Schedule
- Site Preparation including wayfinding and safety
- Parking
- Deliveries / Loading

Site Preparation Plan

Following demolition and selective clearing, the site will be prepared, and logistics have been planned with safety and efficiency in mind.

- ***Site Fencing:*** A driven-post and free-standing fence, free of obstructive screening, encloses the lot.
- ***Access Gate:*** An access gate is located at the rear of the lot to avoid interrupting traffic along Main St.
- ***Dumpster Location:*** The dumpster will remain at least 10' from any exterior walls, at the rear of the lot, as shown.
- ***Material Delivery:*** Deliveries will occur toward the rear of the lot, along Pinevale.
- ***Material Staging:*** Material staging will occur at the rear of the site.
- ***Site Security:*** The site will be remotely monitored via a camera system once temporary power is put in place.



Wayfinding & Public Safety Site Plan

Signage will ensure clarity for pedestrians, jobsite safety and deliveries. The plan below is provided for illustrative purposes and is subject to change as collaboration with the municipality evolves throughout construction sequencing.

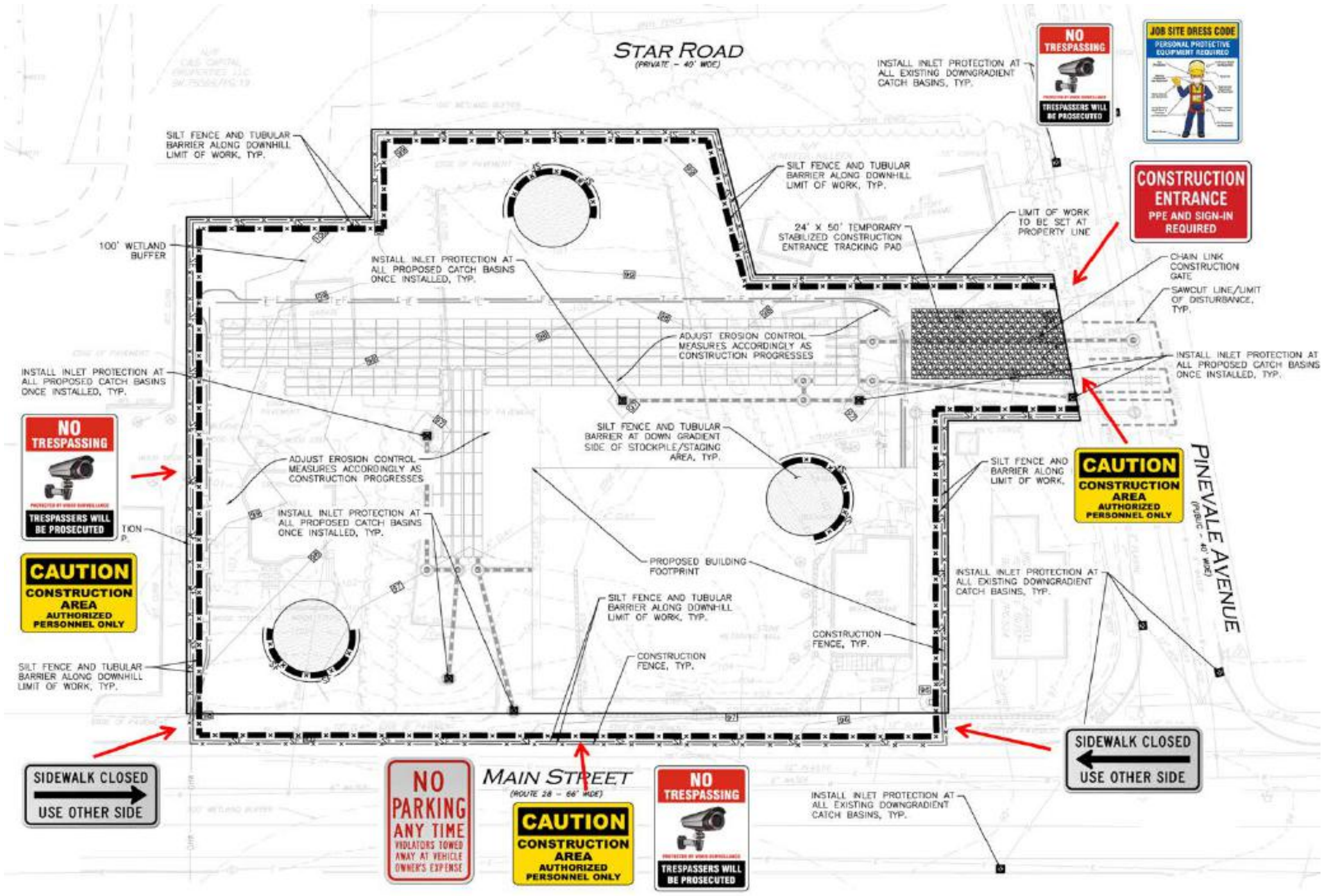
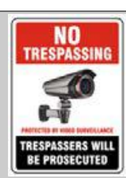


Table of Signage

Description & Location		Description & Location	
JOB SITE DRESS CODE OSHA compliant PPE signs will be posted at the gate to confirm all entrants are fully compliant prior to entering.		**NO PARKING** Will be mounted to ensure vehicles do not park along the site.	
CAUTION Caution signs will be posted around the perimeter of the site.		**ENTRANCE** Will be located at the entry gate, ensuring all visitors are away of our PPE and sign-in procedure.	
NO TRESPASSING No trespassing signs will help dissuade potential crime and vandalism and inform of the presence of surveillance equipment.		**SIDEWALK CLOSED** Sidewalk Closed signs will help direct pedestrian traffic to the temporary walkway, when applicable.	

Construction Logistics

Construction Scheduling & Sequencing

We estimate that construction will take ***18 months.*** The following serves as an overview of construction sequencing:

Month 1 – 3	Excavation, preliminary site work, foundation
Month 4 – 8	Framing, roofing, envelope
Month 9 – 14	Mechanical, insulation
Month 15 – 18	Interior finishes, site/landscape, O & M training

Work Hours

Working hours will comply with municipal guidelines and primarily occur Monday through Friday.

Work Period	Time of Day
Typical (Monday – Friday)	7:00 AM – 6:00 PM
Saturday (only as permitted, occasionally)	7:00 AM – 4:00 PM

- No work will occur on Sundays or Holidays.
- As permitted, occasionally work may occur on Saturdays only after municipal approval, if applicable.

Access & Trip Generation

Emergency Vehicle Access

Emergency vehicle access is critical to site safety.

- Access to the site for emergency vehicles will be maintained. The pedestrian access and fencing plan have been planned with this in mind, to ensure both pedestrian and automobile access during normal activity.
- The designated truck route is to be illustrated using site Wayfinding as detailed in the Site Prep Plan.
- Loading/unloading of deliveries will occur within the site. When not possible, the team will coordinate with Police.

Truck Movements During Construction

Trucks will be needed for material delivery and removal. The site benefits from easy access from Route 128/95 and Route 28.

- Truck traffic will be coordinated to be completed at the start of a typical workday rather than the peak evening hour
- Whenever possible, deliveries will be coordinated to occur in sequence on the same day(s)
- Trucks visiting the site will be required to use major roadways rather than local streets.

Construction Staff Trip Generation & Parking

The development team is mindful of the impact construction of this scale can have on vehicle parking and trip generation. While the site has more than sufficient, unmanaged parking, the development team has secured locations for offsite parking and will endeavor to shuttle employees to and from the site, if it becomes necessary.

- The number of workers at the site at a given time will vary throughout the construction, between 10 – 20 per day.
- Trips generated will mostly occur prior to the peak morning hour, minimizing impact to the adjacent street network.
- On-site parking will be limited to Foreman vehicles and/or shuttles as necessary to transport workers, as applicable.
- Due to the site's proximity to public transportation, employees will be incentivized to use public transport, or carpool.

Site Conditions

Dust Control

Construction activities generate fugitive dust that will result in localized increases in airborne particulate levels. To minimize impacts on the local environment, strictly enforced mitigation measures will be employed, including:

- Streets and sidewalks will be cleaned to minimize accumulations, and wetting agents will be used to suppress dust.
- Trucks hauling debris away from the site will be covered prior to exiting the site
- Truck tires shall be hosed down, as applicable, prior to entering public streets and/or prior to exiting the site

Noise and Odor Control

To minimize noise and odor, the team will implement a variety of mitigation measures, including, but not limited to:

- We will endeavor to use techniques which minimize noise such as utilizing offsite operations when possible.
- Use of low sulfur fuels, and turning off idling equipment
- Scheduling & coordination of equipment use to reduce average noise levels and synchronize/offset noisiest operations.

Rodent Control

An Integrated Pest Management Plan is included in the Appendix of this Plan. The Goals of the IPM are:

- To minimize the impact of site management practices on the local environment
- To reduce exposure of potentially hazardous chemical, biological and particle contaminants
- To contain and control pest populations as a result of construction at this site.

The IPM will be administered by:

Elite Pest Solutions, Inc. C/O Vanessa Giovanniello
E: vanessa@elitepestma.com
Elitepestma.com

Street Cleaning & Snow Removal

The team will be responsible for continuous snow/ice removal and cleaning of the pedestrian walkways. Snow will be disposed of offsite, and never on public property.

Roles & Responsibilities During Construction

Construction of this nature involves several stakeholders including the managers who will be responsible for managing and maintaining this plan, as well as subcontractors, abutting property owners and municipal departments/agencies. The following outlines key roles in overseeing this plan, as well the actions the team will take to coordinate with effected stakeholders such as abutters and agencies.

Emergency Contacts and Roles

The following chart provides emergency contacts and roles. The complete list of project contacts is included in the Appendix.

General Contractor & Fire Prevention Program Manager (FPPM)	Peter J. Zanni E: pjzbuilt@yahoo.com
Project Manager / Owner	Saverio P. Fulciniti E: saverio@weare14.com
Project Manager / Owner	Tony Grieco E: tony@griecoelectric.com
Project Website	www.StradaOnMain.com (to be published)

Roles & Responsibilities

- ***Program Managers & Emergency Contacts -*** During the project, the General Contractor (hereafter referred to as the "GC" or "Manager") will be responsible for managing and maintaining the construction management plan as well as the fire prevention program (as Fire Prevention Program Manager aka FPPM). This Manager will have the authority to enforce the provisions of this and other applicable fire protection standards. The FPPM will have knowledge of the applicable fire protection standards, available fire protection systems, and fire inspection procedures.
- ***Subcontractors -*** Subcontractors must abide by the provisions contained in this and the fire prevention program. If specific trades need to conduct operations that are not specifically addressed in this document and are otherwise governed by NFPA 1, NFPA 241, then the subcontractor must submit an Addendum to this program to FD for approval. Examples of said Addenda may include a sprinkler/fire alarm impairment plan or specialized hazardous materials storage licenses that was not necessary as part of the initial submission. As necessary, these Addenda should be issued as part of the FD permit process.
- ***Owner's Representative -*** The Owner, or owner's representative, will review and authorize the necessary internal permits, logs, and documentation required by contractors, tenants, and subcontractors whose work requires impairments within the building and will serve as the point of contact with the Building/Inspections Division and Fire Departments for any building fire protection and life safety concerns.

STRADA

258 Main Street Redevelopment

READING, MASSACHUSETTS

October 23rd, 2023

PREPARED FOR:
Community Planning and Development Committee
TOWN HALL
16 Lowel Street
Reading, MA 01867
Tel (781) 942-6612

OWNER:
BLVD Reading, LLC
P.O. Box 4449
Peabody, MA 01961
Tel (781) 389-5989

ARCHITECT:
RP ARCHITECTURAL STUDIO
78 Highland Circle
Wayland, MA 01778
Tel (617) 794-7759

CIVIL ENGINEER:
ALLEN & MAJOR ASSOCIATES, INC.
100 Commerce Way, Suite 5
Woburn, MA 01801
Tel (781) 935-6889

Front Elevation

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

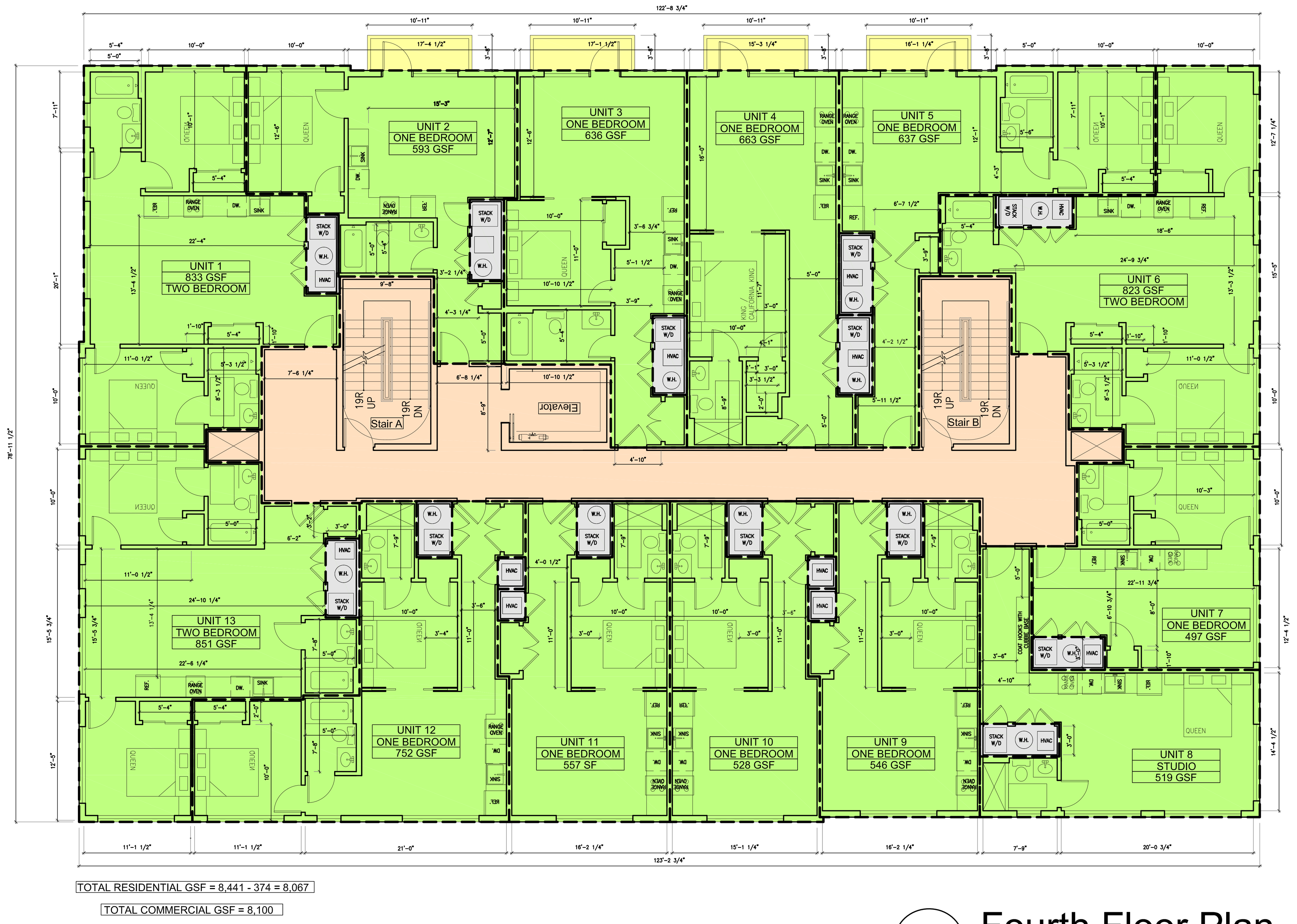
RP Architectural Studio
78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

Project Team:

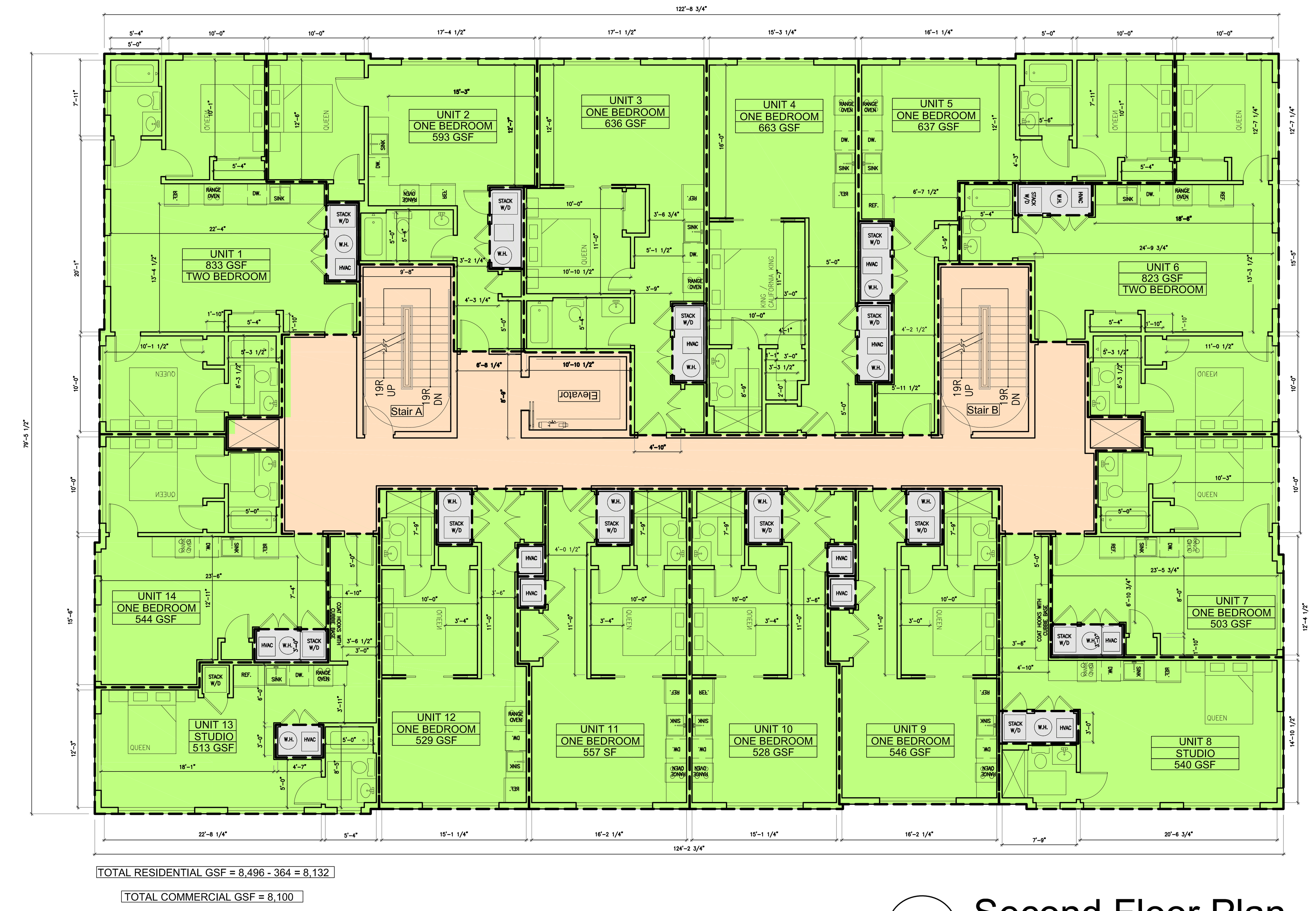
Date:	Revisions:

Drawing Title:

Scale:
Drawing No. :
Job No.: 434
Date: 10/23/23



4 Fourth Floor Plan
Scale: 3/32" = 1'-0"



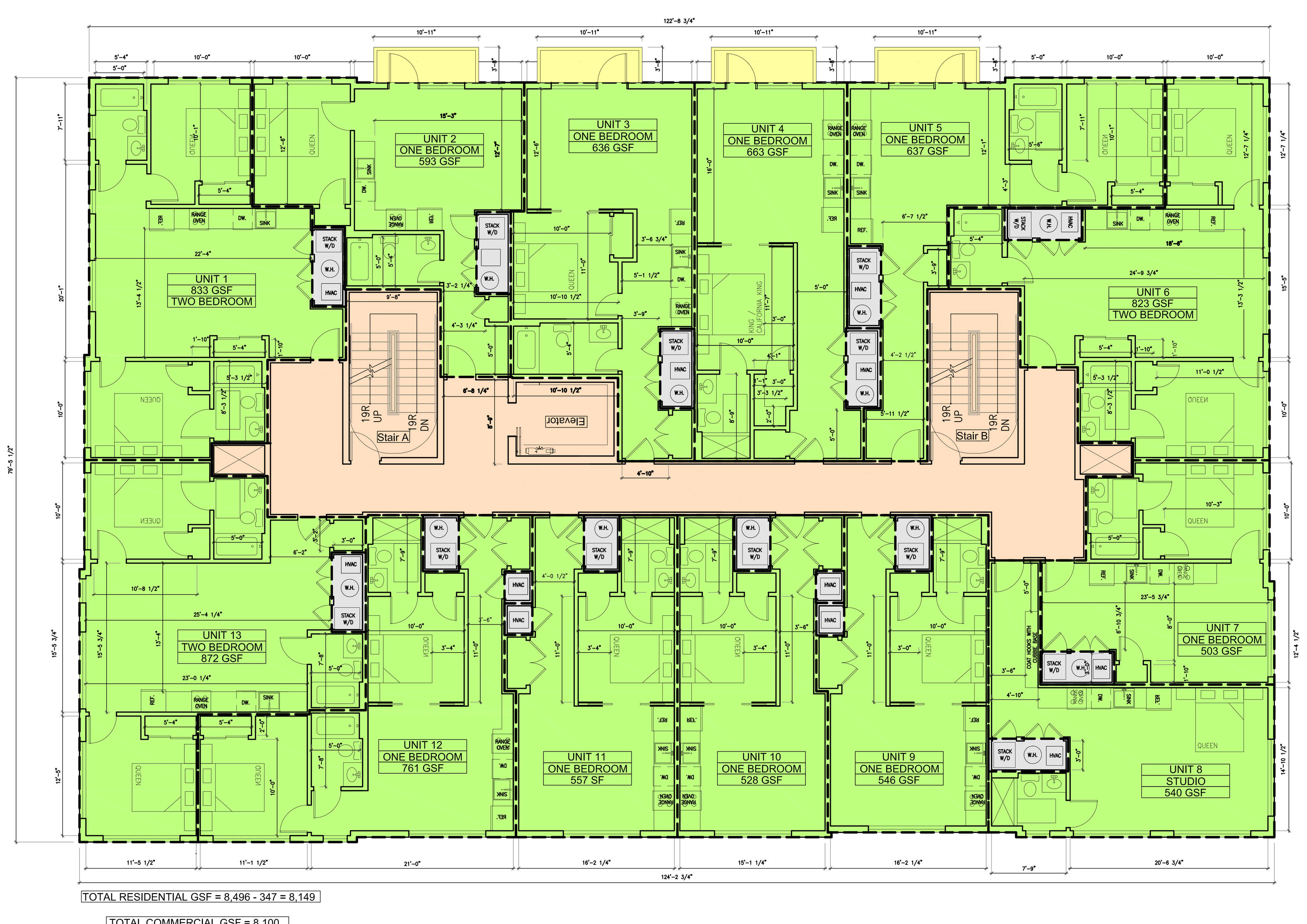
2 Second Floor Plan
Scale: 3/32" = 1'-0"

GRAPHIC KEY

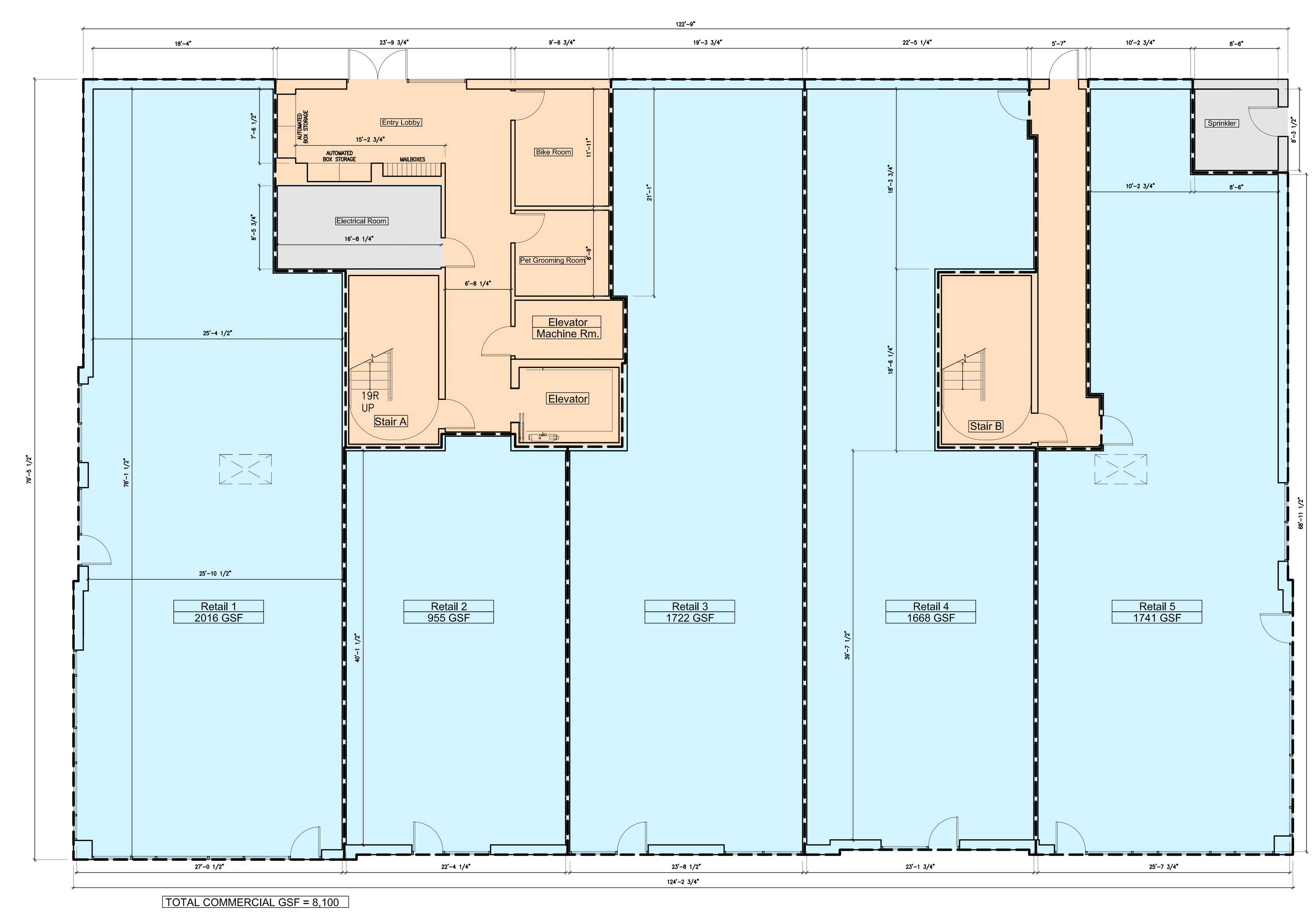
- RESIDENTIAL UNIT
- COMMERCIAL SPACE
- EGRESS/ CIRCULATION/ AMENITIES
- BALCONY
- UTILITY

RESIDENTIAL / COMMERCIAL PERCENT RATIO CALCULATION
TOTAL FIRST FLOOR COMMERCIAL GROSS FLOOR AREA= 8,100 GSF
TOTAL SECOND FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,132 GSF TOTAL THIRD FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,149 GSF TOTAL FOURTH FLOOR RESIDENTIAL GROSS FLOOR AREA= 8,067 GSF
TOTAL RESIDENTIAL GROSS FLOOR AREA= 24,348 GSF
TOTAL RESIDENTIAL / COMMERCIAL PERCENT = 75.00% / 25.00%

TOTAL GROSS FLOOR AREA
TOTAL FIRST FLOOR GROSS FLOOR AREA= 9,748 GSF TOTAL SECOND FLOOR GROSS FLOOR AREA= 9,714 GSF TOTAL THIRD FLOOR GROSS FLOOR AREA= 9,714 GSF TOTAL FOURTH FLOOR GROSS FLOOR AREA= 9,659 GSF TOTAL ROOF FLOOR GROSS FLOOR AREA= 731 GSF
TOTAL GROSS FLOOR AREA = 39,566



3 Third Floor Plan
Scale: 3/32" = 1'-0"



1 First Floor Plan
Scale: 3/32" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

RP Architectural Studio

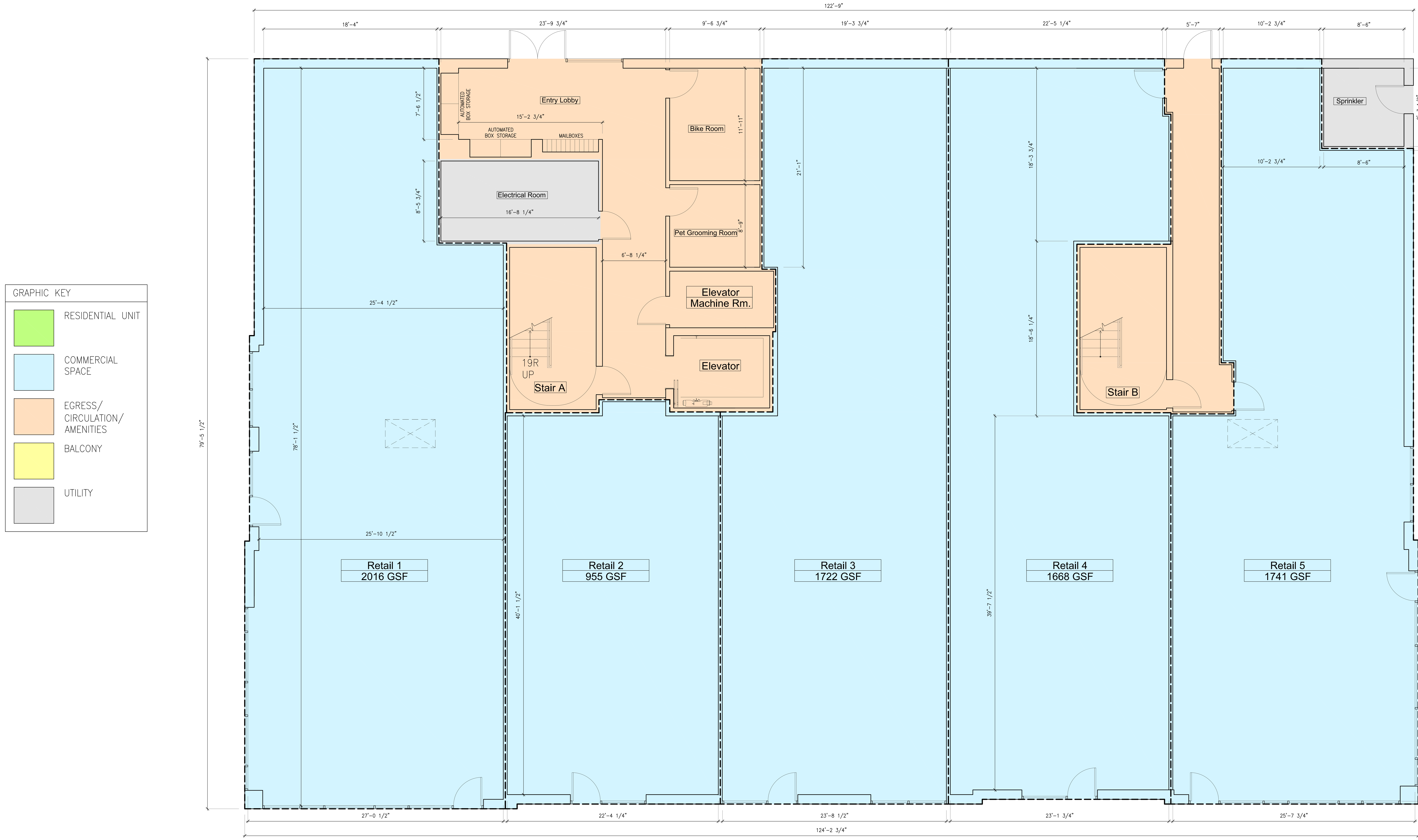
78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

Project Team:

Date:	Revisions:

Drawing Title:
Plan Diagrams

Scale:	Noted	Drawing No. :
Job No.:	434	A0.1
Date:	10/23/23	



TOTAL COMMERCIAL GSF = 8,100

1 First Floor Plan
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

RP Architectural Studio
78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

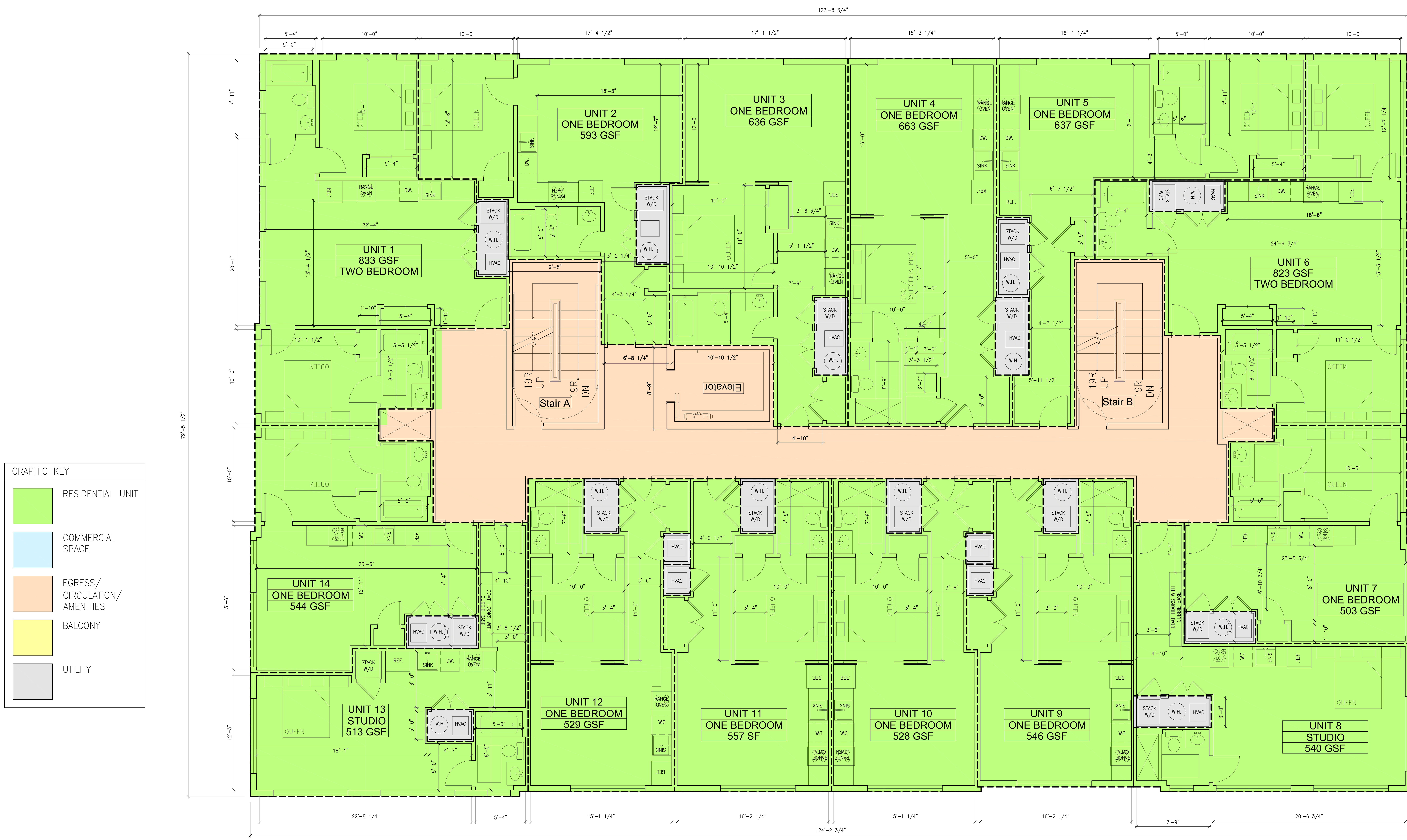
No. 50550
BURLINGTON
MASSACHUSETTS

Project Team:

Date:	Revisions:

Drawing Title:
Proposed Floor Plans

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : A1.0



TOTAL RESIDENTIAL GSF = 8,496 - 364 = 8,132

TOTAL COMMERCIAL GSF = 8,100

1 Second Floor Plan
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

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78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

REGISTERED ARCHITECT ROBERT M. PACIONE No. 50550 BURLINGTON MASSACHUSETTS COMMONWEALTH OF MASSACHUSETTS

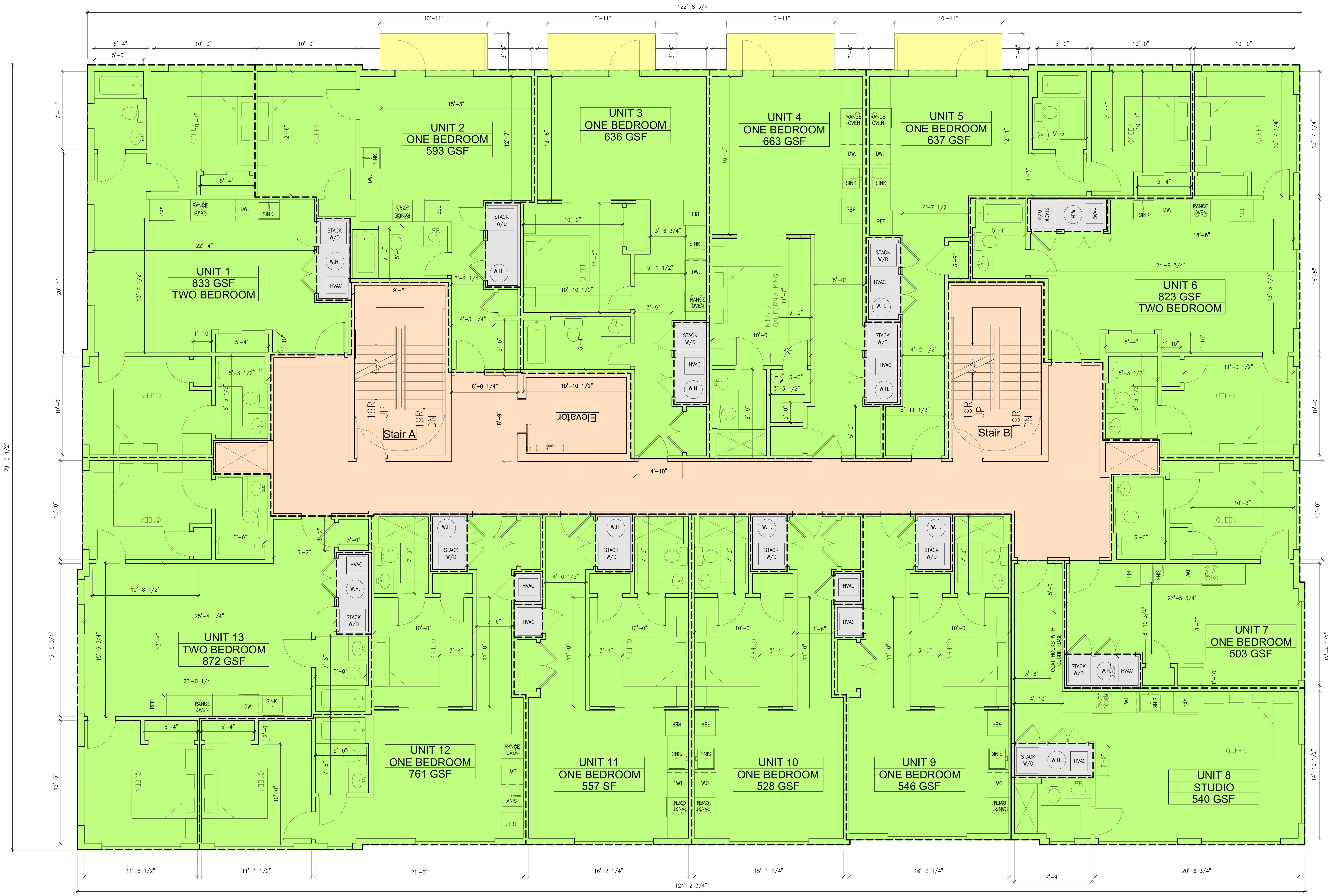
Project Team:

S

Date:	Revisions:

Drawing Title:
Proposed Floor Plans

Scale: Noted
Drawing No. :
Job No.: 434
Date: 10/23/23
A1.1



GRAPHIC KEY

- RESIDENTIAL UNIT
- COMMERCIAL SPACE
- EGRESS/ CIRCULATION/ AMENITIES
- BALCONY
- UTILITY

TOTAL RESIDENTIAL GSF = 8,496 - 347 = 8,149

TOTAL COMMERCIAL GSF = 8,100

1 Third Floor Plan
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

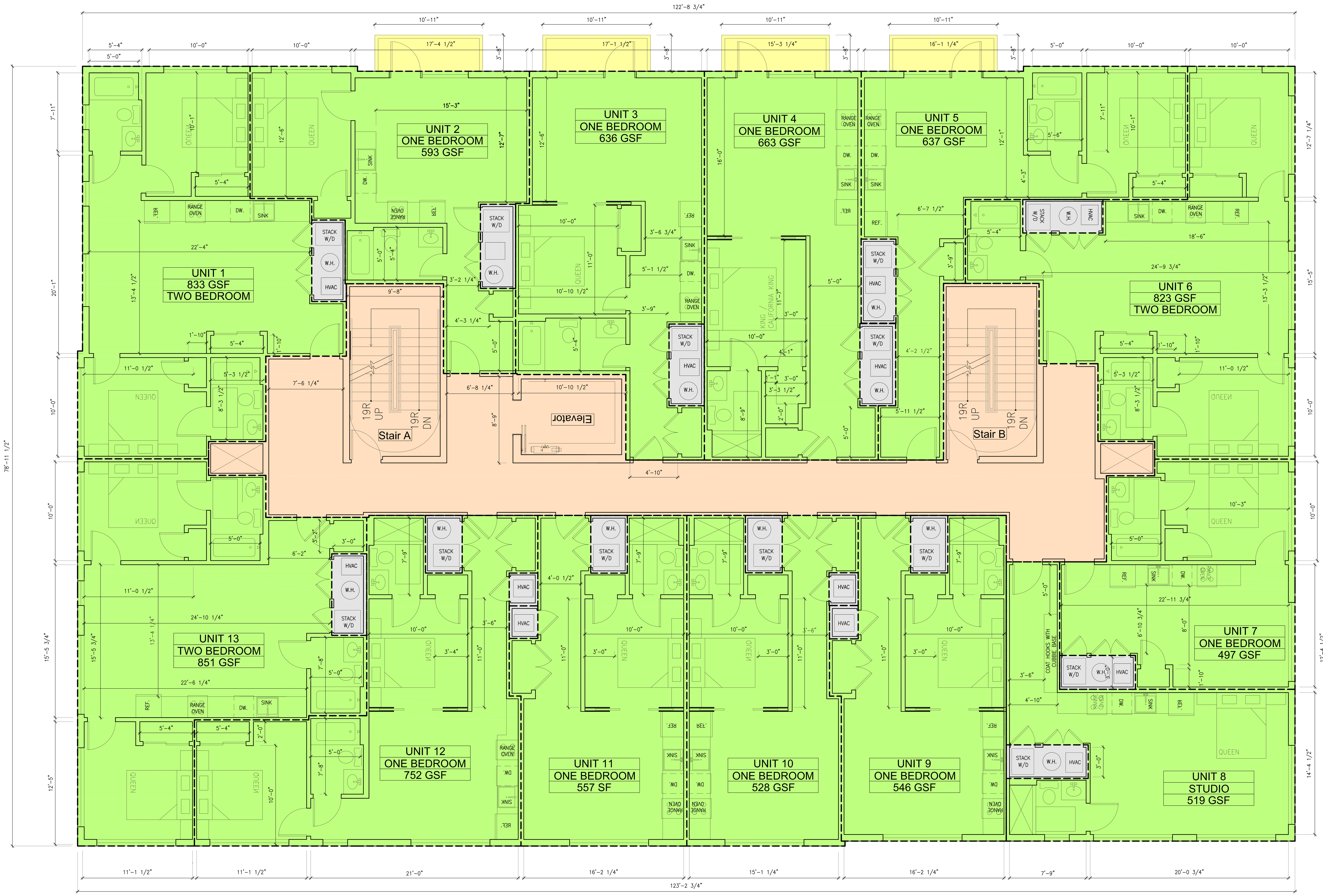
RP Architectural Studio
78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

Project Team:

Date:	Revisions:

Drawing Title:
Proposed Floor Plans

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : A1.2



GRAPHIC KEY

- RESIDENTIAL UNIT
- COMMERCIAL SPACE
- EGRESS/ CIRCULATION/ AMENITIES
- BALCONY
- UTILITY

TOTAL RESIDENTIAL GSF = 8,441 - 374 = 8,067

TOTAL COMMERCIAL GSF = 8,100

1 Fourth Floor Plan
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

RP Architectural Studio

78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

Project Team:

Date:	Revisions:

Drawing Title:
Proposed Floor Plans

Scale: Noted

Drawing No. :

Job No.: 434

Date: 10/23/23

A1.3

Roof Gross Floor Area = 731

GRAPHIC KEY
- RESIDENTIAL UNIT
- COMMERCIAL SPACE
- EGRESS/ CIRCULATION/ AMENITIES
- BALCONY
- UTILITY

1 Roof Plan
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

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78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

REGISTERED ARCHITECT No. 50550 BURLINGTON MASSACHUSETTS COMMONWEALTH OF MASSACHUSETTS

Project Team:

S

Date:	Revisions:

Drawing Title:
Proposed Roof Plan

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : A1.4

2 Proposed South Elevation
Scale: 1/4" = 1'-0"

1 Proposed East Elevation
Scale: 3/16" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

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78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

REGISTERED ARCHITECT ROBERT M. PACCIONE No. 50550 BURLINGTON MASSACHUSETTS COMMONWEALTH OF MASSACHUSETTS

Project Team:

Date:	Revisions:

Drawing Title:
Proposed Elevations

Scale:	Noted	Drawing No. :
Job No.:	434	A2.1
Date:	10/23/23	

2 Proposed North Elevation
Scale: 3/16" = 1'-0"

1 Proposed West Elevation
Scale: 1/4" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

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Wayland, MA 01778
Tel. 617-794-7759

REGISTERED ARCHITECT
No. 50550
BURLINGTON MASSACHUSETTS
COMMONWEALTH OF MASSACHUSETTS

Project Team:

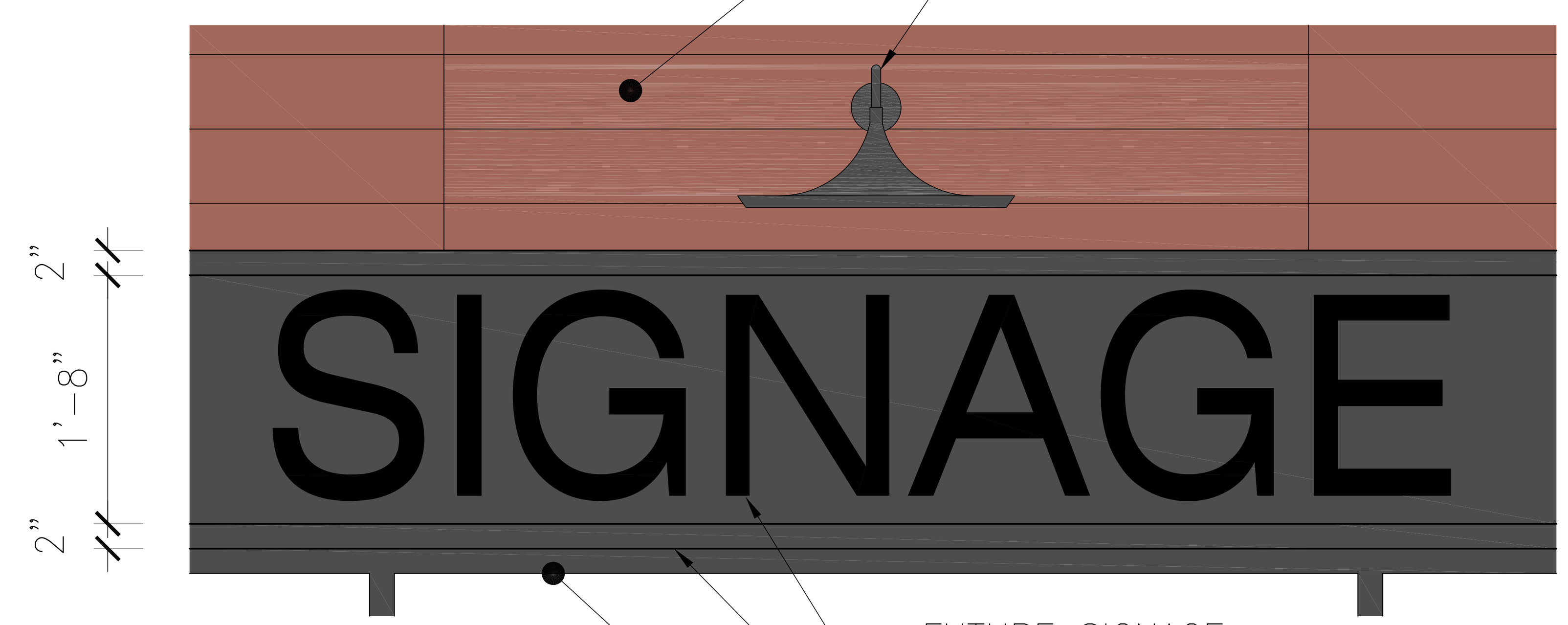
S

Date:	Revisions:

Drawing Title:
Proposed Elevations

Scale:	Noted	Drawing No. :
Job No.:	434	A2.2
Date:	10/23/23	

3 Signage Type "B"
Scale: 1" = 1'-0"



2 Signage Type "A"
Scale: 1" = 1'-0"

1 Rooftop Railing View Distances
Scale: 1" = 20'

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

RP Architectural Studio

78 Highland Circle
Wayland, MA 01778
Tel. 617-794-7759

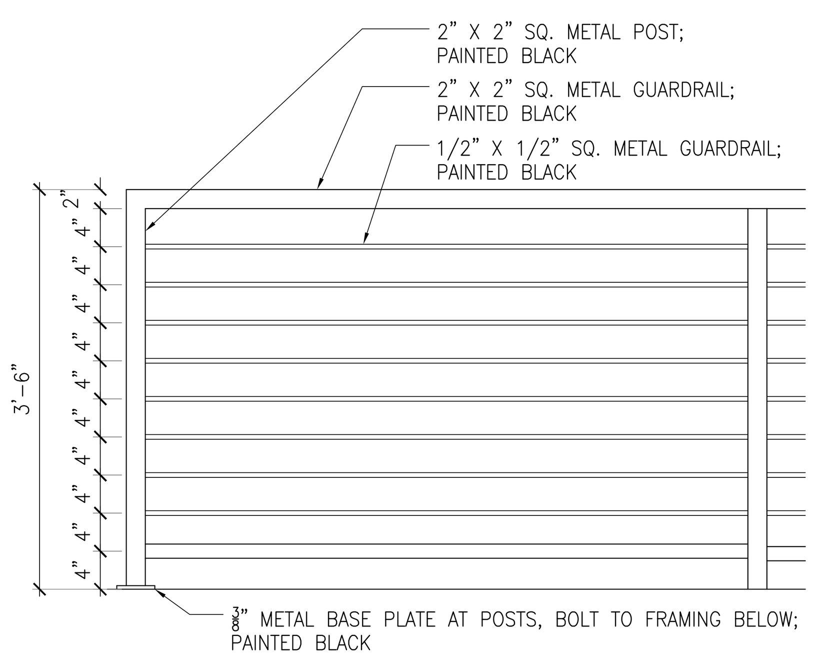
Project Team:

Date:	Revisions:

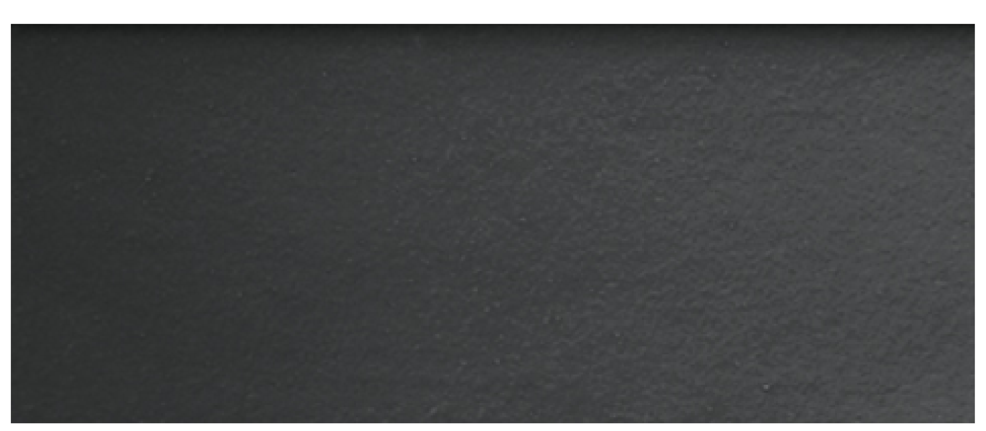
Drawing Title:
Proposed Elevations

Scale:	Noted	Drawing No. :
Job No.:	434	A2.3
Date:	10/23/23	

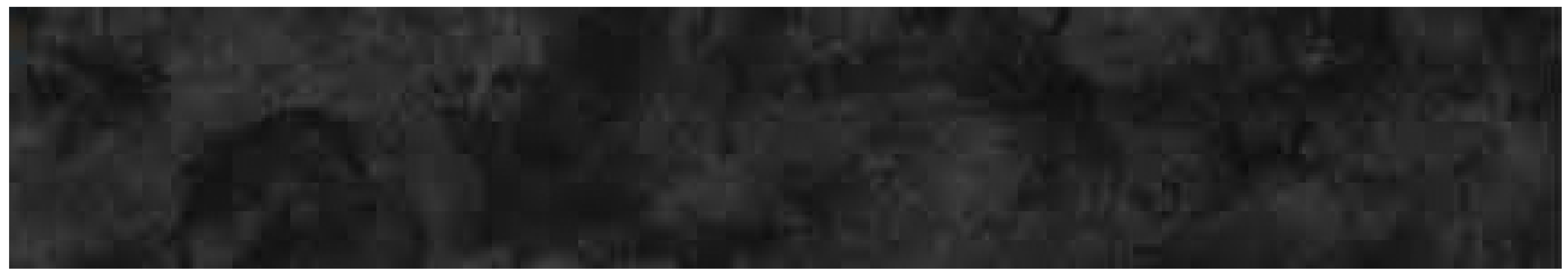
EXAMPLE OF GUARD RAILING STYLE



5 Rooftop Guard Railing Type
SCALE: 3/4" = 1'-0"



4 Door, Window, Trim, and Flashing Color: Black



3 EXTERIOR SIDING COLOR C: Nichiha Concrete Corbosa Series Composite Panel - Color "Shadow"

2 EXTERIOR SIDING COLOR B: Nichiha Masonry Series Composite Panel - Color "Desert Beige"

1 EXTERIOR SIDING COLOR A: Nichiha Vintage Wood Composite Panel - Color "Cedar"

PROJECT:
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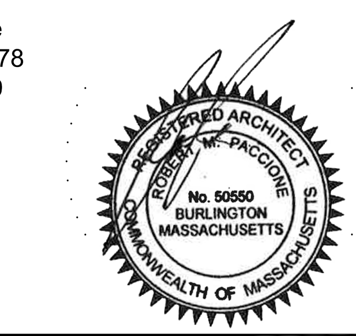


Project Team:

Date:	Revisions:

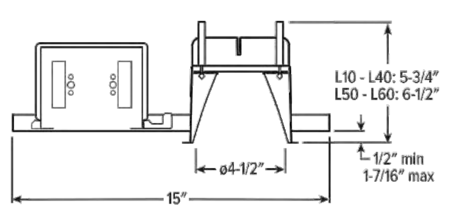
Drawing Title:
Materials

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. :
A3.1

4DR LED 4.5″ Downlight – Round

DR

Williams



CATALOG #:

TYPE:

PROJECT:

NEW CONSTRUCTION AND REMODEL

FEATURES

TrimLock®

- Innovative TrimLock reflector retention system ensures trim remains flush with ceiling plane
- Industry-leading efficacies as high as 113 lm/W – ENERGY STAR® certified
- Available on QuickShip

SPECIFICATIONS

- HOUSING – Die-cast aluminum trim housing with forged aluminum heat sink. Galvanized steel splice compartment with driver mounting plate/enclosure. Swing-out mounting arms adjust for ceiling thickness from 1/2″ - 1-7/16″ (see options for additional ceiling thicknesses).
- TRIMLOCK – Innovative TrimLock reflector retention system ensures the trim remains flush with the ceiling plane.
- OPEN REFLECTOR – Low-iridescent anodized aluminum. Clear semi-specular finish standard.
- LENSED TRIM – Die-cast aluminum frame with micro-prismatic, tempered glass lens.
- ELECTRICAL – High-performance Class 2 C.O.B. LED array. Modular quick-connect plug for easy field-connection of LED light assembly to driver. Reported L70>55,000 hours. Reported L90>55,000 hours. Estimated L70 = 200,000 hours.
- MOUNTING – Recessed. 20 ga. galvanized steel mounting pan for new construction or IC-rated enclosure. Remodel kit option includes receiver bracket hardware. Minimum 24″ O.C. marked spacing required for L50 and L60 lumen packages.
- LISTINGS –
  - cCSAus conforms to UL STD 1598; Certified to CAN/CSA STD C22.2 No. 250.0 for damp locations. LED light assembly conforms to UL 2108 for remote installation.
  - Suitable for wet location under covered ceiling when specified with WET/CC or TD options.
  - ENERGY STAR® certified in select configurations, see www.energystar.gov
  - IC-rated for direct contact with insulation when specified with I Mounting Type.
  - City of Chicago Environmental Air approved when specified with CP option.
  - Complies with ASTM-E283 when specified with ATH option.
  - RoHS compliant.
  - Title 24 (JA8) compliant in select configurations, see www.cacertappliances.energy.ca.gov.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

ENERGY STAR

bios ILLUMINATED

Available with BIOS® consult factory

ORDERING EXAMPLE: 4DR - TL - L20/835 - OPTIONS - DIM - UNV - OW - OF - CS - TRIM OPTIONS - N - F1 (HOUSING / TRIM / MOUNT.)

HOUSING

SERIES	LUMENS [1]	CRI	CCT	OPTIONS	CONTROL [2]	VOLTAGE
4DR - TL TrimLock	L10 1,000lm [3]	8 80	27 2700K	SCA_ _ Sloped ceiling adapter [5]	DIM Dimming driver, 0-10V	UNV 120-277V
	L15 1,500lm	9 90 [4]	30 3000K	ATH Airtight construction	DIM1 1% Dimming driver, 0-10V	347 347V [6]
	L20 2,000lm		35 3500K	F Fuse		
	L30 3,000lm		40 4000K	EM/7W 7-watt emergency battery [7]		
	L40 4,000lm		50 5000K	EM/10W 10-watt emergency battery [8]		
	L50 5,000lm			EM/10W/RTS 10-watt emergency battery with regressed test switch [9]		
	L60 6,000lm			CP Chicago plenum (CCEA) [10]		
				SDT Stepdown transformer [11]		
				TC Adjustable mounting arms for 1-1/2″ – 2-1/4″ thick ceilings		

TRIM [12]

TRIM TYPE	DISTRIBUTION [13]	FLANGE TYPE	REFLECTOR FINISH	TRIM OPTIONS
O Open reflector	W Wide: 65° Open, 50° Flush, 50° Regressed	OF 1/2″ standard flange	Open trim types: CS Clear semi-specular anodize	MWT Textured white trim flange [20]
L Flush lens	M Medium [16]: 45° Open, 35° Flush, 30° Regressed	SF 1/4″ mud-in flange [19]	SG Satin-glow anodize	IP IP65 rated trim [21]
R Regressed lens	N Narrow [17]: 10° Open, 25° Flush, 25° Regressed		GD Gold anodize	AD Diffuse acrylic lens [22]
A Angled lens [14]	WW Wall wash [18]		CG Champagne gold anodize	PD Diffuse 1/8″ polycarbonate lens [23]
S Non-conductive flush lens for shower applications [15]			PW Pewter anodize	TD Diffuse polycarbonate lens media at top of open reflector [24]
			SPC Clear specular anodize	WET/CC Wet location, covered ceiling listed [25]
			RG Rose gold anodize	AM Anti-microbial [26]
			WH White texture powder coat	
			BL Black texture powder coat	
			Lens trim types: CS Clear semi-specular powder coat	
			WH White texture powder coat	
			BL Black texture powder coat	
			MB Black texture splay with white flange [27]	

MOUNTING

MOUNTING TYPE [28]

- N Open pan for new construction
- I IC-rated enclosure for new construction [30]
- R Remodel kit [31]

MOUNTING HARDWARE [29]

- F1 Integral 2-position fixed pan bracket, universal bar hanger included [32]
- BA1 Adjustable butterfly pan bracket, bar hanger not included [33]
- CA1 Adjustable caterpillar pan bracket, universal bar hanger included [34]

NOTES

1 Lumen output based on O trim type, W distribution and CS finish, 3500K/80CRI. Actual lumens may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA
2 See page 4 for ADDITIONAL CONTROL OPTIONS.
3 Not available with EM/10W emergency batteries.
4 Extended lead times may apply. Consult factory for availability.
5 9″ aperture, specify degrees of slope in 5° increments, 05°-30°. See page 4 for SLOPED CEILING ADAPTOR DETAILS. Not available with ATH or TC options. N Mounting Type only. Not available with WET/CC.
6 Not available with EM batteries or DMX controls.
7 N and R Mounting Types only.
8 N and R Mounting Types only.
9 Not available with WET/CC, ATH or IP options. N and R Mounting Types only. See page 5 for EM/10W/RTS DETAILS.
10 I Mounting Type required.
11 May be required for 347V, see product builder at hew.com/product-builder
12 Trim ships separately.
13 Beam angle based on CS or WH reflector finish.
14 Available with WW Distribution only.
15 W Distribution, OF Flange Type, WH Reflector Finish only. Standard with AD diffuse acrylic lens. IP and WET/CC options standard.
16 Not available with lumen stops L50 and higher when specified with flush or regressed trim types.
17 Not available with lumen stops L50 and higher when specified with flush or regressed trim types.
18 O and A Trim Types only.
19 For use with mud-in plaster construction only, supplied with mud flange installation kit. See page 5 for FLANGE TYPE DETAILS. Not available with ATH or IP options.
20 Not available with WH Reflector Finish, L or S Trim Types.
21 L and R Trim Types only.
22 Not available with O trim type. W distribution only.
23 Not available with O trim type. W distribution only.
24 O Trim Type only. WET/CC standard. L50 lumen package max.
25 L50 lumen package max with O Trim Type.
26 WH and BL Reflector Finishes only. Not available with S Trim Type.
27 R Trim Type only. Not available with MWT.
28 Mounting hardware required (N and I only), ordered separately, see MOUNTING HARDWARE ordering info. See page 5 for MOUNTING TYPE DETAILS.
29 Additional mounting hardware options available. See page 6 for MOUNTING HARDWARE DETAILS.
30 L20 lumen package max. L30 available, wide distribution only for lensed trims.
31 Also used in new construction sheetrock ceilings.
32 N and I Mounting Types only. I Mounting requires external brackets.
33 N Mounting Type only
34 N Mounting Type only

3 Recessed Downlighting

ALCON LIGHTING

SHOP NOW

Project Name: Type: Quantity:

Pavo Architectural LED 6-Inch Cylinder Wall Downlight

FIXTURE SPECIFICATIONS

INTENDED USE

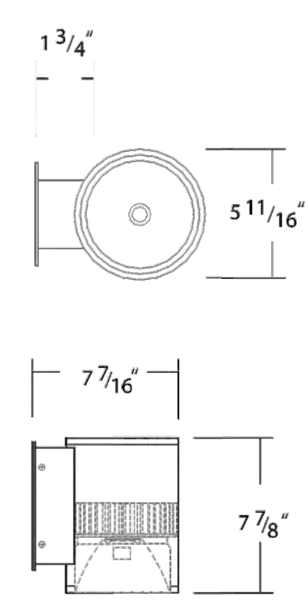
This architectural cylinder wall light is a versatile low-glare lighting fixture. This product can be used indoors and outdoors for commercial or retail purposes. The downlight can also be used to accent and create dramatic effects or provide safety and security. This fixture is exclusively designed for downlighting.

PRODUCT FAMILY

11218-DIR Cylinder Direct
11218-ADJ Cylinder Adjustable
11219-2D Cylinder Direct Indirect
11220-DIR Square Direct
11221-2D Square Direct Indirect

FEATURES

Construction: Round One Piece High Grade Aluminum with corrosion-resistant finish
Light Engine: LED Chip-On-Board
Lens: Tempered Glass and Silicone O-Ring
Reflector: Glare-Free, One piece, Heavy Gauge Aluminum
Mounting: Includes Bracket for Installation Directly to a 4" octagonal electrical junction-box
Voltage: 120V *(Non-Dimming)*, 120V/277V *(Dimming)*
CRI: 84+
Dimming: Universal Dimming System Compatible with 2-Wire TRIAC, 3-Wire ELV, and 5-Wire 0-10V Dimmers
Life: L70 - 50,000 Hours
Emergency: 90 Minutes Minimum, Remote Test Switch, Plate Cover, Junction Box Included
Listing: ETL/cETL Listed Suitable for Wet Location. Assembled in the US (IP65)
Electrical: Electronic Direct Current Class 2 driver
Warranty: 5 Years Carefree for Parts and Components (Labor not included). We recommend the use of surge protectors on the power entering LED Housings. Surge damage is not covered by warranty.
Compliancy: Dark Sky Compliant when fixture is pointing downward.



SPEC GRADE · ASSEMBLED IN THE USA · DIMMABLE · LIMITED 5-YEAR WARRANTY · DARK SKY COMPLIANT · WET LOCATION SUITABLE · IP65 TESTED & APPROVED · INTERTEK ETL LISTED C US

ORDERING INFORMATION Example: (11218-DIR-L15-B60-UNI-40K-WH-EM)

Model	Lumen	Beam Spread	Dimming	Color Temperature	Finish	Options
11218-DIR Pavo-Cylinder	L10 1000 lm (15W) Standard	B2 2° Narrow Spot	ND Standard Non-Dimming (120V)	27K 2700K	WH White	EM Emergency
	L15 1500 lm (22W)	B10 10° Spot	UNI Universal (120V / 277V)	30K 3000K	BK Black	
	L22 2200 lm (22W)	B20 20° Wide Spot		35K 3500K	SL Silver	
	L26 2600 lm (30W)	B45 45° Flood		40K 4000K Standard	BZ Bronze	
		B60 60° Wide Flood Standard		50K 5000K		
		WW Wall Wash				
		IV Type IV (forward throw)				

2 Wall Mount Lighting

Elias Outdoor LED Wall Sconce
By Kichler

LUMENS
Call Us (877) 445-4486

Elias Outdoor LED Wall Sconce
By Kichler

Product Options

Size: Medium

Details

Finish: Textured Black with Gold interior

Dimensions

Medium Option Backplate: Diameter 6"
Medium Option Fixture: Height 9", Depth 11", Diameter 16", Weight 1.5Lbs

Lighting

Medium

Lamp Type	LED Built-in
Total Lumens	425
Total Watts	9.00
Volts	120
Color Temp	3000 (Soft White)
CRI	90
Equivalent Halogen, CFL or LED Bulb Can Be Used	No

Notes:

Prepared by:

Prepared for:
Project:
Room:
Placement:
Approval:

Additional Details

Product URL:
https://www.lumens.com/elias-outdoor-led-wall-sconce-by-kichler-KCH1991370.html
Rating: ETL Listed Wet

ITEM#: KCH1991370

Created September 12th, 2023

1 Gooseneck Lighting

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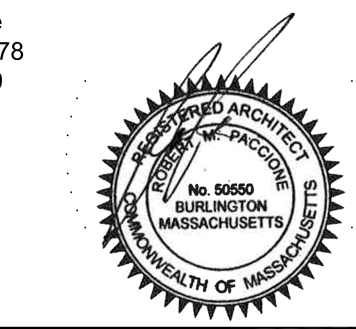
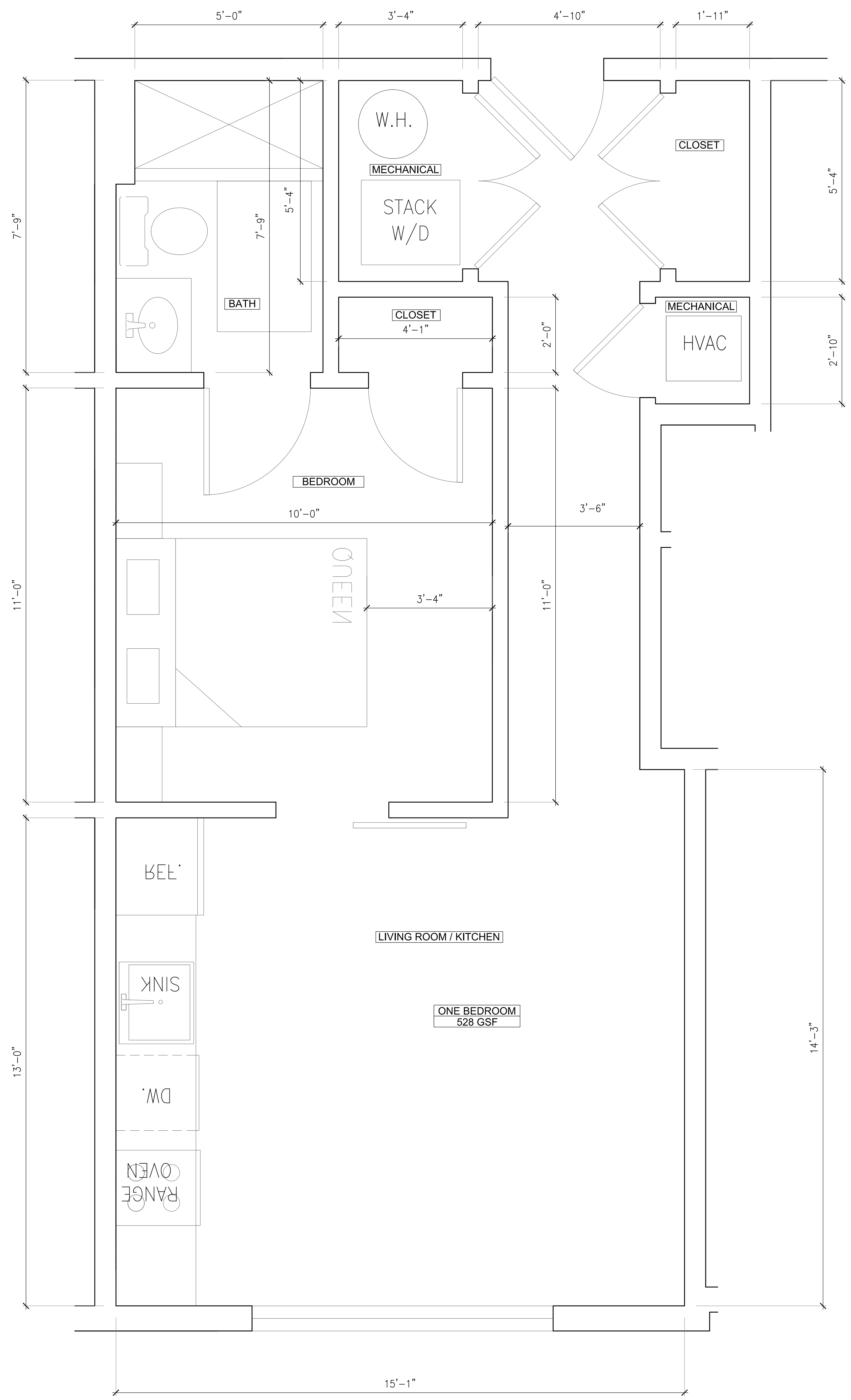


Project Team:

Date:	Revisions:

Drawing Title:
Lighting

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : A3.2



1 Typical One Bedroom
Scale: 1/4" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

RP Architectural Studio

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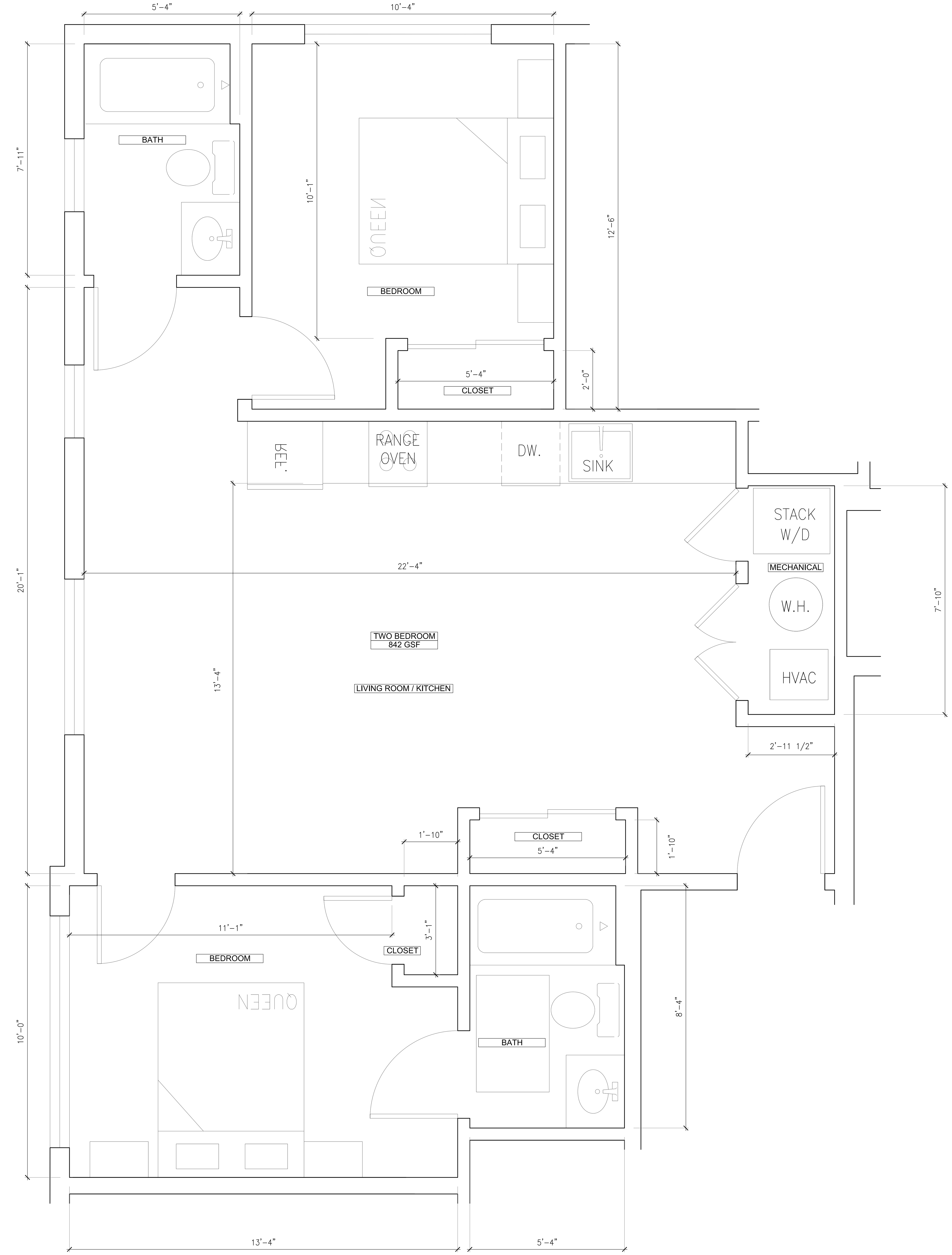
Tel. 617-794-7759

Project Team:

Date:	Revisions:

Drawing Title:
Enlarged Plans

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : A4.1



1 Typical Two Bedroom
Scale: 1/4" = 1'-0"

PROJECT:
258 Main Street - Mixed use New Construction
Reading, MA

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Wayland, MA 01778
Tel. 617-794-7759

REGISTERED ARCHITECT
ROBERT M. PACIONE
No. 50550
BURLINGTON
MASSACHUSETTS
COMMONWEALTH OF MASSACHUSETTS

Project Team:

Date:	Revisions:

Drawing Title:
Enlarged Plans

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. :
A4.2

4 Southwest Corner Rendering - Evening
Scale: N.T.S.

3 Southwest Corner Rendering - Daytime
Scale: N.T.S.

2 Southeast Corner Rendering - Evening
Scale: N.T.S.

1 Southeast Corner Rendering - Daytime
Scale: N.T.S.

PROJECT:
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Project Team:

Date:	Revisions:

Drawing Title:
Renderings

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No.: R1.1

4 Northeast Rendering - Evening
Scale: N.T.S.

3 Northeast Rendering - Daytime
Scale: N.T.S.

2 East Rendering - Evening
Scale: N.T.S.

1 East Rendering - Daytime
Scale: N.T.S.

PROJECT:
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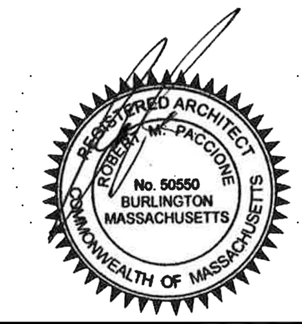

Project Team:

Date:	Revisions:

Drawing Title:
Renderings

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No.: R1.2

2 Roof Rendering Looking East
Scale: N.T.S.

1 Roof Rendering Looking West
Scale: N.T.S.

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REGISTERED ARCHITECT
No. 50550
BURLINGTON
MASSACHUSETTS
COMMONWEALTH OF MASSACHUSETTS

Project Team:

Date:	Revisions:

Drawing Title:
Renderings

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. :
R1.3

1 Winter Solstic - 12pm
Scale: N.T.S.

1 Winter Solstic - 12pm
Scale: N.T.S.

1 Winter Solstic - 8am
Scale: N.T.S.

1 Summer Solstic - 12pm
Scale: N.T.S.

1 Summer Solstic - 12pm
Scale: N.T.S.

1 Summer Solstic - 8am
Scale: N.T.S.

PROJECT:
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Project Team:

Date:	Revisions:

Drawing Title:
Renderings

Scale: Noted
Job No.: 434
Date: 10/23/23
Drawing No. : R1.3

November 29, 2023

TO: Town of Reading, Community Planning and Development Commission
C/O Mary Bendetto and Andrew MacNichols

FROM: BLVD Reading, LLC
C/O Saverio Fulciniti
PO Box 4449, Peabody, MA 01961

RE: Special Permit 252, 258, 262 Main St & 10 Pinevale (Response to November 16, 2023 email)

Mary,

For your convenience, we have compiled responses to address each of the question you posed in your email dated Thursday, November 16, 2023.

If you should have any questions, or additional feedback, please feel free to reach out.

Regards,

Saverio Fulciniti
E: Saverio@weare14.com
M: 781.389.5989

[MB] Architectural Plans: There are two R1.3 sheets, re-number the second one with the Shadow studies please.

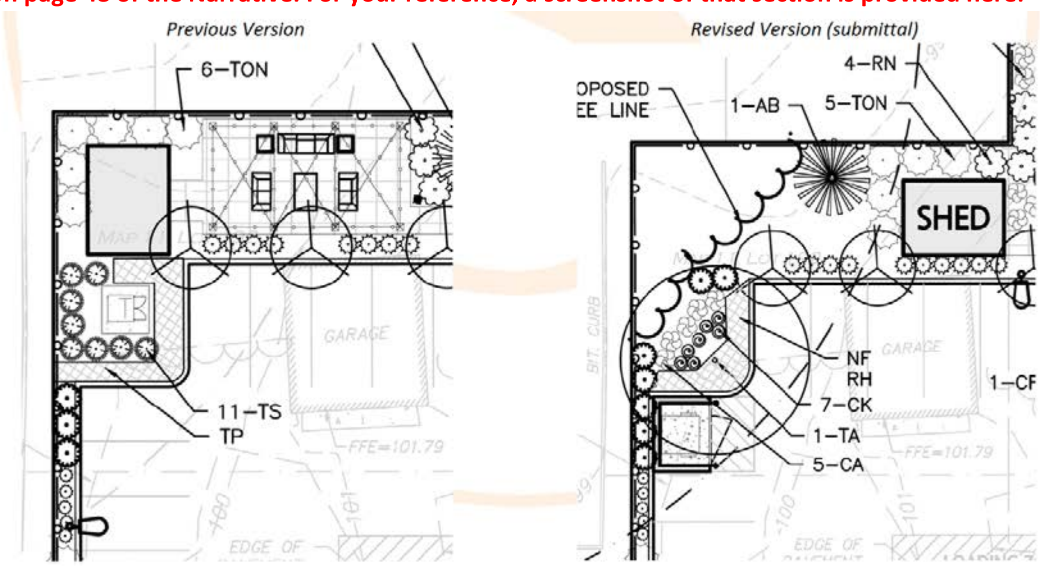
[Applicant Response:] Thank you for pointing this out. We will revise the plans following community feedback.

[MB] Stormwater Permit Application: Because the project is larger than 1 acre this is required. Please submit the attached application and appropriate fee. We don't need additional envelopes, it will all be advertised in one notice.

[Applicant Response:] Thank you, we will remit the Stormwater Application and Fee.

[MB] Wetlands: There isn't much in your narrative about the sliver of 100' wetland buffer shown on the site. What is the date of the wetland delineation that provided that line?

[Applicant Response:] The line was delineated on March 9, 2023. We are submitting a Notice of Intent for the wetland buffer impacts. Based on feedback we received during the DRT meeting, we made several revisions which are discussed on page 48 of the Narrative. For your reference, a screenshot of that section is provided here:



Previously, the shed, transformer, and a seating area, as well as 5 parking spaces were located within the 100' buffer.

In the revised plan, only 3 parking spaces and the dumpster pad are now located within the 100' buffer. The shed and transformer have been moved, and the planting schedule has been revised

Our NOI includes the following Tree Replacement Policy and our design exceeds the replacement standards:

Tree Replacement Policy.

Tree removal is reviewed by the Commission at its scheduled bi-monthly meetings, pursuant to an application filed beforehand. The Commission requires replacement ratio based on the Replacement Tree and Shrub Schedule for trees removed within one hundred feet of a wetland and 200 feet of a river.

There are five (5) existing trees that measure over 6" DBH located within the 100' Buffer Zone. These 5 trees are planned to be removed.

The proposed native trees and shrubs within the 100' Buffer Zone are as follows:

TREES
1 Quercus Palustris (Green Pillar Oak)
1 Tilia Americana (Redmond American Linden)
1 Abies Balsamea (Balsam Fir)
2 Thuja Occidentalis (American Arborvitae)
SHRUBS
5 Ceanothus Americanus (New Jersey Tea)
5 Clethra Alnifolia (Summersweet)
4 Ilex Glabra (Shamrock Inkberry)

The replacement ratio of one tree removed with one proposed deciduous shade and evergreen tree is met. The ratio for shrubs is 3 per one tree removed. The total count of 14 shrubs covers 4 existing trees.

[MB] Fencing: Can you clarify for me what type of fencing you are proposing around the full exterior of the site? Particularly what fencing is going up against the abutters, if that is different than other portions of the site. If there already is a rendering or detail included feel free to direct me to the page(s).

[Applicant Response:] The fence is specified on Sheet L-102 within the Materials Schedule table shown below:

MATERIALS SCHEDULE

HARDSCAPE & FURNITURE

QTY	ITEM	MODEL NUMBER	COLOR	SIZE	COMPANY
3,000 SF±	PAVERS	ARCANA	FIELD: CORVARA ACCENT: VIVANTO	24"x24" 2" DEEP	UNILOCK.COM ASHLEY ALLARD–LACROIX 508–277–4413
665 LF±	FENCE	BUFFTECH CHESTERFIELD VINYL FENCE	VINYL	6' HEIGHT	AVOFENCEANDSUPPLY.COM

An illustrative image is shown on Sheet L-505, under Detail #3, as shown below:

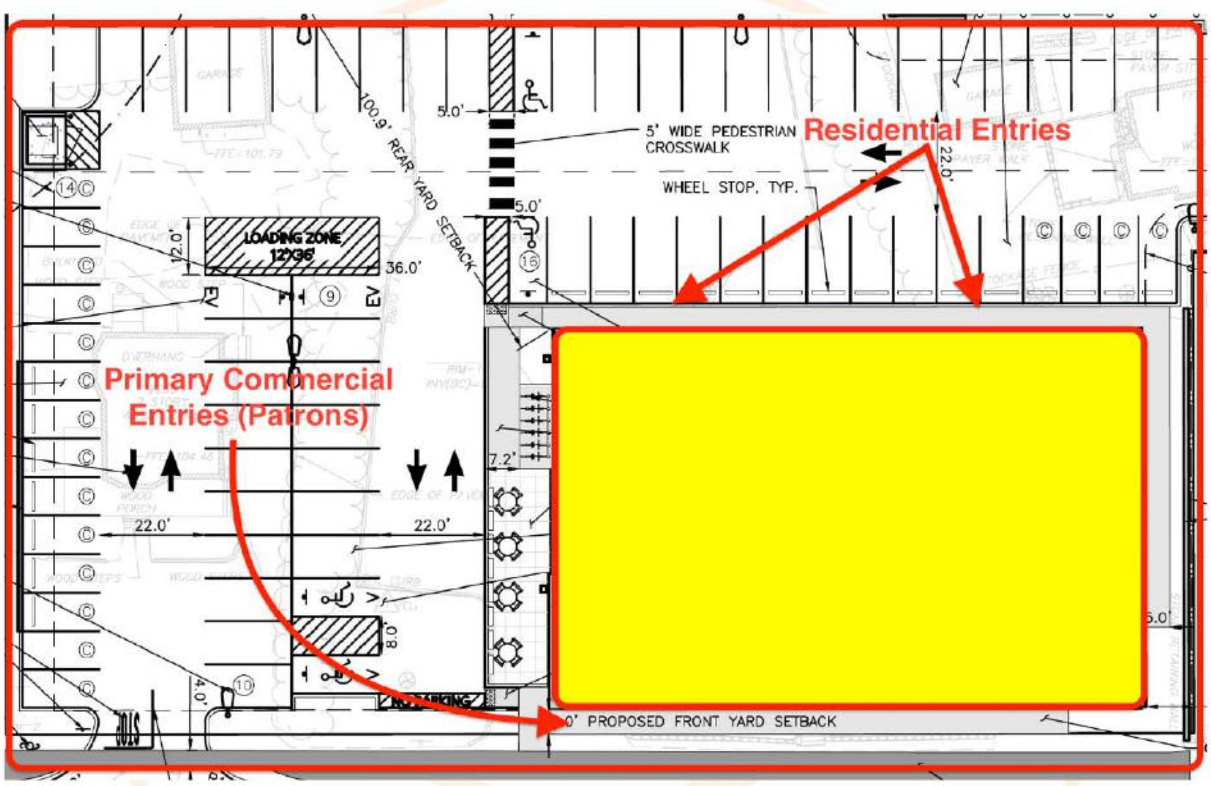
NOTES:
1. 6' HEIGHT PRIVACY FENCE. SEE SHEET L–102 FOR MODEL NUMBER.
2. PREPARE SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION.
3. COLOR TO BE: TBD, COLORS TO BE APPROVED BY OWNER.
4. SEE PLAN FOR LOCATIONS.

FENCE
NOT TO SCALE
3

[MB] Parking: Do you anticipate marking any of the parking as "resident only" or "business only"? Discussion on any parking management strategies would be appreciated.

[Applicant Response:] We are open to any strategies which would improve parking management. Additionally, it should be noted:

- **With 77 spaces needed and 78 provided, the plan exceeds the requirements outlined in sections 5.6.7.4 & 9.1.2.2.**
- **As discussed on page 21 of the Narrative, given the location of residential entries, as well as the use of 2 points of entry, residential parking is most convenient at the rear, while commercial parking is most convenient at the south side of the lot. If marking the spaces is helpful, maybe we could allocate similarly?**



[MB] Loading spaces: You've proposed two-ish loading spaces, or space for one box truck to park for loading/unloading. What happens for commercial tenants when a resident has parked their moving truck in that space? More detail on a proposed loading management plan would be appreciated.

[Applicant Response:] At present, we've designed the loading space in accordance with the requirements of sections 5.6.7.4 and 9.1.2.2 of the Zoning Bylaws. In terms of how that space is managed, as a rental property, we will have significant control over the use and administration of this space, as directed through our lease agreements and "house rules." When it comes to move ins, those will be pre-scheduled with our property manager in coordination with commercial uses to mitigate conflicts.

[MB] Lighting: Is all the lighting being proposed dark-sky compliant? I believe it says that in the narrative but not on the plan sheet?

[Applicant Response:] Yes, all lighting will be dark-sky compliant.

[MB] Signage: I'm just noting that no signage is included in this application.

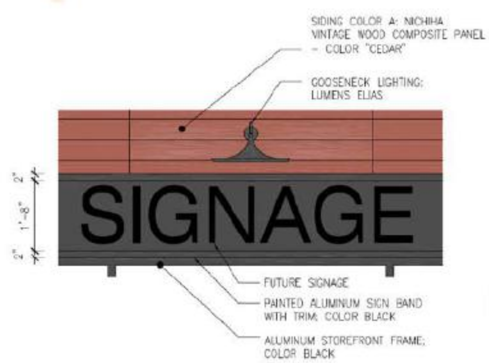
[Applicant Response:] The only signage we have shown is the building iconography, in the form of the "S" along the south side of the structure. Otherwise, we are not requesting any freestanding signage. We have, however, provided detail on the anticipated signage band and illumination on page 40 of the Narrative as provided below:

Signage

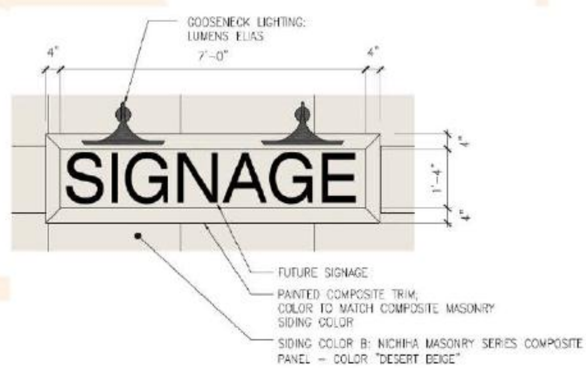
- The signage areas have been designed to allow tenants to create a distinct storefront presence, illuminated by gooseneck lighting.
- Tenants will be responsible for seeking approvals for signage.
- The applicant is not requesting any pylon signage on site.

Building branding appears at the south side of the structure.

There are 2 types of signage bands, where Type A is mounted to an area using Material C, and the other is applied over Material B. The available signage area is roughly 7' x 2'



2 Signage Type "A"



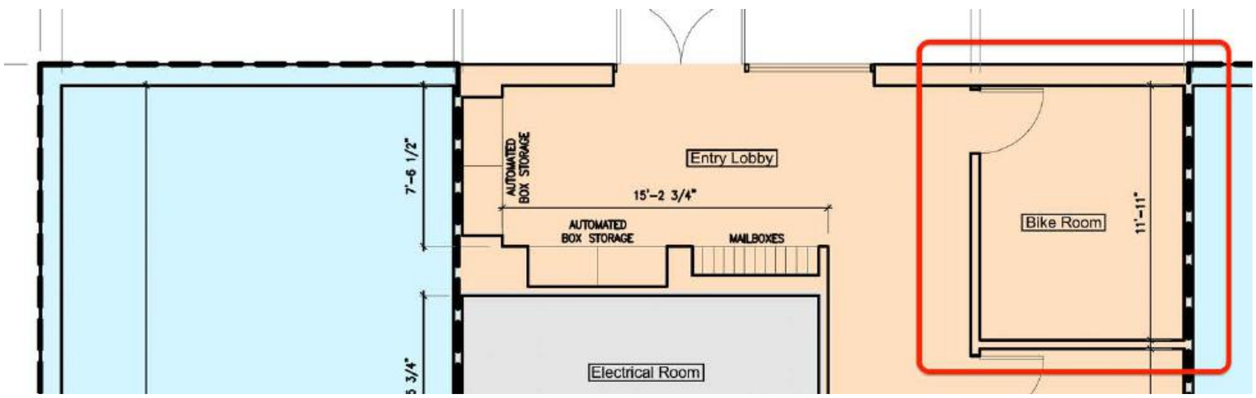
3 Signage Type "B"

[MB] Trash: There's only one dumpster being proposed. Is this to be shared between the residential and the commercial customers? Please clarify how often you anticipate pick-up being needed. Do you anticipate offering recycling to residents/commercial customers? Without knowing what types of commercial or restaurant tenants may be in the spaces it is hard to understand future trash needs, but I think generally our concern is that one dumpster doesn't seem like enough. Given the constraints on the site, where could additional trash storage be located on site if it was needed?

[Applicant Response:] In alignment with the MA DEP's 2030 Solid Waste Master Plan, we are seeking to implement strategies to reduce waste.

Currently, we show a pad for 1 x 10-yard dumpster, which is sufficient for +1,800 pounds of waste. In consulting with our vendor, Republic, they feel a 10-yard dumpster, picked up twice per week, will be sufficient for the use. If necessary, we can increase the pick-up frequency up to daily (I have confirmed they have the routes available to accommodate a daily pick up schedule). Additionally, we are proposing several, other measures:

1) **Commercial vs Residential Waste: To cope with future trash needs, we have discussed the opportunity to repurpose the Bike Room as an interior Trash-Room, servicing the residential tenants. We will add a door along the rear of the building for vendor access, and complete 2 picks up per week. Under this scenario, the pad can then be exclusively located to the commercial uses.**



2) **Recycling & Composting: In an effort to reduce waste, we will make both composting and recycling available for all tenants, at our cost, on a weekly pick up schedule. We have connected with Black Earth Composting, and they will be offering composting services. Republic Waste will provide recycling services.**

This multi-pronged approach allows us to easily increase our capacity, while implementing reduction strategy's aligned with DEP's Master Plan.

[MB] Construction: The one construction entrance being provided off Pinevale is an interesting choice. An alternative entrance proposal off Main St offered for consideration would be appreciated.

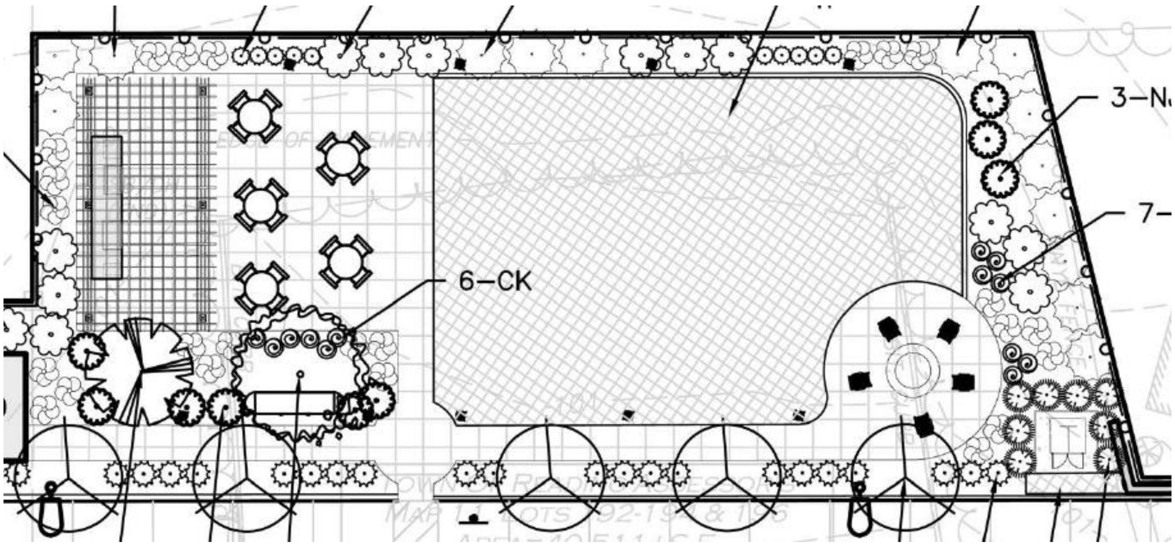
[Applicant Response:] We're open to whatever the community feels would work best to help mitigate any impacts.

[MB] Affordable leases: Please provide sample affordable leases.

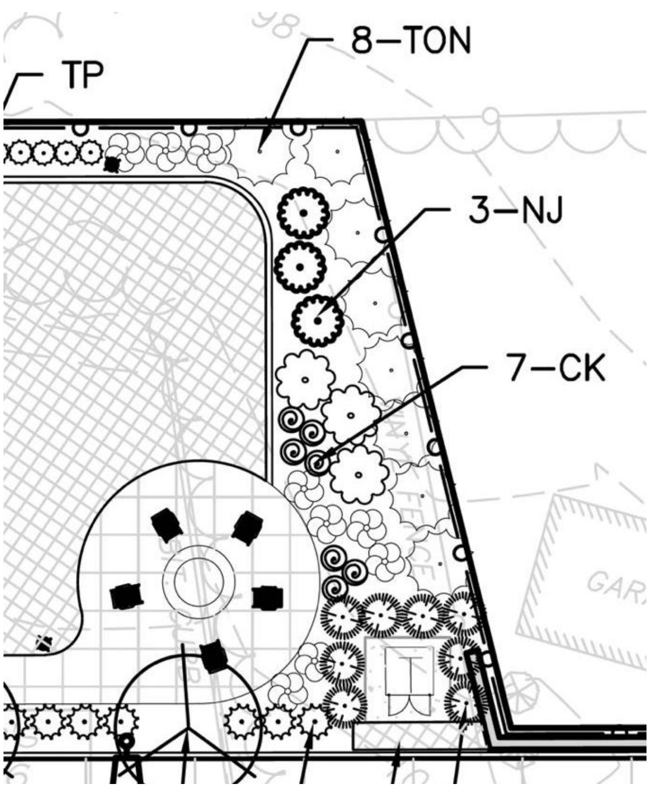
[Applicant Response:] We will work with our agent to provide these.

[MB] Amenity management: Please provide details of how you plan to manage resident access to the rear amenity area in order to ascertain that it won't be used late at night and become a nuisance.

[Applicant Response:] We will not allow late night access to this area and this will be administered via our leases and property rules. Please also recall, we are only abutted on one, short span of fencing by an abutter's backyard (12 Pinevale). The other 2 sides of this area are abutted by a private way (Star Road), or wooded area. We have designed our landscaping to wrap around the perimeter of this area, in its entirety, including evergreens and trees:



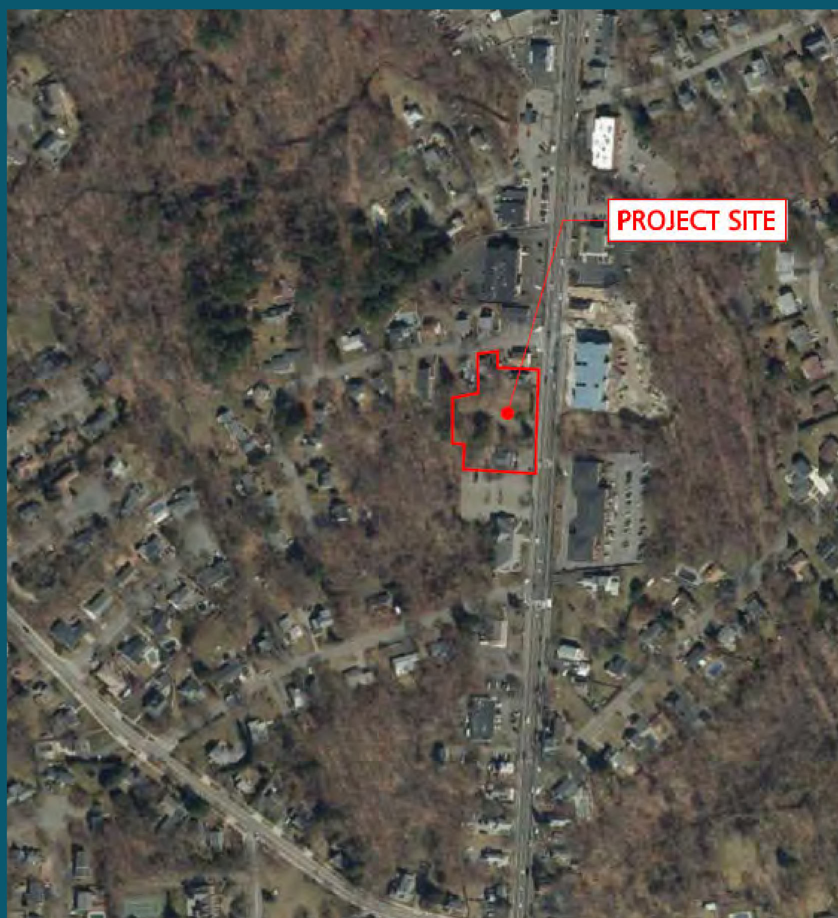
Along the boundary of 12 Pinevale, we've proposed an oversized planting buffer featuring 7 types of plantings, including 8 x 8-ton evergreens which will line the fence, provide privacy and sound mitigation. See below:



DRAINAGE REPORT

ALLEN & MAJOR ASSOCIATES, INC.

Strada Mixed Used Building
252-262 Main Street & 10 Pinevale Avenue
Reading, Massachusetts



APPLICANT:
BLVD Reading, LLC
1 Sylvan Street
Peabody, MA 01960

PREPARED BY:
Allen & Major Associates, Inc.
100 Commerce Way, Suite 5
Woburn, Massachusetts 01801
E.O.R. Carlton Quinn PE

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER

DRAINAGE REPORT

Mixed Used Building
252-262 Main Street
& 10 Pinevale Avenue
Reading, MA

APPLICANT:
BLVD READING, LLC
1 Sylvan Street
Peabody, MA 01960

PREPARED BY:
Allen & Major Associates, Inc.
100 Commerce Way, Suite 5
Woburn, Massachusetts 01801

ISSUED:
October 5, 2023

REVISED:

A&M PROJECT NO.:
2398-01A

TABLE OF CONTENTS

Introduction

The purpose of this drainage report is to provide an overview of the proposed stormwater management system (SMS) for the new development located at 252-262 main street & 10 Pinevale Ave in Reading. The report will show by means of narrative, calculations and exhibits that the proposed stormwater management system will meet or exceed the Massachusetts Department of Environmental Protection (MassDEP) stormwater standards, and the town Stormwater Management Regulations.

The proposed site improvements include the demolishing of three buildings, clearing of existing vegetation and constructing one mixed-use building. Other improvements to the site include construction of surface parking, landscaping and underground utilities servicing the site. The project will be serviced by connecting existing utilities off of Main street and Pinevale street.

The proposed SMS incorporates structural and non-structural Best Management Practices (BMPs) to provide stormwater peak flow mitigation, quality treatment, and conveyance.

The SMS includes drywells, catch basins, water quality units, drain manholes, roof drains, underground piping, underground infiltration chambers, and an Operation & Maintenance Plan.

Site Categorization for Stormwater Regulations

The proposed site improvements at 252-262 Main Steet & 10 Pinevale Ave are considered a new development under the DEP Stormwater Management Standards due to the net increase in impervious area. A new development project is required to meet all of Stormwater Management Standards listed within the MA DEP Stormwater Handbook.

Site Location and Access

The site consists of four lots with 247 feet of frontage on Main Street entirely within the town of Reading. The site is situated between Pinevale Street to the north and Main Street to the east. The site is currently accessed by three curb cuts. The first two being existing entrances coming off Main Street and the other proposed entrance coming off Pinevale Avenue.

Existing Site Conditions

The site currently includes two residential houses, and a retail building. Most of the site is currently wooded, except for the access driveway to the commercial building & a driveway to the north of the site that serves the residential property. The site also has a retaining wall that runs along the frontage that varies in height from one to four-feet tall. The site topography slopes west towards the rear and east towards Main Street from a high point located at the center of the site.

The surface drainage flows were analyzed at three Study Points. Study Point #1 summarizes off-site flows generated from the western area of the site that flow north off site to transition into gutter line flow to the drainage system on Pinevale Avenue. Study Point #2 summarizes off site flows towards the catch basin on Main street. This catchment area sits in the eastern side of the site. Once flow has left the site it becomes concentrated in the gutter line and then directly to the drainage system. Study Point #3 has been delineated as the existing wetlands towards the south of the site. Copies of the existing watershed plan, showing the boundaries of each catchment area, are provided in the rear pocket of this report.

Existing Soil Conditions

The on-site soils were identified using the USDA Natural Resources Conservation Services (NRCS) Soil Survey for Middlesex County. The site is primarily soil type 602 – Urban Land. These soil types are assumed to be A-type soils because of the landform (outwash terraces/plans) as well as the surrounding soil types. There is a copy of the boring logs taken at this site, provided in the rear pocket of this report.

A copy of the NRCS Custom Soil Resource Report is included in the appendix of this report.

FEMA Floodplain/Environmental Due Diligence

There are no portions of the site located within the FEMA Zone "AE" Special Flood Hazard Area Subject to Inundation by the 1% Annual Chance Flood (100-year floodplain). The official Flood Insurance Rate Map (FIRM) effective date June 4, 2010, community panel 312 of 656. Map number 25017C0313E. See section 3 of this report for a copy of the FEMA FIRM.

Environmentally Sensitive Zones

The Commonwealth of Massachusetts asserts control over numerous protected and regulated areas including: Areas of Critical Environmental Concern (ACEC); Outstanding Resource Waters (ORWs); Priority and Protected Habitat for rare and endangered species, and areas protected under the Wetlands Protection Act. The subject property is not located within any of these regulated areas.

Drainage Analysis Methodology

A peak rate of runoff will be determined using techniques and data found in the following:

1. Urban Hydrology for Small Watersheds – Technical Release 55 by the United States Department of Agriculture Soils Conservation Service, June 1986. Runoff curve numbers and 24-hour precipitation values were obtained from this reference.
2. HydroCAD © Stormwater Modeling System by HydroCAD Software Solutions LLC, version 10.00-24. The HydroCAD program was used to generate runoff

hydrographs for the watershed areas, to determine discharge/ stage/storage characteristics for the stormwater BMPs, to perform drainage routing and to combine the results of the runoff hydrographs. HydroCAD uses the TR-20 methodology of the SCS Unit Hydrograph procedure (SCS-UH).

3. Soil Survey of Middlesex County Massachusetts by United States Department of Agriculture, NRCS. Soil types and boundaries were obtained from this reference.

Proposed Conditions – Peak Rate of Runoff

The stormwater runoff analysis of the existing and proposed conditions includes an estimate of the peak rate of runoff from various rainfall events. Peak runoff rates were developed using TR55 Urban Hydrology for Small Watersheds, developed by the U.S. Department of Commerce, Engineering Division and the HydroCAD computer program. Further, the analysis has been prepared in accordance with the MassDEP and the town requirements and standard engineering practices. The peak rate of runoff has been estimated for each watershed during the 2, 10, 25, and 100-year storm events.

The proposed stormwater management system for the site consists of drywells, catch basins, water quality units, drain manholes, roof drains, underground piping, area drains, underground infiltration chambers These systems have been designed in accordance with the MA DEP Stormwater Management Policy to recharge groundwater and reduce rate of runoff from the parcel.

The proposed Underground Infiltration System #1 (UIS#1) collects flows from the proposed roof (Sub-catchment R-1), parking area (Sub-catchments P-1 and most of the amenity area (Sub-catchment area P-5). The proposed Underground Infiltration System #2 (UIS#2) collects water from Sub-catchment area P-2, which mostly consists of impervious cover. The proposed Underground Infiltration System #3 (UIS#3) collects water from Sub-catchment area 3, which is also mostly impervious cover. When UIS-3 is at its full capacity it outlets the existing drainage system on the public R.O.W. These infiltration systems were designed to contain flow for the 25-year storm, as requested by the town of Reading Engineering department. This will help mitigate extra flow to the existing drainage structures on Pinevale/Main Street and promote infiltration.

The proposed drywell system is intended to collect any runoff from sub catchment P-4. It has been sized to address any storm runoff from the impervious cover area with a depth of 1”. Stone bedding will be placed around the system to add extra storage capacity. Once the system has reached capacity it will spill over to the gutter line and be caught in the existing drainage system, “study point 2”.

Study point 3 (Flow off-site to the existing wetlands) which captures storm runoff from Sub-catchment 3, which is mostly landscape cover. The peak rate/volume for this study point has been minimized compared to the existing conditions.

The stormwater runoff model indicates that the proposed site development reduces the rate of runoff during all storm events at the identified points of analysis. The following tables provide a summary of the estimated peak rate, in Cubic Feet per Second (CFS) and total runoff volume, in cubic feet (CF) at each of the three Study Points for each of the design storm events. The HydroCAD worksheets are included in Section 4 and 5 of this report.

STUDY POINT #1: (Flow Off-Site to Drainage System)

	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	0.36	0.94	1.34	1.99
Proposed Flow (CFS)	0.00	0.00	0.00	0.47
Decrease (CFS)	**0.36**	**0.94**	**1.34**	**1.52**
Existing Volume (CF)	1,328	3,262	4,649	6,934
Proposed Volume (CF)	0	0	0	1,295
Change (CF)	**1,328**	**3,262**	**4,649**	**5,640**

STUDY POINT #2: (Flow Off-Site to Drainage System)

	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	0.72	1.90	2.73	4.07
Proposed Flow (CFS)	0.00	0.00	0.00	0.47
Decrease (CFS)	**0.72**	**1.90**	**2.73**	**3.60**
Existing Volume (CF)	2,631	6,530	9,336	13,970
Proposed Volume (CF)	0	0	0	1,295
Change (CF)	**2,631**	**6,530**	**9,336**	**12,675**

STUDY POINT #3: (Flow to Wetlands)

	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	0.03	0.24	0.41	0.71
Proposed Flow (CFS)	0.00	0.01	0.02	0.06
Decrease (CFS)	**0.03**	**0.23**	**0.39**	**0.65**
Existing Volume (CF)	254	928	1,482	2,462
Proposed Volume (CF)	5	58	113	221
Change (CF)	**249**	**870**	**1,369**	**2,241**

TOTAL

	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	1.11	3.08	4.48	6.77
Proposed Flow (CFS)	0.00	0.01	0.02	0.53
Decrease (CFS)	**1.11**	**3.07**	**4.46**	**6.24**
Existing Volume (CF)	4,213	10,720	15,467	23,366
Proposed Volume (CF)	5	58	113	1,516
Change (CF)	**4,208**	**10,662**	**15,354**	**21,850**

MASSDEP Stormwater Performance Standards
The MA DEP Stormwater Management Policy was developed to improve water quality by implementing performance standards for stormwater management. The intent is to implement the stormwater management standards through the review of Notice of Intent filings by the issuing authority (Conservation Commission or DEP). The following section outlines how the proposed Stormwater Management System meets the standards set forth by the Policy.

BMP's implemented in the design include –

- Deep Sump Catch Basins
- Drywell
- Subsurface Structures
- Water Quality Units

Stormwater Best Management Practices (BMP's) have been incorporated into the design of the project to mitigate the anticipated pollutant loading. An Operations and Maintenance Plan has been developed for the project, which addresses the long-term maintenance requirements of the proposed system.

Temporary erosion and sedimentation controls will be incorporated into the construction phase of the project. These temporary controls may include straw bale and/or silt fence barriers, inlet sediment traps, slope stabilization, and stabilized construction entrances.

The Massachusetts Department of Environmental Protection has established ten (10) Stormwater Management Standards. A project that meets or exceeds the standards is presumed to satisfy the regulatory requirements regarding stormwater management. The Standards are enumerated below as well as descriptions and supporting calculations as to how the Project will comply with the Standards:

1. *No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.*

   The proposed development will not introduce any new outfalls with direct discharge to a wetland area or waters of the Commonwealth of Massachusetts. All discharges will be treated for water quality and the rate will not be increased over existing conditions.

2. *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.*

   The proposed development has been designed so that the post-development peak discharge rates do not exceed the predevelopment peak discharge rates. A summary of the existing and proposed discharge rates is included within this document.

3. *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

   The existing annual recharge for the site has been approximated in the proposed condition. There are proposed subsurface infiltration systems designed to meet this requirement. Stormwater runoff generated from the impervious areas of the proposed development are routed through these infiltration BMPs. The proposed Recharge Volume is based on the Static Method per the MA DEP Stormwater Management Standards, Volume 3, Chapter 1.

   See the appendix located at section 6 of this report for stormwater recharge calculations.

4. *Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:*
   - *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
   - *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
   - *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

   Standard #4 is met when structural stormwater best management practices are sized to capture and treat the required water quality volume and pretreatment is provided in accordance with the Massachusetts Stormwater Handbook. Standard #4 also requires that suitable source control measures are identified in the Long-term Pollution Prevention Plan. The water quality volume for the site redevelopment is captured and treated using underground infiltration systems with isolator rows, water quality units, and drywells.

The implemented BMPs have been designed to treat the contributing water quality volume. These water quality calculations can be seen within the appendix of this report.

The proposed stormwater management system has been designed to remove 80% of the average annual post-construction load for each treatment train. The TSS removal calculations can be seen within the appendix of this report.

The TSS removal efficiencies for the proprietary separator are based on the values assigned under the Technology Acceptance and Reciprocity Partnership (TARP) testing protocol. The TARP is a workgroup of the Environmental Council of States that was originally comprised of California, Illinois, Maryland, Massachusetts, New Jersey, New York, Pennsylvania and Virginia. TARP is recognized in the MA DEP Stormwater Management Handbook as a valid source for assigning TSS removal efficiencies for proprietary separators.

5. *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.*

   The site is not considered a land use with higher potential pollutant loads.

6. *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account*

site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The project site does not discharge stormwater within a Zone II or Interim Wellhead Protection Area or near a critical area. Critical Areas are Outstanding Resource Waters as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02, bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

7. *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

   The proposed project is not considered a re-development project under the Stormwater Management Handbook guidelines as there is an increase in the amount of impervious area.

8. *A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

   A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction has been developed. A detailed Erosion and Sedimentation Control Plan is included in the Permit Drawings. The proponent will prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) prior to commencement of construction activities that will result in the disturbance of one acre of land or more.

9. *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

   A Long-Term Operation & Maintenance (O&M) Plan has been developed for the proposed stormwater management system and is included within this document. See Section 2.0 of this report.

10. *All illicit discharges to the stormwater management system are prohibited.*

    See appendix for Illicit Discharge Statement

Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

---

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
CARLTON M.
QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER

10/5/23

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☒ Other (describe): Underground Infiltration Sytstem (Stormtech SC-310, Stormtech SC-740)

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☐ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:
- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

SECTION 2.0 -
OPERATION & MAINTENANCE PLAN

Introduction

In accordance with the standards set forth by the Stormwater Management Policy issued by the Massachusetts Department of Environmental Protection (MassDEP), Allen & Major Associates, Inc. has prepared the following Operations & Maintenance (O&M) Plan for the proposed development at 252-260 Main Street, Reading, MA.

The plan is broken down into three major sections. The first section describes construction-related erosion and sedimentation controls (Demolition & Construction Maintenance Plan). The second section describes the long-term pollution prevention measures (Long Term Pollution Prevention Plan). The third section is a post-construction operation and maintenance plan designed to address the long-term maintenance needs of the stormwater management system (Long-Term Maintenance Plan – Facilities Description).

Notification Procedures for Change of Responsibility for O&M

The Stormwater Management System (SMS) for this project is owned by BLVD Reading LLC (owner). The owner shall be legally responsible for the long-term operation and maintenance of this SMS as outlined in this Operation and Maintenance Plan.

The owner shall submit an annual summary report and the completed Operation & Maintenance Schedule & Checklist to the Conservation Commission (via email or print copy), highlighting inspection and maintenance activities including performances of BMPs. Should ownership of the SMS change, the owner will continue to be responsible until the succeeding owner shall notify the Commission that the succeeding owner has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of transferring owner until the transferee owner notifies the Commission of its assumption of responsibility.

In the event the SMS will serve multiple lots/owners, such as the subdivision of the existing parcel or creation of lease areas, the owner(s) shall establish an association on other legally enforceable arrangements under which the association or a single party shall have legal responsibility for the operation and maintenance of the entire SMS. The legal instrument creating such responsibility shall be recorded with the Registry of Deeds and promptly following its recording, a copy thereof shall be furnished to the Commission.

Contact Information

Stormwater Management System Owner:	BLVD Reading LLC 1 Slyvan Street Peabody, MA Phone: (781) 389-5989

Emergency Contact Information:

BLVD Reading LLC (Owner/Operator)	Phone: (781) 389-5989
Allen & Major Associates, Inc. (Site Civil Engineer)	Phone: (781) 935-6889
Reading Department of Public Works	Phone: (781) 942-9092
Reading Conservation Commission	Phone: (781) 942-9016
Reading Fire Department (non-emergency line)	Phone: (781) 944-3131
MassDEP Emergency Response	Phone: (888) 304-1133
Clean Harbors Inc (24-Hour Line)	Phone: (800) 645-8265

Demolition & Construction Maintenance Plan

1. Call Digsafe: 1-888-344-7233
2. Contact the town at least three (3) days prior to start of demolition and/or construction activities.
3. Install Erosion Control measures as shown on the Plans prepared by A&M. The town shall review the installation of straw bales and silt fencing prior to the start of any site demolition work. Install Construction fencing if determined to be necessary at the commencement of construction.
4. Install construction entrances, straw bales, and silt fence at the locations shown on the Erosion Control Plan prepared by A&M.
5. Site access shall be achieved only from the designated construction entrances.
6. Cut and clear trees in construction areas only (within the limit of work; see plans).
7. Stockpiles of materials subject to erosion shall be stabilized with erosion control matting or temporary seeding whenever practicable, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.
8. Install silt sacks and straw bales around each drain inlet prior to any demolition and or construction activities.

9. All erosion control measures shall be inspected weekly and after every rainfall event. Records of these inspections shall be kept on-site for review.
10. All erosion control measures shall be maintained, repaired, or replaced as required or at the direction of the owner's engineer or the town.
11. Sediment accumulation up-gradient of the straw bales, silt fence, and stone check dams greater than 6" in depth shall be removed and disposed of in accordance with all applicable regulations.
12. If it appears that sediment is exiting the site, silt sacks shall be installed in all catch basins adjacent to the site. Sediment accumulation on all adjacent catch basin inlets shall be removed and the silt sack replaced if torn or damaged.
13. Install stone check dams on-site during construction as needed. Refer to the erosion control details. Temporary sediment basins combined with stone check damns shall be installed on-site during construction to control and collect runoff from upland areas of this site during demolition and construction activities.
14. The contractor shall comply with the Sedimentation and Erosion Control Notes as shown on the Site Development Plans and Specifications.
15. The stabilized construction entrances shall be inspected weekly and records of inspections kept. The entrances shall be maintained by adding additional clean, angular, durable stone to remove the soil from the construction vehicle's tires when exiting the site. If soil is still leaving the site via the construction vehicle tires, adjacent roadways shall be kept clean by street sweeping.
16. Dust pollution shall be controlled using on-site water trucks and/or an approved soil stabilization product.
17. During demolition and construction activities, Status Reports on compliance with this O&M Document shall be submitted weekly. The report shall document any deficiencies and corrective actions taken by the applicant.

Long-Term Pollution Prevention Plan

Standard #4 from the MassDEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation and Maintenance Plan of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures of the LTPPP.

- <u>Housekeeping</u>
  The existing development has been designed to maintain a high level of water quality treatment for all stormwater discharge to the wetland areas. An Operation and Maintenance (O&M) plan has been prepared and is included in this section of the report. The owner (or its designee) is responsible for adherence to the O&M plan in a strict and complete manner.

- <u>Storing of Materials & Water Products</u>
  The trash and waste program for the site includes exterior dumpsters. There is a trash contractor used to pick up the waste material in the dumpsters. The stormwater drainage system has water quality inlets designed to capture trash and debris.

- <u>Vehicle Washing</u>
  Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions, as the detergent-rich water used to wash the grime off the vehicle enters the stormwater drainage system. The existing development does not include any designated vehicle washing areas, nor is it expected that any vehicle washing will take place on-site.

- <u>Spill Prevention & Response</u>
  Sources of potential spill hazards include vehicle fluids, liquid fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within the buildings and would not enter the stormwater drainage system. However, there are spill hazards from vehicle fluids or liquid fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

  1. Spill hazards of pesticides, paints, and solvents shall be remediated using the Manufacturers' recommended spill cleanup protocol.
  2. Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
  3. The owner shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust pans, mops, rags, gloves, absorptive material, sand, sawdust, plastic and metal trash containers.
  4. All spills shall be cleaned up immediately after discovery.
  5. Spills of toxic or hazardous material shall be reported, regardless of size, to the Massachusetts Department of Environmental Protection at (888) 304-1333.

6. Should a spill occur, the pollution prevention plan will be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures will be included in the updated pollution prevention plan.

- Maintenance of Lawns, Gardens, and Other Landscaped Areas
  It should be recognized that this is a general guideline towards achieving high quality and well-groomed landscaped areas. The grounds staff/landscape contractor must recognize the shortcomings of a general maintenance plan such as this, and modify and/or augment it based on weekly, monthly, and yearly observations. In order to assure the highest quality conditions, the staff must also recognize and appreciate the need to be aware of the constantly changing conditions of the landscaping and be able to respond to them on a proactive basis. No trees shall be planted over the drain lines or recharge area, and that only shallow rooted plants and shrubs will be allowed.

  - Fertilizer
    Maintenance practices should be aimed at reducing environmental, mechanical and pest stresses to promote healthy and vigorous growth. When necessary, pest outbreaks should be treated with the most sensitive control measure available. Synthetic chemical controls should be used only as a last resort to organic and biological control methods. Fertilizer, synthetic chemical controls and pest management applications (when necessary) shall be performed only by licensed applicators in accordance with the manufacturer's label instructions when environmental conditions are conducive to controlled product application.

    Only slow-release organic fertilizers should be used in the planting and mulch areas to limit the amount of nutrients that could enter downstream resource areas. Fertilization of the planting and mulch areas will be performed within manufacturers labeling instructions and shall not exceed an NPK ration of 1:1:1 (i.e. Triple 10 fertilizer mix), considered a low nitrogen mixture. Fertilizers approved for the use under this O&M Plan are as follows:

    Type: LESCO® 28-0-12 (Lawn Fertilizer)
    MERIT® 0.2 Plus Turf Fertilizer
    MOMENTUM™ Force Weed & Feed

  - Suggested Aeration Program
    In-season aeration of lawn areas is good cultural practice, and is recommended whenever feasible. It should be accomplished with a solid thin tine aeration method to reduce disruption to the use of the area. The

depth of solid tine aeration is similar to core type, but should be performed when the soil is somewhat drier for a greater overall effect.

Depending on the intensity of use, it can be expected that all landscaped lawn areas will need aeration to reduce compaction at least once per year. The first operation should occur in late May following the spring season. Methods of reducing compaction will vary based on the nature of the compaction. Compaction on newly established landscaped areas is generally limited to the top 2-3" and can be alleviated using hollow core or thin tine aeration methods.

The spring aeration should consist of two passes at opposite directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. Aeration should occur when the soil is moist but not saturated. The soil cores should be shattered in place and dragged or swept back into the turf to control thatch. If desired the cores may also be removed and the area top-dressed with sand or sandy loam. If the area drains on average too slowly, the topdressing should contain a higher percentage of sand. If it is draining on average too quickly, the top dressing should contain a higher percentage of soil and organic matter.

- Landscape Maintenance Program Practices:
  - Lawn

    1. Mow a minimum of once a week in spring, to a height of 2” to 2 1/2” high. Mowing should be frequent enough so that no more than 1/3 of grass blade is removed at each mowing. The top growth supports the roots; the shorter the grass is cute, the less the roots will grow. Short cutting also dries out the soil and encourages weeds to germinate.
    2. Mow approximately once every two weeks from July 1st to August 15th depending on lawn growth.
    3. Mow on a ten-day cycle in fall, when growth is stimulated by cooler nights and increased moisture.
    4. Do not remove grass clippings after mowing.
    5. Keep mower blades sharp to prevent ragged cuts on grass leaves, which cause a brownish appearance and increase the chance for disease to enter a leaf.
  - Shrubs

    1. Mulch not more than 3” depth with shredded pine or fir bark.

2. Hand prune annually, immediately after blooming, to remove 1/3 of the above-ground biomass (older stems). Stem removals are to occur within 6″ of the ground to open up shrub and maintain two-year wood (the blooming wood).
3. Hand-prune evergreen shrubs only as needed to remove dead and damaged wood and to maintain the naturalistic form of the shrub. Never mechanically shear evergreen shrubs.

- Trees
  1. Provide aftercare of new tree plantings for the first three years.
  2. Do not fertilize trees, it artificially stimulates them (unless tree health warrants).
  3. Water once a week for the first year; twice a month for the second; once a month for the third year.
  4. Prune trees on a four-year cycle.
- Invasive Species
  1. Inform the Conservation Commission Agent prior to the removal of invasive species proposed either through hand work or through chemical removal.

- Storage and Use of Herbicides and Pesticides

  Integrated Pest Management is the combination of all methods (of pest control) which may prevent, reduce, suppress, eliminate, or repel an insect population. The main requirements necessary to support any pest population are food, shelter and water, and any upset of the balance of these will assist in controlling a pest population. Scientific pest management is the knowledgeable use of all pest control methods (sanitation, mechanical, chemical) to benefit mankind's health, welfare, comfort, property and food. A Pest Management Professional (PMP) should be retained who is licensed with the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Department of Agricultural Resources.

  The site manager will be provided with approved bulletin before entering into or renewing an agreement to apply pesticides for the control of indoor household or structural pests, refer to 333 CMR 13.08.

  Before beginning each application, the applicator must post a Department approved notice on all of the entrances to the treated room or area. The applicator must leave such notices posted after the application. The notice will be posted at conspicuous point(s) of access to the area treated. The location and number of signs will be determined by the configuration of the area to be treated based on the applicator's best judgment. It is intended to give sufficient notice so that no one comes into an area being treated unaware that the applicator is working and pesticides are being applied. However, if the contracting entity does not want the signs posted, he/she may sign a Department approved waiver indicating this.

The applicator or employer will provide to any person upon their request the following information on previously conducted applications:

1. Name and phone number of pest control company;
2. Date and time of the application;
3. Name and license number of the applicator;
4. Target pests; and
5. Name and EPA Registration Number of pesticide products applied.

- Pet Waste Management
  The owner's landscape crew (or designee) shall remove any obvious pet waste that has been left behind by pet owners within the development. The pet waste shall be disposed of in accordance with local and state regulations.
- Operations and Management of Septic Systems
  There are no proposed septic systems within the limits of the project.
- Management of Deicing Chemicals and Snow
  Snow will be stockpiled on site until the accumulated snow becomes a hazard to the daily operations of the site. It will be the responsibility of the snow removal contractor to properly dispose of transported snow according to MassDEP, Bureau of Resource Protection – Snow Disposal Guideline #BRPG01-01, governing the proper disposal of snow. It will be the responsibility of the snow removal contractor to follow these guidelines and all applicable laws and regulations

  The owner's maintenance staff (or its designee) will be responsible for the clearing of the sidewalk and building entrances. The owner may be required to use a de-icing agent such as potassium chloride to maintain a safe walking surface. If used, the de-icing agent for the walkways and building entrances will be kept within the storage rooms located within the building. If used, de-icing agents will not be stored outside. The owner's maintenance staff will limit the application of sand.

Long-Term Maintenance Plan – Facilities Description

A maintenance log will be kept (i.e. report) summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to department staff and a copy provided to the department upon request.

The following is a description of the Stormwater Management System for the project site.

Stormwater Collection System – On-Site:

The stormwater collection system is a series of inlets located at low points within the limits of the paved area. All of the proposed on-site catch basins incorporate a deep sump and hooded outlet. The catch basins are connected by a closed gravity pipe network that pass through proprietary separators prior to entering the underground detention chamber or porous pavement.

Other Maintenance Activity:

- Mosquito Control - Both above ground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance, and treatment with larvicides can minimize this potential. See the supplemental information for Mosquito Control in Stormwater Management Practices, and the Operation and Maintenance Plan Schedule for inspection schedule.
- Street Sweeping - Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

Inspection and Maintenance Frequency and Corrective Measures

In accordance with MA DEP Stormwater Handbook: Volume 2, Chapter 2; the previously described BMPs will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments, trash, and debris. In any and all cases, operations, inspections, and maintenance activities shall utilize best practical measures to avoid and minimize impacts to wetland resource areas outside the footprint of the SMS.

Supplemental Information

- Operation & Maintenance Plan Schedule
- Massachusetts Stormwater Handbook, Chapter 5, Miscellaneous Stormwater Topics, Mosquito Control in Stormwater Management Practices.
- Massachusetts Department of Environmental Protection Bureau of Water Resources Snow Disposal Guidance.
- Stormtech Isolator ROW O&M Manual

OPERATION AND MAINTENANCE PLAN SCHEDULE **Date: 10/5/2023**

ALLEN & MAJOR
ASSOCIATES, INC.

Project: Strada Mixed Use Building
Project Address: 258 Main Street Reading, MA
Responsible for O&M Plan: BLVD Reading, LLC
Address: 1 Sylvan Street, Peabody MA 01960
Phone: (781) 389-5989

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/ FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
STRUCTURAL PRETREATMENT BMPs	DEEP SUMP CATCH BASIN	Four times per year (quarterly).	Inspect and clean catch basin units whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.	$1,000		
	PROPRIETARY SEPARATORS	In accordance with manufacturers requirements, but no less than twice a year following installation and once a year thereafter.	Remove sediment and other trapped pollutants at frequency or level specified by manufacturer.	$2,000		

All information within table is derived from Massachussetts Stormwater Handbook: Volume 2, Chapter 2

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/ FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
INFILTRATION BMPs	DRY WELL	Inspect after every major storm in the first few months following construction. Thereafter, inspect annually.	Inspect dry wells. Measure the water depth in the observation well at 24- and 48-hour intervals after a storm. Calculate clearance rates by dividing the drop in water level (inches) by the time elapsed (hr.).	$500		
	SUBSURFACE STRUCTURES	Inspect structure inlets at least twice a year. Remove debris that may clog the system as needed.	Because subsurface structures are installed underground, they are extremely difficult to maintain. Remove any debris that might clog the system.	$500		
	OUTLET STRUCTURES	Periodic cleaning of Outlet Control Structures as needed.	Clear trash and debris as necessary.	$500		

All information within table is derived from Massachussetts Stormwater Handbook: Volume 2, Chapter 2

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/ FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
OTHER MAINTENANCE ACTIVITY	MISQUITO CONTROL	Inspect BMPs as needed to ensure the system's drainage time is less than the maximum 72 hour period.	Massachusetts stormwater handbook requires all stormwater practices that are designed to drain do so within 72 hours to reduce the number of mosquitos that mature to adults since the aquatic stage of a mosquito is 7-10 days.	$100		
	SNOW STORAGE	Clear and remove snow to approved storage locations as necessary to ensure systems are working properly and are protected from meltwater pollutants.	Carefully select snow disposal sites before winter. Avoid dumping removed snow over catch basins, or in detention ponds, sediment forebays, rivers, wetlands, and flood plains. It is also prohibited to dump snow in the bioretention basins or gravel swales.	$500		
	STREET SWEEPING	Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably spring.	Sweep, power broom or vacuum paved areas. Submit information that confirms that all street sweepings have been completed in accordance with state and local requirements	$2,000		

All information within table is derived from Massachussetts Stormwater Handbook: Volume 2, Chapter 2

Chapter 5
Miscellaneous Stormwater Topics

Mosquito Control in Stormwater Management Practices

Both aboveground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance and treatment with larvicides can minimize this potential.

EPA recommends that stormwater treatment practices dewater within 3 days (72 hours) to reduce the number of mosquitoes that mature to adults, since the aquatic stage of many mosquito species is 7 to 10 days. Massachusetts has had a 72-hour dewatering rule in its Stormwater Management Standards since 1996. The 2008 technical specifications for BMPs set forth in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook also concur with this practice by requiring that all stormwater practices designed to drain do so within 72 hours.

Some stormwater practices are designed to include permanent wet pools. These practices – if maintained properly – can limit mosquito breeding by providing habitat for mosquito predators. Additional measures that can be taken to reduce mosquito populations include increasing water circulation, attracting mosquito predators by adding suitable habitat, and applying larvicides.

The Massachusetts State Reclamation and Mosquito Control Board (SRMCB), through the Massachusetts Mosquito Control Districts, can undertake further mosquito control actions specifically for the purpose of mosquito control pursuant to Massachusetts General Law Chapter 252. The Mosquito Control Board, http://www.mass.gov/agr/mosquito/, describes mosquito control methods and is in the process of developing guidance documents that describe Best Management Practices for mosquito control projects.

The SRMCB and Mosquito Control Districts are not responsible for operating and maintaining stormwater BMPs to reduce mosquito populations. The owners of property that construct the stormwater BMPs or municipalities that "accept" them through local subdivision approval are responsible for their maintenance.[1] The SRMCB is composed of officials from MassDEP, Department of Agricultural Resources, and Department of Conservation and Recreation. The nine (9) Mosquito Control Districts overseen by the SRMCB are located throughout Massachusetts, covering 176 municipalities.

Construction Period Best Management Practices for Mosquito Control

To minimize mosquito breeding during construction, it is essential that the following actions be taken to minimize the creation of standing pools by taking the following actions:

- ***Minimize Land Disturbance:*** Minimizing land disturbance reduces the likelihood of mosquito breeding by reducing silt in runoff that will cause construction period controls to clog and retain standing pools of water for more than 72 hours.
- ***Catch Basin inlets:*** Inspect and refresh filter fabric, hay bales, filter socks or stone dams on a regular basis to ensure that any stormwater ponded at the inlet drains within 8 hours after precipitation stops. Shorter periods may be necessary to avoid hydroplaning in roads

[1] MassDEP and MassHighway understand that the numerous stormwater BMPs along state highways pose a unique challenge. To address this challenge, the 2004 MassHighway Stormwater Handbook will provide additional information on appropriate operation and maintenance practices for mosquito control when the Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards..

caused by water ponded at the catch basin inlet. Treat catch basin sumps with larvicides such as *Bacillus sphaericus* (*Bs*) using a licensed pesticide applicator.

- ***Check Dams:*** If temporary check dams are used during the construction period to lag peak rate of runoff or pond runoff for exfiltration, inspect and repair the check dams on a regular basis to ensure that any stormwater ponded behind the check dam drains within 72 hours.
- ***Design construction period sediment traps*** to dewater within 72 hours after precipitation. Because these traps are subject to high silt loads and tend to clog, treat them with the larvicide *Bs* after it rains from June through October, until the first frost occurs.
- ***Construction period open conveyances:*** When temporary manmade ditches are used for channelizing construction period runoff, inspect them on a regular basis to remove any accumulated sediment to restore flow capacity to the temporary ditch.
- ***Revegetating Disturbed Surfaces:*** Revegetating disturbed surfaces reduces sediment in runoff that will cause construction period controls to clog and retain standing pools of water for greater than 72 hours.
- ***Sediment fences/hay bale barriers:*** When inspections find standing pools of water beyond the 24-hour period after a storm, take action to restore barrier to its normal function.

<u>Post-Construction Stormwater Treatment Practices</u>

- Mosquito control begins with the environmentally sensitive site design. Environmentally sensitive site design that minimizes impervious surfaces reduces the amount of stormwater runoff. Disconnecting runoff using the LID Site Design credits outlined in the Massachusetts Stormwater Handbook reduces the amount of stormwater that must be conveyed to a treatment practice. Utilizing green roofs minimizes runoff from smaller storms. Storage media must be designed to dewater within 72 hours after precipitation.
- Mosquito control continues with the selection of structural stormwater BMPs that are unlikely to become breeding grounds for mosquitoes, such as:
  - ***Bioretention Areas/Rain Gardens/Sand Filter:*** These practices tend not to result in mosquito breeding. If any level spreaders, weirs or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
  - ***Infiltration Trenches:*** This practice tends not to result in mosquito breeding. If any level spreaders, weirs, or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
- Another mosquito control strategy is to select BMPs that can become habitats for mosquito predators, such as:
  - ***Constructed Stormwater Wetlands:*** Habitat features can be incorporated in constructed stormwater wetlands to attract dragonflies, amphibians, turtles, birds, bats, and other natural predators of mosquitoes.
  - ***Wet Basins:*** Wet basins can be designed to incorporate fish habitat features, such as deep pools. Introduce fish in consultation with Massachusetts Division of Fisheries and Wildlife. Vegetation within wet basins designed as fish habitat must be properly managed to ensure that vegetation does not overtake the habitat. Proper design to ensure that no low circulation or "dead" zones are created may reduce the potential for mosquito breeding. Introducing bubblers may increase water circulation in the wet basin.

Effective mosquito controls require proponents to design structural BMPs to prevent ponding and facilitate maintenance and, if necessary, the application of larvicides. Examples of such design practices include the following:

- ***Basins:*** Provide perimeter access around wet basins, extended dry detention basins and dry detention basins for both larviciding and routine maintenance. Control vegetation to ensure that access pathways stay open.
- ***BMPs without a permanent pool of water:*** All structural BMPs that do not rely on a permanent pool of water must drain and completely dewater within 72 hours after precipitation. This includes dry detention basins, extended dry detention basins, infiltration basins, and dry water quality swales. Use underdrains at extended dry detention basins to drain the small pools that form due to accumulation of silts. Wallace indicates that extended dry extended detention basins may breed more mosquitoes than wet basins. It is, therefore, imperative to design outlets from extended dry detention basins to completely dewater within the 72-hour period.
- ***Energy Dissipators and Flow Spreaders:*** Currier and Moeller, 2000 indicate that shallow recesses in energy dissipators and flow spreaders trap water where mosquitoes breed. Set the riprap in grout to reduce the shallow recesses and minimize mosquito breeding.
- ***Outlet control structures:*** Debris trapped in small orifices or on trash racks of outlet control structures such as multiple stage outlet risers may clog the orifices or the trash rack, causing a standing pool of water. Optimize the orifice size or trash rack mesh size to provide required peak rate attenuation/water quality detention/retention time while minimizing clogging.
- ***Rain Barrels and Cisterns:*** Seal lids to reduce the likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over inlets. The cistern system should be designed to ensure that all collected water is drained into it within 72 hours.
- ***Subsurface Structures, Deep Sump Catch Basins, Oil Grit Separators, and Leaching Catch Basins:*** Seal all manhole covers to reduce likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over the outlet (CALTRANS 2004).

The Operation and Maintenance Plan should provide for mosquito prevention and control.

- ***Check dams:*** Inspect permanent check dams on the schedule set forth in the O&M Plan. Inspect check dams 72 hours after storms for standing water ponding behind the dam. Take corrective action if standing water is found.
- ***Cisterns:*** Apply *Bs* larvicide in the cistern if any evidence of mosquitoes is found. The Operation and Maintenance Plan shall specify how often larvicides should be applied to waters in the cistern.
- ***Water quality swales:*** Remove and properly dispose of any accumulated sediment as scheduled in the Operation and Maintenance Plan.
- ***Larvicide Treatment:*** The Operation and Maintenance Plan must include measures to minimize mosquito breeding, including larviciding.
- The party identified in the Operation and Maintenance Plan as responsible for maintenance shall see that larvicides are applied as necessary to the following stormwater treatment practices: catch basins, oil/grit separators, wet basins, wet water quality swales, dry extended detention basins, infiltration basins, and constructed stormwater wetlands. The Operation and Maintenance Plan must ensure that all larvicides are applied by a licensed pesticide applicator and in compliance with all pesticide label requirements.
- The Operation and Maintenance Plan should identify the appropriate larvicide and the time and method of application. For example, *Bacillus sphaericus (Bs*), the preferred

larvicide for stormwater BMPs, should be hand-broadcast.[2] Alternatively, Altosid, a Methopren product, may be used. Because some practices are designed to dewater between storms, such as dry extended detention and infiltration basins, the Operation and Maintenance Plan should provide that larviciding must be conducted during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless a product is used that can withstand extended dry periods.

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[2] *Bacillus thuringienis israelensis* or *Bti* is usually applied by helicopter to wetlands and floodplains

Roads and Stormwater BMPs

In general, the stormwater BMPs used for land development projects can also be used for new roadways and roadway improvement projects. However, for improvement of existing roads, there are often constraints that limit the choice of BMP. These constraints derive from the linear configuration of the road, the limited area within the existing right-of-way, the structural and safety requirements attendant to good roadway design, and the long-term maintainability of the roadway drainage systems. The MassHighway Handbook provides strategies for dealing with the constraints associated with providing stormwater BMPs for roadway redevelopment projects.

Roadway design can minimize impacts caused by stormwater. Reducing roadway width reduces the total and peak volume of runoff. Designing a road with country drainage (no road shoulders or curbs) disconnects roadway runoff. Disconnection of roadway runoff is eligible for the Low Impact Site Design Credit provided the drainage is disconnected in accordance with specifications outlined in Volume 3.

Like other parties, municipalities that work within wetlands jurisdictional areas and adjacent buffer zones must design and implement structural stormwater best management practices in accordance with the Stormwater Management Standards and the Stormwater Management Handbook. In addition, in municipalities and areas where state agencies operate stormwater systems, the DPWs (or other town or state agencies) must meet the "good housekeeping" requirement of the municipality's or agency's MS4 permit.

MassHighway has taken stormwater management one step further by working with MassDEP to develop the MassHighway Storm Water Handbook for Highways and Bridges. The purpose of the MassHighway Handbook is to provide guidance for persons involved in the design, permitting, review and implementation of state highway projects, especially those involving existing roadways where physical constraints often limit the stormwater management options available. These constraints, like those common to redevelopment sites, may make it difficult to comply precisely with the requirements of the Stormwater Management Standards and the Massachusetts Stormwater Handbook.[3] In response to these constraints, MassDEP and MHD developed specific design, permitting, review and implementation practices that meet the unique challenges of providing environmental protection for existing state roads. The information in the MassHighway Handbook may also aid in the planning and design of projects to build new highways and to add lanes to existing highways, since they may face similar difficulties in meeting the requirements of the Stormwater Management Standards.

Although it is very useful, the MassHighway Handbook does not allow MassHighway projects to proceed without individual review and approval by the issuing authority when subject to the Wetlands Protection Act Regulations, 310 CMR 10.00, or the 401 Water Quality Certification Regulations, 314 CMR 9.00. For example, MassHighway must provide a Conservation Commission with a project-specific Operation and Maintenance Plan in accordance with Standard 9 that documents how the project's post-construction BMPs will be operated and maintained.[4]

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[3] The 2004 MassHighway Handbook outlines standardized methods for dealing with these constraints as they apply to highway redevelopment projects. MassDEP and MassHighway intend to work together to provide guidance for add a lane projects when the 2004 Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards.

[4] The general permit for municipal separate storm sewer systems (the MS4 Permit) requires MassHighway to develop and implement procedures for the proper operation and maintenance of stormwater BMPs. To

Some municipalities have asked if the MassHighway Handbook governs municipal road projects. The answer is no.[5] The MassHighway Handbook was developed in response to the unique problems and challenges arising out of the management of the state highway system. Like other project proponents, cities and towns planning road or other projects in areas subject to jurisdiction under the Wetlands Protection Act must design and implement LID, non-structural and structural best management practices in accordance with the Stormwater Management Standards and the Massachusetts Stormwater Handbook.

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avoid duplication of effort, MassHighway may be able rely on the same procedures to fulfill the operation and maintenance requirements of Standard 9 and the MS 4 Permit.

[5] Although the MassHighway Handbook does not govern municipal road projects, cities and towns may find some of the information presented in the Handbook useful.

Massachusetts Department of Environmental Protection
Bureau of Water Resources
Snow Disposal Guidance

Effective Date: December 23, 2019

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: Bureau of Resource Protection (BRP) Snow Disposal Guideline No. BRPG97-1 issued December 12, 1997 and BRPG01-01 issued March 8, 2001; Bureau of Water Resources (BWR) snow disposal guidance issued December 21, 2015 and December 12, 2018.

Approved by: Kathleen Baskin, Assistant Commissioner, Bureau of Water Resources

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are protective of wetlands, drinking water, and water bodies, and are acceptable to the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Water Resources.

APPLICABILITY: These Guidelines are issued by MassDEP's Bureau of Water Resources on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to all federal agencies, state agencies, state authorities, municipal agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While MassDEP is aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything that occurs on the land has the potential to impact the Commonwealth's water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help federal agencies, state agencies, state authorities, municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter. Following these guidelines and obtaining the necessary approvals may also help municipalities in cases when seeking reimbursement for snow disposal costs from the Federal Emergency Management Agency is possible.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces away from water resources and drinking water wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris which can be removed in the spring. The following conditions should be followed:

- Within water supply Zone A and Zone II, avoid storage or disposal of snow and ice containing deicing chemicals that has been collected from streets located outside these zones. Municipalities may have a water supply protection land use control that prohibits the disposal of snow and ice containing deicing chemicals from outside the Zone A and Zone II, subject to the Massachusetts Drinking Water Regulations at 310 CMR 22.20C and 310 CMR 22.21(2).
- Avoid storage or disposal of snow or ice in Interim Wellhead Protection Areas (IWPA) of public water supply wells, and within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.

- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage systems including detention basins, swales or ditches. Snow combined with sand and debris may block a stormwater drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Recommended Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:

- Estimate how much snow disposal capacity may be needed for the season so that an adequate number of disposal sites can be selected and prepared.
- Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).
- Select sites located in upland locations that are not likely to impact sensitive environmental resources first.
- If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

Snow Disposal Mapping Assistance

MassDEP has an online mapping tool to assist in identifying possible locations to potentially dispose of snow. MassDEP encourages municipalities to use this tool to identify possible snow disposal options. The tool identifies wetland resource areas, public drinking water supplies and other sensitive locations where snow should not be disposed. The tool may be accessed through the Internet at the following web address:
https://maps.env.state.ma.us/dep/arcgis/js/templates/PSF/.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- Wherever possible maintain a 50-foot vegetated buffer between the disposal site and adjacent waterbodies to filter pollutants from the meltwater.
- Clear debris from the site prior to using the site for snow disposal.
- Clear debris from the site and properly dispose of it at the end of the snow season, and no later than May 15.

3. SNOW DISPOSAL APPROVALS

Proper snow disposal may be undertaken through one of the following approval procedures:

- Routine snow disposal – Minimal, if any, administrative review is required in these cases when upland and pervious snow disposal locations or upland locations on impervious surfaces that have functioning and maintained stormwater management systems have been identified, mapped, and used for snow disposal following ordinary snowfalls. Use of upland and pervious snow disposal sites avoids wetland resource areas and allows snow meltwater to recharge groundwater and will help filter pollutants, sand, and other debris. This process will address the majority of snow removal efforts until an entity exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each entity's routine snow management efforts.
- Emergency Certifications – If an entity demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions may issue an Emergency Certification under the Massachusetts Wetlands Protection regulations to authorize snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas (i.e. within flood plains). Emergency Certifications can only be issued at the request of a public agency or by order of a public agency for the protection of the health or safety of citizens, and are limited to those activities necessary to abate the emergency. See 310 CMR 10.06(1)-(4). Use the following guidelines in these emergency situations:
    - Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
    - Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPAs of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
    - Do not dispose of snow where trucks may cause shoreline damage or erosion.
    - Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.

- Severe Weather Emergency Declarations – In the event of a large-scale severe weather event, MassDEP may issue a broader Emergency Declaration under the Wetlands Protection Act which allows federal agencies, state agencies, state authorities, municipalities, and businesses greater flexibility in snow disposal practices. Emergency Declarations typically authorize greater snow disposal options while protecting especially sensitive resources such as public drinking water supplies, vernal pools, land containing shellfish, FEMA designated floodways, coastal dunes, and salt marsh. In the event of severe winter storm emergencies, the snow disposal site maps created by municipalities will enable MassDEP and the Massachusetts Emergency Management Agency (MEMA) in helping communities identify appropriate snow disposal locations.

  If upland disposal sites have been exhausted, the Emergency Declaration issued by MassDEP allows for snow disposal near water bodies. In these situations, a buffer of at least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, the Emergency Declaration issued by MassDEP may allow disposal of snow in certain waterbodies under certain conditions. ***A federal agency, state agency, state authority, municipality or business seeking to dispose of snow in a waterbody should take the following steps***:

- Call the emergency contact phone number [(888) 304-1133)] and notify the MEMA of the municipality's intent.
- MEMA will ask for some information about where the requested disposal will take place.
- MEMA will confirm that the disposal is consistent with MassDEP's Severe Weather Emergency Declaration and these guidelines and is therefore approved.

During declared statewide snow emergency events, MassDEP's website will also highlight the emergency contact phone number [(888) 304-1133)] for authorizations and inquiries. For further non-emergency information about this Guidance you may contact your MassDEP Regional Office Service Center:

Northeast Regional Office, Wilmington, 978-694-3246
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-792-7650
Western Regional Office, Springfield, 413-755-2114

StormTech®

Detention • Retention • Recharge

Subsurface Stormwater Management℠

Isolator™ Row O&M Manual

StormTech® Chamber System for Stormwater Management

1.0 The Isolator™ Row

1.1 INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a patent pending technique to inexpensively enhance Total Suspended Solids (TSS) removal and provide easy access for inspection and maintenance.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

1.2 THE ISOLATOR™ ROW

The Isolator Row is a row of StormTech chambers, either SC-740 or SC-310 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

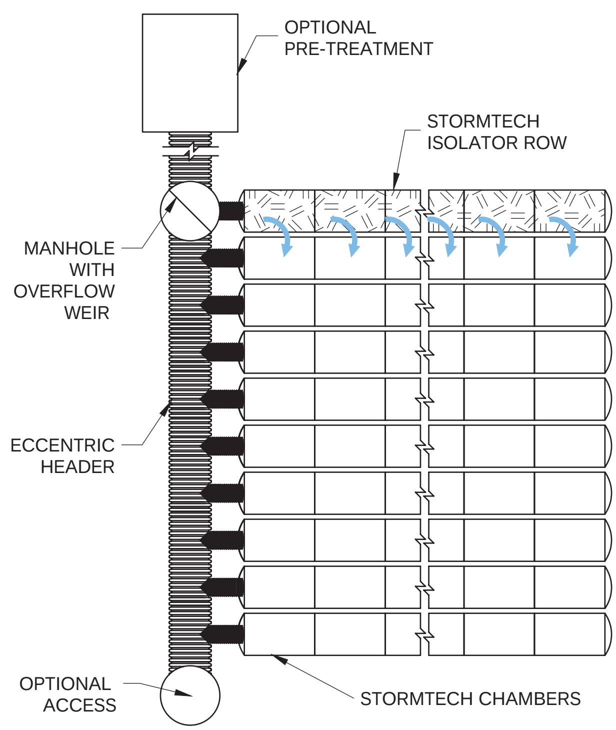
Two different fabrics are used for the Isolator Row. A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The tough geotextile provides a media for storm water filtration and provides a durable surface for maintenance operations. It is also designed to prevent scour of the underlying stone and remain intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber.

The Isolator Row is typically designed to capture the “first flush” and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole not only provides access to the Isolator Row but typically includes a high flow weir such that storm water flowrates or volumes that exceed the capacity of the Isolator Row overtop the over flow weir and discharge through a manifold to the other chambers.

The Isolator Row may also be part of a treatment train. By treating storm water prior to entry into the chamber system, the service life can be extended and pollutants such as hydrocarbons can be captured. Pre-treatment best management practices can be as simple as deep sump catch basins, oil-water separators or can be innovative storm water treatment devices. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

StormTech Isolator Row with Overflow Spillway
(not to scale)



2.1 INSPECTION

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

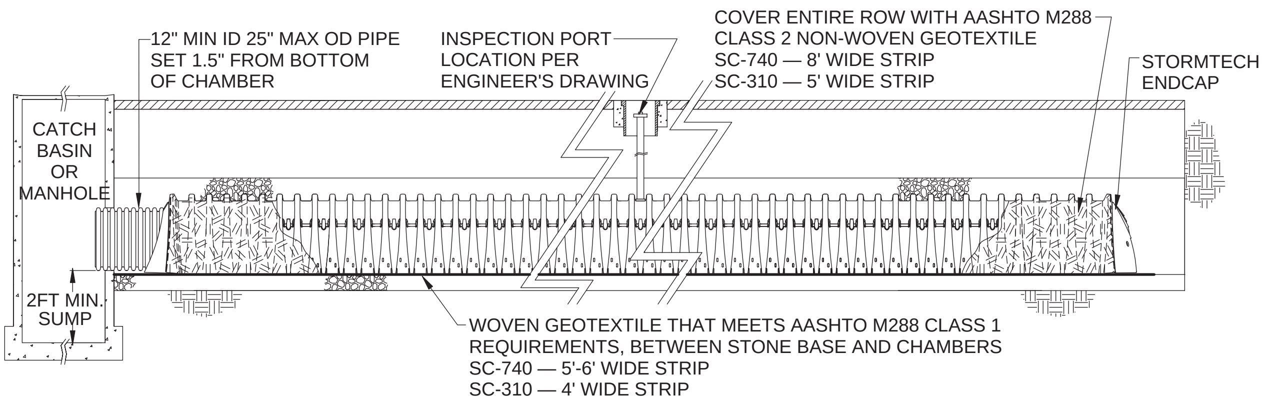
2.2 MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Examples of culvert cleaning nozzles appropriate for Isolator Row maintenance. (These are not StormTech products.)

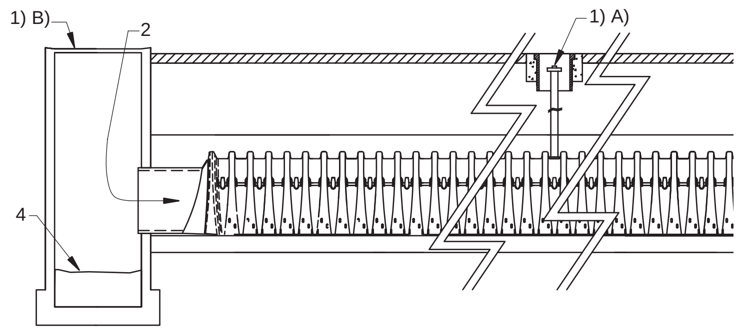
Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)



3.0 Isolator Row Step By Step Maintenance Procedures

StormTech Isolator Row (not to scale)



Step 1) Inspect Isolator Row for sediment

A) Inspection ports (if present)

i. Remove lid from floor box frame

ii. Remove cap from inspection riser

iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

iv. If sediment is at, or above, 3 inch depth proceed to Step 2. If not proceed to step 3.

B) All Isolator Rows

i. Remove cover from manhole at upstream end of Isolator Row

ii. Using a flashlight, inspect down Isolator Row through outlet pipe

1. Mirrors on poles or cameras may be used to avoid a confined space entry
2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches) proceed to Step 2. If not proceed to Step 3.

Step 2) Clean out Isolator Row using the JetVac process

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

Step 3) Replace all caps, lids and covers, record observations and actions

Step 4) Inspect & clean catch basins and manholes upstream of the StormTech system

Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/01	6.3 ft.	none		New installation. Fixed point is CI frame at grade	djm
9/24/01		6.2	0.1 ft.	Some grit felt	sm
6/20/03		5.8	0.5 ft.	Mucky feel, debris visible in manhole and in Isolator row, maintenance due	rv
7/7/03	6.3 ft.		0	System jetted and vacuumed	djm

StormTech®

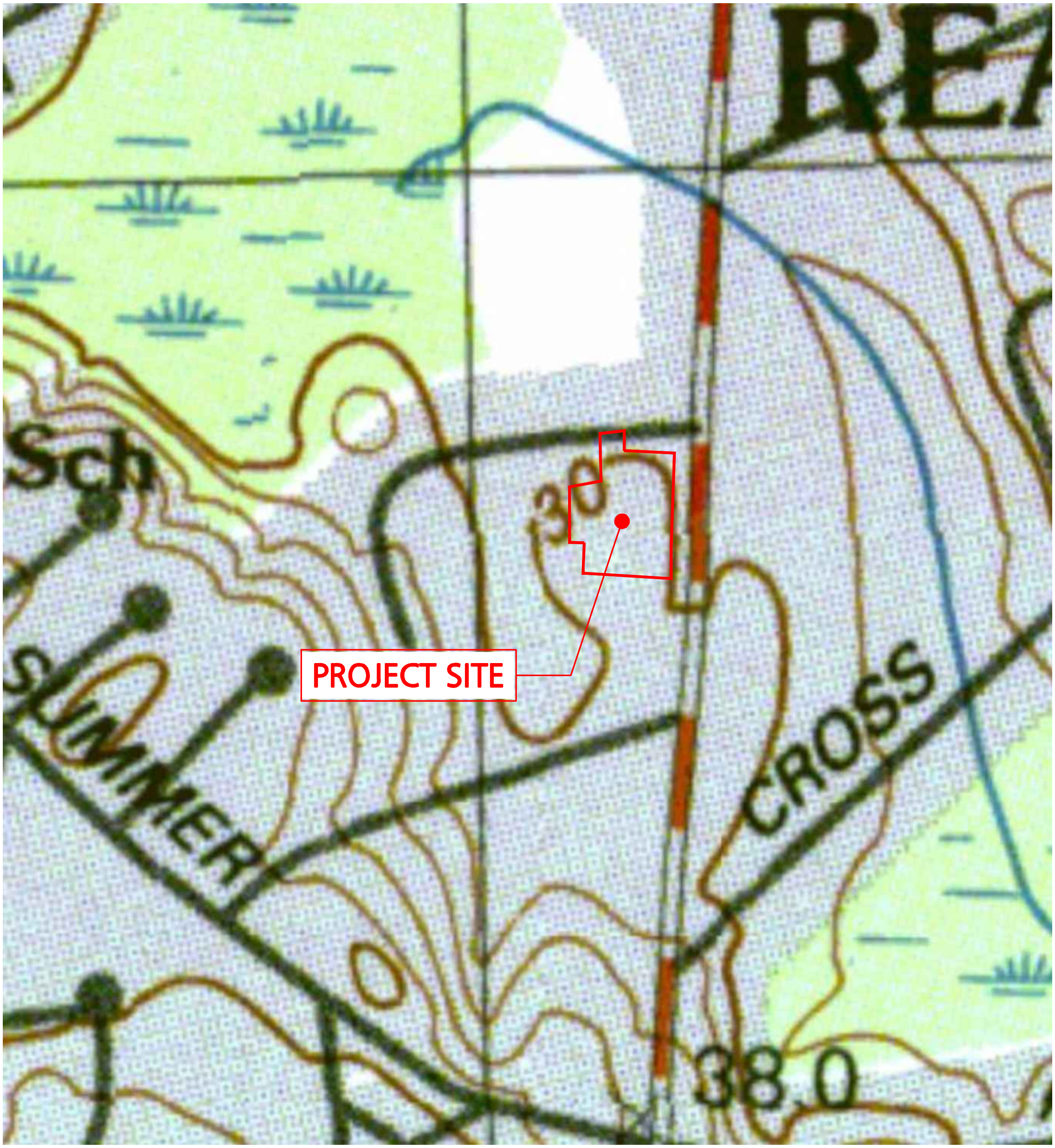
Detention • Retention • Recharge

Subsurface Stormwater Management℠

20 Beaver Road, Suite 104 | Wethersfield | Connecticut | 06109

860.529.8188 | 888.892.2694 | fax 866.328.8401 | www.stormtech.com

SECTION 3.0 - EXHIBITS



PREPARED BY:

ALLEN & MAJOR
ASSOCIATES, INC.
civil engineering ◆ land surveying environmental consulting ◆ landscape architecture
www.allenmajor.com
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P.O. BOX 2118
WOBURN MA 01888-0118
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

PROJECT:
STRADA
258 MAIN STREET
READING, MA

USGS SITE LOCUS MAP

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1"=300'	DWG. NAME:	EXHIBITS
DESIGNED BY:	MTB	CHECKED BY:	CMQ

SHEET No.
EX-1

PREPARED BY:

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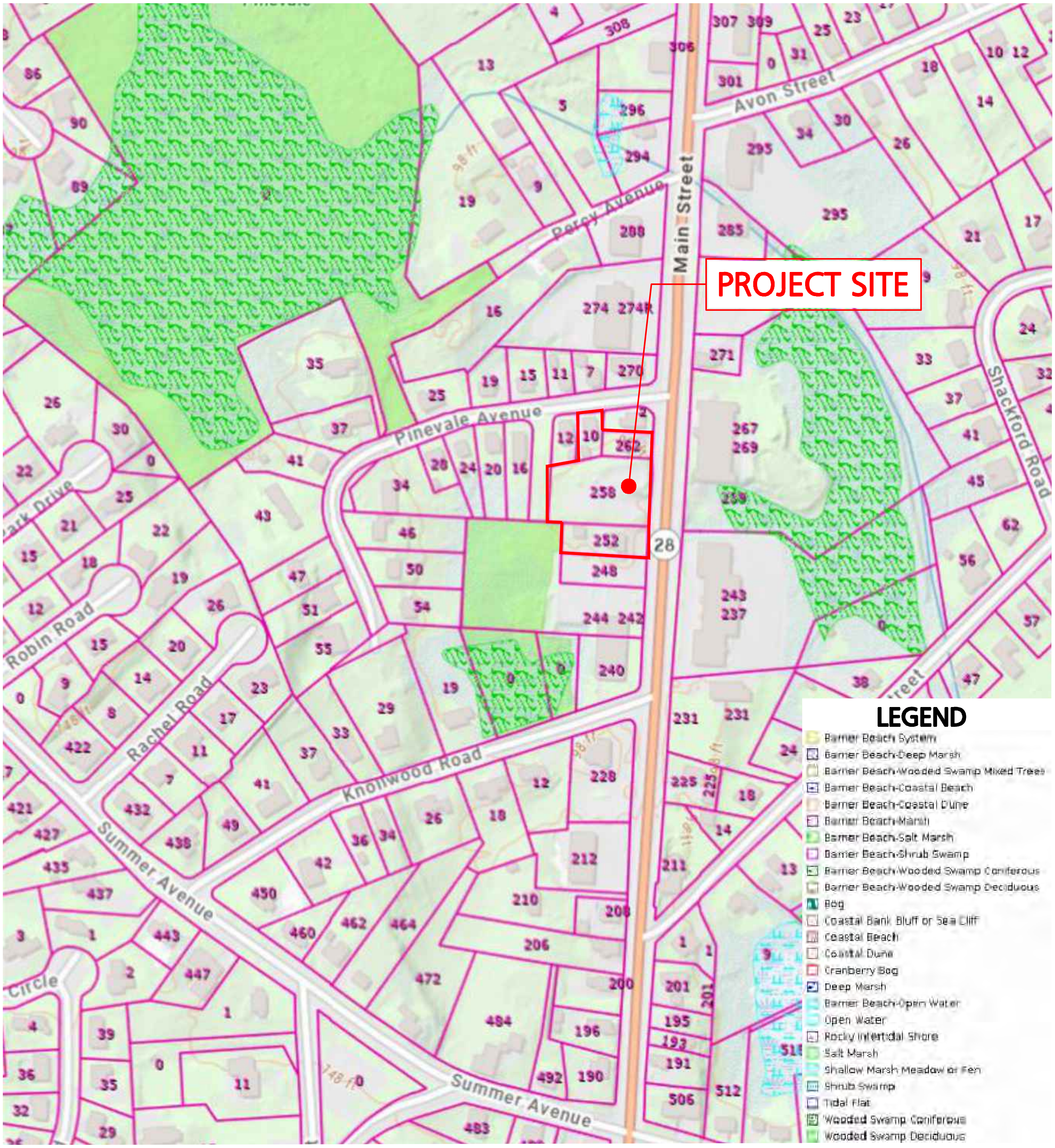
PROJECT:
STRADA
258 MAIN STREET
READING, MA

AERIAL PHOTO

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1"=300'	DWG. NAME:	EXHIBITS
DESIGNED BY:	MTB	CHECKED BY:	CMQ

SHEET No.
EX-2



THERE ARE NO DEP WETLANDS DIRECTLY ON SITE
THE SITE DOES FALLS WITHIN 100 FOOT WETLAND BUFFER

PREPARED BY:

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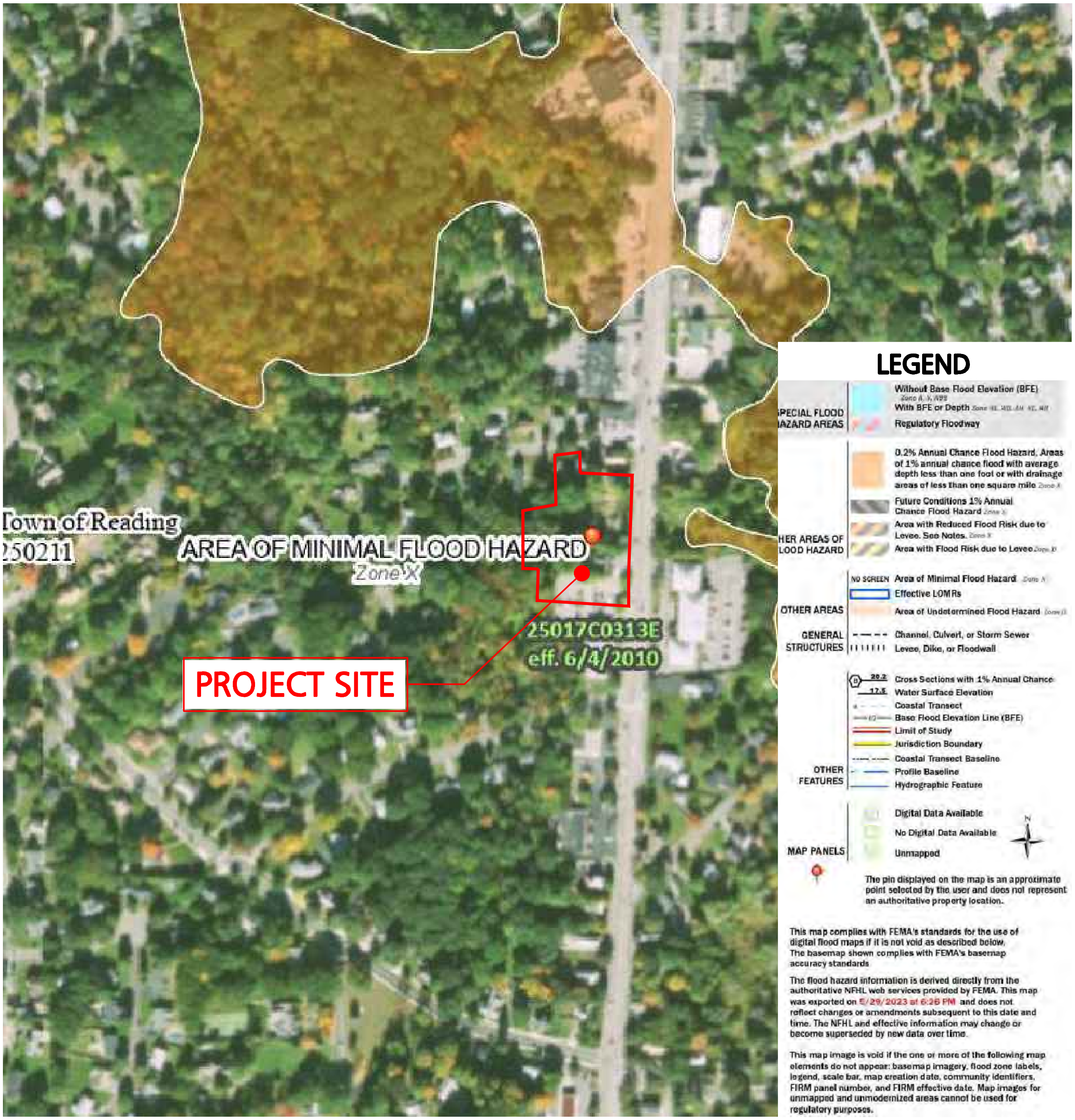
PROJECT: STRADA
258 MAIN STREET
READING, MA

WETLANDS MAP

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1"=300'	DWG. NAME:	EXHIBITS
DESIGNED BY:	MTB	CHECKED BY:	CMQ

SHEET No.
EX-3



FEMA FLOOD INSURANCE RATE MAP
MIDDLESEX COUNTY, MASSACHUSETTS
COMMUNITY PANEL 312 OF 656
MAP NUMBER 25017C0313E
EFFECTIVE DATE: JUNE 4, 2010

SITE IS NOT LOCATED IN A FLOOD HAZARD ZONE

PREPARED BY:

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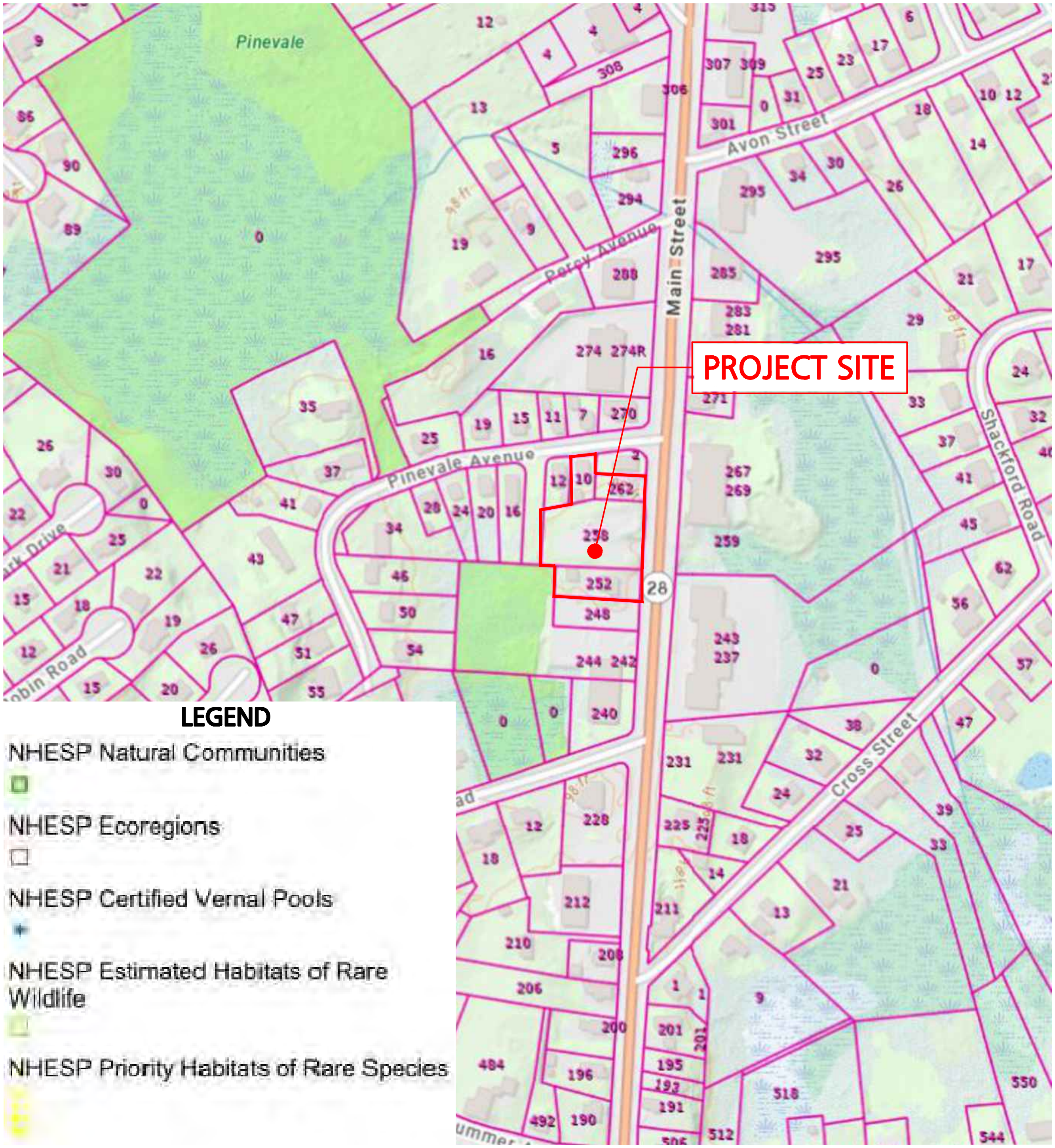
PROJECT:
STRADA
258 MAIN STREET
READING, MA

FEMA FIRM MAP

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1"=300'	DWG. NAME:	EXHIBITS
DESIGNED BY:	MTB	CHECKED BY:	CMQ

SHEET No.
EX-4



NO PRIORITY & ESTIMATED HABITATS LOCATED ON SITE

PREPARED BY:
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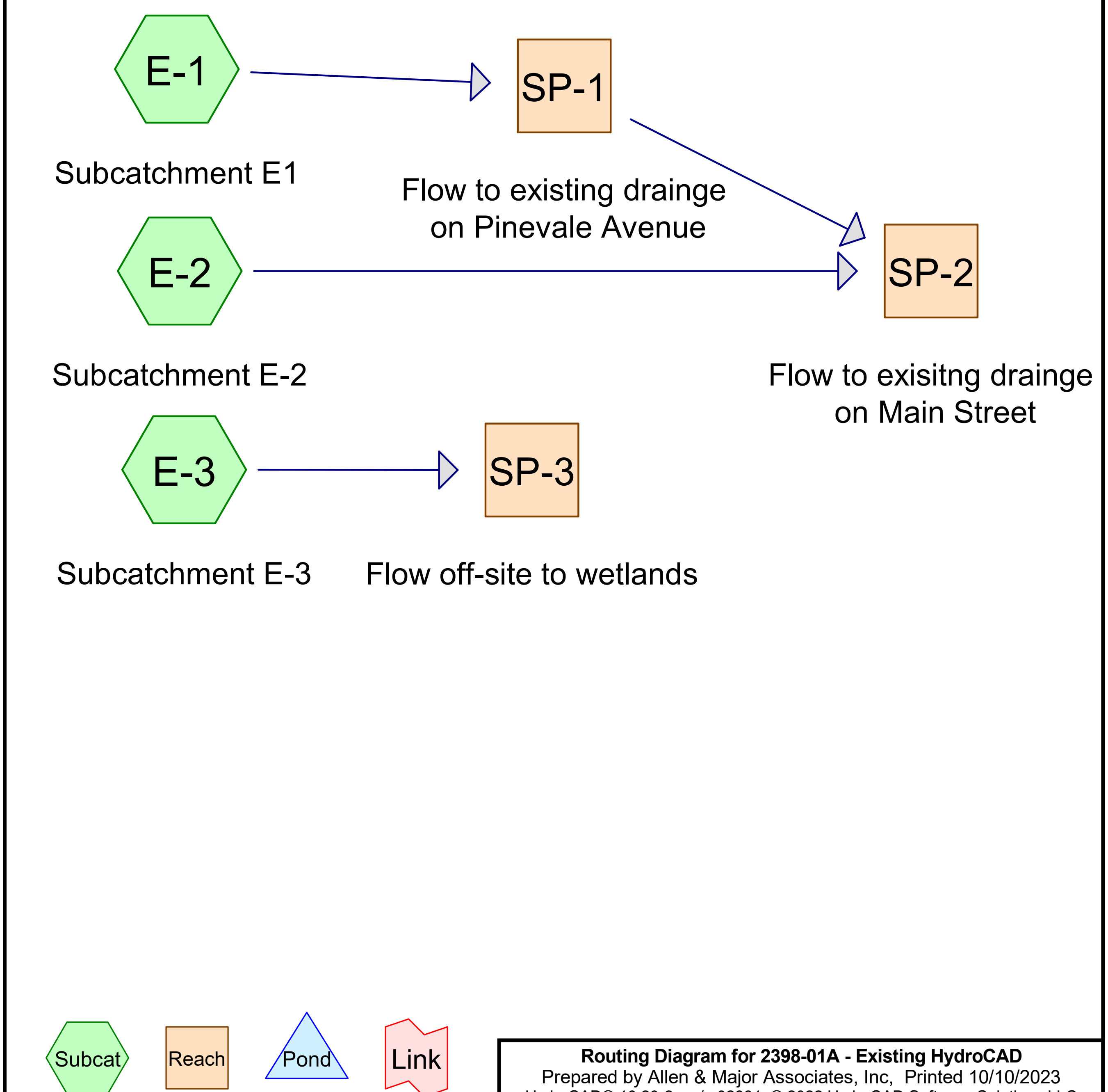
PROJECT:
STRADA
258 MAIN STREET
READING, MA

PRIORITY & ESTIMATED HABITATS

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1"=300'	DWG. NAME:	EXHIBITS
DESIGNED BY:	MTB	CHECKED BY:	CMQ

SHEET No.
EX-5

SECTION 4.0 -
EXISTING DRAINAGE ANALYSIS



Routing Diagram for 2398-01A - Existing HydroCAD
Prepared by Allen & Major Associates, Inc, Printed 10/10/2023
HydroCAD® 10.20-2g s/n 02881 © 2022 HydroCAD Software Solutions LLC

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4245 MA Reading Middlesex County South
Rainfall events imported from "NRCS-Rain.txt" for 4245 MA Reading Middlesex County South

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.31	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	5.21	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	6.40	2
4	100-Year	NRCC 24-hr	D	Default	24.00	1	8.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
8,464	39	>75% Grass cover, Good, HSG A (E-1, E-2, E-3)
19,705	98	Paved parking, HSG A (E-1, E-2, E-3)
1,851	98	Roofs, HSG A (E-2, E-3)
1,594	98	Unconnected roofs, HSG A (E-1)
14,480	32	Woods/grass comb., Good, HSG A (E-1, E-2, E-3)
46,094	**66**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
46,094	HSG A	E-1, E-2, E-3
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
46,094		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	S N
8,464	0	0	0	0	8,464	>75% Grass cover, Good	
19,705	0	0	0	0	19,705	Paved parking	
1,851	0	0	0	0	1,851	Roofs	
1,594	0	0	0	0	1,594	Unconnected roofs	
14,480	0	0	0	0	14,480	Woods/grass comb., Good	
46,094	**0**	**0**	**0**	**0**	**46,094**	**TOTAL AREA**	

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

Subcatchment E-1: Subcatchment E1 Runoff Area=17,846 sf 53.69% Impervious Runoff Depth=0.89"
Flow Length=177' Tc=7.1 min CN=70 Runoff=0.36 cfs 1,328 cf

Subcatchment E-2: Subcatchment E-2 Runoff Area=18,574 sf 55.11% Impervious Runoff Depth=0.84"
Flow Length=333' Tc=6.0 min CN=69 Runoff=0.36 cfs 1,304 cf

Subcatchment E-3: Subcatchment E-3 Runoff Area=9,674 sf 34.45% Impervious Runoff Depth=0.31"
Flow Length=127' Tc=6.8 min CN=56 Runoff=0.03 cfs 254 cf

Reach SP-1: Flow to existing drainge on Pinevale Avenue Inflow=0.36 cfs 1,328 cf
Outflow=0.36 cfs 1,328 cf

Reach SP-2: Flow to exisitng drainge on Main Street Inflow=0.72 cfs 2,631 cf
Outflow=0.72 cfs 2,631 cf

Reach SP-3: Flow off-site to wetlands Inflow=0.03 cfs 254 cf
Outflow=0.03 cfs 254 cf

Total Runoff Area = 46,094 sf Runoff Volume = 2,885 cf Average Runoff Depth = 0.75"
49.78% Pervious = 22,944 sf 50.22% Impervious = 23,150 sf

Summary for Subcatchment E-1: Subcatchment E1

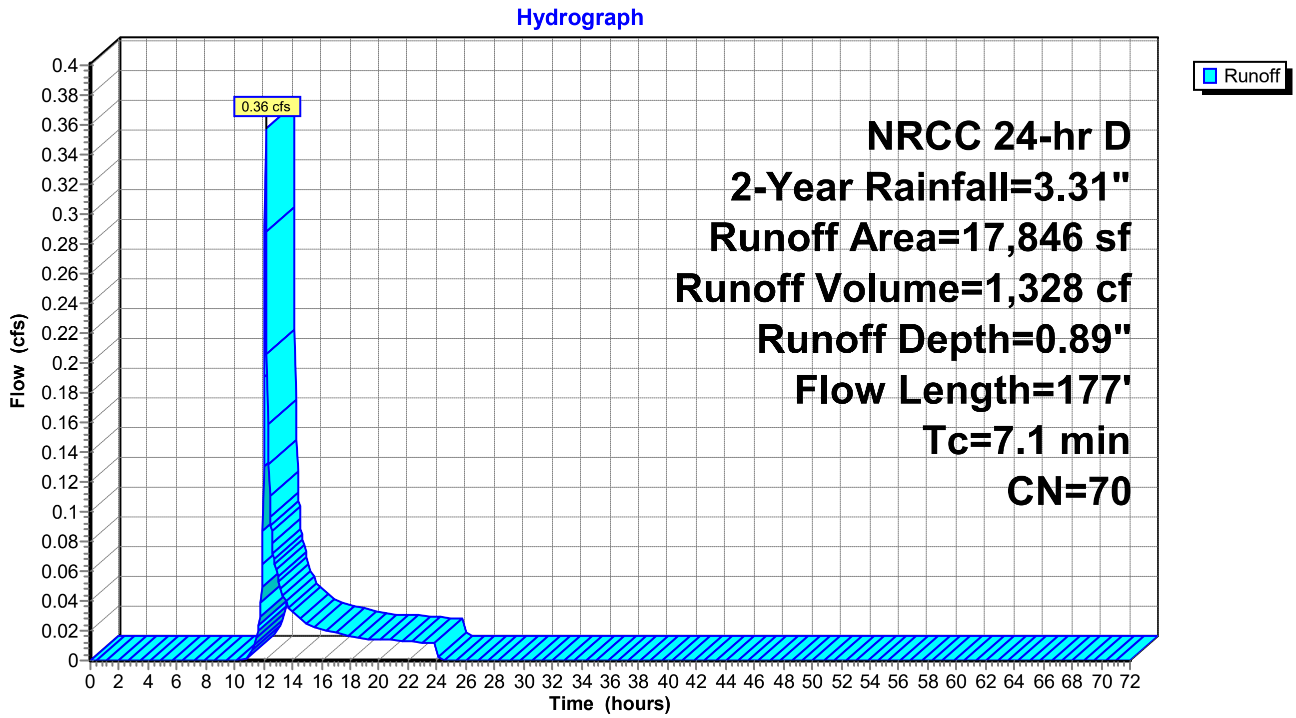
Runoff = 0.36 cfs @ 12.15 hrs, Volume= 1,328 cf, Depth= 0.89"
Routed to Reach SP-1 : Flow to existing drainge on Pinevale Avenue

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
1,594	98	Unconnected roofs, HSG A
7,987	98	Paved parking, HSG A
1,752	32	Woods/grass comb., Good, HSG A
6,513	39	>75% Grass cover, Good, HSG A
17,846	70	Weighted Average
8,265		46.31% Pervious Area
9,581		53.69% Impervious Area
1,594		16.64% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	38	0.0500	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.2	23	0.0800	1.79		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
3.6	53	0.0700	0.25		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	63	0.0800	5.74		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
7.1	177	Total			

Subcatchment E-1: Subcatchment E1



Summary for Subcatchment E-2: Subcatchment E-2

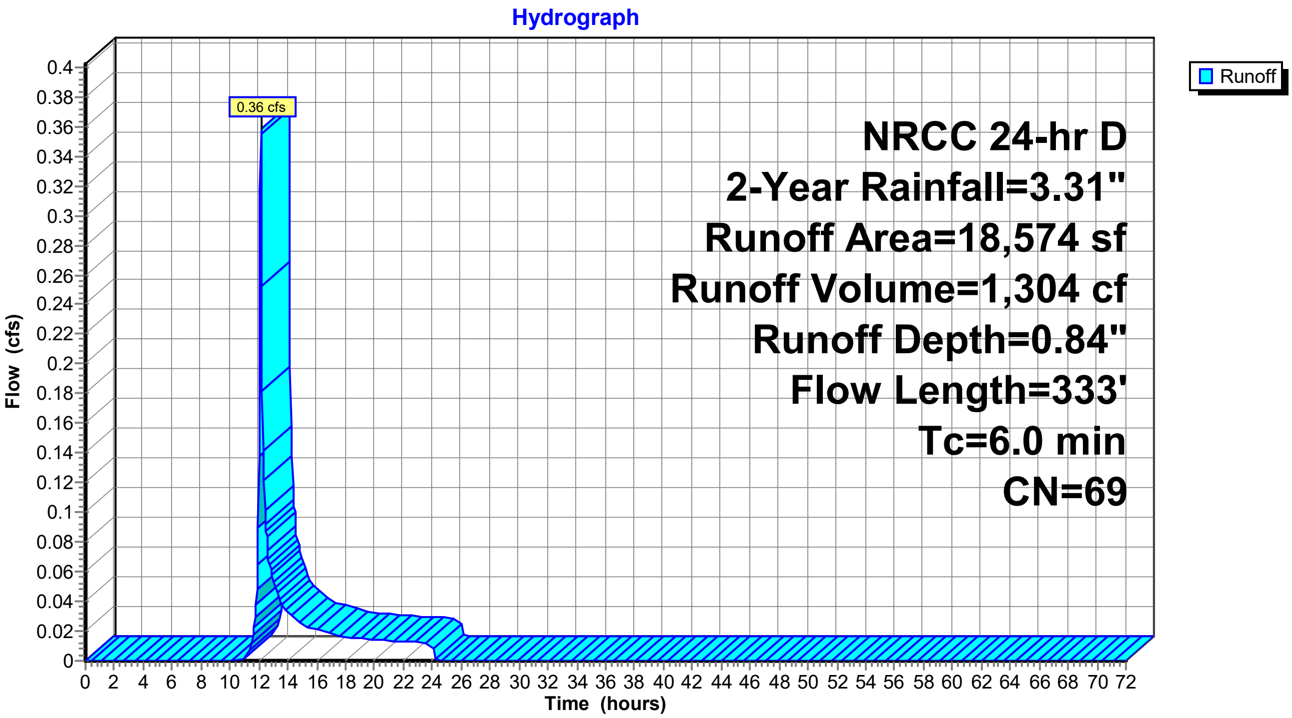
Runoff = 0.36 cfs @ 12.14 hrs, Volume= 1,304 cf, Depth= 0.84"
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
965	98	Roofs, HSG A
9,271	98	Paved parking, HSG A
7,853	32	Woods/grass comb., Good, HSG A
485	39	>75% Grass cover, Good, HSG A
18,574	69	Weighted Average
8,338		44.89% Pervious Area
10,236		55.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	12	0.0800	1.57		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
0.3	36	0.0800	1.95		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	285	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
2.7	333	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E-2: Subcatchment E-2



Summary for Subcatchment E-3: Subcatchment E-3

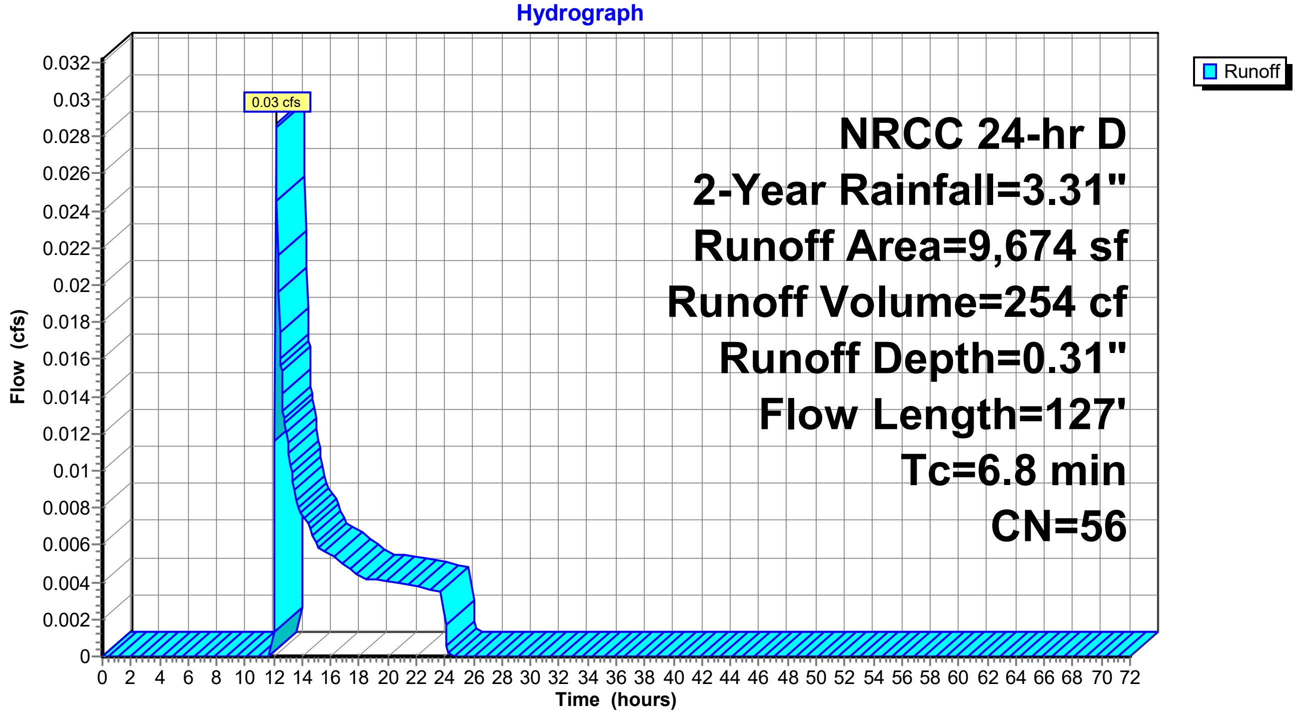
Runoff = 0.03 cfs @ 12.19 hrs, Volume= 254 cf, Depth= 0.31"
Routed to Reach SP-3 : Flow off-site to wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
886	98	Roofs, HSG A
2,447	98	Paved parking, HSG A
4,875	32	Woods/grass comb., Good, HSG A
1,466	39	>75% Grass cover, Good, HSG A
9,674	56	Weighted Average
6,341		65.55% Pervious Area
3,333		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.0400	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.2	20	0.0500	1.44		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	23	0.0400	0.17		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	15	0.0600	1.46		**Sheet Flow, D-E** Smooth surfaces n= 0.011 P2= 3.20"
0.5	44	0.0400	1.40		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
6.8	127	Total			

Subcatchment E-3: Subcatchment E-3



Summary for Reach SP-1: Flow to existing drainge on Pinevale Avenue

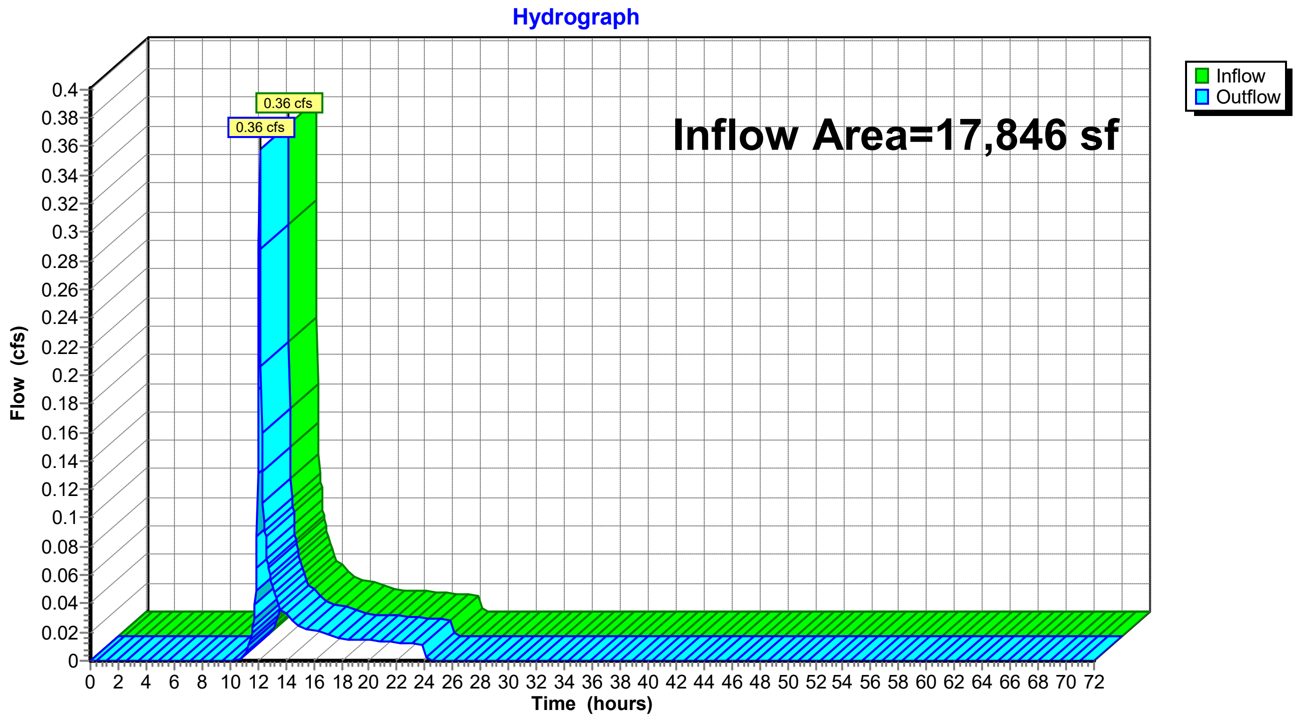
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	17,846 sf,	53.69% Impervious,	Inflow Depth = 0.89"	for 2-Year event
Inflow =	0.36 cfs @	12.15 hrs, Volume=	1,328 cf	
Outflow =	0.36 cfs @	12.15 hrs, Volume=	1,328 cf, Atten= 0%, Lag= 0.0 min	

Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

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

Reach SP-1: Flow to existing drainge on Pinevale Avenue



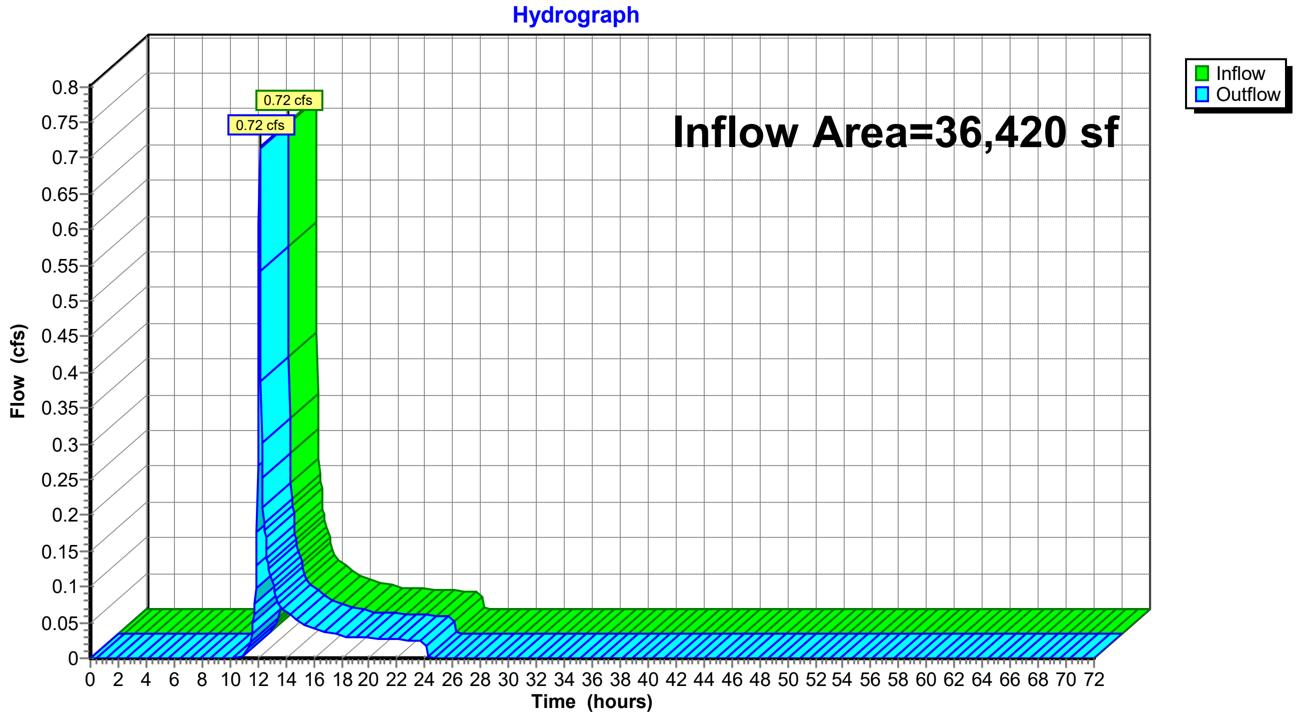
Summary for Reach SP-2: Flow to exisitng drainge on Main Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	36,420 sf,	54.41% Impervious,	Inflow Depth = 0.87"	for 2-Year event
Inflow =	0.72 cfs @	12.14 hrs, Volume=	2,631 cf	
Outflow =	0.72 cfs @	12.14 hrs, Volume=	2,631 cf,	Atten= 0%, Lag= 0.0 min

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

Reach SP-2: Flow to exisitng drainge on Main Street



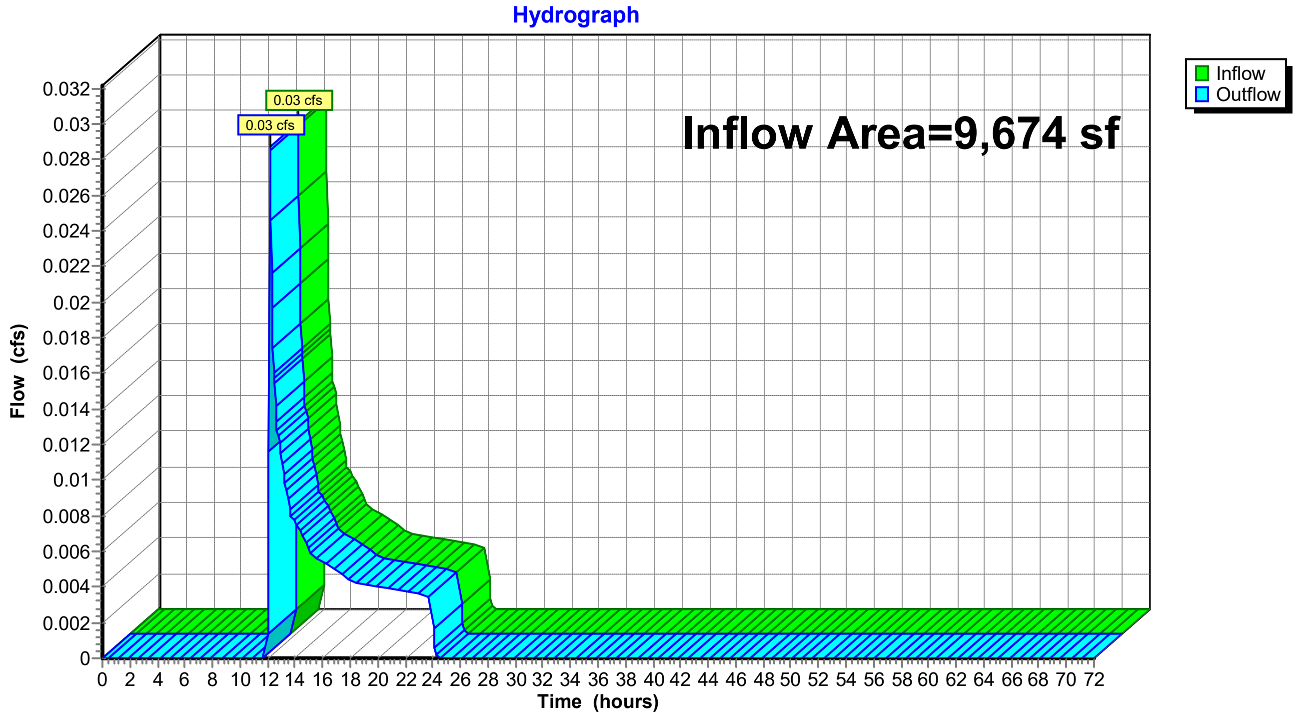
Summary for Reach SP-3: Flow off-site to wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9,674 sf, 34.45% Impervious, Inflow Depth = 0.31" for 2-Year event
Inflow = 0.03 cfs @ 12.19 hrs, Volume= 254 cf
Outflow = 0.03 cfs @ 12.19 hrs, Volume= 254 cf, Atten= 0%, Lag= 0.0 min

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

Reach SP-3: Flow off-site to wetlands



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

Subcatchment E-1: Subcatchment E1 Runoff Area=17,846 sf 53.69% Impervious Runoff Depth=2.19"
Flow Length=177' Tc=7.1 min CN=70 Runoff=0.94 cfs 3,262 cf

Subcatchment E-2: Subcatchment E-2 Runoff Area=18,574 sf 55.11% Impervious Runoff Depth=2.11"
Flow Length=333' Tc=6.0 min CN=69 Runoff=0.96 cfs 3,268 cf

Subcatchment E-3: Subcatchment E-3 Runoff Area=9,674 sf 34.45% Impervious Runoff Depth=1.15"
Flow Length=127' Tc=6.8 min CN=56 Runoff=0.24 cfs 928 cf

Reach SP-1: Flow to existing drainge on Pinevale Avenue Inflow=0.94 cfs 3,262 cf
Outflow=0.94 cfs 3,262 cf

Reach SP-2: Flow to exisitng drainge on Main Street Inflow=1.90 cfs 6,530 cf
Outflow=1.90 cfs 6,530 cf

Reach SP-3: Flow off-site to wetlands Inflow=0.24 cfs 928 cf
Outflow=0.24 cfs 928 cf

Total Runoff Area = 46,094 sf Runoff Volume = 7,458 cf Average Runoff Depth = 1.94"
49.78% Pervious = 22,944 sf 50.22% Impervious = 23,150 sf

Summary for Subcatchment E-1: Subcatchment E1

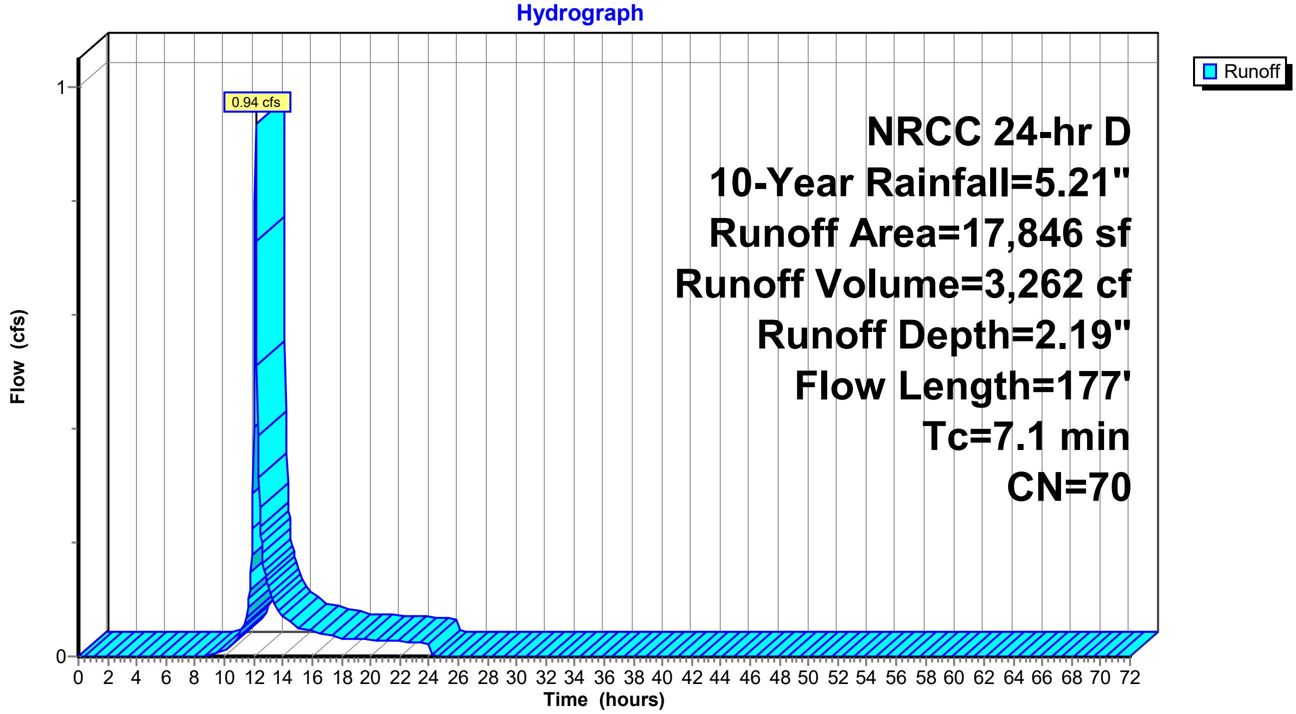
Runoff = 0.94 cfs @ 12.15 hrs, Volume= 3,262 cf, Depth= 2.19"
Routed to Reach SP-1 : Flow to existing drainge on Pinevale Avenue

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
1,594	98	Unconnected roofs, HSG A
7,987	98	Paved parking, HSG A
1,752	32	Woods/grass comb., Good, HSG A
6,513	39	>75% Grass cover, Good, HSG A
17,846	70	Weighted Average
8,265		46.31% Pervious Area
9,581		53.69% Impervious Area
1,594		16.64% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	38	0.0500	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.2	23	0.0800	1.79		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
3.6	53	0.0700	0.25		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	63	0.0800	5.74		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
7.1	177	Total			

Subcatchment E-1: Subcatchment E1



Summary for Subcatchment E-2: Subcatchment E-2

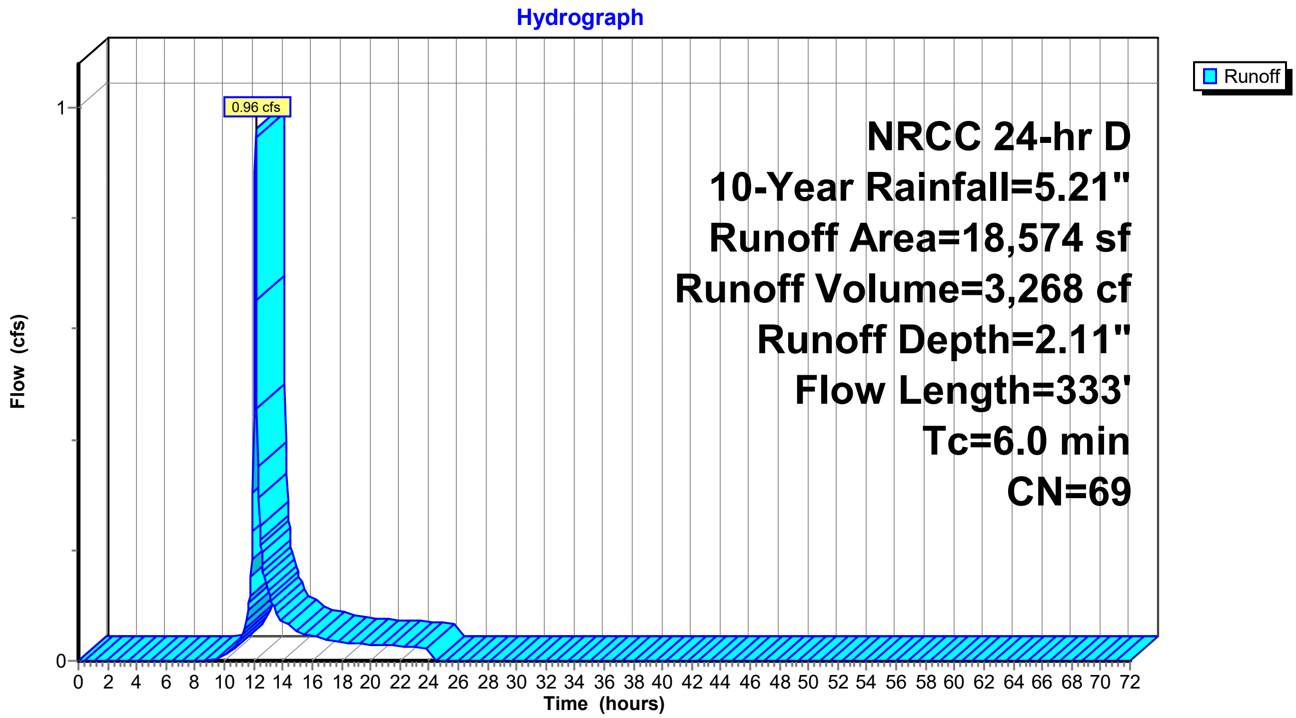
Runoff = 0.96 cfs @ 12.13 hrs, Volume= 3,268 cf, Depth= 2.11"
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
965	98	Roofs, HSG A
9,271	98	Paved parking, HSG A
7,853	32	Woods/grass comb., Good, HSG A
485	39	>75% Grass cover, Good, HSG A
18,574	69	Weighted Average
8,338		44.89% Pervious Area
10,236		55.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	12	0.0800	1.57		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
0.3	36	0.0800	1.95		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	285	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
2.7	333	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E-2: Subcatchment E-2



Summary for Subcatchment E-3: Subcatchment E-3

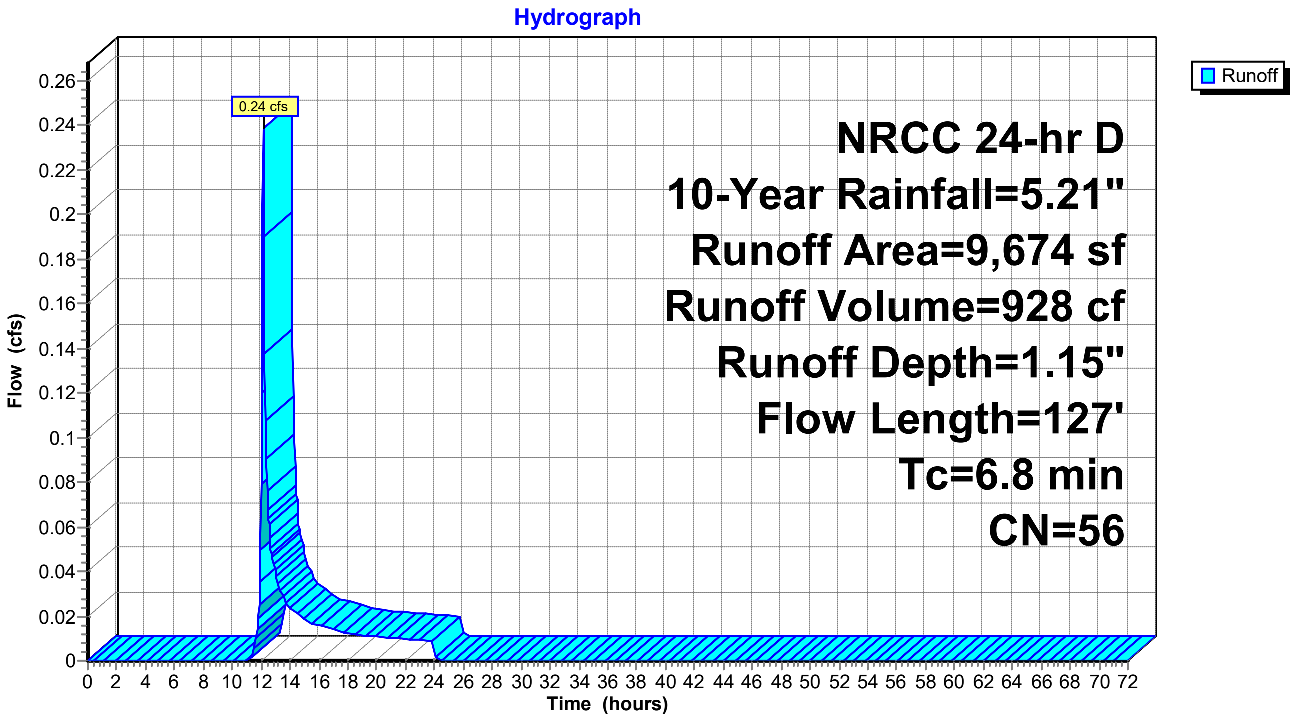
Runoff = 0.24 cfs @ 12.15 hrs, Volume= 928 cf, Depth= 1.15"
Routed to Reach SP-3 : Flow off-site to wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
886	98	Roofs, HSG A
2,447	98	Paved parking, HSG A
4,875	32	Woods/grass comb., Good, HSG A
1,466	39	>75% Grass cover, Good, HSG A
9,674	56	Weighted Average
6,341		65.55% Pervious Area
3,333		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.0400	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.2	20	0.0500	1.44		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	23	0.0400	0.17		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	15	0.0600	1.46		**Sheet Flow, D-E** Smooth surfaces n= 0.011 P2= 3.20"
0.5	44	0.0400	1.40		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
6.8	127	Total			

Subcatchment E-3: Subcatchment E-3



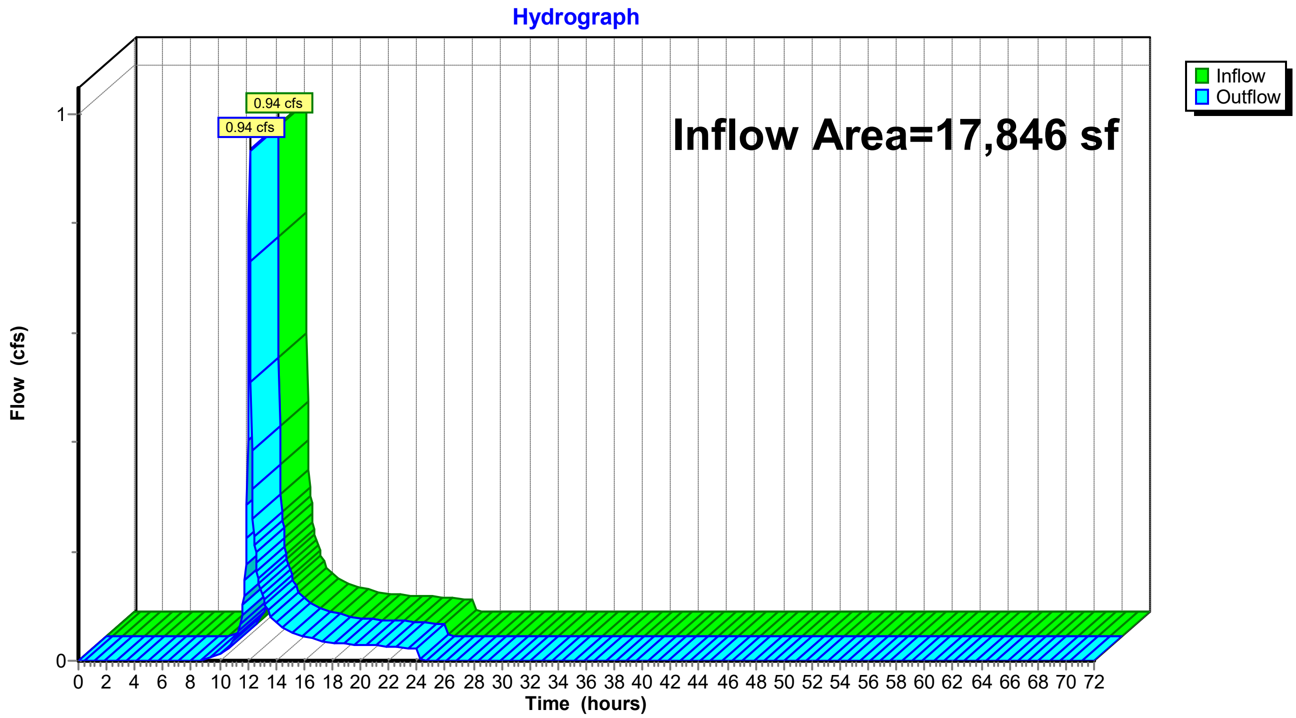
Summary for Reach SP-1: Flow to existing drainge on Pinevale Avenue

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17,846 sf, 53.69% Impervious, Inflow Depth = 2.19" for 10-Year event
Inflow = 0.94 cfs @ 12.15 hrs, Volume= 3,262 cf
Outflow = 0.94 cfs @ 12.15 hrs, Volume= 3,262 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

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

Reach SP-1: Flow to existing drainge on Pinevale Avenue



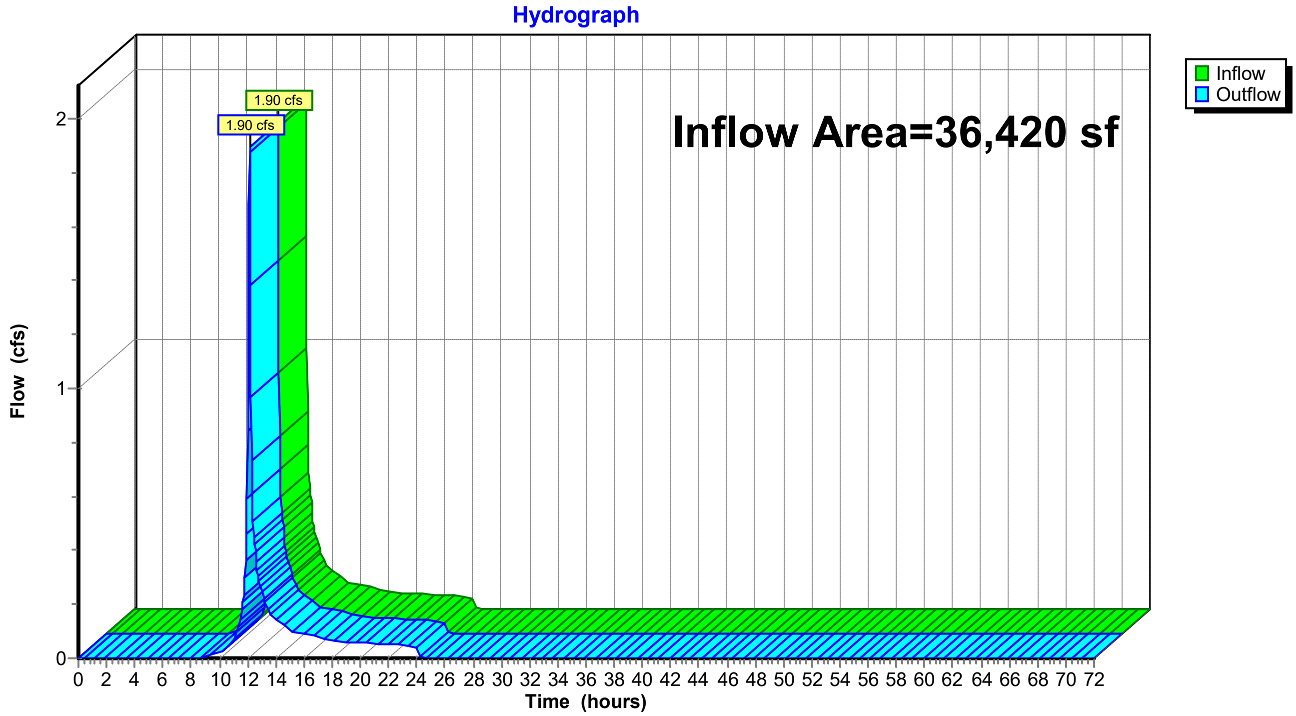
Summary for Reach SP-2: Flow to exisitng drainge on Main Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	36,420 sf, 54.41% Impervious,	Inflow Depth = 2.15"	for 10-Year event
Inflow =	1.90 cfs @ 12.14 hrs, Volume=	6,530 cf	
Outflow =	1.90 cfs @ 12.14 hrs, Volume=	6,530 cf, Atten= 0%, Lag= 0.0 min	

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

Reach SP-2: Flow to exisitng drainge on Main Street



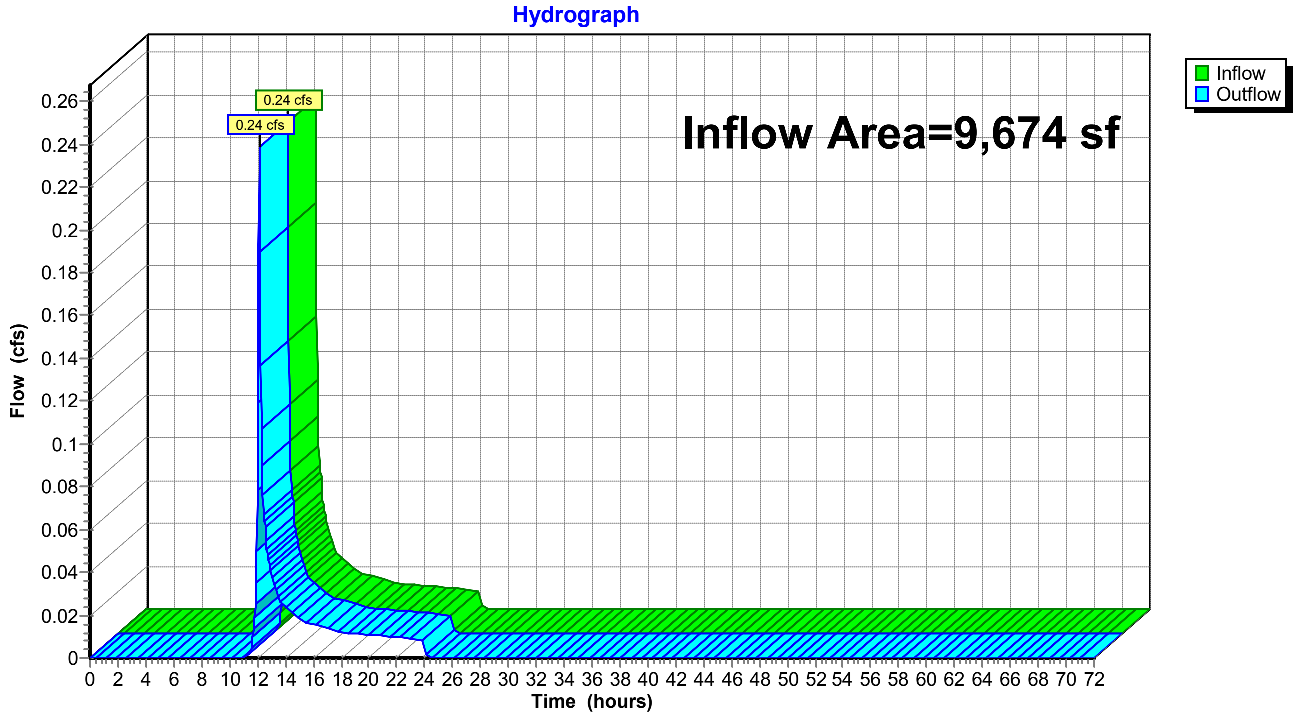
Summary for Reach SP-3: Flow off-site to wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9,674 sf, 34.45% Impervious, Inflow Depth = 1.15" for 10-Year event
Inflow = 0.24 cfs @ 12.15 hrs, Volume= 928 cf
Outflow = 0.24 cfs @ 12.15 hrs, Volume= 928 cf, Atten= 0%, Lag= 0.0 min

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

Reach SP-3: Flow off-site to wetlands



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

Subcatchment E-1: Subcatchment E1 Runoff Area=17,846 sf 53.69% Impervious Runoff Depth=3.13"
Flow Length=177' Tc=7.1 min CN=70 Runoff=1.34 cfs 4,649 cf

Subcatchment E-2: Subcatchment E-2 Runoff Area=18,574 sf 55.11% Impervious Runoff Depth=3.03"
Flow Length=333' Tc=6.0 min CN=69 Runoff=1.39 cfs 4,687 cf

Subcatchment E-3: Subcatchment E-3 Runoff Area=9,674 sf 34.45% Impervious Runoff Depth=1.84"
Flow Length=127' Tc=6.8 min CN=56 Runoff=0.41 cfs 1,482 cf

Reach SP-1: Flow to existing drainge on Pinevale Avenue Inflow=1.34 cfs 4,649 cf
Outflow=1.34 cfs 4,649 cf

Reach SP-2: Flow to exisitng drainge on Main Street Inflow=2.73 cfs 9,336 cf
Outflow=2.73 cfs 9,336 cf

Reach SP-3: Flow off-site to wetlands Inflow=0.41 cfs 1,482 cf
Outflow=0.41 cfs 1,482 cf

Total Runoff Area = 46,094 sf Runoff Volume = 10,818 cf Average Runoff Depth = 2.82"
49.78% Pervious = 22,944 sf 50.22% Impervious = 23,150 sf

Summary for Subcatchment E-1: Subcatchment E1

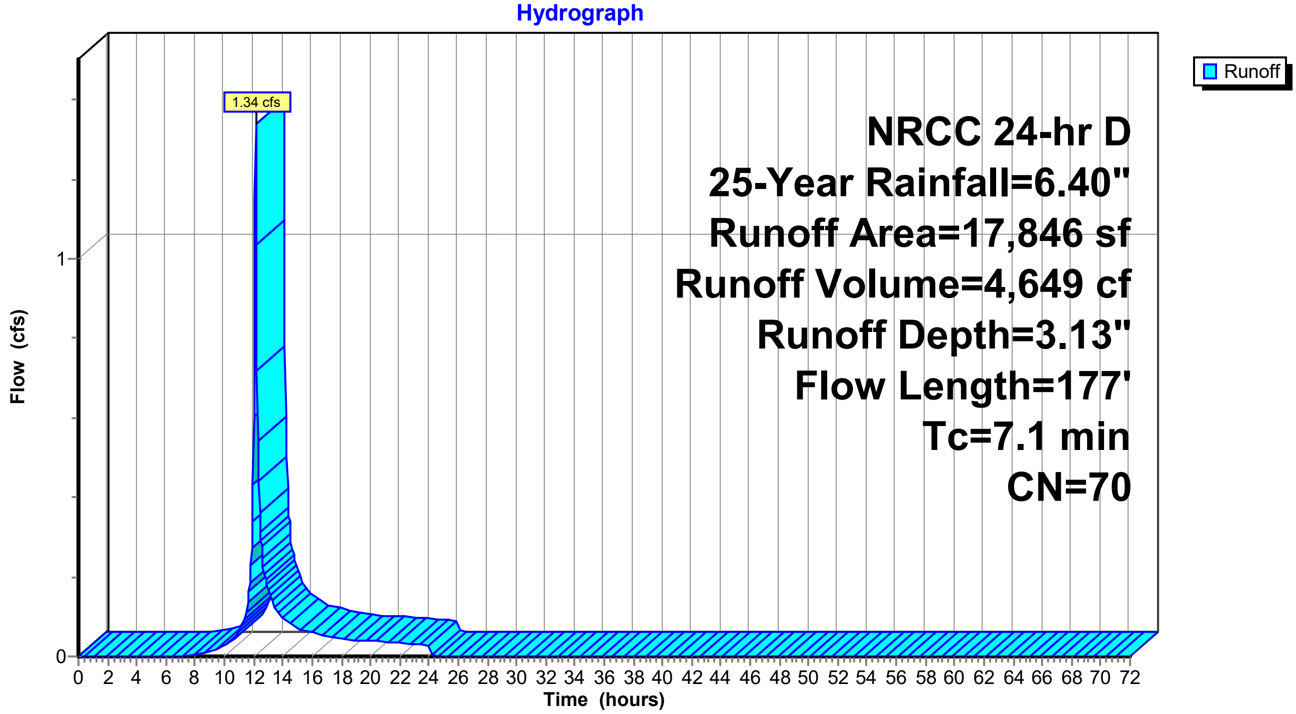
Runoff = 1.34 cfs @ 12.14 hrs, Volume= 4,649 cf, Depth= 3.13"
Routed to Reach SP-1 : Flow to existing drainge on Pinevale Avenue

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
1,594	98	Unconnected roofs, HSG A
7,987	98	Paved parking, HSG A
1,752	32	Woods/grass comb., Good, HSG A
6,513	39	>75% Grass cover, Good, HSG A
17,846	70	Weighted Average
8,265		46.31% Pervious Area
9,581		53.69% Impervious Area
1,594		16.64% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	38	0.0500	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.20"
0.2	23	0.0800	1.79		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
3.6	53	0.0700	0.25		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	63	0.0800	5.74		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
7.1	177	Total			

Subcatchment E-1: Subcatchment E1



Summary for Subcatchment E-2: Subcatchment E-2

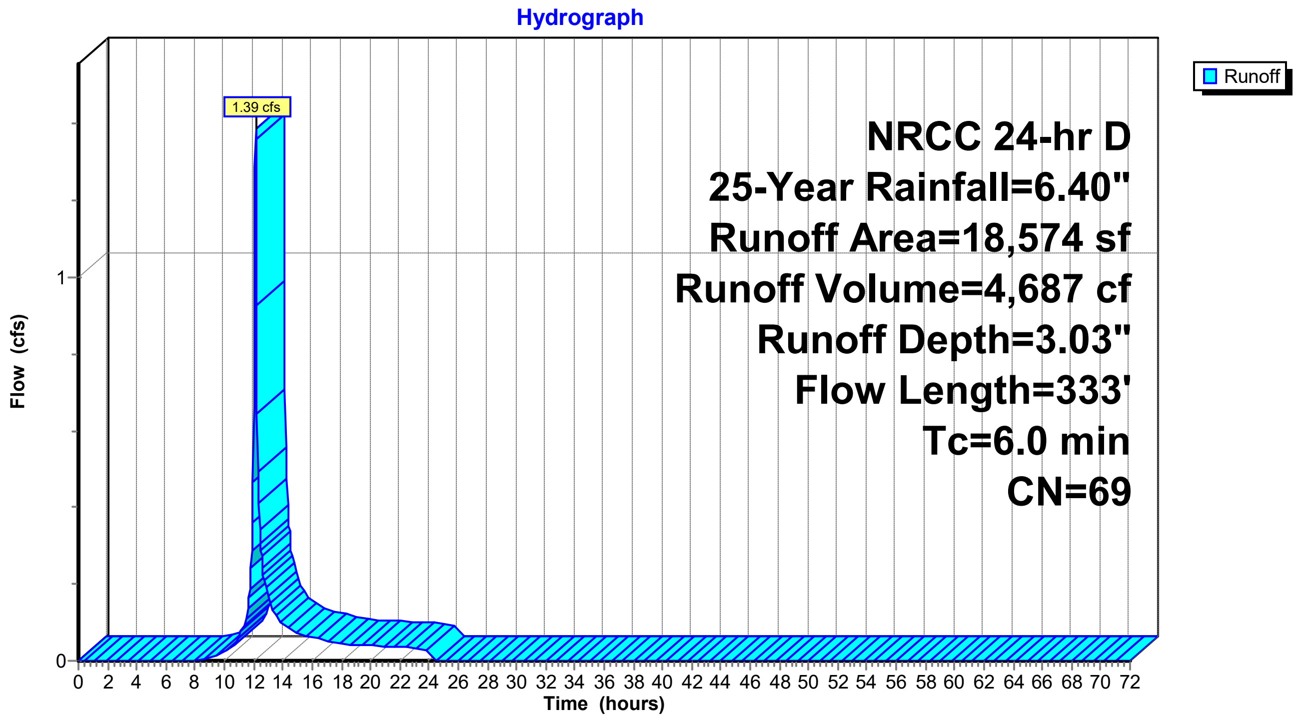
Runoff = 1.39 cfs @ 12.13 hrs, Volume= 4,687 cf, Depth= 3.03"
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
965	98	Roofs, HSG A
9,271	98	Paved parking, HSG A
7,853	32	Woods/grass comb., Good, HSG A
485	39	>75% Grass cover, Good, HSG A
18,574	69	Weighted Average
8,338		44.89% Pervious Area
10,236		55.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	12	0.0800	1.57		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
0.3	36	0.0800	1.95		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	285	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
2.7	333	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E-2: Subcatchment E-2



Summary for Subcatchment E-3: Subcatchment E-3

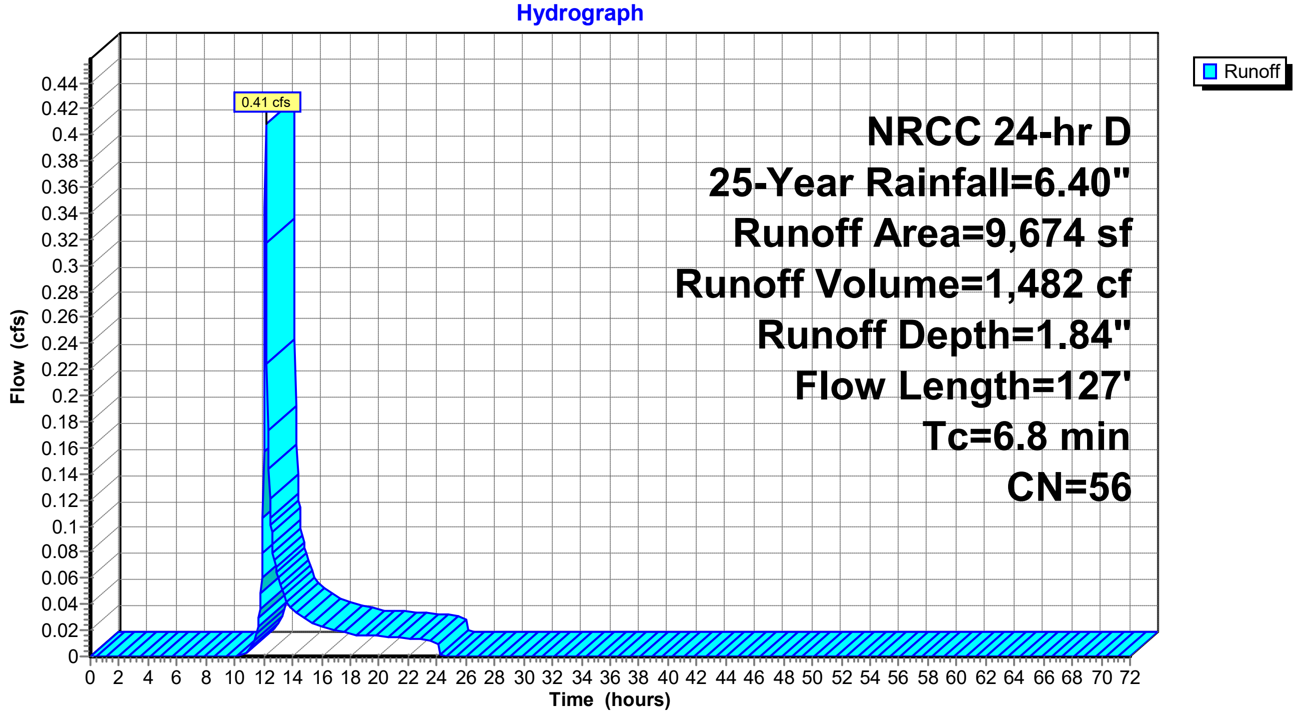
Runoff = 0.41 cfs @ 12.15 hrs, Volume= 1,482 cf, Depth= 1.84"
Routed to Reach SP-3 : Flow off-site to wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
886	98	Roofs, HSG A
2,447	98	Paved parking, HSG A
4,875	32	Woods/grass comb., Good, HSG A
1,466	39	>75% Grass cover, Good, HSG A
9,674	56	Weighted Average
6,341		65.55% Pervious Area
3,333		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.0400	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.2	20	0.0500	1.44		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	23	0.0400	0.17		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	15	0.0600	1.46		**Sheet Flow, D-E** Smooth surfaces n= 0.011 P2= 3.20"
0.5	44	0.0400	1.40		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
6.8	127	Total			

Subcatchment E-3: Subcatchment E-3



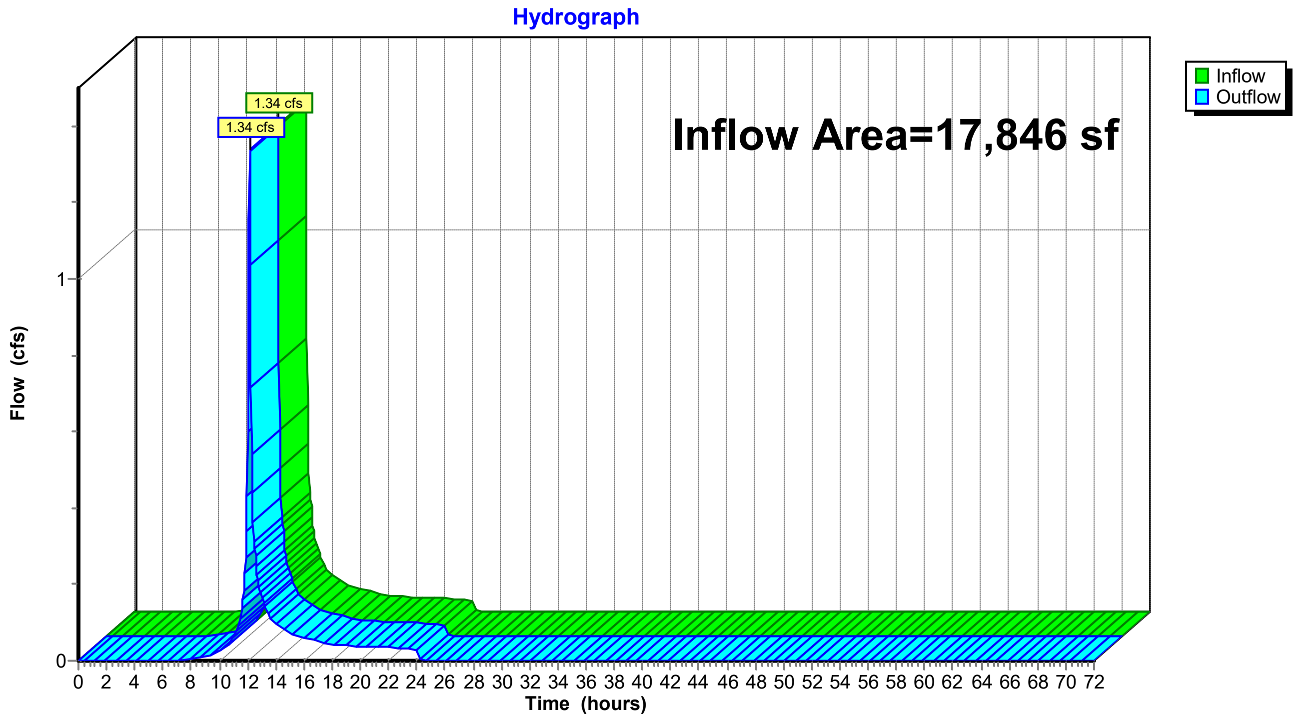
Summary for Reach SP-1: Flow to existing drainge on Pinevale Avenue

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17,846 sf, 53.69% Impervious, Inflow Depth = 3.13" for 25-Year event
Inflow = 1.34 cfs @ 12.14 hrs, Volume= 4,649 cf
Outflow = 1.34 cfs @ 12.14 hrs, Volume= 4,649 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

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

Reach SP-1: Flow to existing drainge on Pinevale Avenue



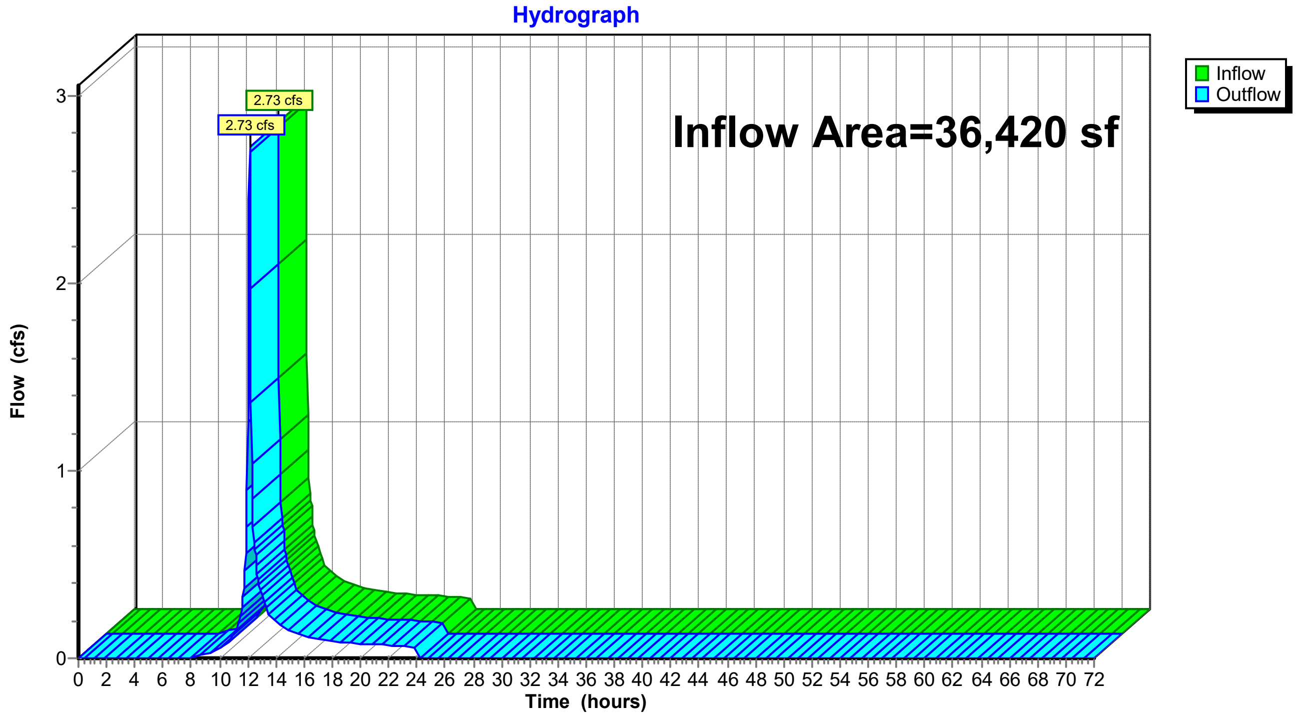
Summary for Reach SP-2: Flow to exisitng drainge on Main Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 36,420 sf, 54.41% Impervious, Inflow Depth = 3.08" for 25-Year event
Inflow = 2.73 cfs @ 12.14 hrs, Volume= 9,336 cf
Outflow = 2.73 cfs @ 12.14 hrs, Volume= 9,336 cf, Atten= 0%, Lag= 0.0 min

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

Reach SP-2: Flow to exisitng drainge on Main Street

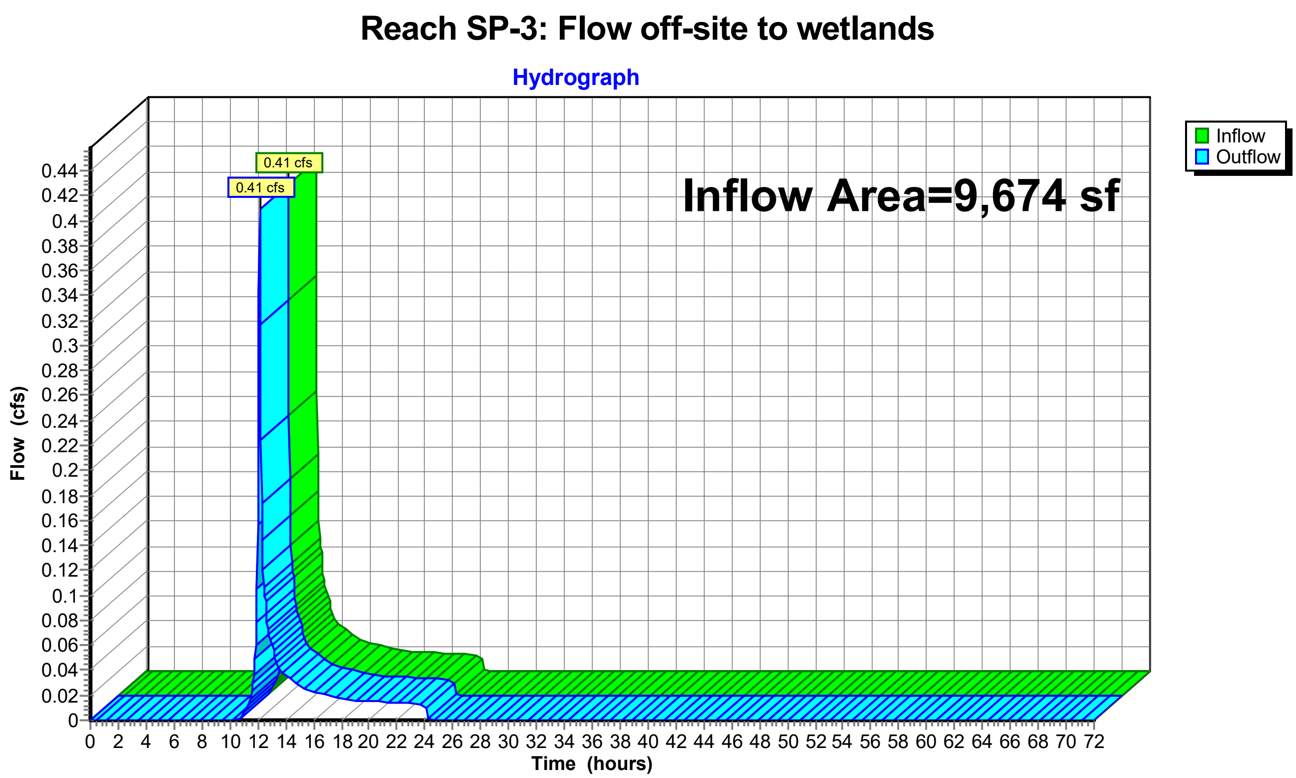


Summary for Reach SP-3: Flow off-site to wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	9,674 sf, 34.45% Impervious,	Inflow Depth = 1.84"	for 25-Year event	
Inflow =	0.41 cfs @ 12.15 hrs,	Volume=	1,482 cf	
Outflow =	0.41 cfs @ 12.15 hrs,	Volume=	1,482 cf,	Atten= 0%, Lag= 0.0 min

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



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

Subcatchment E-1: Subcatchment E1 Runoff Area=17,846 sf 53.69% Impervious Runoff Depth=4.66"
Flow Length=177' Tc=7.1 min CN=70 Runoff=1.99 cfs 6,934 cf

Subcatchment E-2: Subcatchment E-2 Runoff Area=18,574 sf 55.11% Impervious Runoff Depth=4.55"
Flow Length=333' Tc=6.0 min CN=69 Runoff=2.08 cfs 7,036 cf

Subcatchment E-3: Subcatchment E-3 Runoff Area=9,674 sf 34.45% Impervious Runoff Depth=3.05"
Flow Length=127' Tc=6.8 min CN=56 Runoff=0.71 cfs 2,462 cf

Reach SP-1: Flow to existing drainge on Pinevale Avenue Inflow=1.99 cfs 6,934 cf
Outflow=1.99 cfs 6,934 cf

Reach SP-2: Flow to exisitng drainge on Main Street Inflow=4.07 cfs 13,970 cf
Outflow=4.07 cfs 13,970 cf

Reach SP-3: Flow off-site to wetlands Inflow=0.71 cfs 2,462 cf
Outflow=0.71 cfs 2,462 cf

Total Runoff Area = 46,094 sf Runoff Volume = 16,432 cf Average Runoff Depth = 4.28"
49.78% Pervious = 22,944 sf 50.22% Impervious = 23,150 sf

Summary for Subcatchment E-1: Subcatchment E1

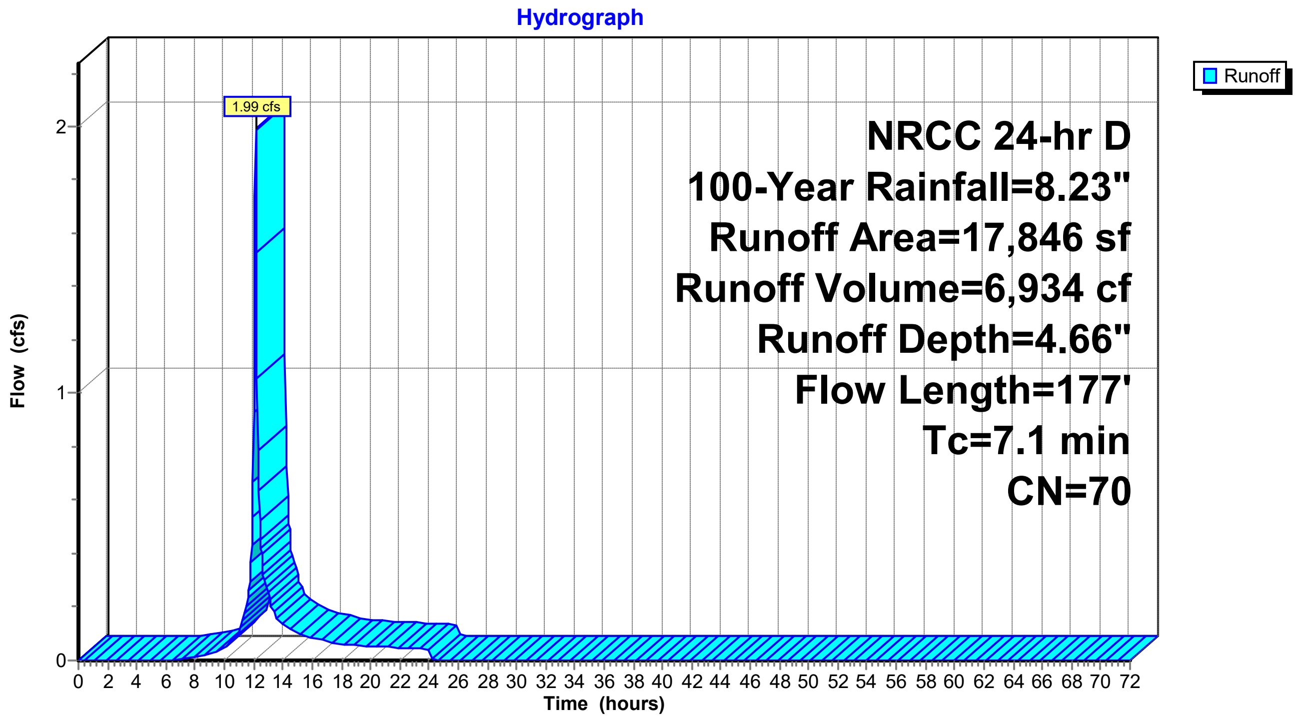
Runoff = 1.99 cfs @ 12.14 hrs, Volume= 6,934 cf, Depth= 4.66"
Routed to Reach SP-1 : Flow to existing drainge on Pinevale Avenue

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

Area (sf)	CN	Description
1,594	98	Unconnected roofs, HSG A
7,987	98	Paved parking, HSG A
1,752	32	Woods/grass comb., Good, HSG A
6,513	39	>75% Grass cover, Good, HSG A
17,846	70	Weighted Average
8,265		46.31% Pervious Area
9,581		53.69% Impervious Area
1,594		16.64% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	38	0.0500	0.20		**Sheet Flow, A-B**
					Grass: Short n= 0.150 P2= 3.20"
0.2	23	0.0800	1.79		**Sheet Flow, B-C**
					Smooth surfaces n= 0.011 P2= 3.20"
3.6	53	0.0700	0.25		**Sheet Flow, C-D**
					Grass: Short n= 0.150 P2= 3.20"
0.2	63	0.0800	5.74		**Shallow Concentrated Flow, D-E**
					Paved Kv= 20.3 fps
7.1	177	Total			

Subcatchment E-1: Subcatchment E1



Summary for Subcatchment E-2: Subcatchment E-2

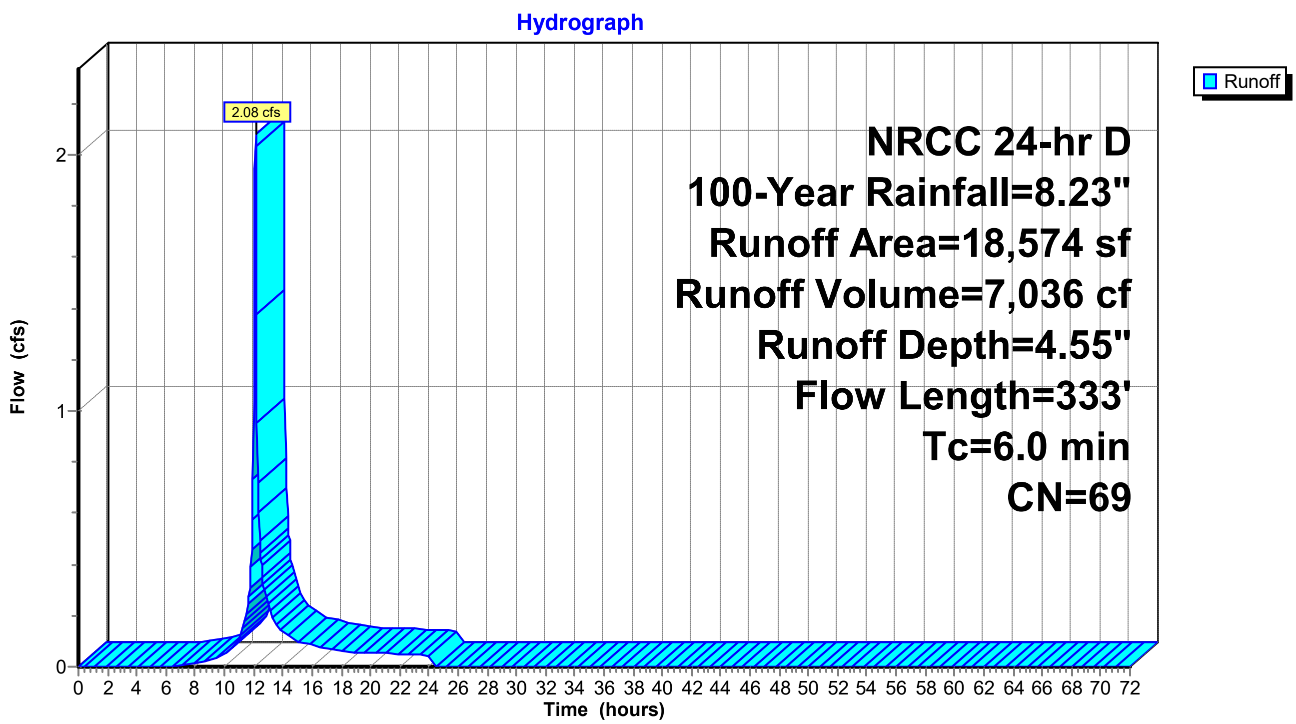
Runoff = 2.08 cfs @ 12.13 hrs, Volume= 7,036 cf, Depth= 4.55"
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

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

Area (sf)	CN	Description
965	98	Roofs, HSG A
9,271	98	Paved parking, HSG A
7,853	32	Woods/grass comb., Good, HSG A
485	39	>75% Grass cover, Good, HSG A
18,574	69	Weighted Average
8,338		44.89% Pervious Area
10,236		55.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	12	0.0800	1.57		**Sheet Flow, A-B** Smooth surfaces n= 0.011 P2= 3.20"
0.3	36	0.0800	1.95		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	285	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
2.7	333	Total, Increased to minimum Tc = 6.0 min			

Subcatchment E-2: Subcatchment E-2



Summary for Subcatchment E-3: Subcatchment E-3

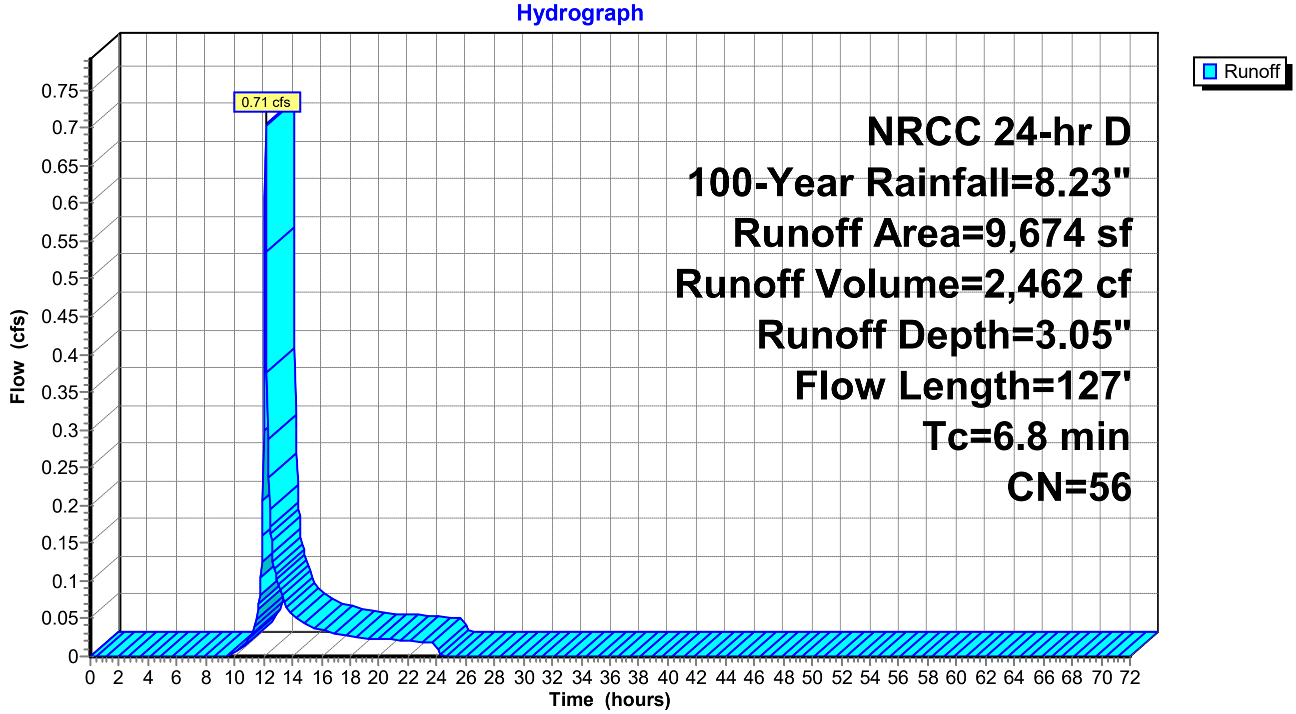
Runoff = 0.71 cfs @ 12.14 hrs, Volume= 2,462 cf, Depth= 3.05"
Routed to Reach SP-3 : Flow off-site to wetlands

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

Area (sf)	CN	Description
886	98	Roofs, HSG A
2,447	98	Paved parking, HSG A
4,875	32	Woods/grass comb., Good, HSG A
1,466	39	>75% Grass cover, Good, HSG A
9,674	56	Weighted Average
6,341		65.55% Pervious Area
3,333		34.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	25	0.0400	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.2	20	0.0500	1.44		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.20"
2.3	23	0.0400	0.17		**Sheet Flow, C-D** Grass: Short n= 0.150 P2= 3.20"
0.2	15	0.0600	1.46		**Sheet Flow, D-E** Smooth surfaces n= 0.011 P2= 3.20"
0.5	44	0.0400	1.40		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
6.8	127	Total			

Subcatchment E-3: Subcatchment E-3



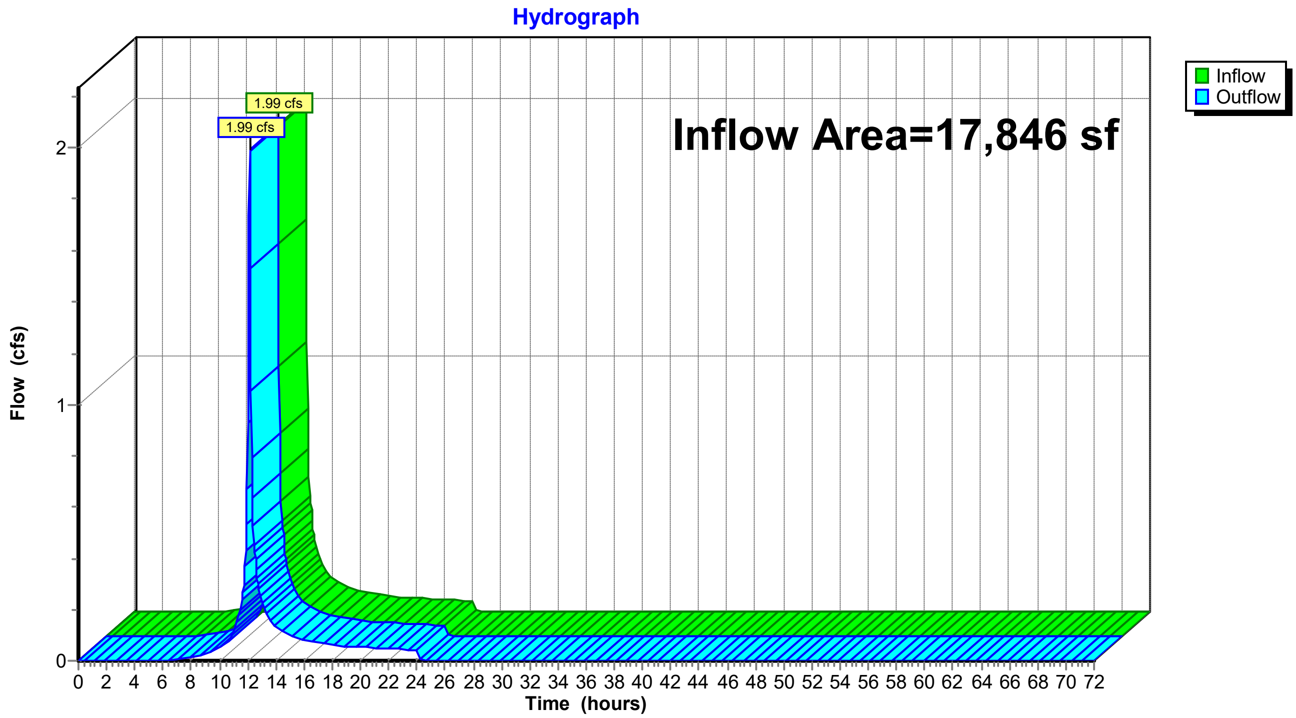
Summary for Reach SP-1: Flow to existing drainge on Pinevale Avenue

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17,846 sf, 53.69% Impervious, Inflow Depth = 4.66" for 100-Year event
Inflow = 1.99 cfs @ 12.14 hrs, Volume= 6,934 cf
Outflow = 1.99 cfs @ 12.14 hrs, Volume= 6,934 cf, Atten= 0%, Lag= 0.0 min
Routed to Reach SP-2 : Flow to exisitng drainge on Main Street

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

Reach SP-1: Flow to existing drainge on Pinevale Avenue



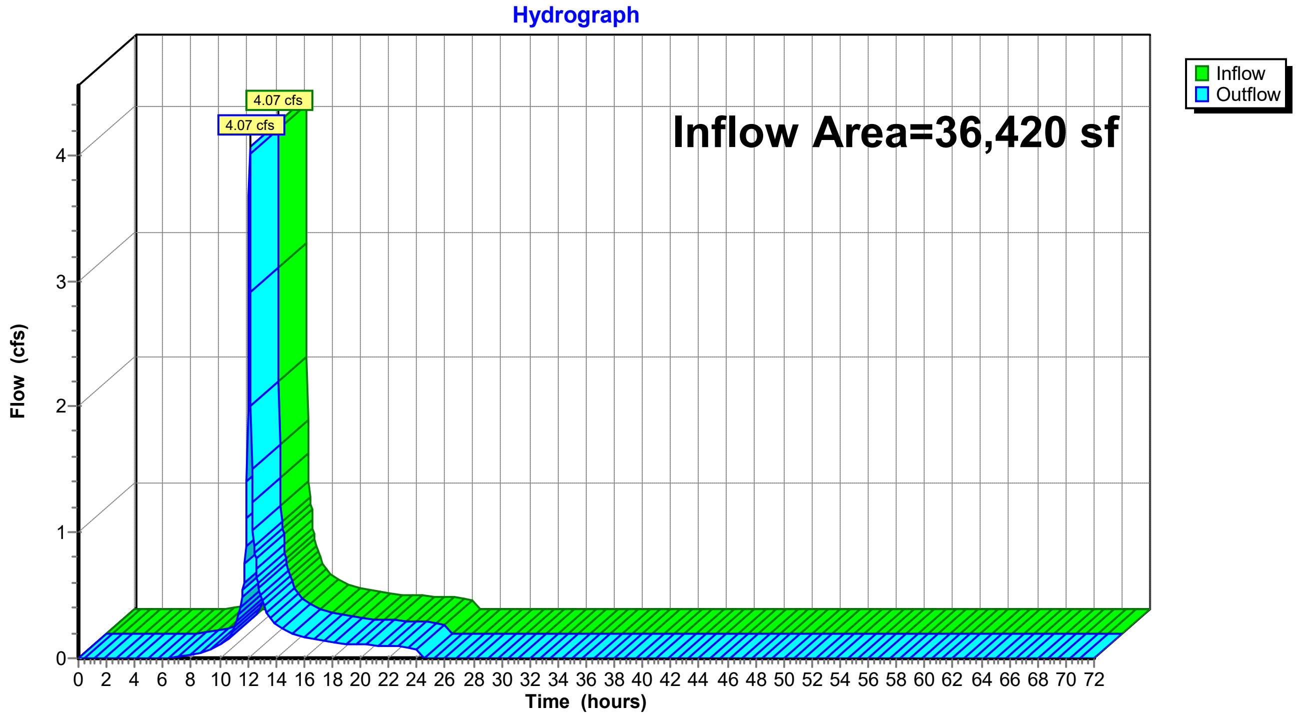
Summary for Reach SP-2: Flow to exisitng drainge on Main Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 36,420 sf, 54.41% Impervious, Inflow Depth = 4.60" for 100-Year event
Inflow = 4.07 cfs @ 12.14 hrs, Volume= 13,970 cf
Outflow = 4.07 cfs @ 12.14 hrs, Volume= 13,970 cf, Atten= 0%, Lag= 0.0 min

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

Reach SP-2: Flow to exisitng drainge on Main Street

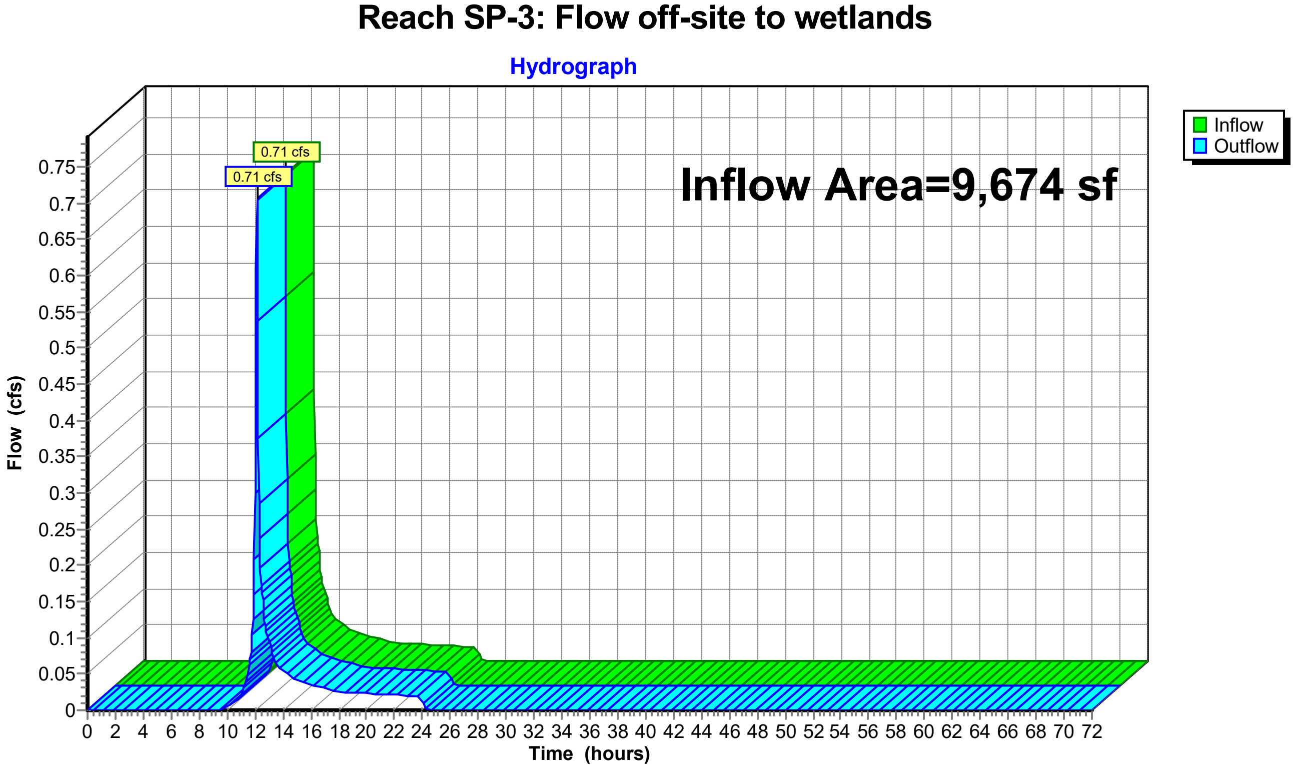


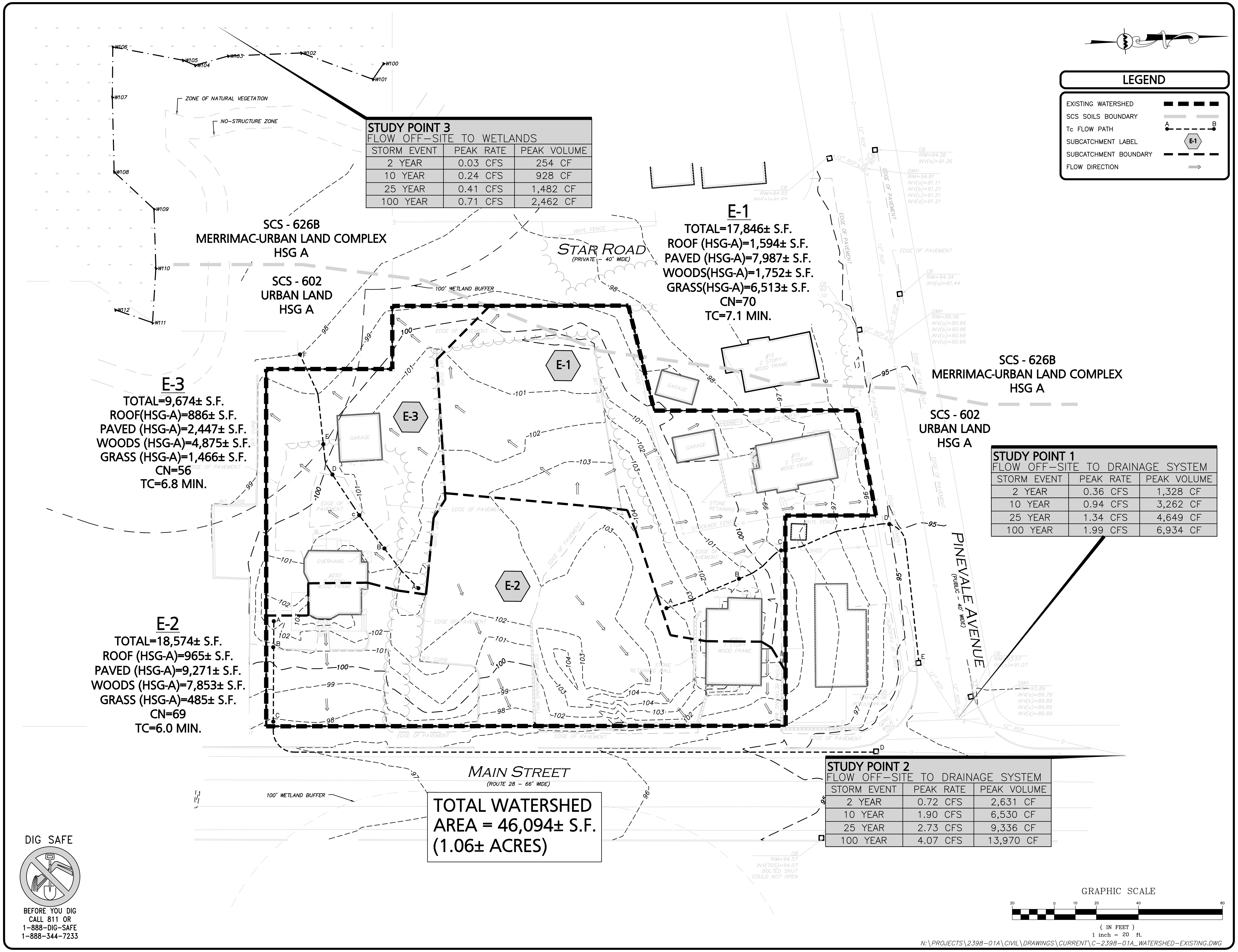
Summary for Reach SP-3: Flow off-site to wetlands

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	9,674 sf, 34.45% Impervious,	Inflow Depth = 3.05"	for 100-Year event
Inflow =	0.71 cfs @ 12.14 hrs, Volume=	2,462 cf	
Outflow =	0.71 cfs @ 12.14 hrs, Volume=	2,462 cf, Atten= 0%, Lag= 0.0 min	

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





STUDY POINT 3
FLOW OFF-SITE TO WETLANDS

STORM EVENT	PEAK RATE	PEAK VOLUME
2 YEAR	0.03 CFS	254 CF
10 YEAR	0.24 CFS	928 CF
25 YEAR	0.41 CFS	1,482 CF
100 YEAR	0.71 CFS	2,462 CF

STUDY POINT 1
FLOW OFF-SITE TO DRAINAGE SYSTEM

STORM EVENT	PEAK RATE	PEAK VOLUME
2 YEAR	0.36 CFS	1,328 CF
10 YEAR	0.94 CFS	3,262 CF
25 YEAR	1.34 CFS	4,649 CF
100 YEAR	1.99 CFS	6,934 CF

STUDY POINT 2
FLOW OFF-SITE TO DRAINAGE SYSTEM

STORM EVENT	PEAK RATE	PEAK VOLUME
2 YEAR	0.72 CFS	2,631 CF
10 YEAR	1.90 CFS	6,530 CF
25 YEAR	2.73 CFS	9,336 CF
100 YEAR	4.07 CFS	13,970 CF

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_WATERSHED-EXISTING.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
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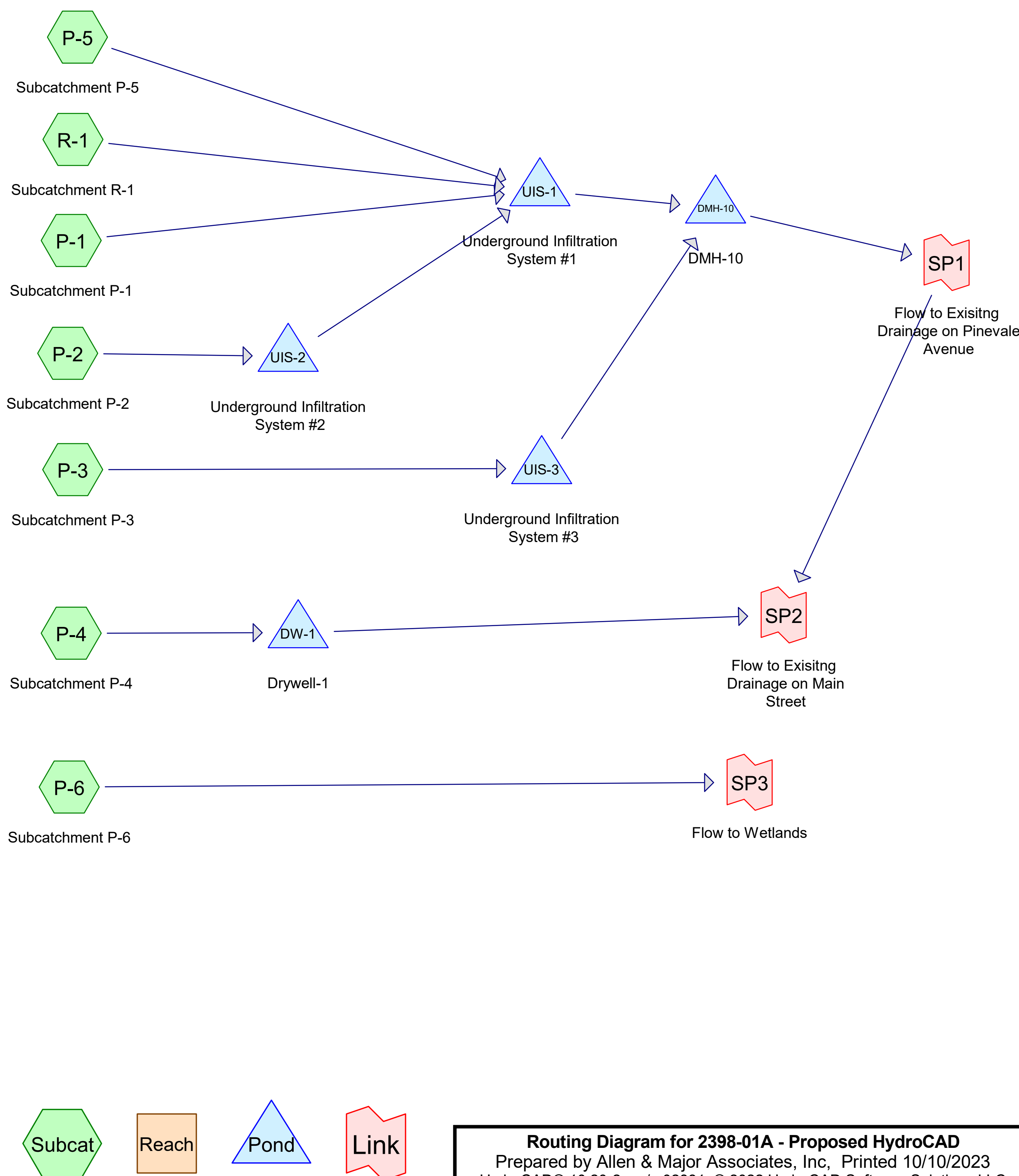
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: EXISTING WATERSHED PLAN

SHEET No. EWS-1

SECTION 5.0 -
PROPOSED DRAINAGE ANALYSIS



Routing Diagram for 2398-01A - Proposed HydroCAD
Prepared by Allen & Major Associates, Inc, Printed 10/10/2023
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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4245 MA Reading Middlesex County South
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	D	Default	24.00	1	3.31	2
2	10-Year	NRCC 24-hr	D	Default	24.00	1	5.21	2
3	25-Year	NRCC 24-hr	D	Default	24.00	1	6.40	2
4	100-Year	NRCC 24-hr	D	Default	24.00	1	8.23	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
8,036	39	>75% Grass cover, Good, HSG A (P-2, P-3, P-4, P-5, P-6)
28,332	98	Paved parking, HSG A (P-1, P-2, P-3, P-4, P-5, P-6)
9,748	98	Roofs, HSG A (R-1)
46,116	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
46,116	HSG A	P-1, P-2, P-3, P-4, P-5, P-6, R-1
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
46,116		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
8,036	0	0	0	0	8,036	>75% Grass cover, Good	
28,332	0	0	0	0	28,332	Paved parking	
9,748	0	0	0	0	9,748	Roofs	
46,116	**0**	**0**	**0**	**0**	**46,116**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	UIS-1	93.00	92.00	100.0	0.0100	0.013	0.0	12.0	0.0
2	UIS-2	94.50	93.50	100.0	0.0100	0.013	0.0	15.0	0.0
3	UIS-3	93.00	92.00	100.0	0.0100	0.013	0.0	12.0	0.0

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

Subcatchment P-1: Subcatchment P-1 Runoff Area=8,087 sf 100.00% Impervious Runoff Depth=3.08"
Tc=6.0 min CN=98 Runoff=0.53 cfs 2,074 cf

Subcatchment P-2: Subcatchment P-2 Runoff Area=16,402 sf 93.02% Impervious Runoff Depth=2.65"
Tc=6.0 min CN=94 Runoff=1.01 cfs 3,623 cf

Subcatchment P-3: Subcatchment P-3 Runoff Area=3,632 sf 77.01% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=84 Runoff=0.16 cfs 537 cf

Subcatchment P-4: Subcatchment P-4 Runoff Area=342 sf 6.43% Impervious Runoff Depth=0.03"
Tc=6.0 min CN=43 Runoff=0.00 cfs 1 cf

Subcatchment P-5: Subcatchment P-5 Runoff Area=6,397 sf 32.09% Impervious Runoff Depth=0.38"
Tc=6.0 min CN=58 Runoff=0.03 cfs 203 cf

Subcatchment P-6: Subcatchment P-6 Runoff Area=1,508 sf 7.69% Impervious Runoff Depth=0.04"
Tc=6.0 min CN=44 Runoff=0.00 cfs 5 cf

Subcatchment R-1: Subcatchment R-1 Runoff Area=9,748 sf 100.00% Impervious Runoff Depth=3.08"
Tc=6.0 min CN=98 Runoff=0.64 cfs 2,500 cf

Pond DMH-10: DMH-10 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond DW-1: Drywell-1 Peak Elev=90.00' Storage=0 cf Inflow=0.00 cfs 1 cf
Discarded=0.00 cfs 1 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 1 cf

Pond UIS-1: Underground Infiltration System Peak Elev=93.58' Storage=1,061 cf Inflow=1.21 cfs 5,254 cf
Discarded=0.22 cfs 5,254 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 5,254 cf

Pond UIS-2: Underground Infiltration System Peak Elev=96.17' Storage=1,317 cf Inflow=1.01 cfs 3,623 cf
Discarded=0.04 cfs 3,145 cf Primary=0.23 cfs 478 cf Outflow=0.27 cfs 3,623 cf

Pond UIS-3: Underground Infiltration System #3 Peak Elev=93.42' Storage=101 cf Inflow=0.16 cfs 537 cf
Discarded=0.03 cfs 537 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 537 cf

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP2: Flow to Exisitng Drainage on Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP3: Flow to Wetlands Inflow=0.00 cfs 5 cf
Primary=0.00 cfs 5 cf

Total Runoff Area = 46,116 sf Runoff Volume = 8,943 cf Average Runoff Depth = 2.33"
17.43% Pervious = 8,036 sf 82.57% Impervious = 38,080 sf

Summary for Subcatchment P-1: Subcatchment P-1

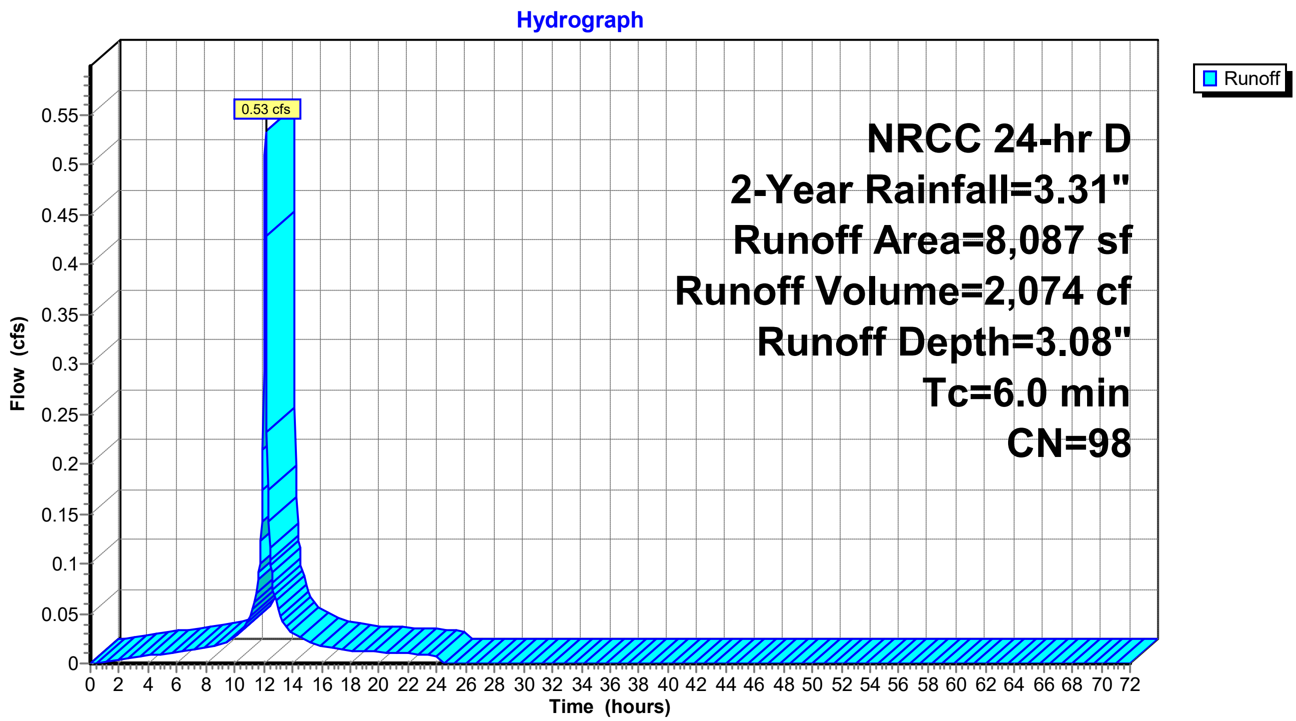
Runoff = 0.53 cfs @ 12.13 hrs, Volume= 2,074 cf, Depth= 3.08"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
8,087	98	Paved parking, HSG A
8,087		100.00% Impervious Area

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

Subcatchment P-1: Subcatchment P-1



Summary for Subcatchment P-2: Subcatchment P-2

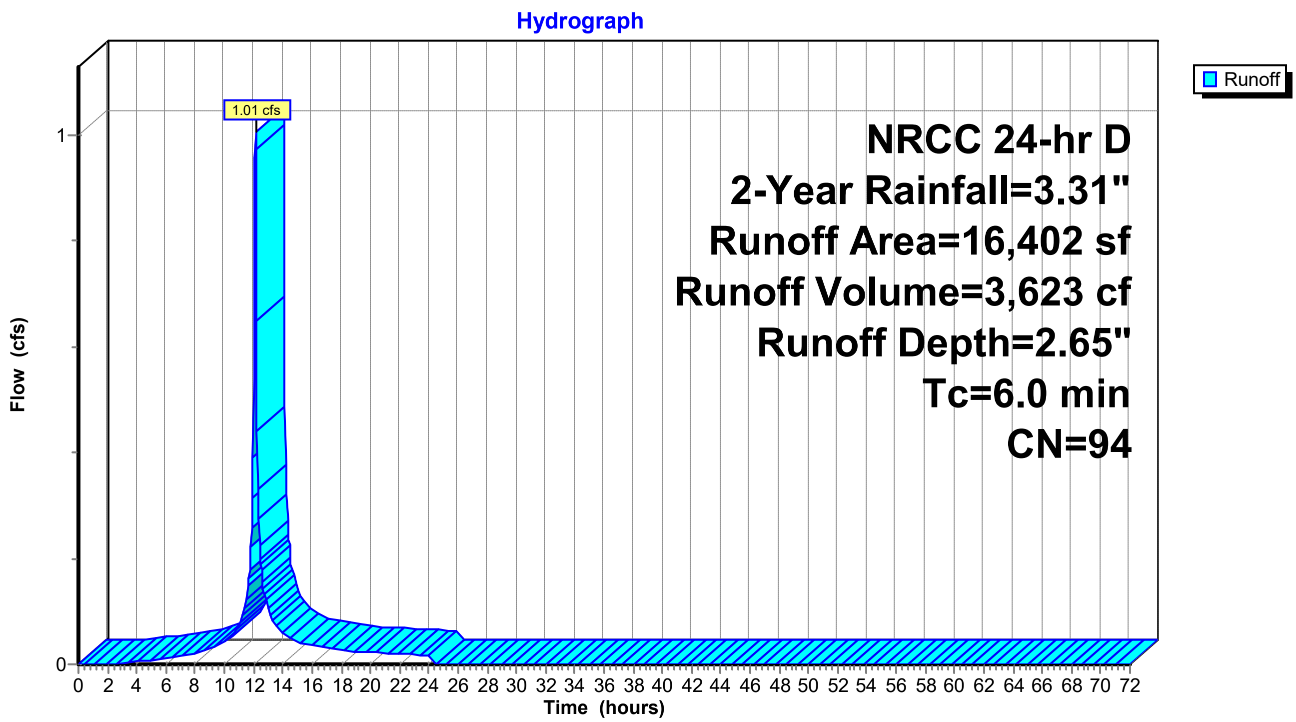
Runoff = 1.01 cfs @ 12.13 hrs, Volume= 3,623 cf, Depth= 2.65"
Routed to Pond UIS-2 : Underground Infiltration System #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
1,145	39	>75% Grass cover, Good, HSG A
15,257	98	Paved parking, HSG A
16,402	94	Weighted Average
1,145		6.98% Pervious Area
15,257		93.02% Impervious Area

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

Subcatchment P-2: Subcatchment P-2



Summary for Subcatchment P-3: Subcatchment P-3

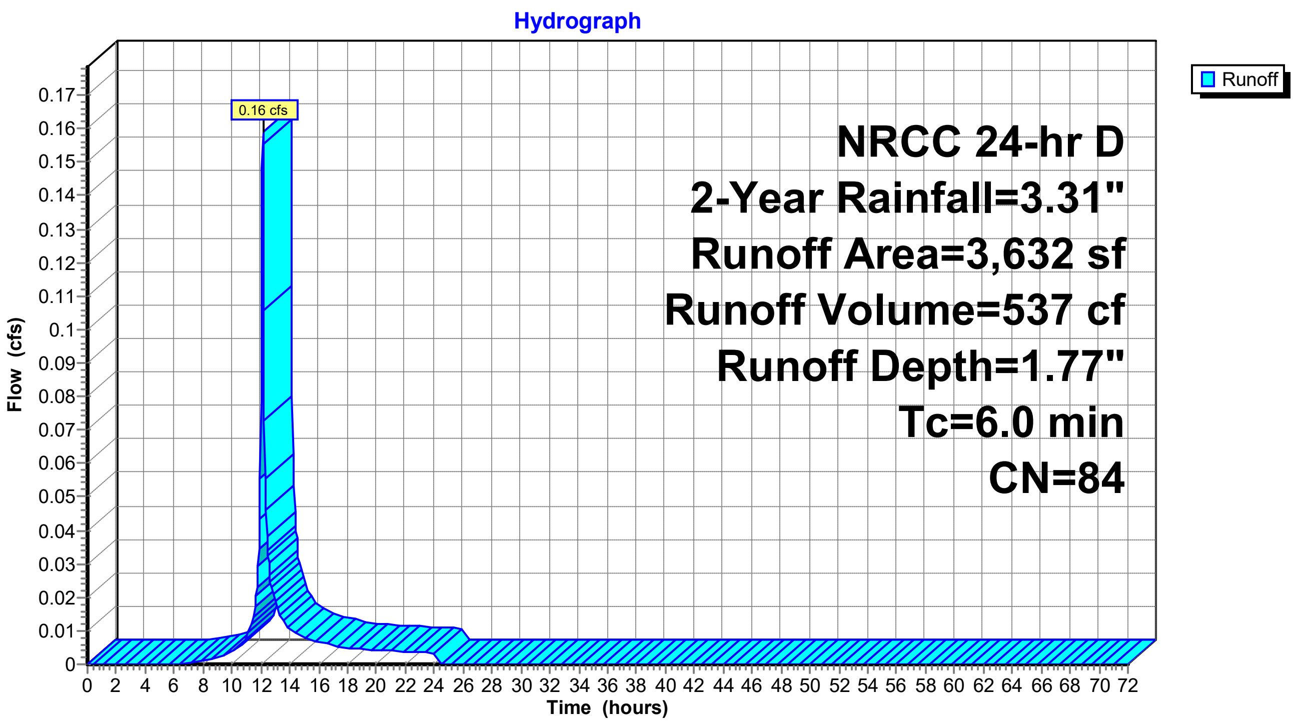
Runoff = 0.16 cfs @ 12.13 hrs, Volume= 537 cf, Depth= 1.77"
Routed to Pond UIS-3 : Underground Infiltration System #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
835	39	>75% Grass cover, Good, HSG A
2,797	98	Paved parking, HSG A
3,632	84	Weighted Average
835		22.99% Pervious Area
2,797		77.01% Impervious Area

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

Subcatchment P-3: Subcatchment P-3



Summary for Subcatchment P-4: Subcatchment P-4

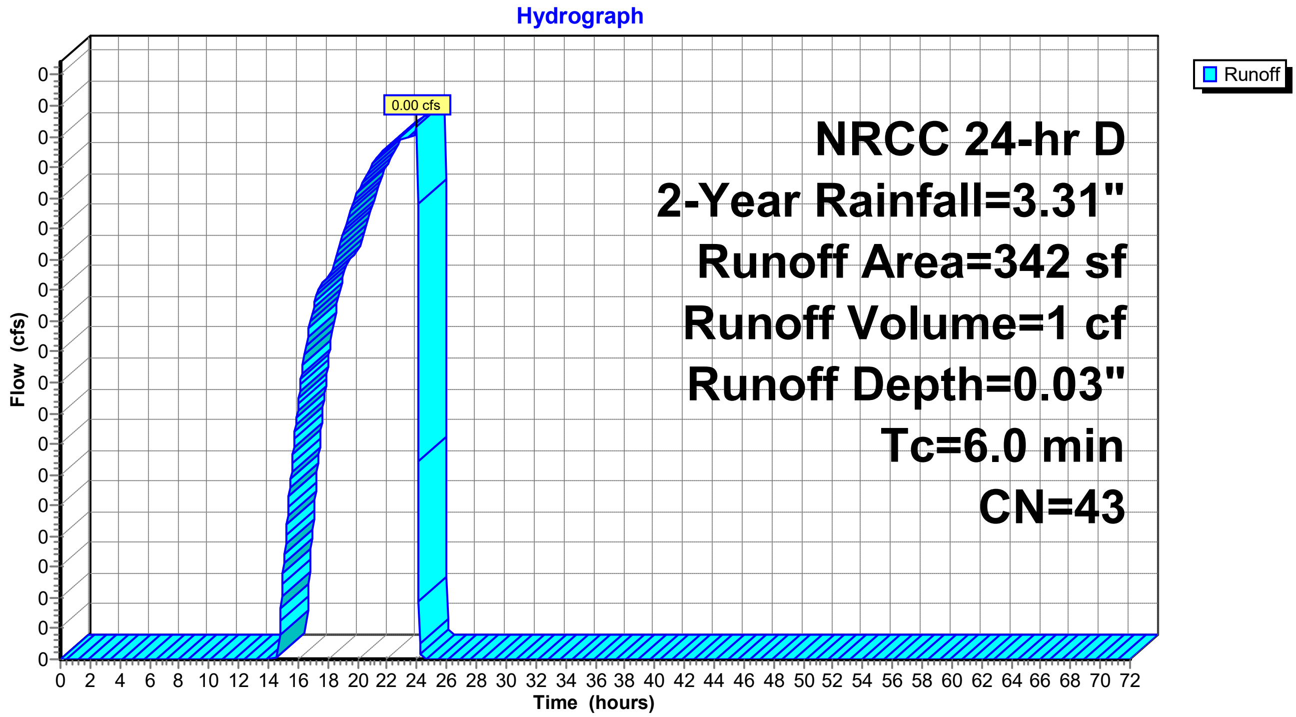
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 1 cf, Depth= 0.03"
Routed to Pond DW-1 : Drywell-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
320	39	>75% Grass cover, Good, HSG A
22	98	Paved parking, HSG A
342	43	Weighted Average
320		93.57% Pervious Area
22		6.43% Impervious Area

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

Subcatchment P-4: Subcatchment P-4



Summary for Subcatchment P-5: Subcatchment P-5

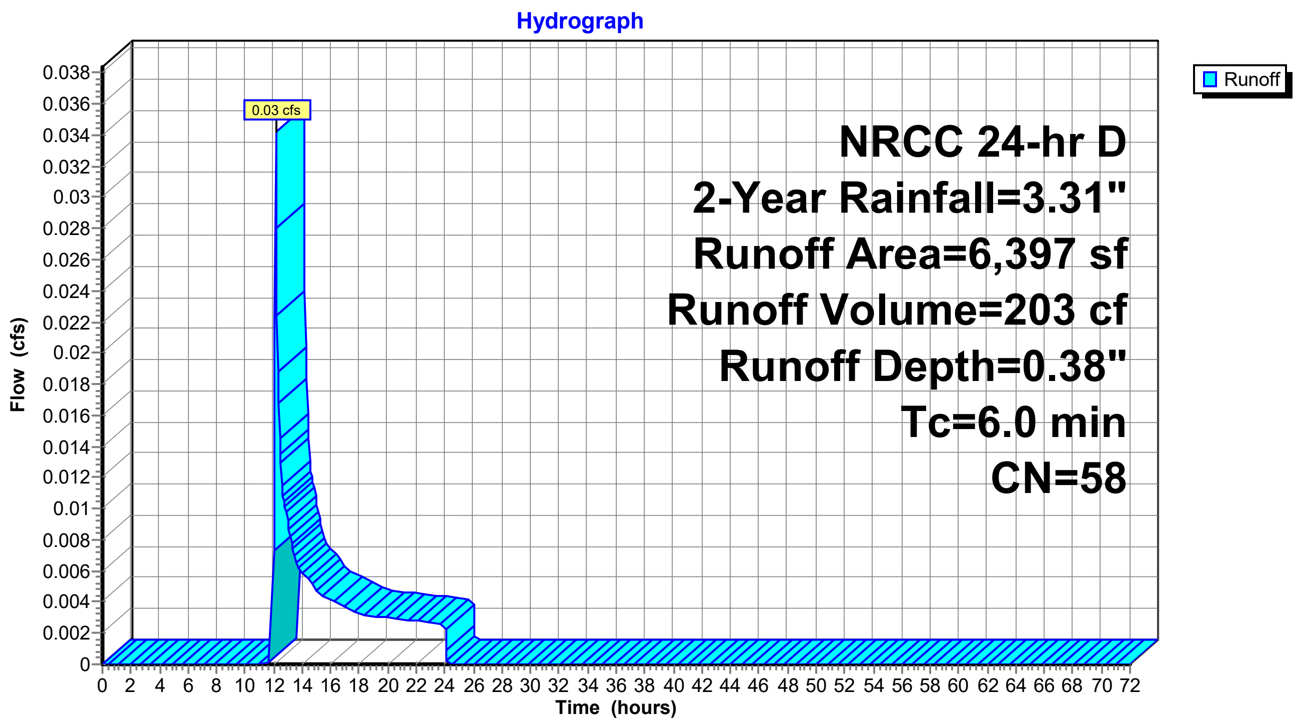
Runoff = 0.03 cfs @ 12.16 hrs, Volume= 203 cf, Depth= 0.38"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
4,344	39	>75% Grass cover, Good, HSG A
2,053	98	Paved parking, HSG A
6,397	58	Weighted Average
4,344		67.91% Pervious Area
2,053		32.09% Impervious Area

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

Subcatchment P-5: Subcatchment P-5



Summary for Subcatchment P-6: Subcatchment P-6

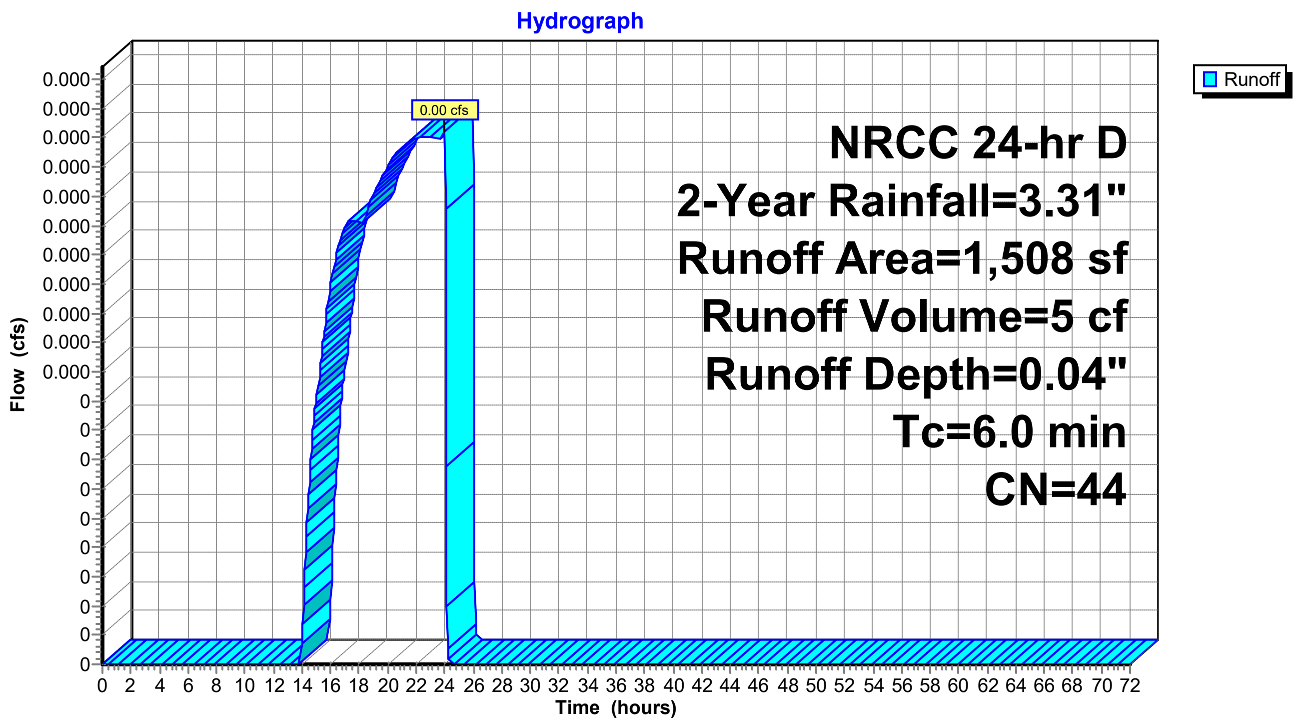
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 5 cf, Depth= 0.04"
Routed to Link SP3 : Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
116	98	Paved parking, HSG A
1,508	44	Weighted Average
1,392		92.31% Pervious Area
116		7.69% Impervious Area

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

Subcatchment P-6: Subcatchment P-6



Summary for Subcatchment R-1: Subcatchment R-1

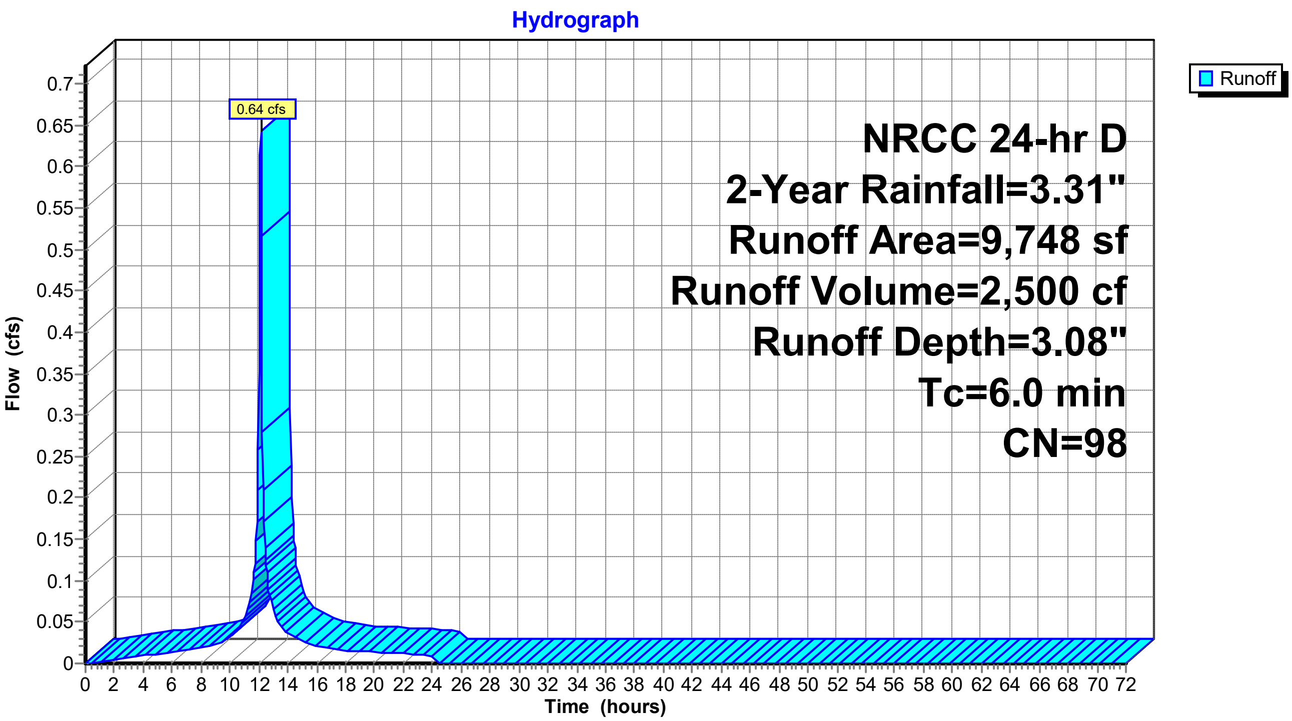
Runoff = 0.64 cfs @ 12.13 hrs, Volume= 2,500 cf, Depth= 3.08"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 2-Year Rainfall=3.31"

Area (sf)	CN	Description
9,748	98	Roofs, HSG A
9,748		100.00% Impervious Area

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

Subcatchment R-1: Subcatchment R-1



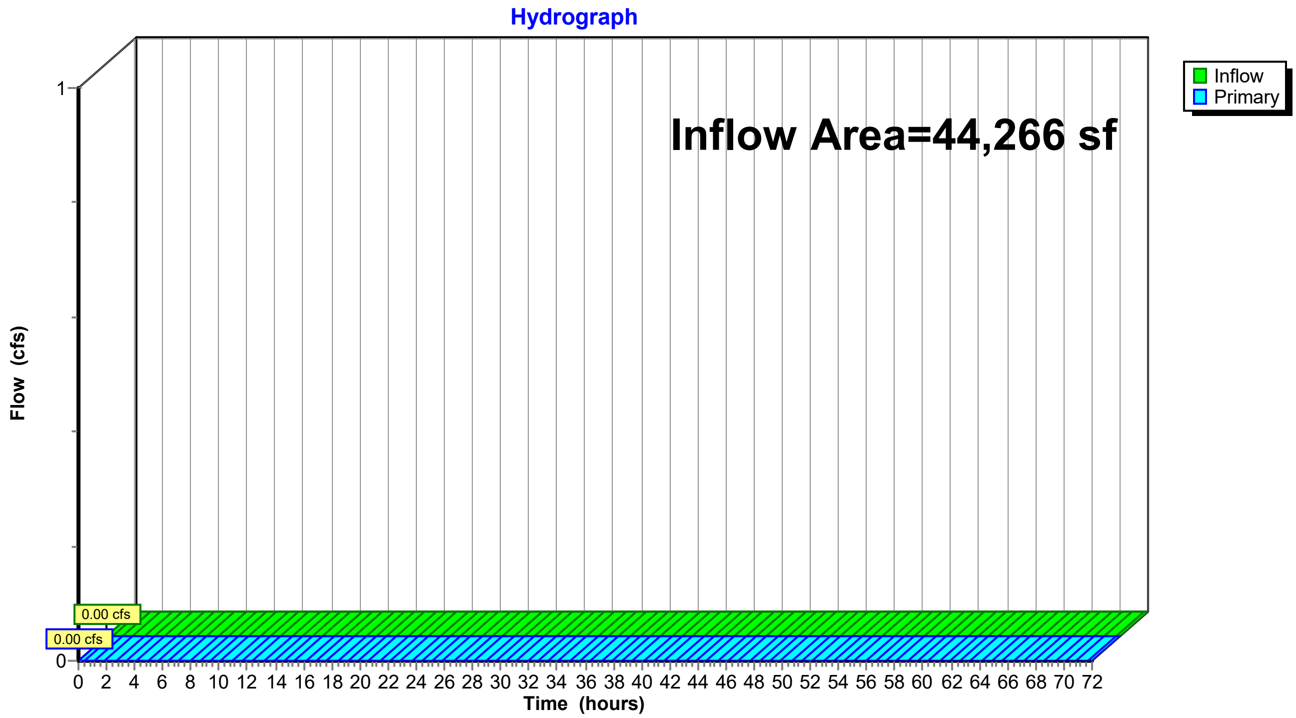
Summary for Pond DMH-10: DMH-10

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP1 : Flow to Exisitng Drainage on Pinevale Avenue

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

Pond DMH-10: DMH-10



Summary for Pond DW-1: Drywell-1

Inflow Area = 342 sf, 6.43% Impervious, Inflow Depth = 0.03" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 1 cf
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 1 cf, Atten= 2%, Lag= 0.0 min
Discarded = 0.00 cfs @ 24.00 hrs, Volume= 1 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 90.00' @ 24.00 hrs Surf.Area= 24 sf Storage= 0 cf

Plug-Flow detention time= 8.4 min calculated for 1 cf (100% of inflow)
Center-of-Mass det. time= 8.4 min (1,218.7 - 1,210.4)

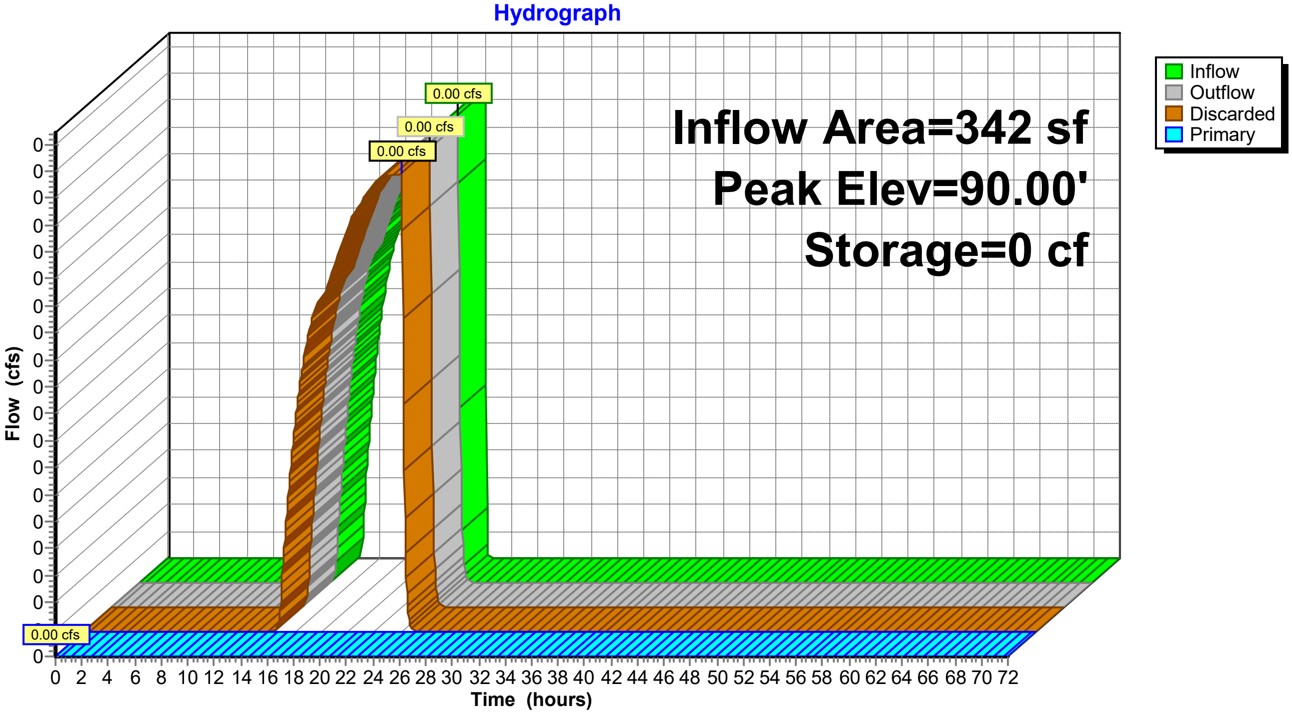
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	34 cf	**3.50'D x 3.50'H Drywell Base** Inside #2
#2	90.00'	29 cf	**5.50'D x 4.50'H stone**
			107 cf Overall - 34 cf Embedded = 73 cf x 40.0% Voids
#3	96.00'	79 cf	**10.00'D x 1.00'H Overflow Above Rim** -Impervious
#4	94.50'	5 cf	**2.00'D x 1.50'H Drywell Riser to Rim** -Impervious
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	96.00'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.00 cfs @ 24.00 hrs HW=90.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=90.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DW-1: Drywell-1



Summary for Pond UIS-1: Underground Infiltration System #1

[79] Warning: Submerged Pond UIS-2 Primary device # 1 OUTLET by 0.08'

Inflow Area = 40,634 sf, 86.49% Impervious, Inflow Depth = 1.55" for 2-Year event
Inflow = 1.21 cfs @ 12.13 hrs, Volume= 5,254 cf
Outflow = 0.22 cfs @ 11.80 hrs, Volume= 5,254 cf, Atten= 81%, Lag= 0.0 min
Discarded = 0.22 cfs @ 11.80 hrs, Volume= 5,254 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.58' @ 12.89 hrs Surf.Area= 4,031 sf Storage= 1,061 cf
Flood Elev= 94.03' Surf.Area= 4,031 sf Storage= 2,550 cf

Plug-Flow detention time= 28.4 min calculated for 5,251 cf (100% of inflow)
Center-of-Mass det. time= 28.4 min (798.7 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	3,659 cf	**87.00'W x 46.34'L x 3.50'H Field A** 14,110 cf Overall - 4,962 cf Embedded = 9,148 cf x 40.0% Voids
#2A	93.50'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 18 Rows
		8,621 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	96.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 11.80 hrs HW=93.04' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-1: Underground Infiltration System #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

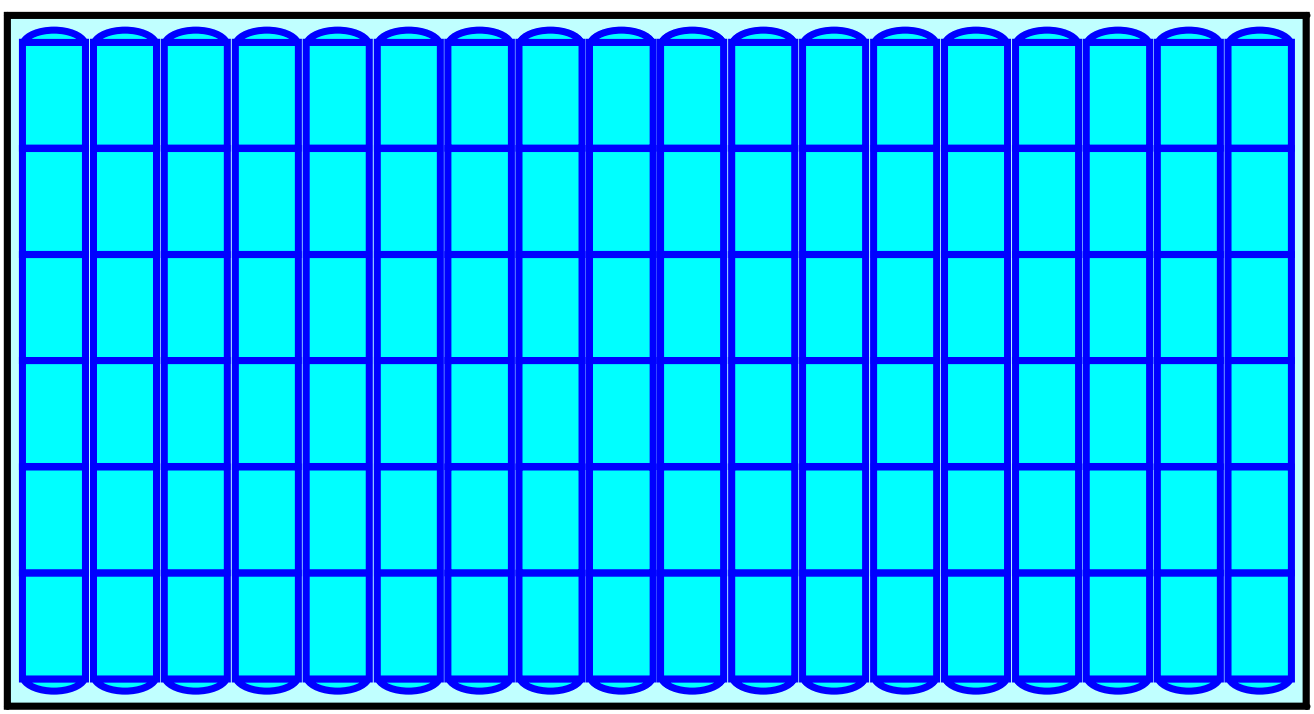
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
18 Rows x 51.0" Wide + 6.0" Spacing x 17 + 12.0" Side Stone x 2 = 87.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

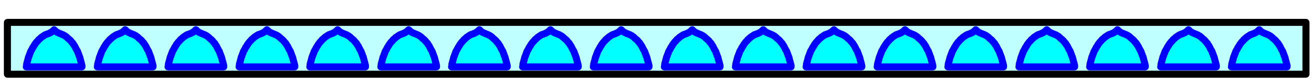
108 Chambers x 45.9 cf = 4,961.5 cf Chamber Storage

14,109.5 cf Field - 4,961.5 cf Chambers = 9,148.0 cf Stone x 40.0% Voids = 3,659.2 cf Stone Storage

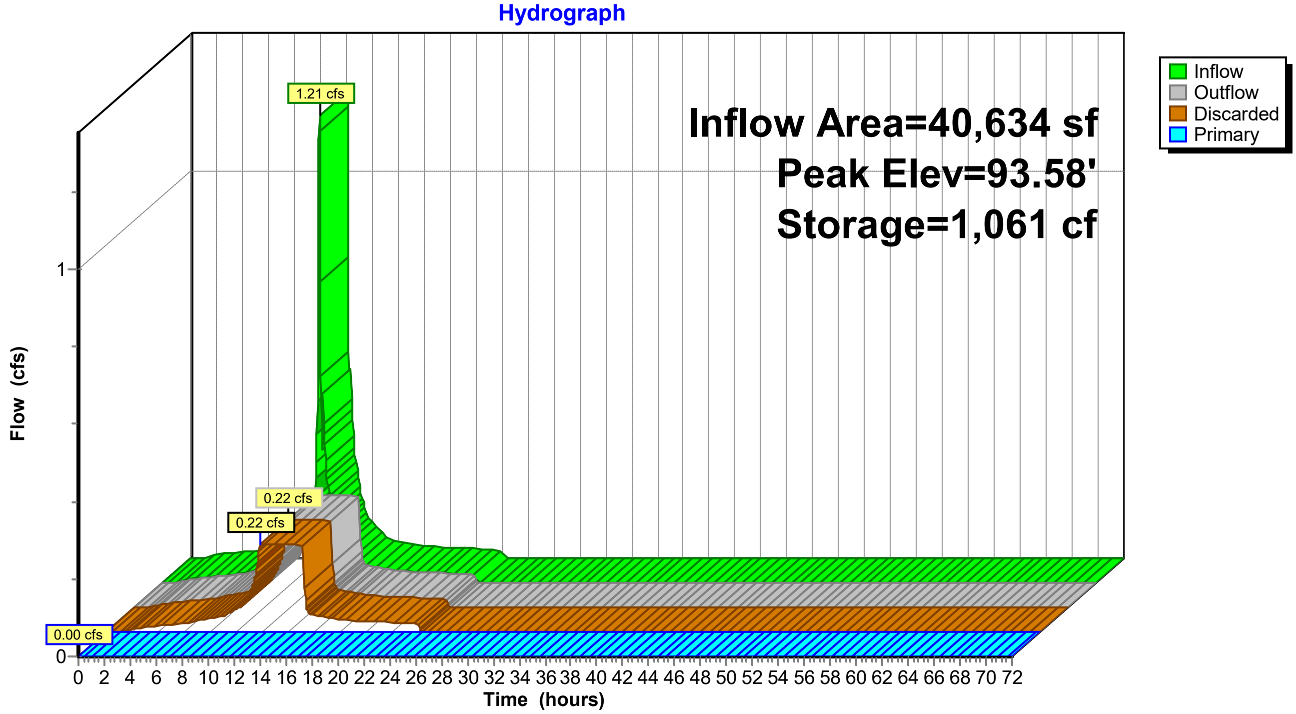
Chamber Storage + Stone Storage = 8,620.7 cf = 0.198 af
Overall Storage Efficiency = 61.1%
Overall System Size = 46.34' x 87.00' x 3.50'

108 Chambers
522.6 cy Field
338.8 cy Stone





Pond UIS-1: Underground Infiltration System #1



Summary for Pond UIS-2: Underground Infiltration System #2

[58] Hint: Peaked 2.14' above defined flood level

Inflow Area = 16,402 sf, 93.02% Impervious, Inflow Depth = 2.65" for 2-Year event
Inflow = 1.01 cfs @ 12.13 hrs, Volume= 3,623 cf
Outflow = 0.27 cfs @ 12.42 hrs, Volume= 3,623 cf, Atten= 73%, Lag= 17.3 min
Discarded = 0.04 cfs @ 9.80 hrs, Volume= 3,145 cf
Primary = 0.23 cfs @ 12.42 hrs, Volume= 478 cf
Routed to Pond UIS-1 : Underground Infiltration System #1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.17' @ 12.42 hrs Surf.Area= 658 sf Storage= 1,317 cf
Flood Elev= 94.03' Surf.Area= 658 sf Storage= 416 cf

Plug-Flow detention time= 293.4 min calculated for 3,621 cf (100% of inflow)
Center-of-Mass det. time= 293.5 min (1,090.8 - 797.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	627 cf	**20.50'W x 32.10'L x 3.50'H Field A** 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	93.50'	735 cf	**ADS_StormTech SC-740 +Cap** x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	93.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder** -Impervious
		1,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	96.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 9.80 hrs HW=93.06' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.19 cfs @ 12.42 hrs HW=96.17' (Free Discharge)
└─**1=Culvert** (Passes 0.19 cfs of 4.76 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.19 cfs @ 0.72 fps)

Pond UIS-2: Underground Infiltration System #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

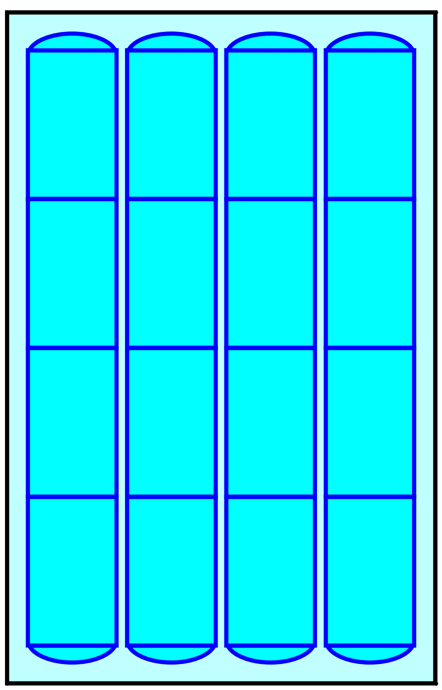
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

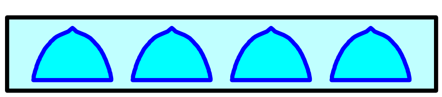
16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,302.9 cf Field - 735.0 cf Chambers = 1,567.9 cf Stone x 40.0% Voids = 627.2 cf Stone Storage

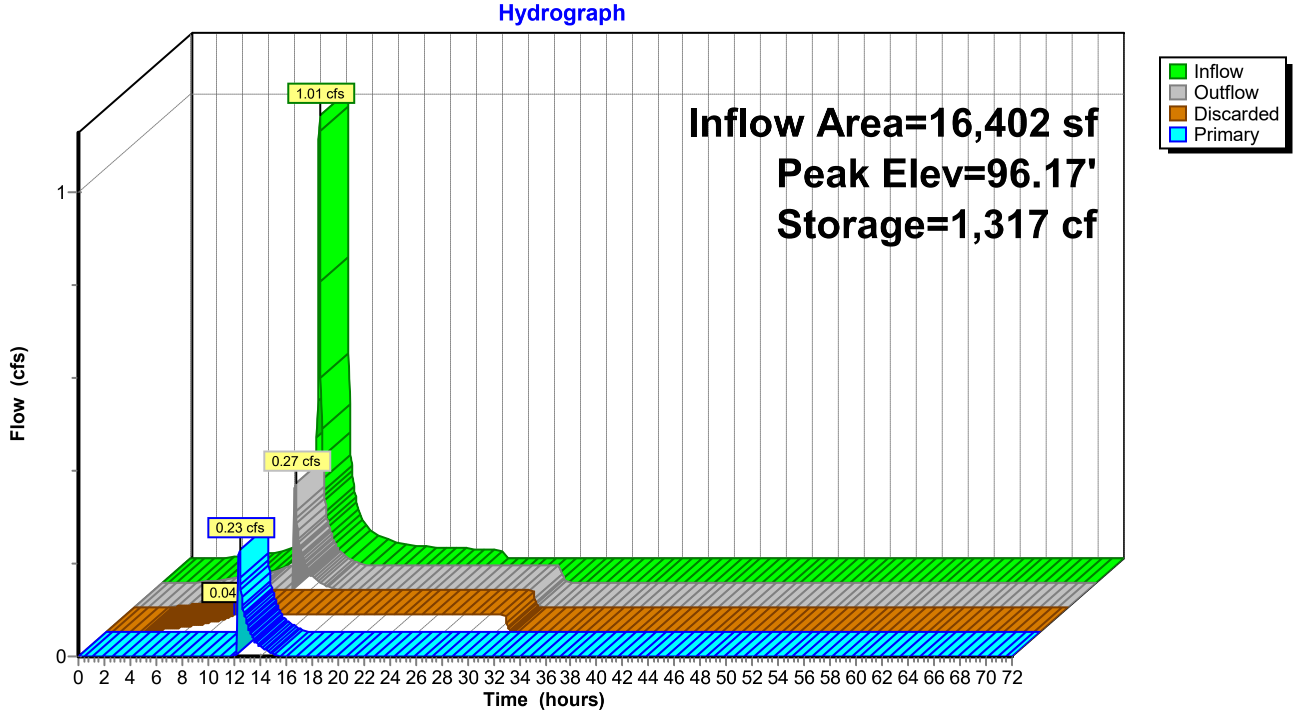
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 59.2%
Overall System Size = 32.10' x 20.50' x 3.50'

16 Chambers
85.3 cy Field
58.1 cy Stone





Pond UIS-2: Underground Infiltration System #2



Summary for Pond UIS-3: Underground Infiltration System #3

Inflow Area = 3,632 sf, 77.01% Impervious, Inflow Depth = 1.77" for 2-Year event
Inflow = 0.16 cfs @ 12.13 hrs, Volume= 537 cf
Outflow = 0.03 cfs @ 11.90 hrs, Volume= 537 cf, Atten= 79%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.90 hrs, Volume= 537 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.42' @ 12.46 hrs Surf.Area= 607 sf Storage= 101 cf
Flood Elev= 94.03' Surf.Area= 607 sf Storage= 351 cf

Plug-Flow detention time= 16.4 min calculated for 537 cf (100% of inflow)
Center-of-Mass det. time= 16.4 min (868.1 - 851.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	449 cf	**34.83'W x 17.44'L x 2.33'H Field A** 1,417 cf Overall - 295 cf Embedded = 1,123 cf x 40.0% Voids
#2A	93.50'	295 cf	**ADS_StormTech SC-310 +Cap** x 20 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 10 Rows
		744 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.20'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.90 hrs HW=93.03' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-3: Underground Infiltration System #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

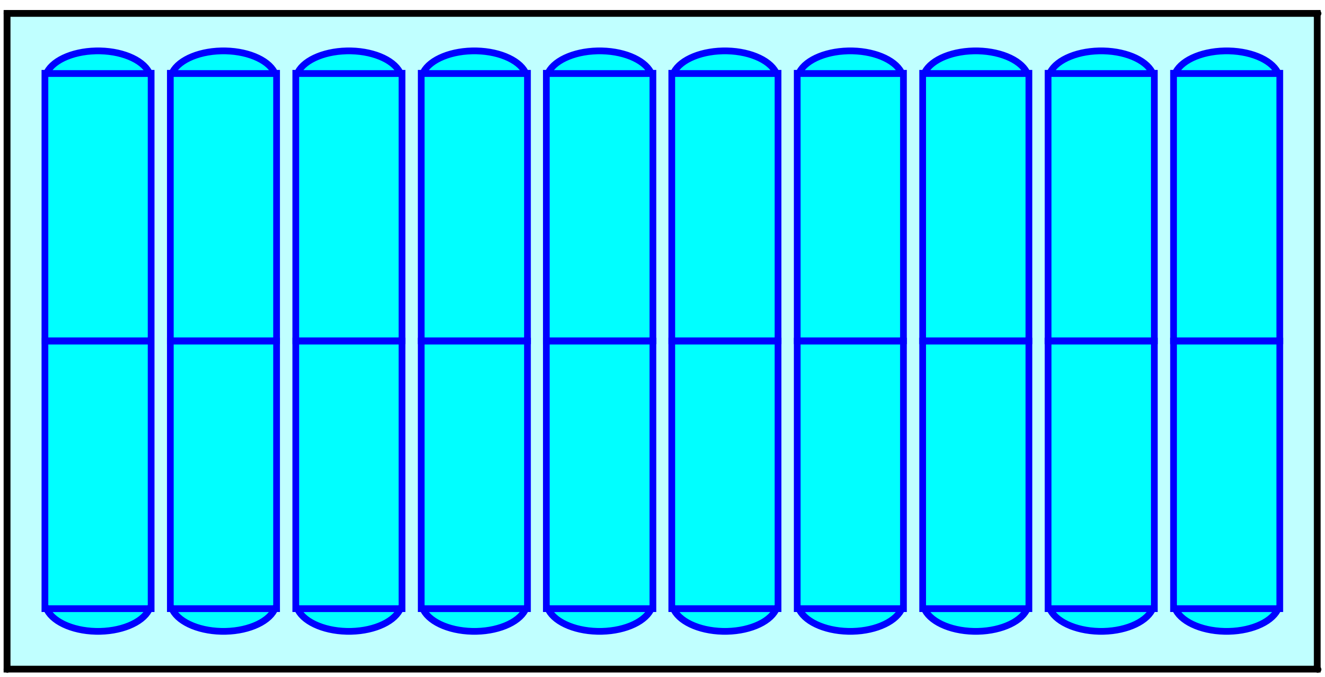
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
10 Rows x 34.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 34.83' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

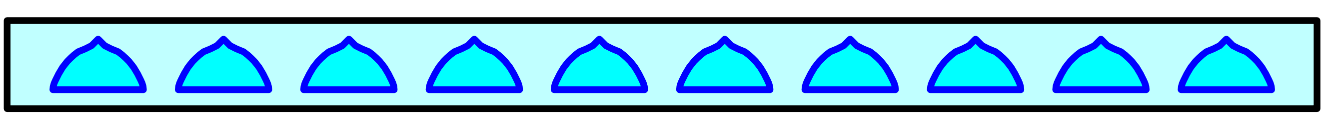
20 Chambers x 14.7 cf = 294.8 cf Chamber Storage

1,417.5 cf Field - 294.8 cf Chambers = 1,122.6 cf Stone x 40.0% Voids = 449.1 cf Stone Storage

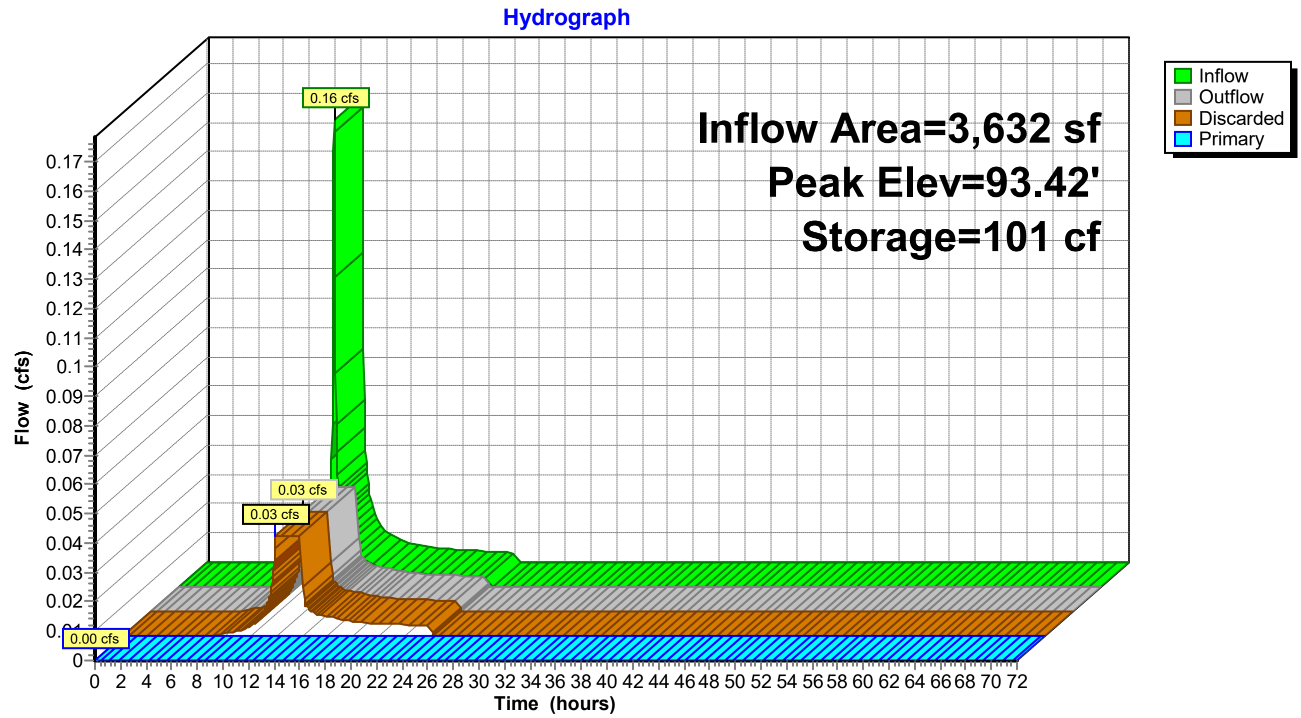
Chamber Storage + Stone Storage = 743.9 cf = 0.017 af
Overall Storage Efficiency = 52.5%
Overall System Size = 17.44' x 34.83' x 2.33'

20 Chambers
52.5 cy Field
41.6 cy Stone





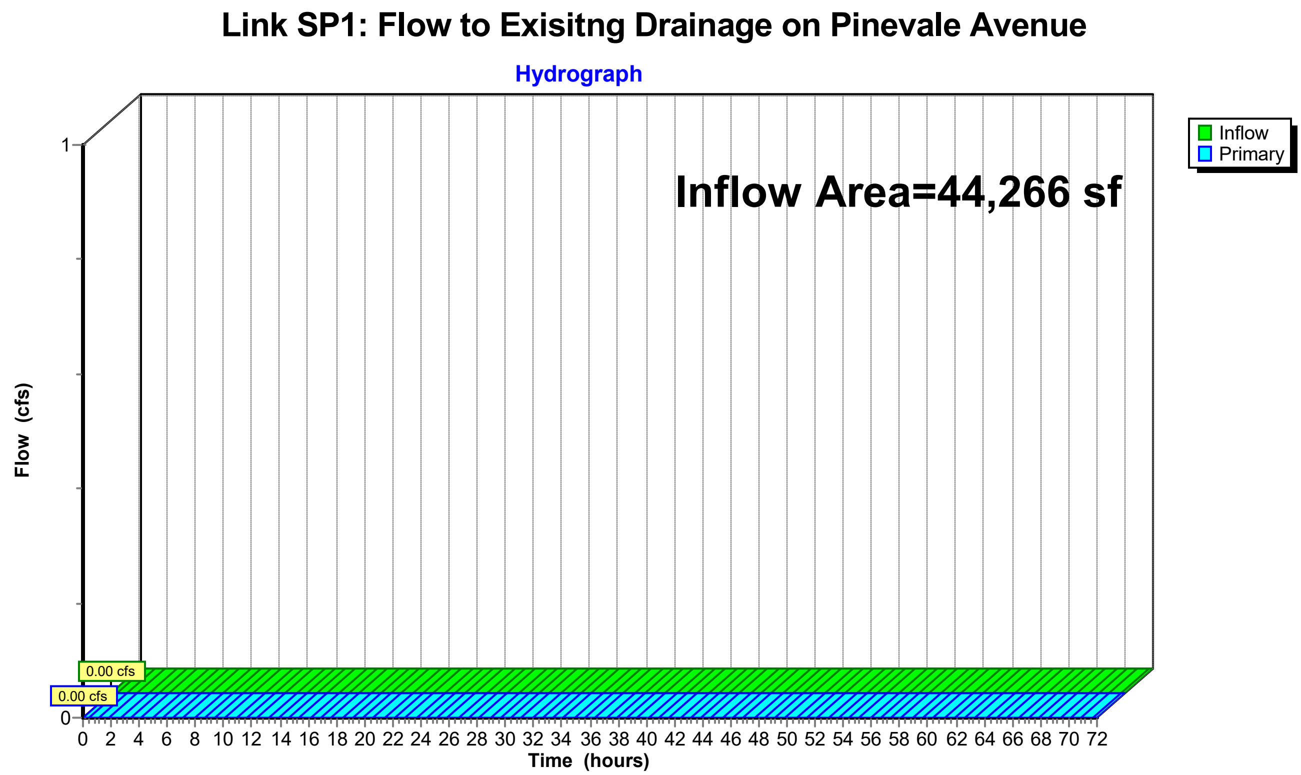
Pond UIS-3: Underground Infiltration System #3



Summary for Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

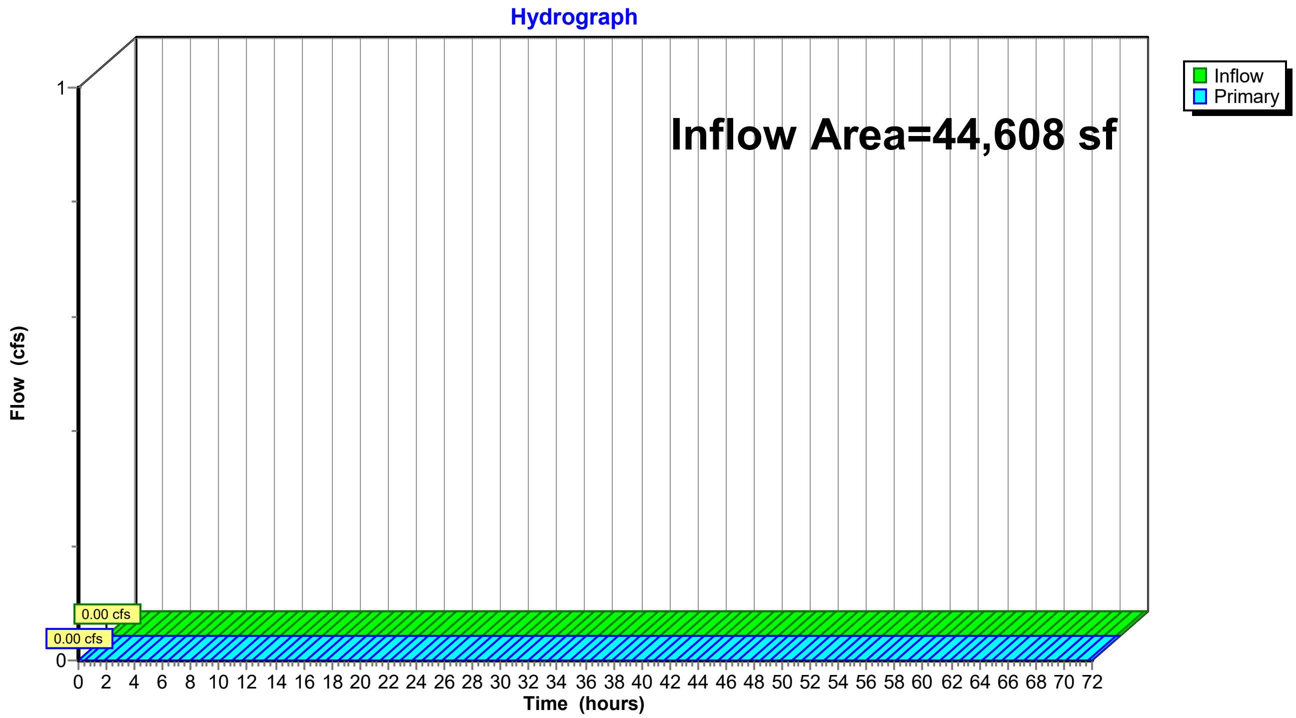


Summary for Link SP2: Flow to Exisitng Drainage on Main Street

Inflow Area = 44,608 sf, 85.11% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: Flow to Exisitng Drainage on Main Street

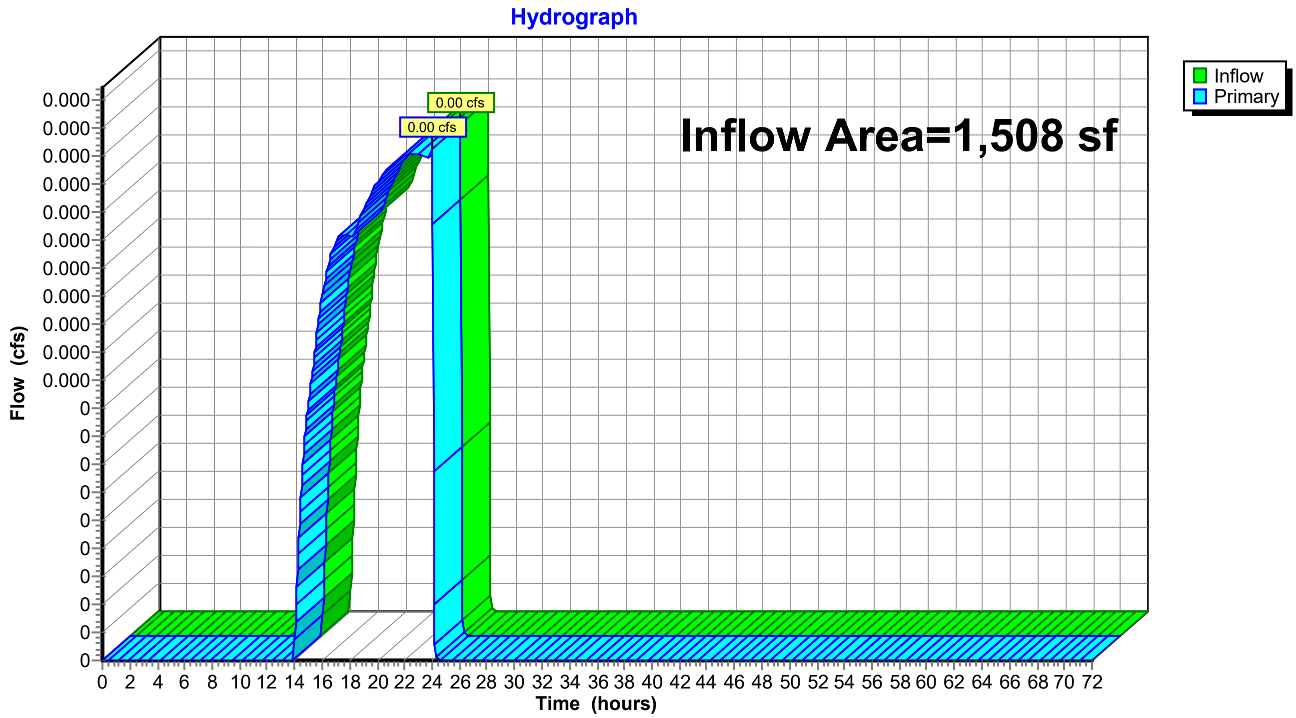


Summary for Link SP3: Flow to Wetlands

Inflow Area =	1,508 sf,	7.69% Impervious,	Inflow Depth = 0.04"	for 2-Year event
Inflow =	0.00 cfs @	24.00 hrs, Volume=	5 cf	
Primary =	0.00 cfs @	24.00 hrs, Volume=	5 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: Flow to Wetlands



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

Subcatchment P-1: Subcatchment P-1 Runoff Area=8,087 sf 100.00% Impervious Runoff Depth=4.97"
Tc=6.0 min CN=98 Runoff=0.85 cfs 3,351 cf

Subcatchment P-2: Subcatchment P-2 Runoff Area=16,402 sf 93.02% Impervious Runoff Depth=4.52"
Tc=6.0 min CN=94 Runoff=1.66 cfs 6,172 cf

Subcatchment P-3: Subcatchment P-3 Runoff Area=3,632 sf 77.01% Impervious Runoff Depth=3.46"
Tc=6.0 min CN=84 Runoff=0.30 cfs 1,048 cf

Subcatchment P-4: Subcatchment P-4 Runoff Area=342 sf 6.43% Impervious Runoff Depth=0.41"
Tc=6.0 min CN=43 Runoff=0.00 cfs 12 cf

Subcatchment P-5: Subcatchment P-5 Runoff Area=6,397 sf 32.09% Impervious Runoff Depth=1.29"
Tc=6.0 min CN=58 Runoff=0.19 cfs 686 cf

Subcatchment P-6: Subcatchment P-6 Runoff Area=1,508 sf 7.69% Impervious Runoff Depth=0.46"
Tc=6.0 min CN=44 Runoff=0.01 cfs 58 cf

Subcatchment R-1: Subcatchment R-1 Runoff Area=9,748 sf 100.00% Impervious Runoff Depth=4.97"
Tc=6.0 min CN=98 Runoff=1.02 cfs 4,040 cf

Pond DMH-10: DMH-10 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond DW-1: Drywell-1 Peak Elev=90.04' Storage=0 cf Inflow=0.00 cfs 12 cf
Discarded=0.00 cfs 12 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 12 cf

Pond UIS-1: Underground Infiltration Peak Elev=94.46' Storage=3,924 cf Inflow=3.66 cfs 10,475 cf
Discarded=0.22 cfs 10,475 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 10,475 cf

Pond UIS-2: Underground Infiltration System Peak Elev=96.37' Storage=1,371 cf Inflow=1.66 cfs 6,172 cf
Discarded=0.04 cfs 3,774 cf Primary=1.61 cfs 2,398 cf Outflow=1.65 cfs 6,172 cf

Pond UIS-3: Underground Infiltration System #3 Peak Elev=93.90' Storage=296 cf Inflow=0.30 cfs 1,048 cf
Discarded=0.03 cfs 1,048 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,048 cf

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP2: Flow to Exisitng Drainage on Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP3: Flow to Wetlands Inflow=0.01 cfs 58 cf
Primary=0.01 cfs 58 cf

Total Runoff Area = 46,116 sf Runoff Volume = 15,366 cf Average Runoff Depth = 4.00"
17.43% Pervious = 8,036 sf 82.57% Impervious = 38,080 sf

Summary for Subcatchment P-1: Subcatchment P-1

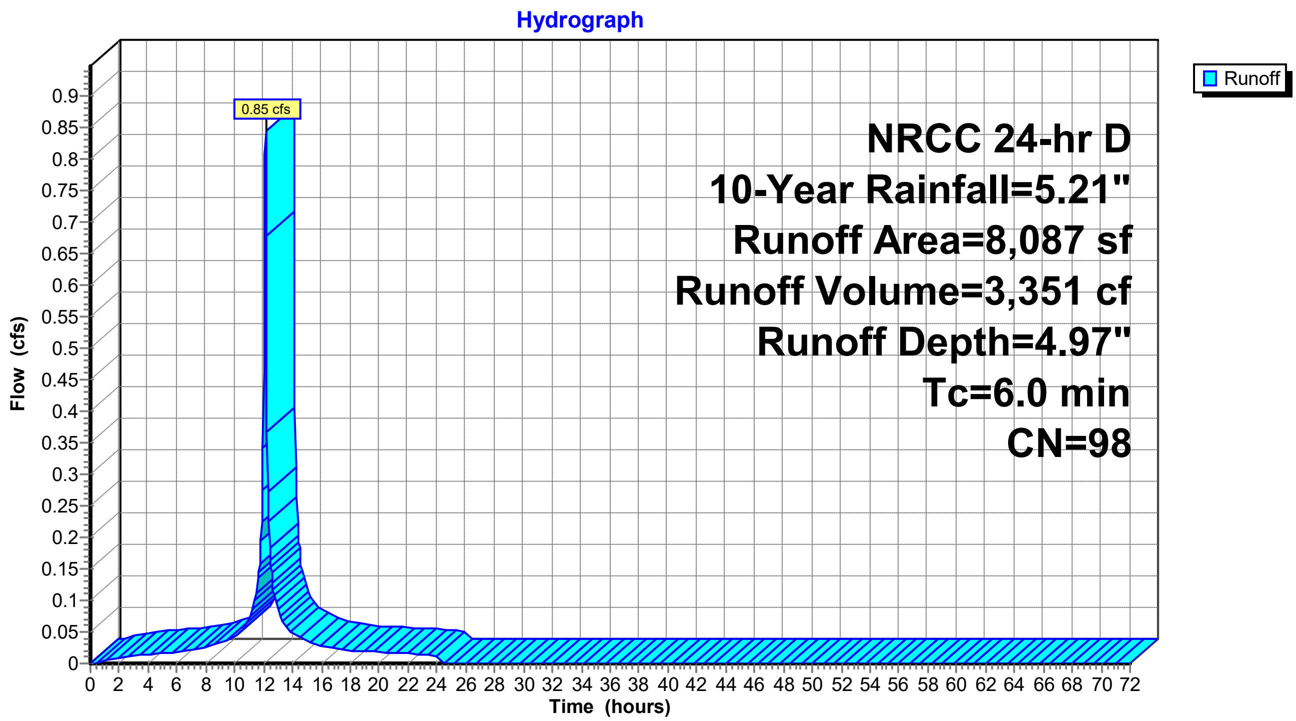
Runoff = 0.85 cfs @ 12.13 hrs, Volume= 3,351 cf, Depth= 4.97"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
8,087	98	Paved parking, HSG A
8,087		100.00% Impervious Area

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

Subcatchment P-1: Subcatchment P-1



Summary for Subcatchment P-2: Subcatchment P-2

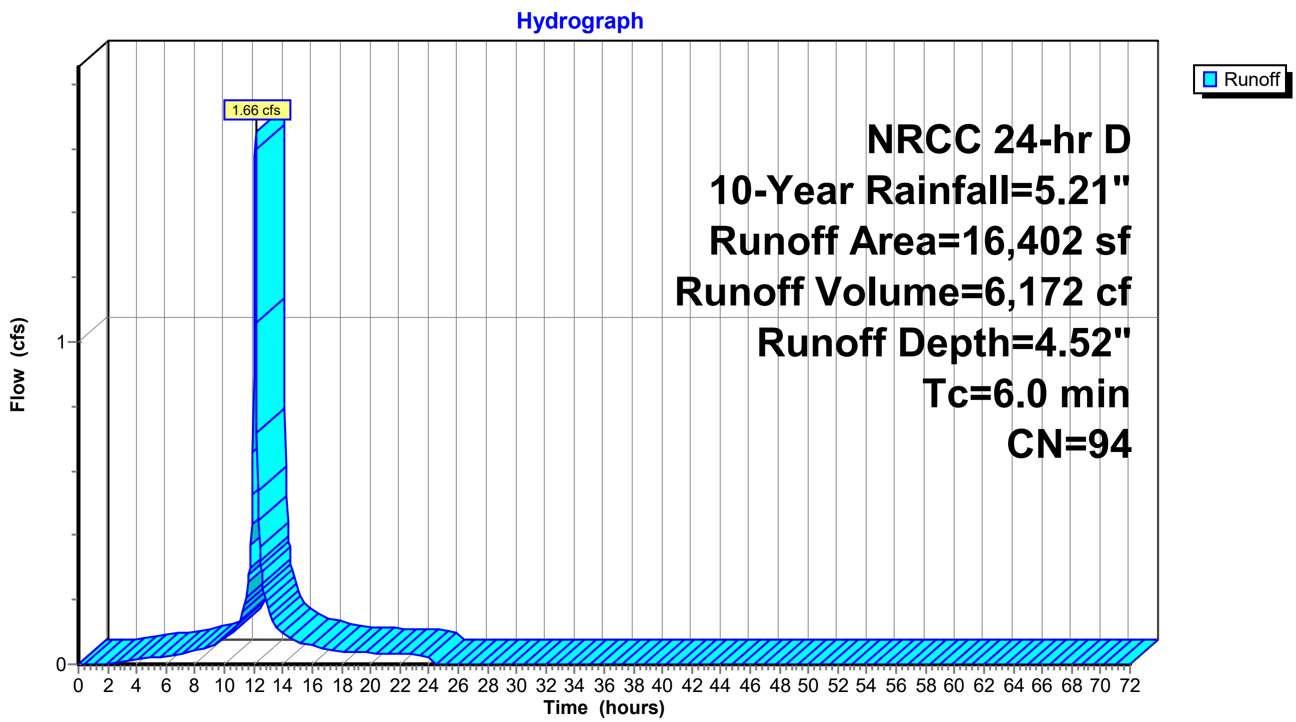
Runoff = 1.66 cfs @ 12.13 hrs, Volume= 6,172 cf, Depth= 4.52"
Routed to Pond UIS-2 : Underground Infiltration System #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
1,145	39	>75% Grass cover, Good, HSG A
15,257	98	Paved parking, HSG A
16,402	94	Weighted Average
1,145		6.98% Pervious Area
15,257		93.02% Impervious Area

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

Subcatchment P-2: Subcatchment P-2



Summary for Subcatchment P-3: Subcatchment P-3

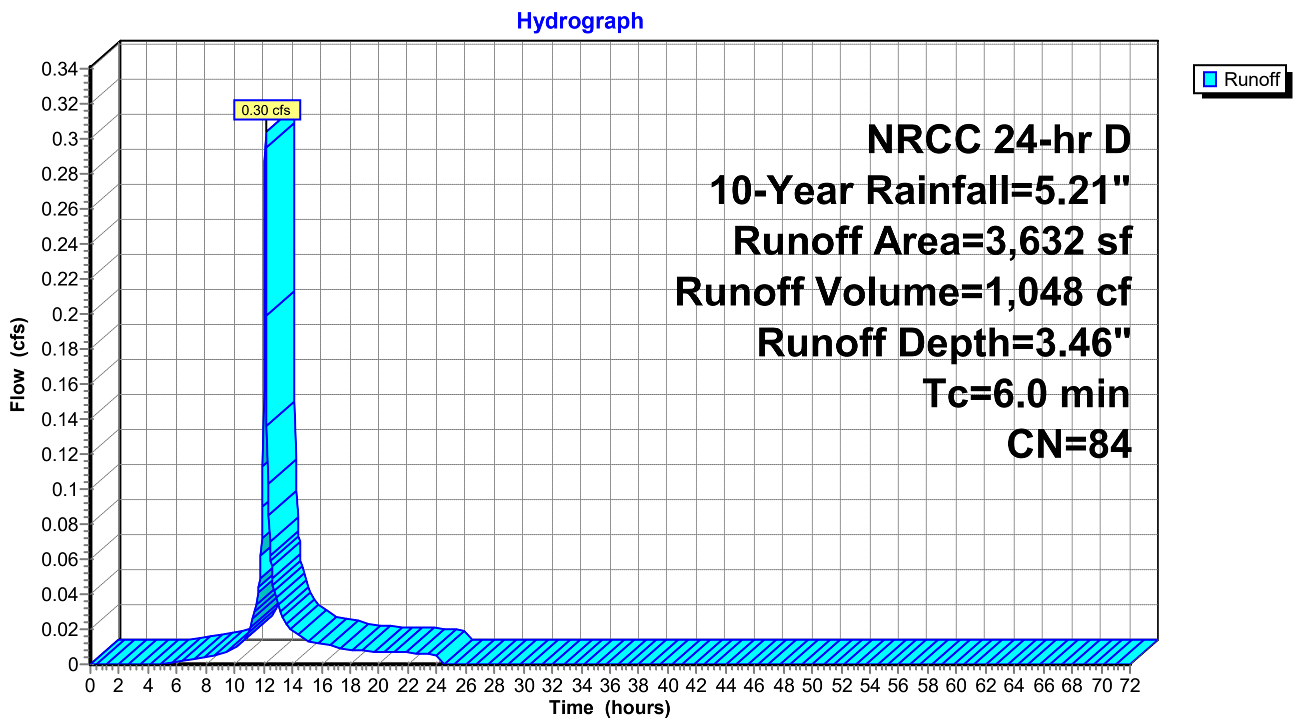
Runoff = 0.30 cfs @ 12.13 hrs, Volume= 1,048 cf, Depth= 3.46"
Routed to Pond UIS-3 : Underground Infiltration System #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
835	39	>75% Grass cover, Good, HSG A
2,797	98	Paved parking, HSG A
3,632	84	Weighted Average
835		22.99% Pervious Area
2,797		77.01% Impervious Area

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

Subcatchment P-3: Subcatchment P-3



Summary for Subcatchment P-4: Subcatchment P-4

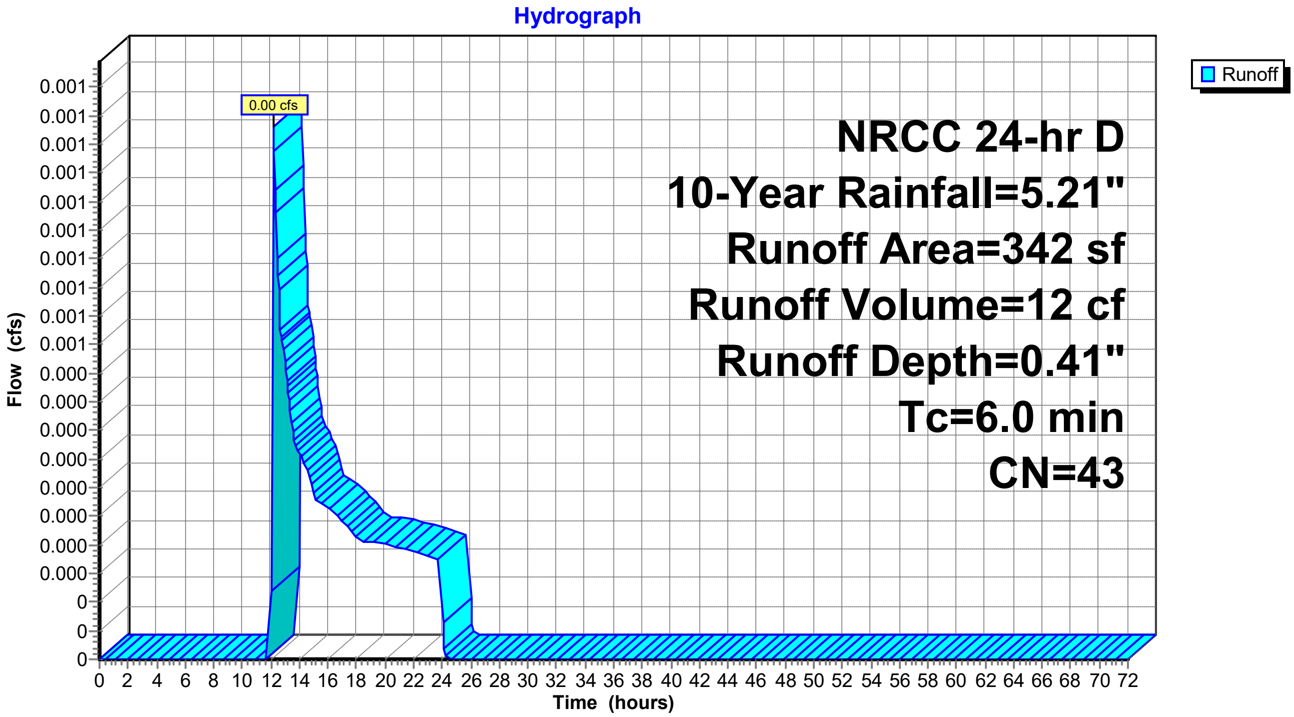
Runoff = 0.00 cfs @ 12.21 hrs, Volume= 12 cf, Depth= 0.41"
Routed to Pond DW-1 : Drywell-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
320	39	>75% Grass cover, Good, HSG A
22	98	Paved parking, HSG A
342	43	Weighted Average
320		93.57% Pervious Area
22		6.43% Impervious Area

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

Subcatchment P-4: Subcatchment P-4



Summary for Subcatchment P-5: Subcatchment P-5

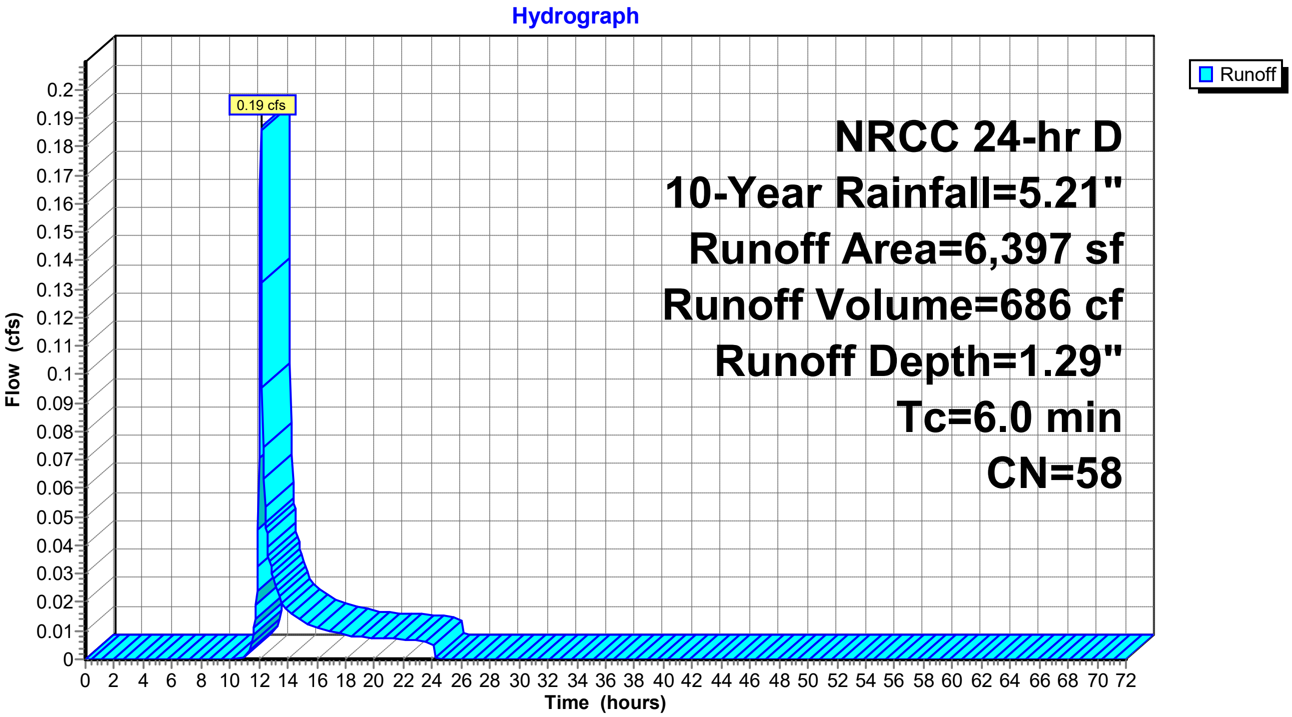
Runoff = 0.19 cfs @ 12.14 hrs, Volume= 686 cf, Depth= 1.29"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
4,344	39	>75% Grass cover, Good, HSG A
2,053	98	Paved parking, HSG A
6,397	58	Weighted Average
4,344		67.91% Pervious Area
2,053		32.09% Impervious Area

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

Subcatchment P-5: Subcatchment P-5



Summary for Subcatchment P-6: Subcatchment P-6

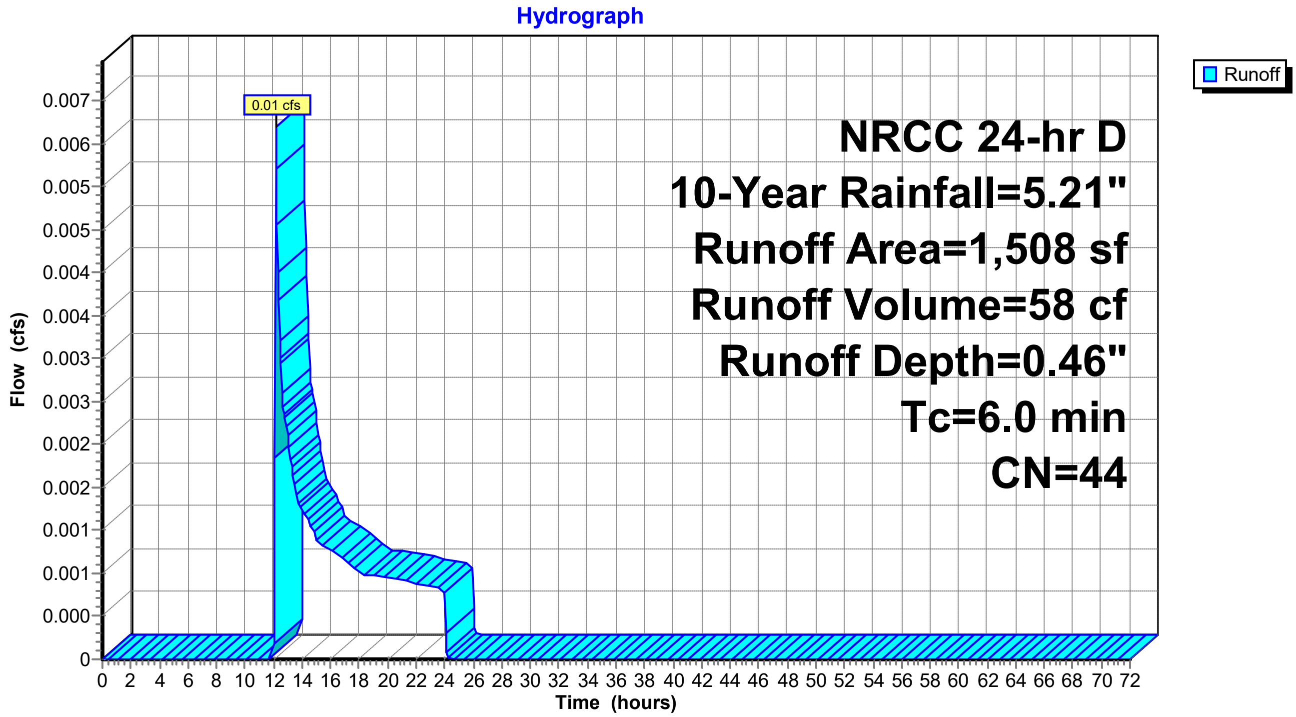
Runoff = 0.01 cfs @ 12.17 hrs, Volume= 58 cf, Depth= 0.46"
Routed to Link SP3 : Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
116	98	Paved parking, HSG A
1,508	44	Weighted Average
1,392		92.31% Pervious Area
116		7.69% Impervious Area

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

Subcatchment P-6: Subcatchment P-6



Summary for Subcatchment R-1: Subcatchment R-1

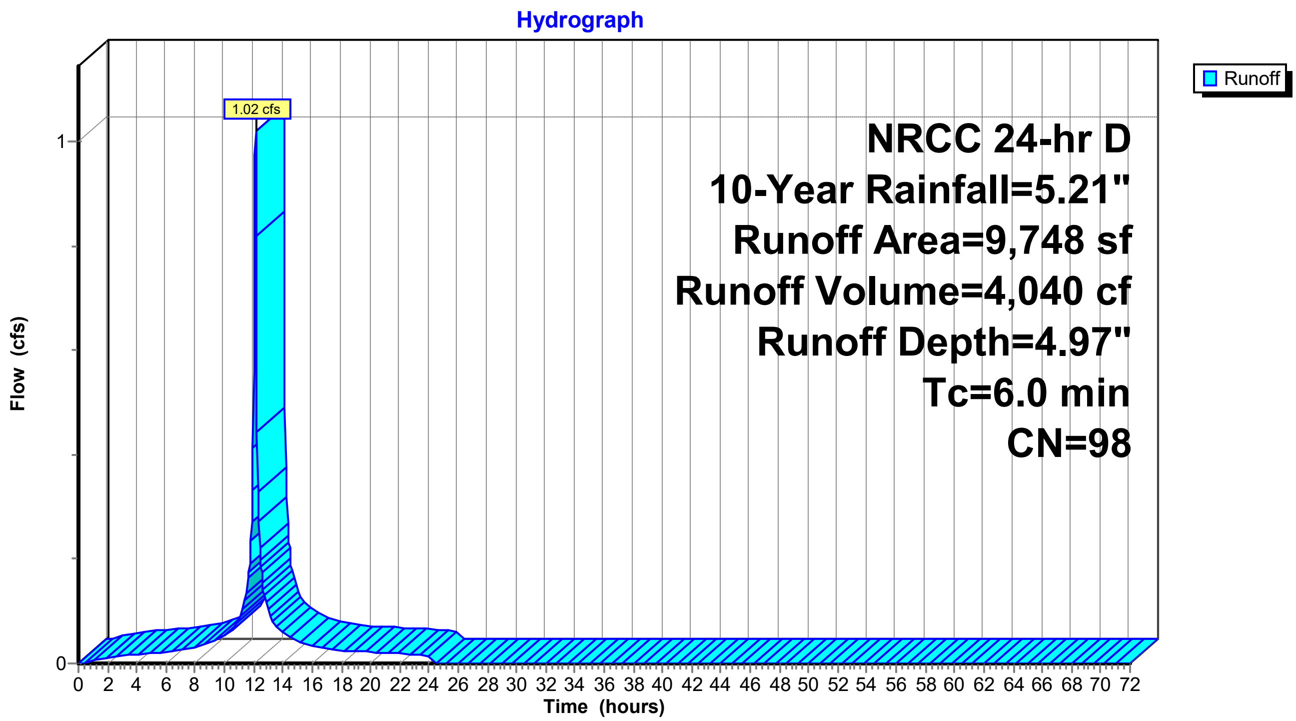
Runoff = 1.02 cfs @ 12.13 hrs, Volume= 4,040 cf, Depth= 4.97"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 10-Year Rainfall=5.21"

Area (sf)	CN	Description
9,748	98	Roofs, HSG A
9,748		100.00% Impervious Area

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

Subcatchment R-1: Subcatchment R-1

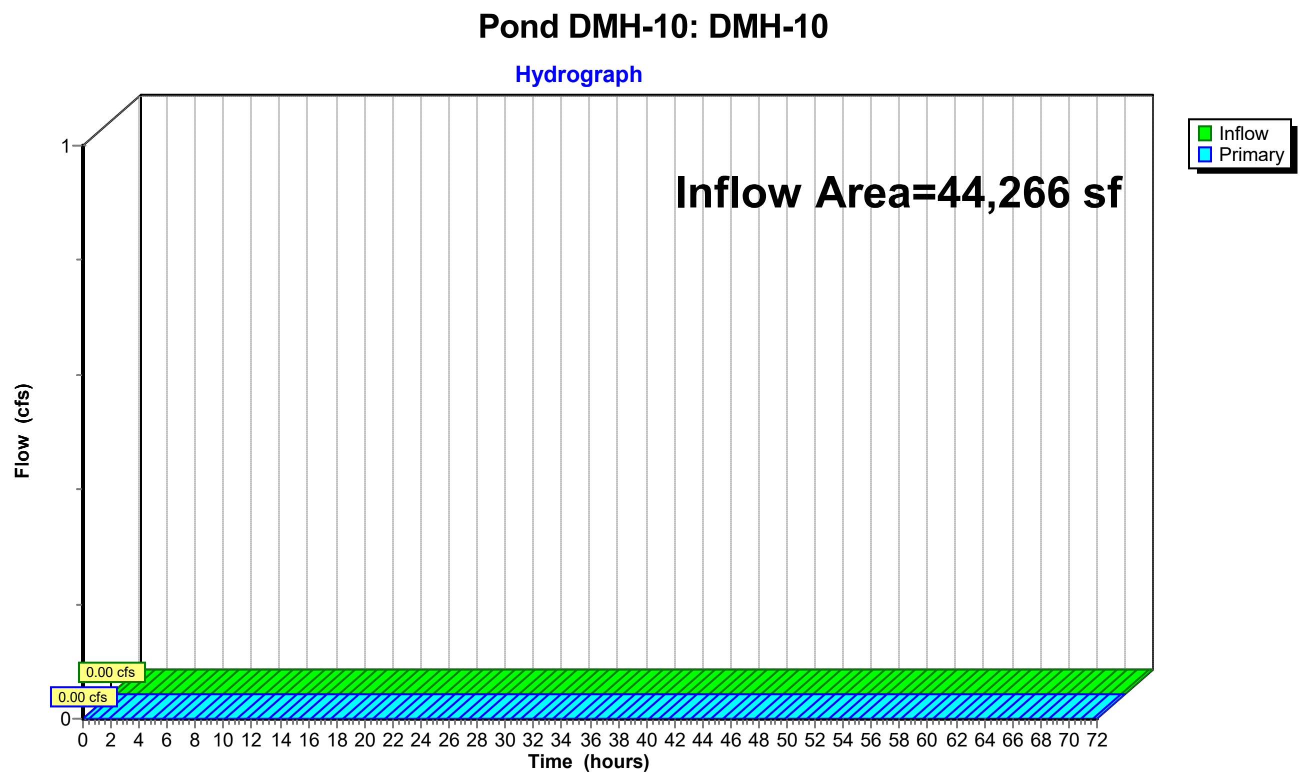


Summary for Pond DMH-10: DMH-10

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP1 : Flow to Exisitng Drainage on Pinevale Avenue

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



Summary for Pond DW-1: Drywell-1

Inflow Area = 342 sf, 6.43% Impervious, Inflow Depth = 0.41" for 10-Year event
Inflow = 0.00 cfs @ 12.21 hrs, Volume= 12 cf
Outflow = 0.00 cfs @ 12.41 hrs, Volume= 12 cf, Atten= 24%, Lag= 12.0 min
Discarded = 0.00 cfs @ 12.41 hrs, Volume= 12 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 90.04' @ 12.41 hrs Surf.Area= 24 sf Storage= 0 cf

Plug-Flow detention time= 8.4 min calculated for 12 cf (100% of inflow)
Center-of-Mass det. time= 8.4 min (1,014.6 - 1,006.2)

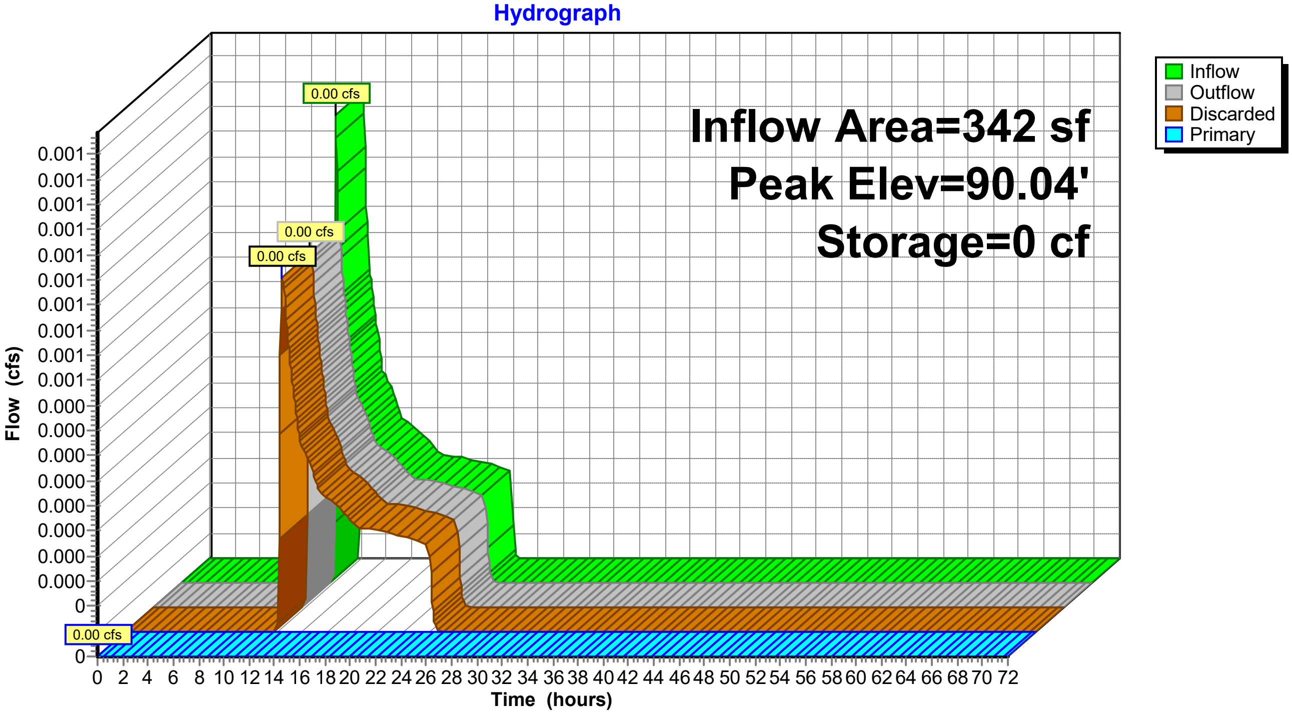
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	34 cf	**3.50'D x 3.50'H Drywell Base** Inside #2
#2	90.00'	29 cf	**5.50'D x 4.50'H stone**
			107 cf Overall - 34 cf Embedded = 73 cf x 40.0% Voids
#3	96.00'	79 cf	**10.00'D x 1.00'H Overflow Above Rim** -Impervious
#4	94.50'	5 cf	**2.00'D x 1.50'H Drywell Riser to Rim** -Impervious
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	96.00'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.00 cfs @ 12.41 hrs HW=90.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=90.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DW-1: Drywell-1



Summary for Pond UIS-1: Underground Infiltration System #1

[58] Hint: Peaked 0.43' above defined flood level
[79] Warning: Submerged Pond UIS-2 Primary device # 1 OUTLET by 0.96'

Inflow Area = 40,634 sf, 86.49% Impervious, Inflow Depth = 3.09" for 10-Year event
Inflow = 3.66 cfs @ 12.13 hrs, Volume= 10,475 cf
Outflow = 0.22 cfs @ 11.45 hrs, Volume= 10,475 cf, Atten= 94%, Lag= 0.0 min
Discarded = 0.22 cfs @ 11.45 hrs, Volume= 10,475 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 94.46' @ 13.54 hrs Surf.Area= 4,031 sf Storage= 3,924 cf
Flood Elev= 94.03' Surf.Area= 4,031 sf Storage= 2,550 cf

Plug-Flow detention time= 132.8 min calculated for 10,475 cf (100% of inflow)
Center-of-Mass det. time= 132.8 min (899.0 - 766.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	3,659 cf	**87.00'W x 46.34'L x 3.50'H Field A** 14,110 cf Overall - 4,962 cf Embedded = 9,148 cf x 40.0% Voids
#2A	93.50'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 18 Rows
		8,621 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	96.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 11.45 hrs HW=93.04' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-1: Underground Infiltration System #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

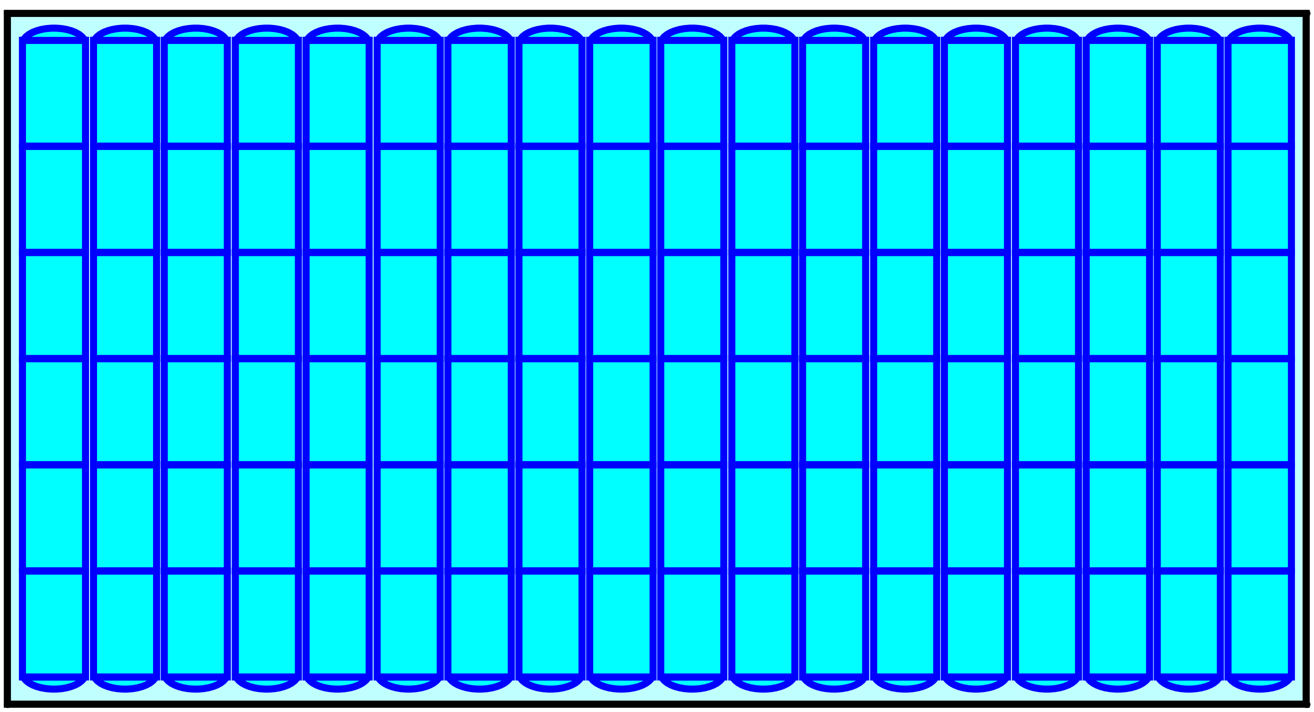
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
18 Rows x 51.0" Wide + 6.0" Spacing x 17 + 12.0" Side Stone x 2 = 87.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

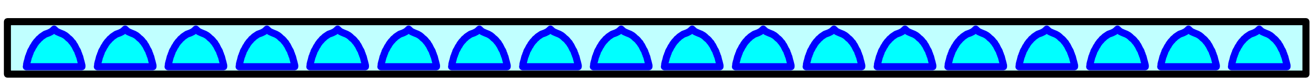
108 Chambers x 45.9 cf = 4,961.5 cf Chamber Storage

14,109.5 cf Field - 4,961.5 cf Chambers = 9,148.0 cf Stone x 40.0% Voids = 3,659.2 cf Stone Storage

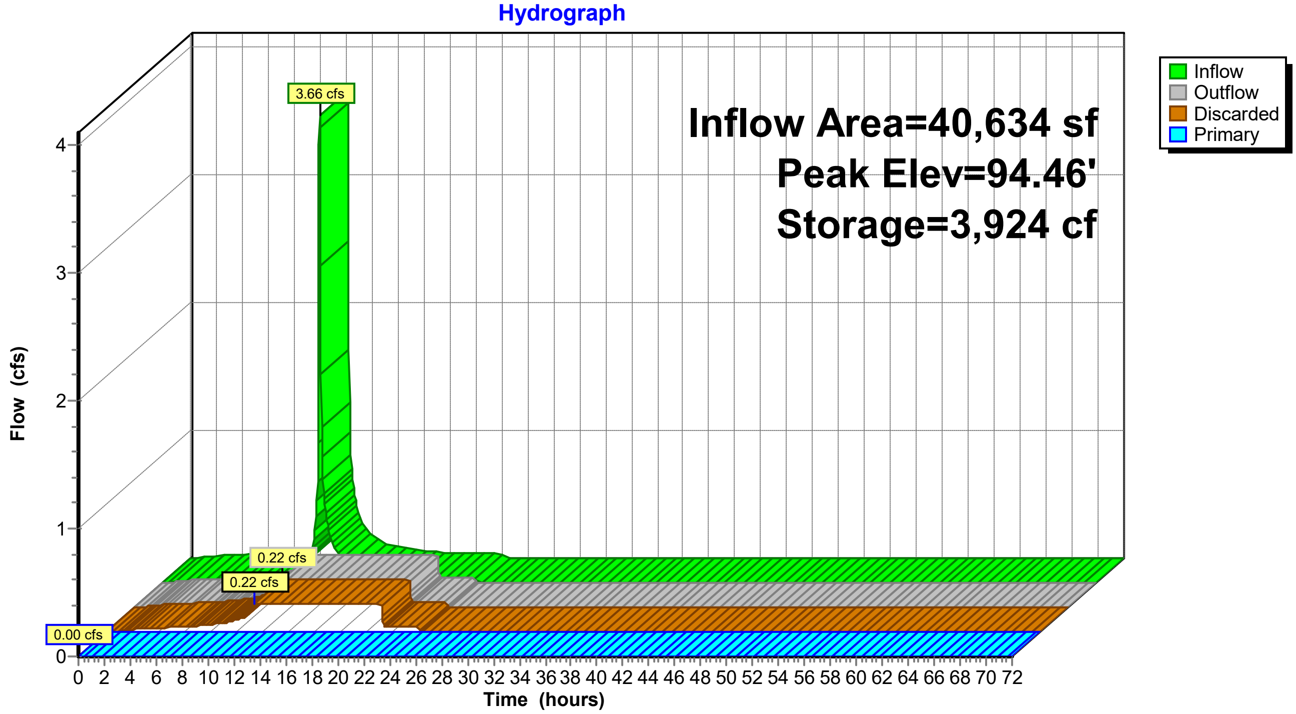
Chamber Storage + Stone Storage = 8,620.7 cf = 0.198 af
Overall Storage Efficiency = 61.1%
Overall System Size = 46.34' x 87.00' x 3.50'

108 Chambers
522.6 cy Field
338.8 cy Stone





Pond UIS-1: Underground Infiltration System #1



Summary for Pond UIS-2: Underground Infiltration System #2

[58] Hint: Peaked 2.34' above defined flood level

Inflow Area = 16,402 sf, 93.02% Impervious, Inflow Depth = 4.52" for 10-Year event
Inflow = 1.66 cfs @ 12.13 hrs, Volume= 6,172 cf
Outflow = 1.65 cfs @ 12.13 hrs, Volume= 6,172 cf, Atten= 1%, Lag= 0.4 min
Discarded = 0.04 cfs @ 7.50 hrs, Volume= 3,774 cf
Primary = 1.61 cfs @ 12.13 hrs, Volume= 2,398 cf
Routed to Pond UIS-1 : Underground Infiltration System #1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.37' @ 12.13 hrs Surf.Area= 658 sf Storage= 1,371 cf
Flood Elev= 94.03' Surf.Area= 658 sf Storage= 416 cf

Plug-Flow detention time= 217.2 min calculated for 6,167 cf (100% of inflow)
Center-of-Mass det. time= 217.4 min (997.4 - 780.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	627 cf	**20.50'W x 32.10'L x 3.50'H Field A** 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	93.50'	735 cf	**ADS_StormTech SC-740 +Cap** x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	93.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder** -Impervious
		1,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	96.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 7.50 hrs HW=93.06' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.55 cfs @ 12.13 hrs HW=96.37' (Free Discharge)
└─**1=Culvert** (Passes 1.55 cfs of 5.19 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.55 cfs @ 1.46 fps)

Pond UIS-2: Underground Infiltration System #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

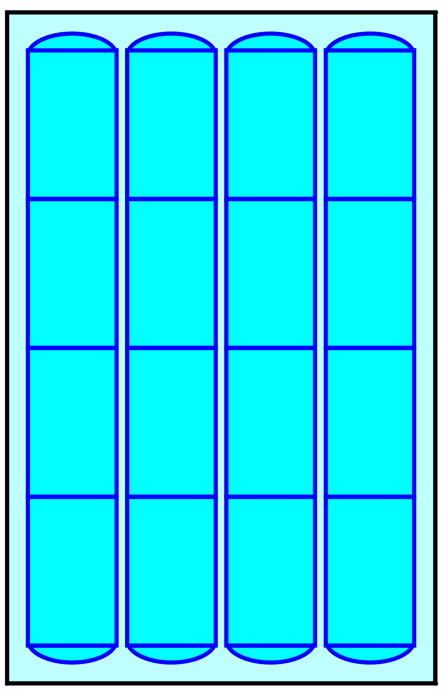
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

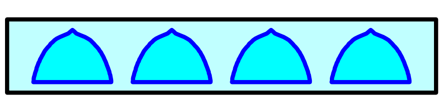
16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,302.9 cf Field - 735.0 cf Chambers = 1,567.9 cf Stone x 40.0% Voids = 627.2 cf Stone Storage

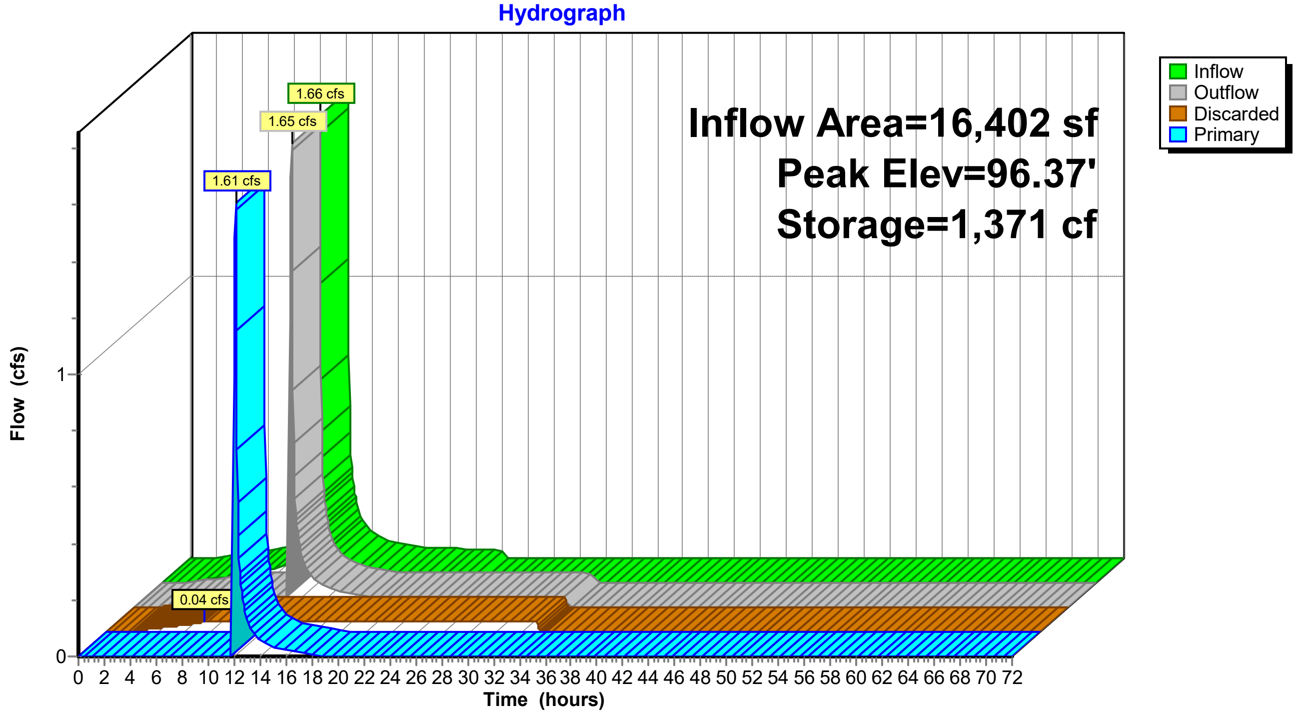
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 59.2%
Overall System Size = 32.10' x 20.50' x 3.50'

16 Chambers
85.3 cy Field
58.1 cy Stone





Pond UIS-2: Underground Infiltration System #2



Summary for Pond UIS-3: Underground Infiltration System #3

Inflow Area = 3,632 sf, 77.01% Impervious, Inflow Depth = 3.46" for 10-Year event
Inflow = 0.30 cfs @ 12.13 hrs, Volume= 1,048 cf
Outflow = 0.03 cfs @ 11.60 hrs, Volume= 1,048 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.60 hrs, Volume= 1,048 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.90' @ 13.00 hrs Surf.Area= 607 sf Storage= 296 cf
Flood Elev= 94.03' Surf.Area= 607 sf Storage= 351 cf

Plug-Flow detention time= 59.4 min calculated for 1,047 cf (100% of inflow)
Center-of-Mass det. time= 59.4 min (886.2 - 826.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	449 cf	**34.83'W x 17.44'L x 2.33'H Field A** 1,417 cf Overall - 295 cf Embedded = 1,123 cf x 40.0% Voids
#2A	93.50'	295 cf	**ADS_StormTech SC-310 +Cap** x 20 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 10 Rows
		744 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.20'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.60 hrs HW=93.03' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-3: Underground Infiltration System #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

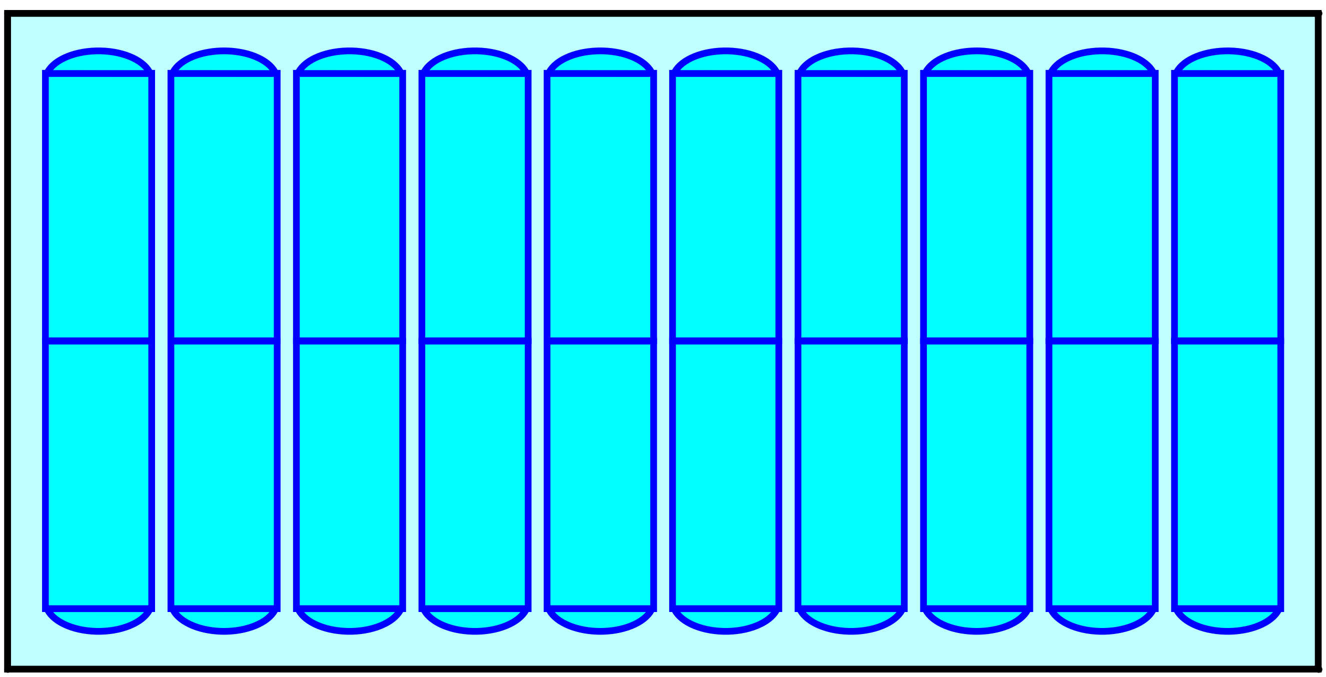
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
10 Rows x 34.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 34.83' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

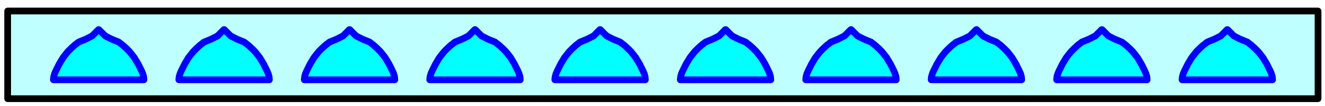
20 Chambers x 14.7 cf = 294.8 cf Chamber Storage

1,417.5 cf Field - 294.8 cf Chambers = 1,122.6 cf Stone x 40.0% Voids = 449.1 cf Stone Storage

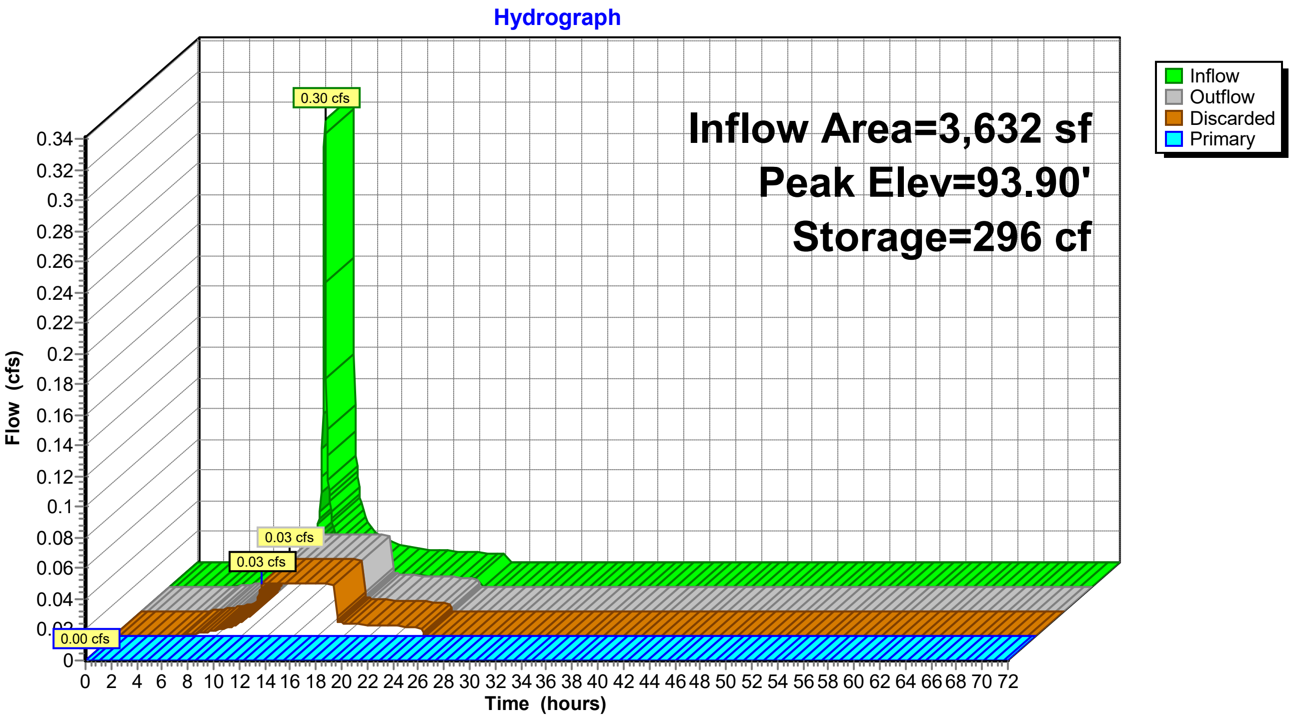
Chamber Storage + Stone Storage = 743.9 cf = 0.017 af
Overall Storage Efficiency = 52.5%
Overall System Size = 17.44' x 34.83' x 2.33'

20 Chambers
52.5 cy Field
41.6 cy Stone





Pond UIS-3: Underground Infiltration System #3

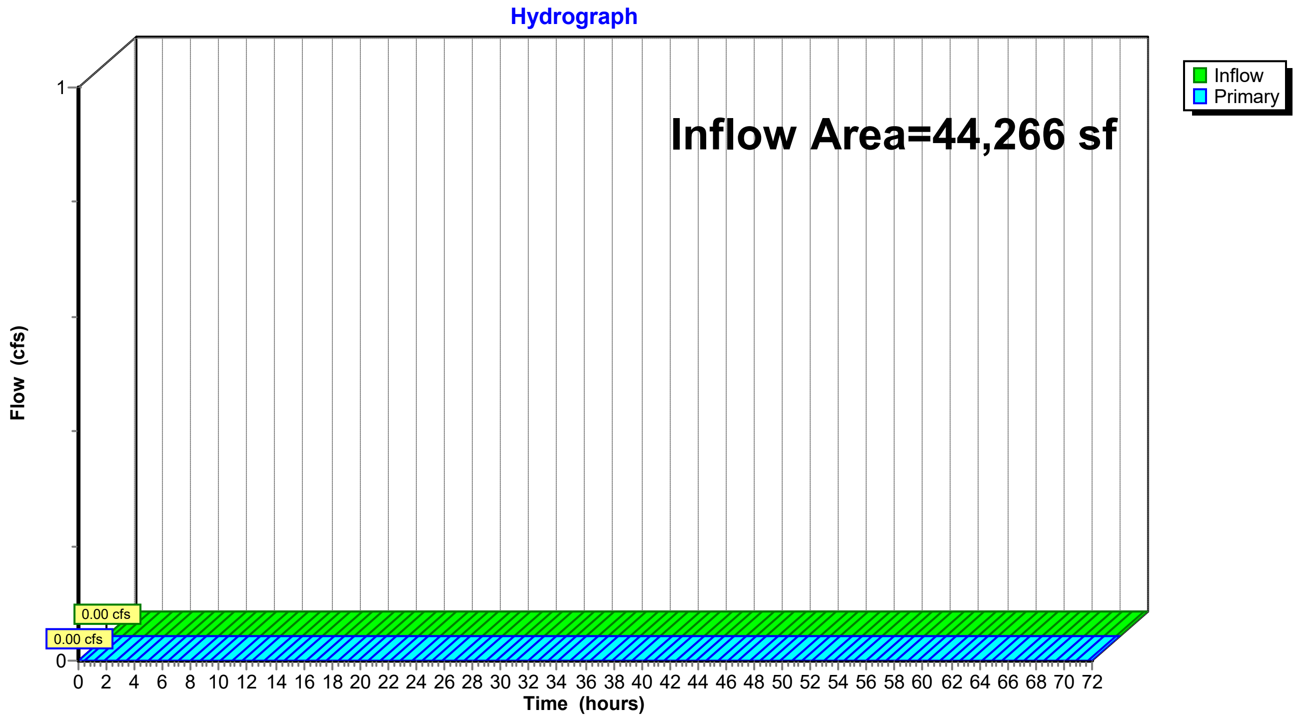


Summary for Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

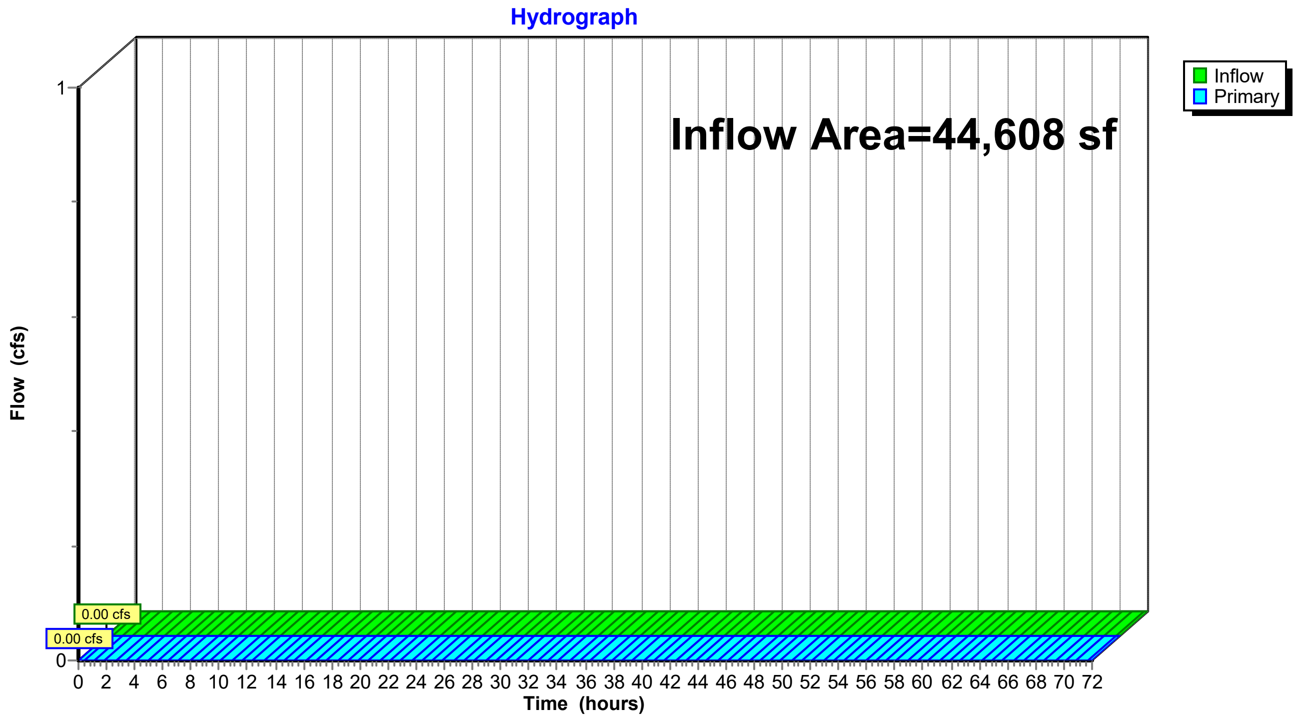


Summary for Link SP2: Flow to Exisitng Drainage on Main Street

Inflow Area =	44,608 sf,	85.11% Impervious,	Inflow Depth = 0.00"	for 10-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

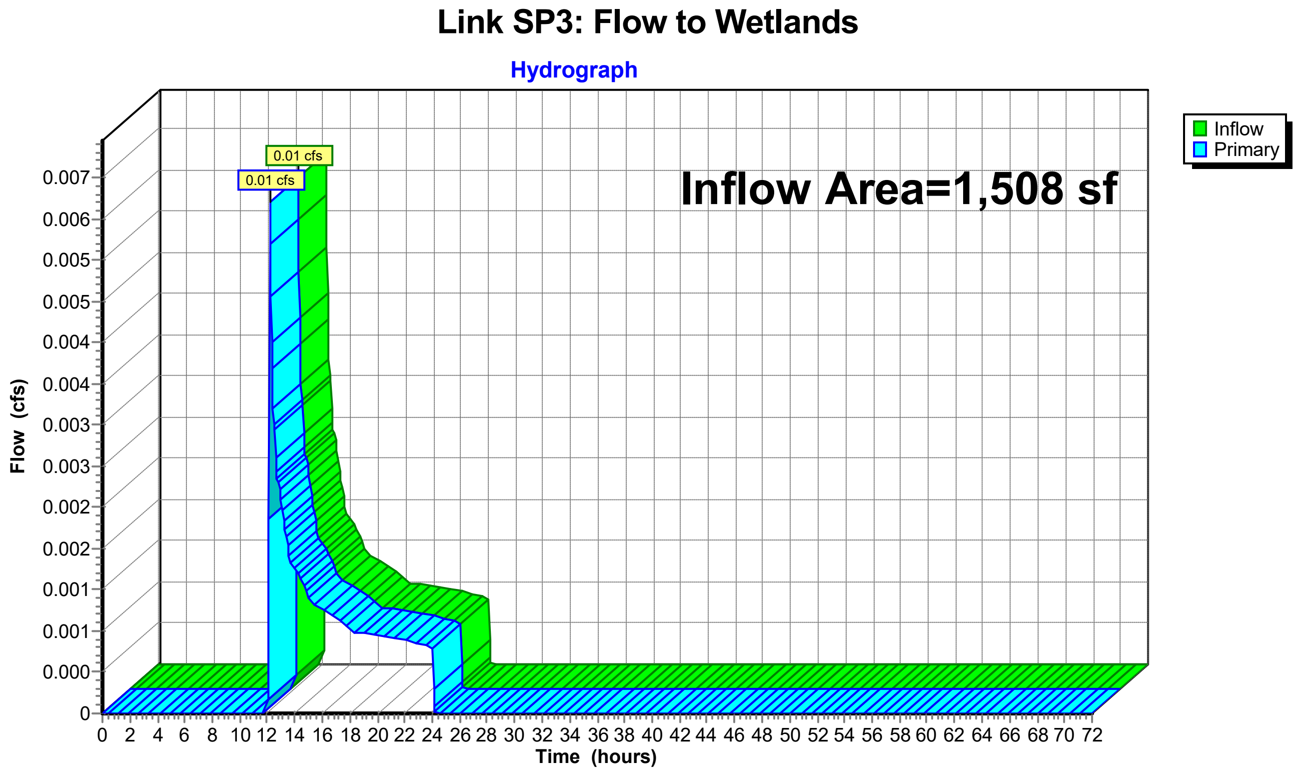
Link SP2: Flow to Exisitng Drainage on Main Street



Summary for Link SP3: Flow to Wetlands

Inflow Area =	1,508 sf,	7.69% Impervious,	Inflow Depth = 0.46"	for 10-Year event
Inflow =	0.01 cfs @	12.17 hrs, Volume=	58 cf	
Primary =	0.01 cfs @	12.17 hrs, Volume=	58 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



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

Subcatchment P-1: Subcatchment P-1 Runoff Area=8,087 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=1.04 cfs 4,152 cf

Subcatchment P-2: Subcatchment P-2 Runoff Area=16,402 sf 93.02% Impervious Runoff Depth=5.69"
Tc=6.0 min CN=94 Runoff=2.06 cfs 7,781 cf

Subcatchment P-3: Subcatchment P-3 Runoff Area=3,632 sf 77.01% Impervious Runoff Depth=4.57"
Tc=6.0 min CN=84 Runoff=0.40 cfs 1,384 cf

Subcatchment P-4: Subcatchment P-4 Runoff Area=342 sf 6.43% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=43 Runoff=0.00 cfs 24 cf

Subcatchment P-5: Subcatchment P-5 Runoff Area=6,397 sf 32.09% Impervious Runoff Depth=2.01"
Tc=6.0 min CN=58 Runoff=0.31 cfs 1,072 cf

Subcatchment P-6: Subcatchment P-6 Runoff Area=1,508 sf 7.69% Impervious Runoff Depth=0.90"
Tc=6.0 min CN=44 Runoff=0.02 cfs 113 cf

Subcatchment R-1: Subcatchment R-1 Runoff Area=9,748 sf 100.00% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=98 Runoff=1.26 cfs 5,005 cf

Pond DMH-10: DMH-10 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond DW-1: Drywell-1 Peak Elev=90.26' Storage=2 cf Inflow=0.00 cfs 24 cf
Discarded=0.00 cfs 24 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 24 cf

Pond UIS-1: Underground Infiltration Peak Elev=95.20' Storage=6,051 cf Inflow=4.62 cfs 14,029 cf
Discarded=0.22 cfs 14,029 cf Primary=0.00 cfs 0 cf Outflow=0.22 cfs 14,029 cf

Pond UIS-2: Underground Infiltration System Peak Elev=96.41' Storage=1,383 cf Inflow=2.06 cfs 7,781 cf
Discarded=0.04 cfs 3,982 cf Primary=2.03 cfs 3,800 cf Outflow=2.06 cfs 7,781 cf

Pond UIS-3: Underground Infiltration System #3 Peak Elev=94.28' Storage=452 cf Inflow=0.40 cfs 1,384 cf
Discarded=0.03 cfs 1,384 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,384 cf

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP2: Flow to Exisitng Drainage on Main Street Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link SP3: Flow to Wetlands Inflow=0.02 cfs 113 cf
Primary=0.02 cfs 113 cf

Total Runoff Area = 46,116 sf Runoff Volume = 19,531 cf Average Runoff Depth = 5.08"
17.43% Pervious = 8,036 sf 82.57% Impervious = 38,080 sf

Summary for Subcatchment P-1: Subcatchment P-1

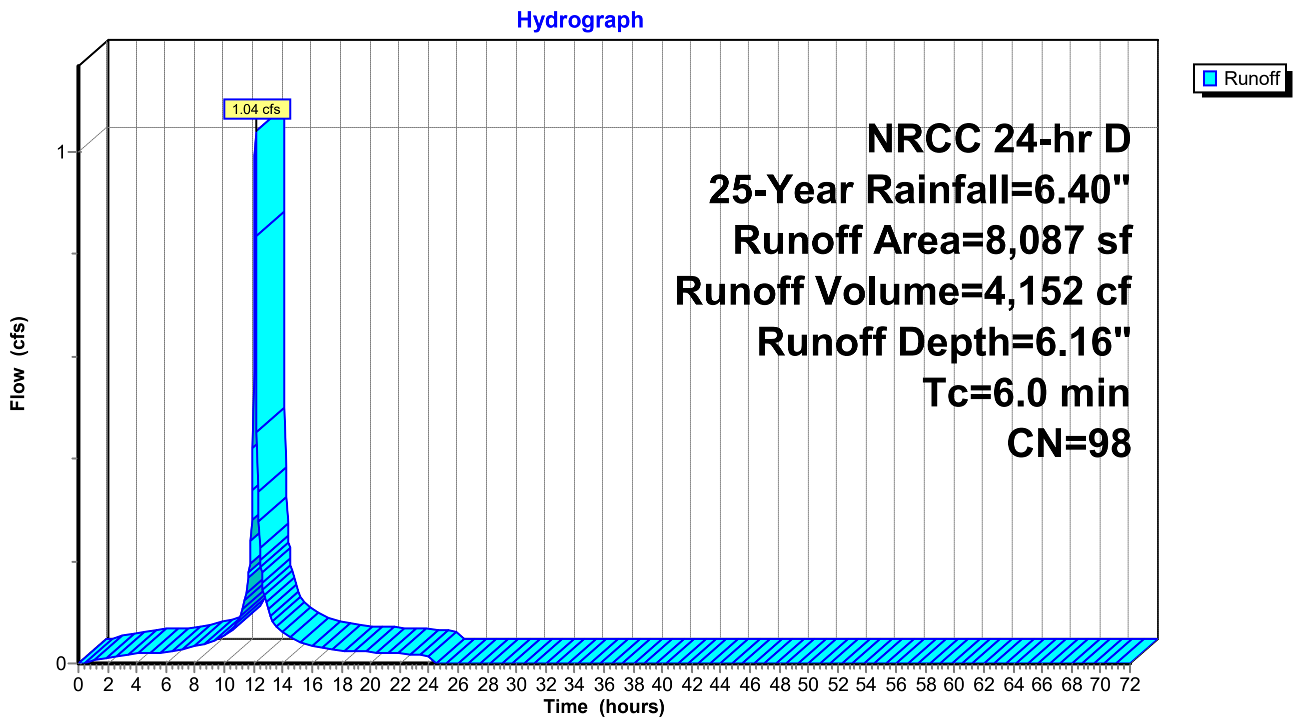
Runoff = 1.04 cfs @ 12.13 hrs, Volume= 4,152 cf, Depth= 6.16"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
8,087	98	Paved parking, HSG A
8,087		100.00% Impervious Area

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

Subcatchment P-1: Subcatchment P-1



Summary for Subcatchment P-2: Subcatchment P-2

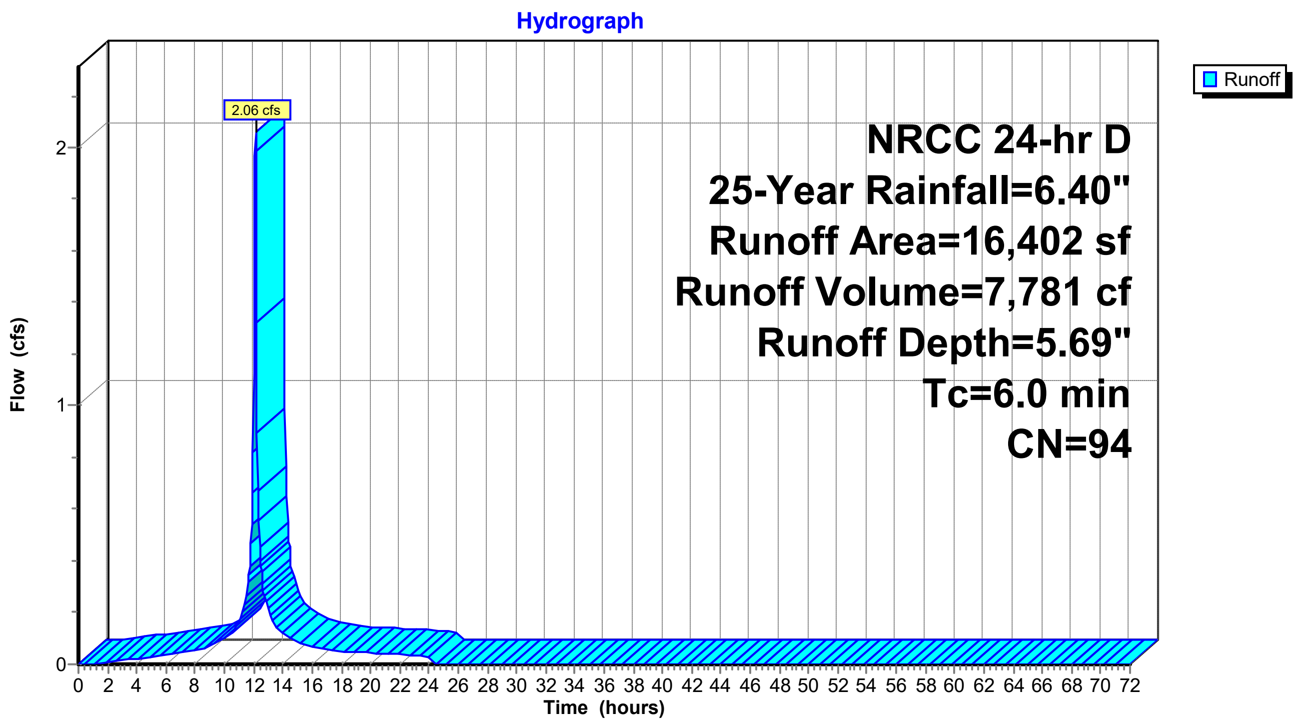
Runoff = 2.06 cfs @ 12.13 hrs, Volume= 7,781 cf, Depth= 5.69"
Routed to Pond UIS-2 : Underground Infiltration System #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
1,145	39	>75% Grass cover, Good, HSG A
15,257	98	Paved parking, HSG A
16,402	94	Weighted Average
1,145		6.98% Pervious Area
15,257		93.02% Impervious Area

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

Subcatchment P-2: Subcatchment P-2



Summary for Subcatchment P-3: Subcatchment P-3

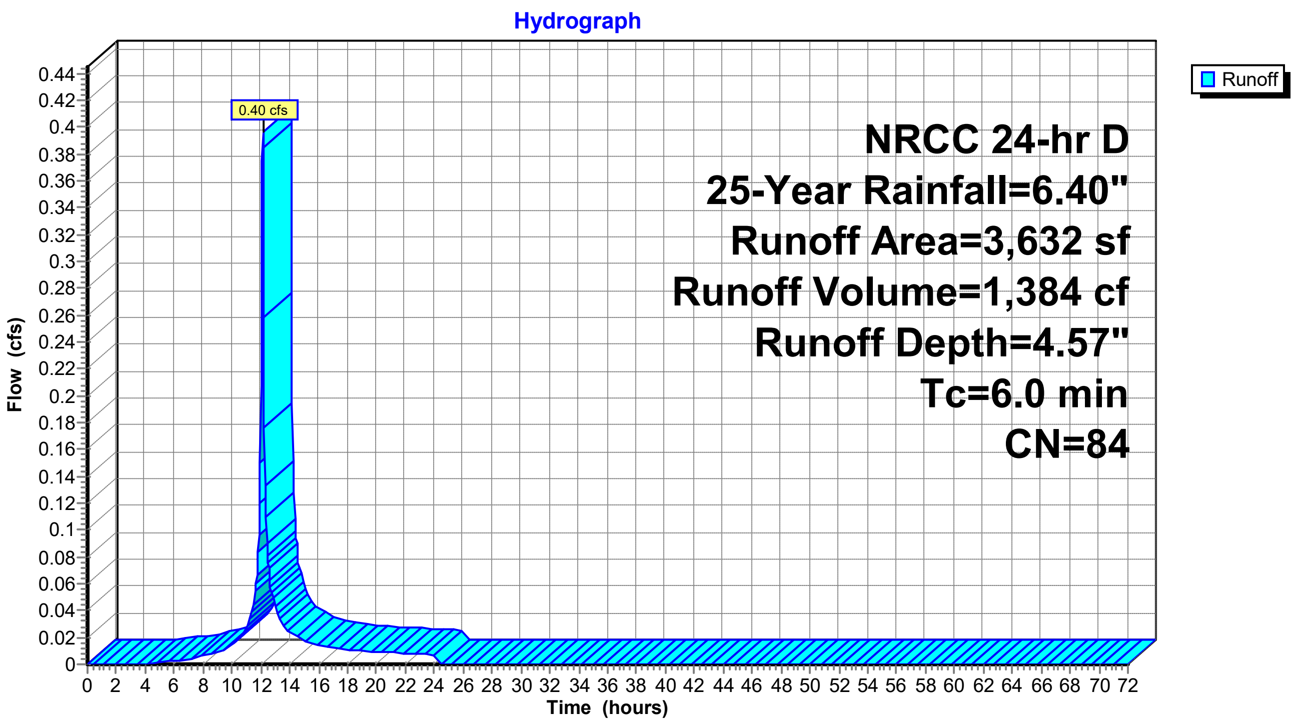
Runoff = 0.40 cfs @ 12.13 hrs, Volume= 1,384 cf, Depth= 4.57"
Routed to Pond UIS-3 : Underground Infiltration System #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
835	39	>75% Grass cover, Good, HSG A
2,797	98	Paved parking, HSG A
3,632	84	Weighted Average
835		22.99% Pervious Area
2,797		77.01% Impervious Area

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

Subcatchment P-3: Subcatchment P-3



Summary for Subcatchment P-4: Subcatchment P-4

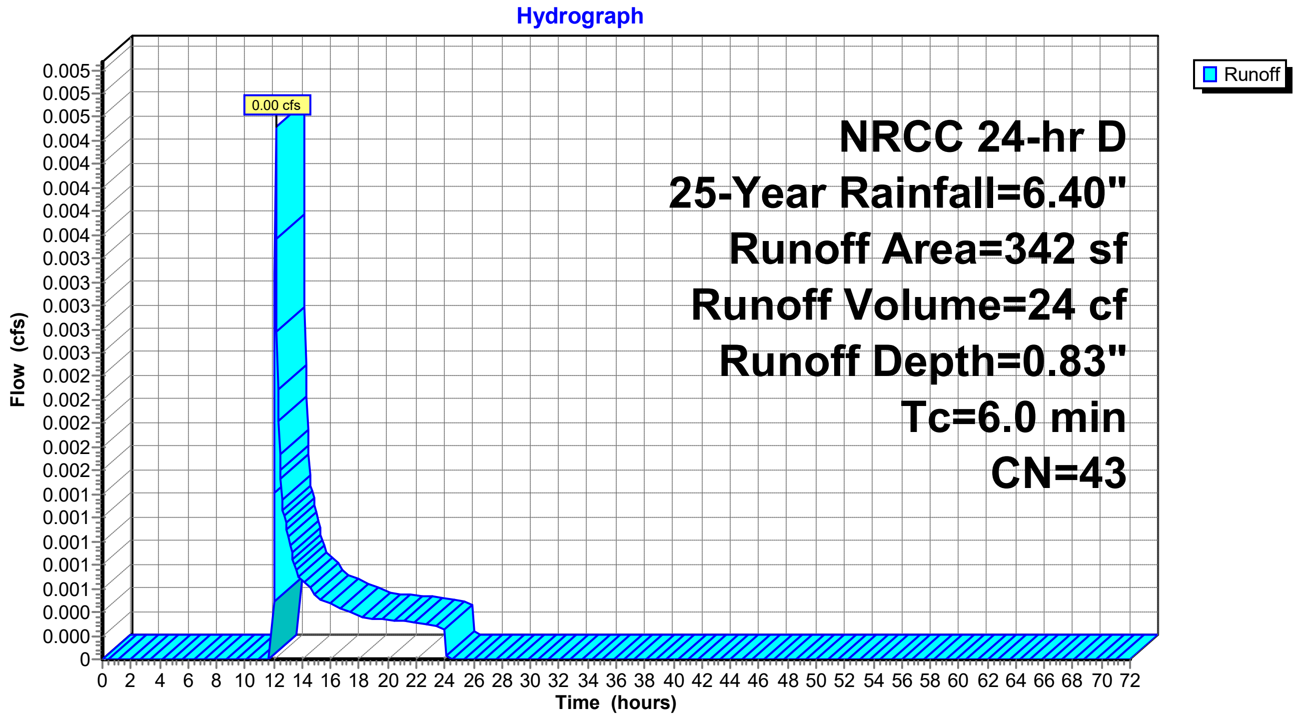
Runoff = 0.00 cfs @ 12.15 hrs, Volume= 24 cf, Depth= 0.83"
Routed to Pond DW-1 : Drywell-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
320	39	>75% Grass cover, Good, HSG A
22	98	Paved parking, HSG A
342	43	Weighted Average
320		93.57% Pervious Area
22		6.43% Impervious Area

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

Subcatchment P-4: Subcatchment P-4



Summary for Subcatchment P-5: Subcatchment P-5

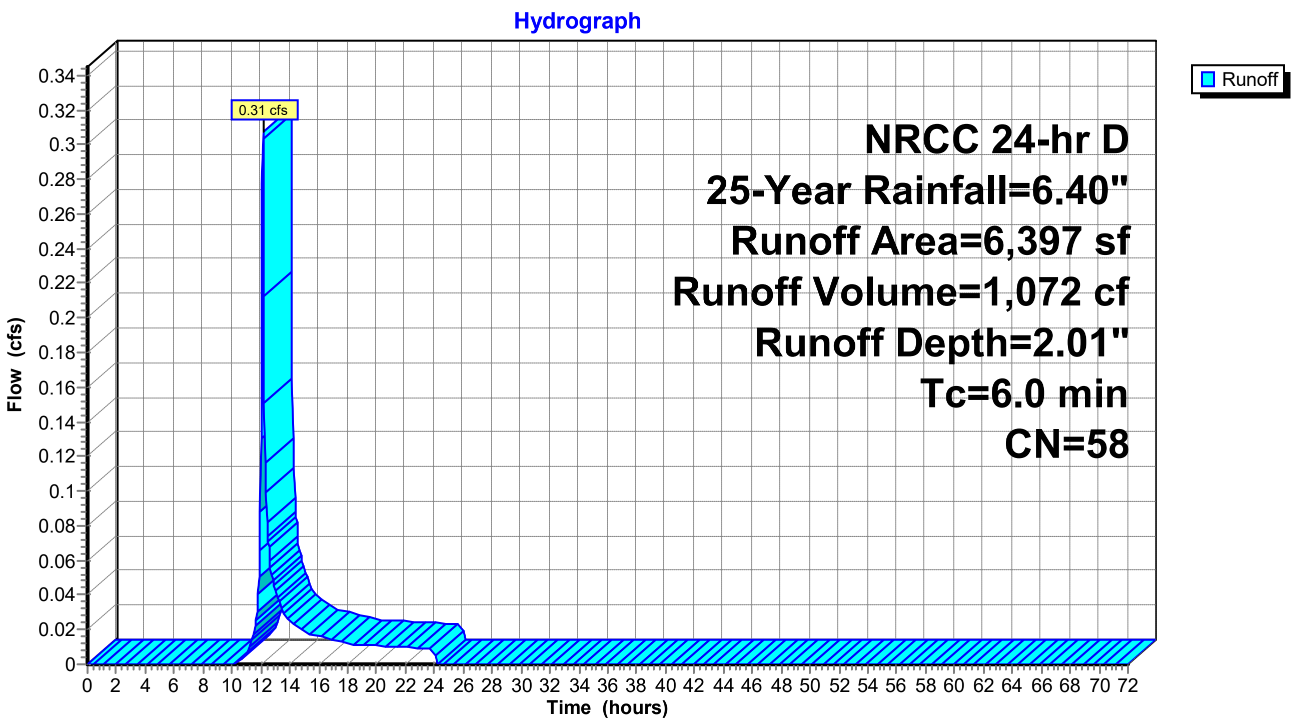
Runoff = 0.31 cfs @ 12.14 hrs, Volume= 1,072 cf, Depth= 2.01"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
4,344	39	>75% Grass cover, Good, HSG A
2,053	98	Paved parking, HSG A
6,397	58	Weighted Average
4,344		67.91% Pervious Area
2,053		32.09% Impervious Area

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

Subcatchment P-5: Subcatchment P-5



Summary for Subcatchment P-6: Subcatchment P-6

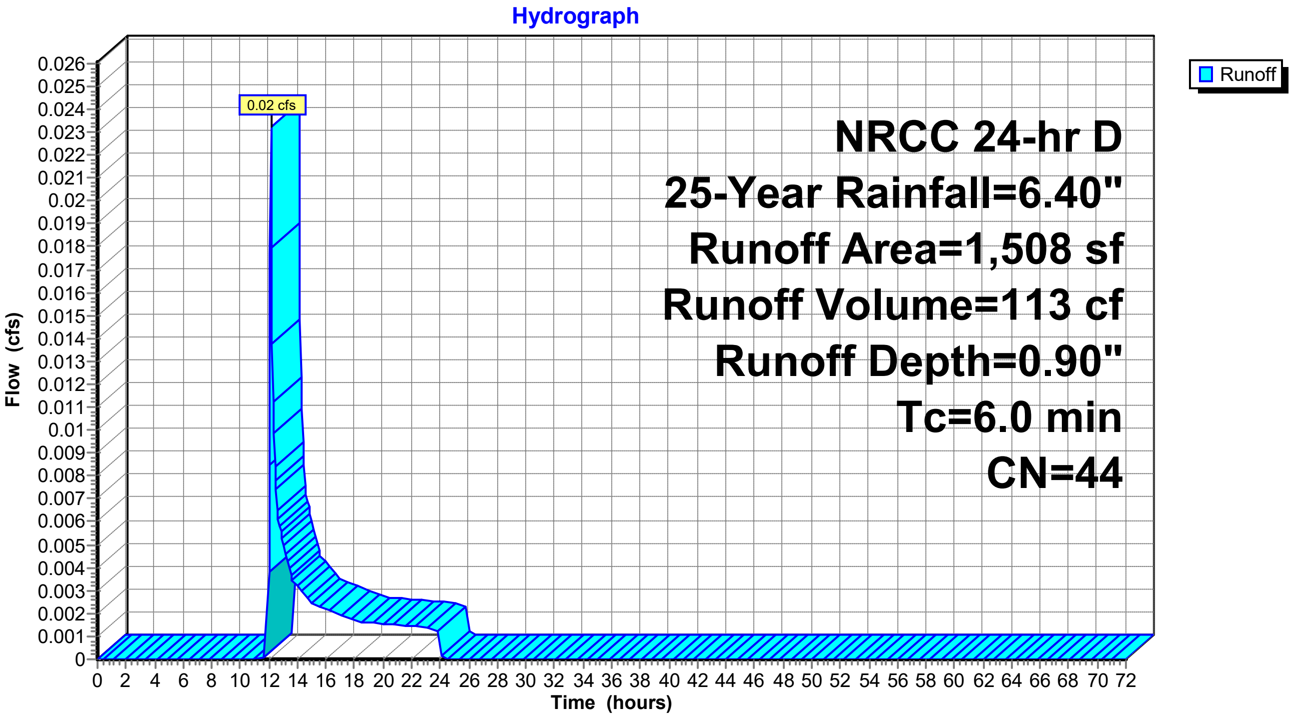
Runoff = 0.02 cfs @ 12.15 hrs, Volume= 113 cf, Depth= 0.90"
Routed to Link SP3 : Flow to Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
116	98	Paved parking, HSG A
1,508	44	Weighted Average
1,392		92.31% Pervious Area
116		7.69% Impervious Area

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

Subcatchment P-6: Subcatchment P-6



Summary for Subcatchment R-1: Subcatchment R-1

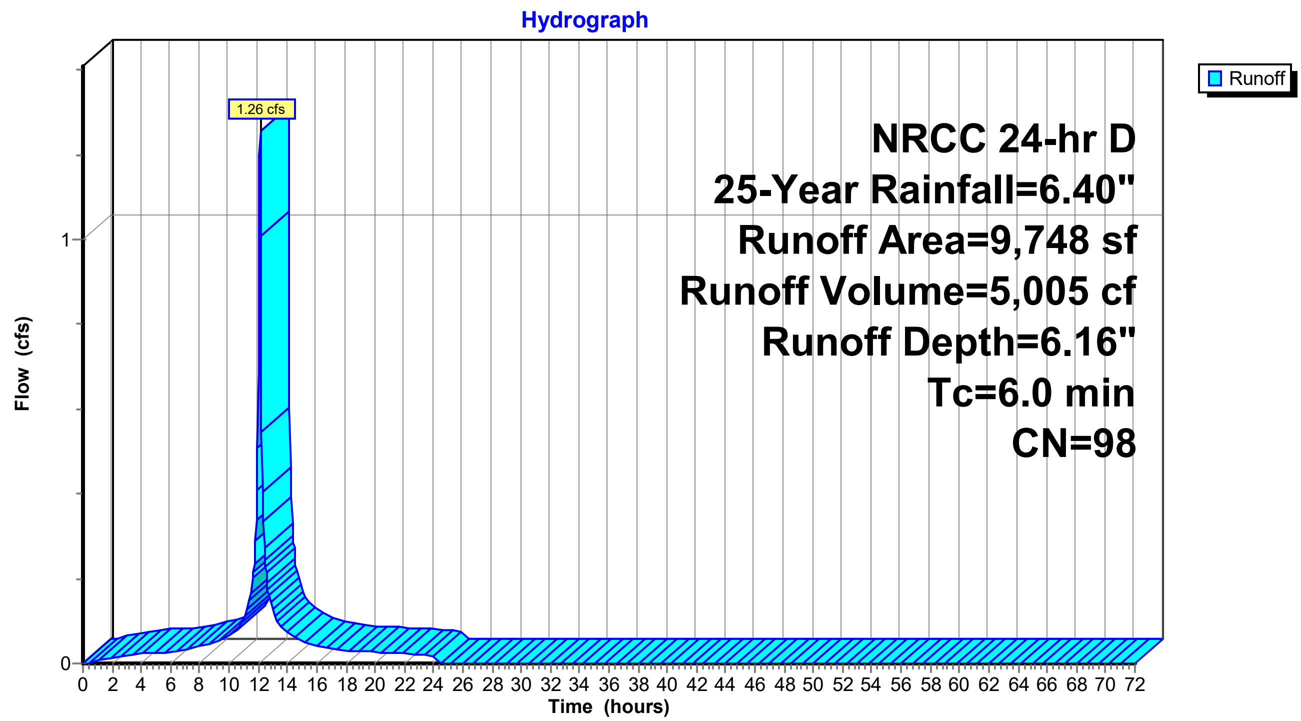
Runoff = 1.26 cfs @ 12.13 hrs, Volume= 5,005 cf, Depth= 6.16"
Routed to Pond UIS-1 : Underground Infiltration System #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NRCC 24-hr D 25-Year Rainfall=6.40"

Area (sf)	CN	Description
9,748	98	Roofs, HSG A
9,748		100.00% Impervious Area

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

Subcatchment R-1: Subcatchment R-1



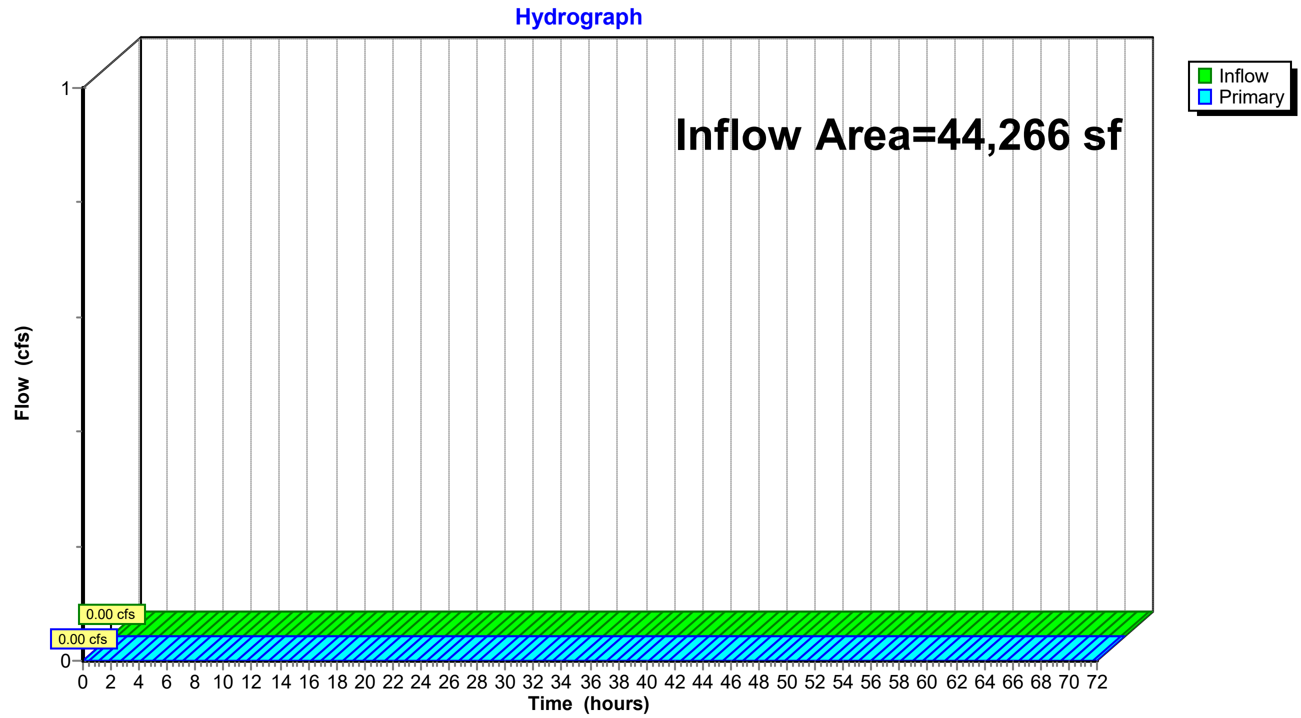
Summary for Pond DMH-10: DMH-10

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP1 : Flow to Exisitng Drainage on Pinevale Avenue

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

Pond DMH-10: DMH-10



Summary for Pond DW-1: Drywell-1

Inflow Area = 342 sf, 6.43% Impervious, Inflow Depth = 0.83" for 25-Year event
Inflow = 0.00 cfs @ 12.15 hrs, Volume= 24 cf
Outflow = 0.00 cfs @ 12.15 hrs, Volume= 24 cf, Atten= 71%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.15 hrs, Volume= 24 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 90.26' @ 12.62 hrs Surf.Area= 24 sf Storage= 2 cf

Plug-Flow detention time= 13.6 min calculated for 24 cf (100% of inflow)
Center-of-Mass det. time= 13.7 min (978.6 - 964.9)

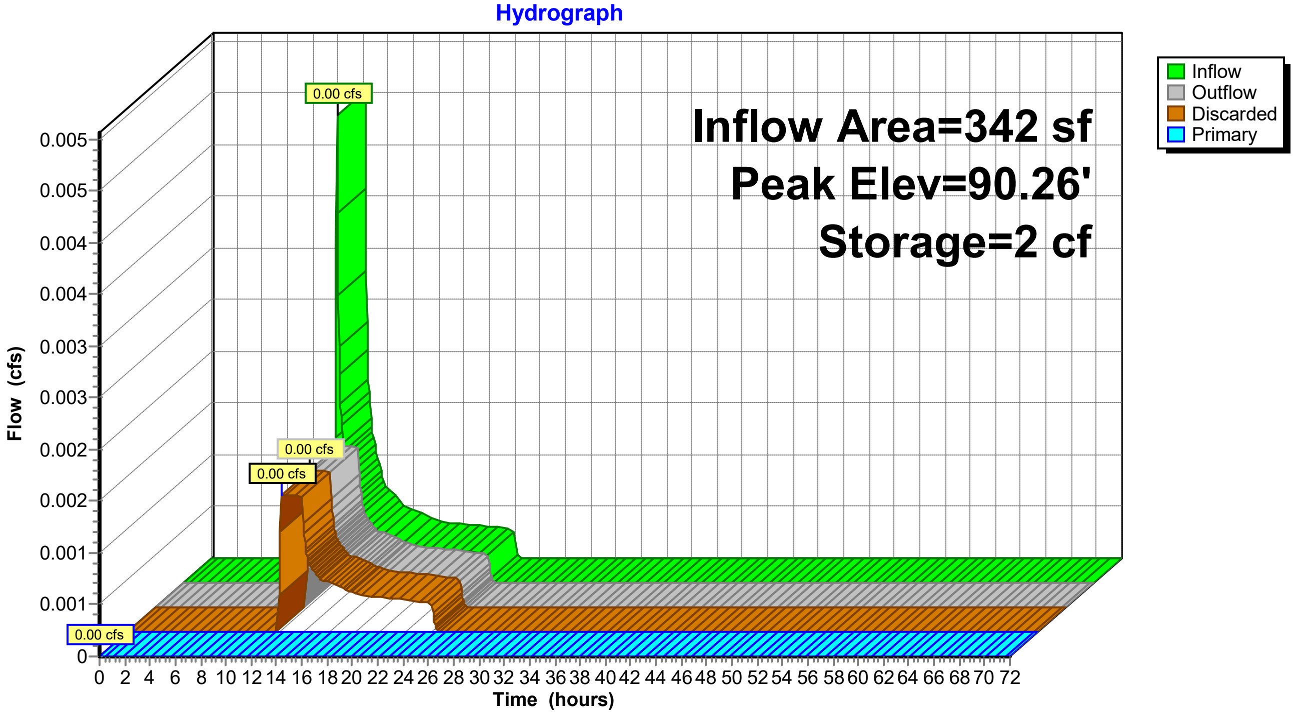
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	34 cf	**3.50'D x 3.50'H Drywell Base** Inside #2
#2	90.00'	29 cf	**5.50'D x 4.50'H stone**
			107 cf Overall - 34 cf Embedded = 73 cf x 40.0% Voids
#3	96.00'	79 cf	**10.00'D x 1.00'H Overflow Above Rim** -Impervious
#4	94.50'	5 cf	**2.00'D x 1.50'H Drywell Riser to Rim** -Impervious
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	96.00'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.00 cfs @ 12.15 hrs HW=90.10' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=90.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DW-1: Drywell-1



Summary for Pond UIS-1: Underground Infiltration System #1

[58] Hint: Peaked 1.17' above defined flood level
[79] Warning: Submerged Pond UIS-2 Primary device # 1 INLET by 0.70'

Inflow Area = 40,634 sf, 86.49% Impervious, Inflow Depth = 4.14" for 25-Year event
Inflow = 4.62 cfs @ 12.13 hrs, Volume= 14,029 cf
Outflow = 0.22 cfs @ 11.20 hrs, Volume= 14,029 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.22 cfs @ 11.20 hrs, Volume= 14,029 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 95.20' @ 14.14 hrs Surf.Area= 4,031 sf Storage= 6,051 cf
Flood Elev= 94.03' Surf.Area= 4,031 sf Storage= 2,550 cf

Plug-Flow detention time= 225.0 min calculated for 14,019 cf (100% of inflow)
Center-of-Mass det. time= 224.9 min (992.6 - 767.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	3,659 cf	**87.00'W x 46.34'L x 3.50'H Field A** 14,110 cf Overall - 4,962 cf Embedded = 9,148 cf x 40.0% Voids
#2A	93.50'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 18 Rows
		8,621 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	96.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 11.20 hrs HW=93.04' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-1: Underground Infiltration System #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

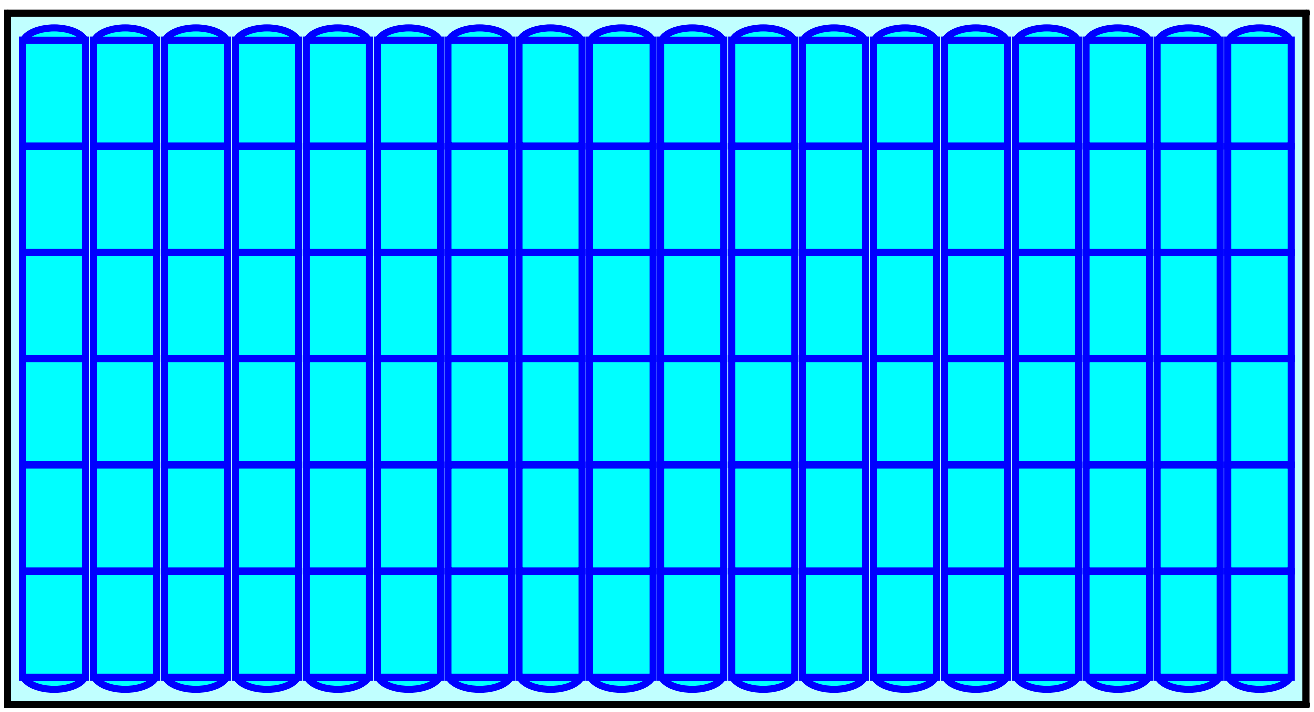
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
18 Rows x 51.0" Wide + 6.0" Spacing x 17 + 12.0" Side Stone x 2 = 87.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

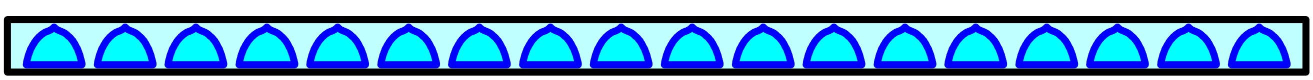
108 Chambers x 45.9 cf = 4,961.5 cf Chamber Storage

14,109.5 cf Field - 4,961.5 cf Chambers = 9,148.0 cf Stone x 40.0% Voids = 3,659.2 cf Stone Storage

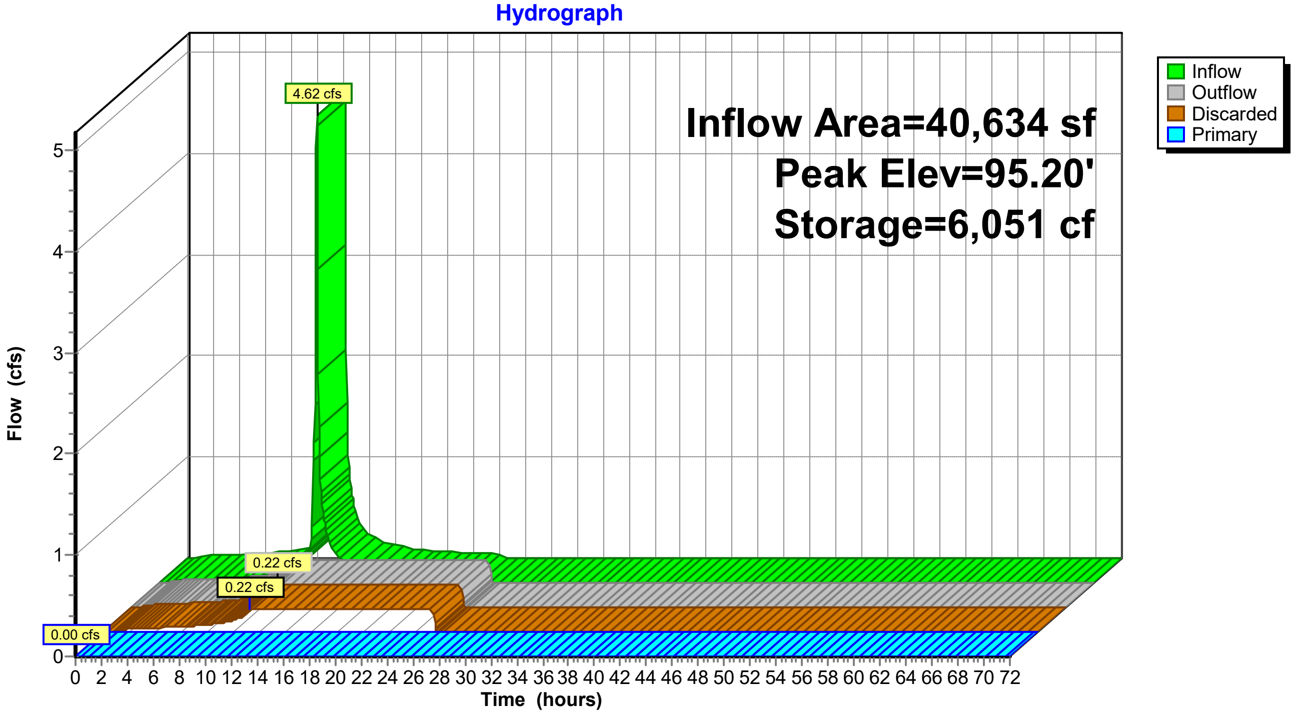
Chamber Storage + Stone Storage = 8,620.7 cf = 0.198 af
Overall Storage Efficiency = 61.1%
Overall System Size = 46.34' x 87.00' x 3.50'

108 Chambers
522.6 cy Field
338.8 cy Stone





Pond UIS-1: Underground Infiltration System #1



Summary for Pond UIS-2: Underground Infiltration System #2

[58] Hint: Peaked 2.38' above defined flood level

Inflow Area = 16,402 sf, 93.02% Impervious, Inflow Depth = 5.69" for 25-Year event
Inflow = 2.06 cfs @ 12.13 hrs, Volume= 7,781 cf
Outflow = 2.06 cfs @ 12.14 hrs, Volume= 7,781 cf, Atten= 0%, Lag= 0.6 min
Discarded = 0.04 cfs @ 6.40 hrs, Volume= 3,982 cf
Primary = 2.03 cfs @ 12.14 hrs, Volume= 3,800 cf
Routed to Pond UIS-1 : Underground Infiltration System #1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.41' @ 12.14 hrs Surf.Area= 658 sf Storage= 1,383 cf
Flood Elev= 94.03' Surf.Area= 658 sf Storage= 416 cf

Plug-Flow detention time= 184.7 min calculated for 7,776 cf (100% of inflow)
Center-of-Mass det. time= 185.0 min (958.1 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	627 cf	**20.50'W x 32.10'L x 3.50'H Field A**
			2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	93.50'	735 cf	**ADS_StormTech SC-740 +Cap** x 16 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			16 Chambers in 4 Rows
#3	93.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder** -Impervious
		1,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	**15.0" Round Culvert**
			L= 100.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 94.50' / 93.50' S= 0.0100 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	96.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 6.40 hrs HW=93.06' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.95 cfs @ 12.14 hrs HW=96.41' (Free Discharge)
└─**1=Culvert** (Passes 1.95 cfs of 5.28 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.95 cfs @ 1.59 fps)

Pond UIS-2: Underground Infiltration System #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

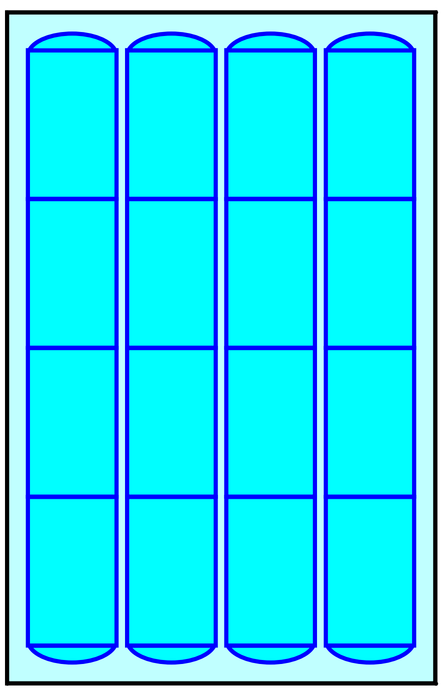
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

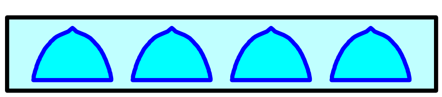
16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,302.9 cf Field - 735.0 cf Chambers = 1,567.9 cf Stone x 40.0% Voids = 627.2 cf Stone Storage

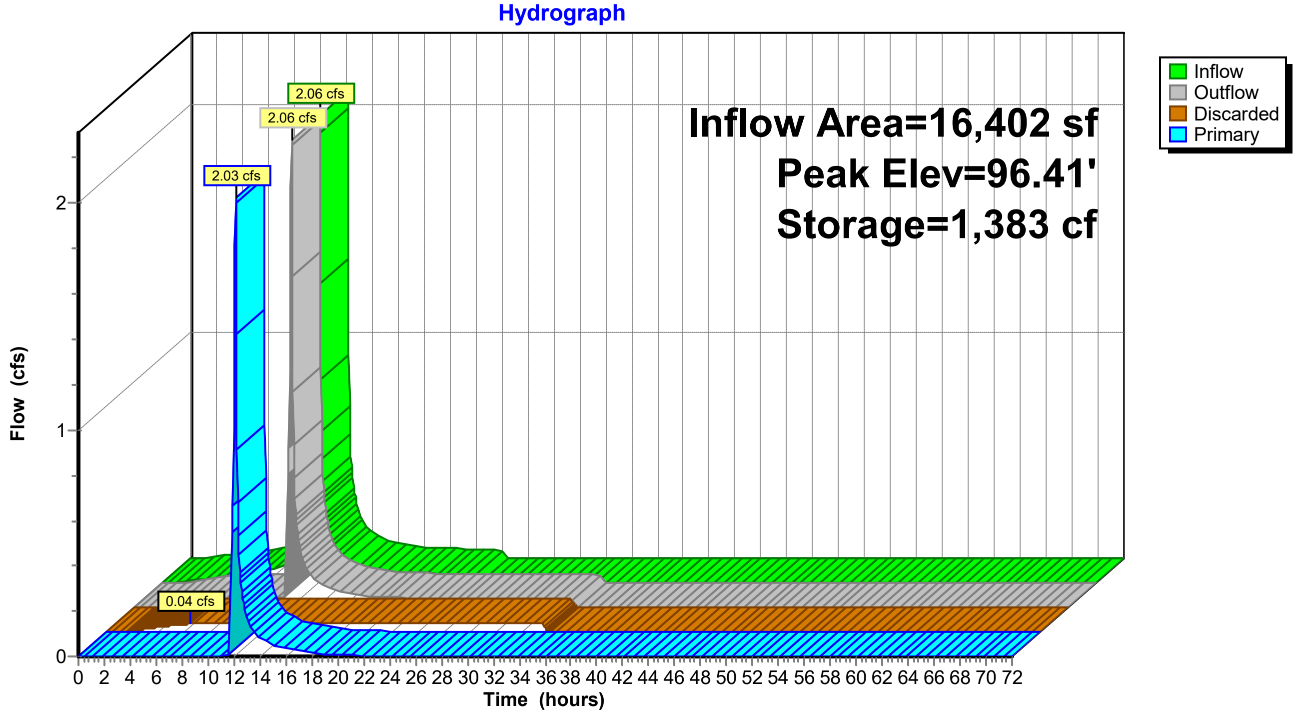
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 59.2%
Overall System Size = 32.10' x 20.50' x 3.50'

16 Chambers
85.3 cy Field
58.1 cy Stone





Pond UIS-2: Underground Infiltration System #2



Summary for Pond UIS-3: Underground Infiltration System #3

[58] Hint: Peaked 0.25' above defined flood level

Inflow Area = 3,632 sf, 77.01% Impervious, Inflow Depth = 4.57" for 25-Year event
Inflow = 0.40 cfs @ 12.13 hrs, Volume= 1,384 cf
Outflow = 0.03 cfs @ 11.30 hrs, Volume= 1,384 cf, Atten= 91%, Lag= 0.0 min
Discarded = 0.03 cfs @ 11.30 hrs, Volume= 1,384 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 94.28' @ 13.32 hrs Surf.Area= 607 sf Storage= 452 cf
Flood Elev= 94.03' Surf.Area= 607 sf Storage= 351 cf

Plug-Flow detention time= 99.4 min calculated for 1,383 cf (100% of inflow)
Center-of-Mass det. time= 99.3 min (916.0 - 816.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	449 cf	**34.83'W x 17.44'L x 2.33'H Field A** 1,417 cf Overall - 295 cf Embedded = 1,123 cf x 40.0% Voids
#2A	93.50'	295 cf	**ADS_StormTech SC-310 +Cap** x 20 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 10 Rows
		744 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.20'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 11.30 hrs HW=93.02' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=93.00' (Free Discharge)
└─**1=Culvert** (Controls 0.00 cfs)
  └─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond UIS-3: Underground Infiltration System #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

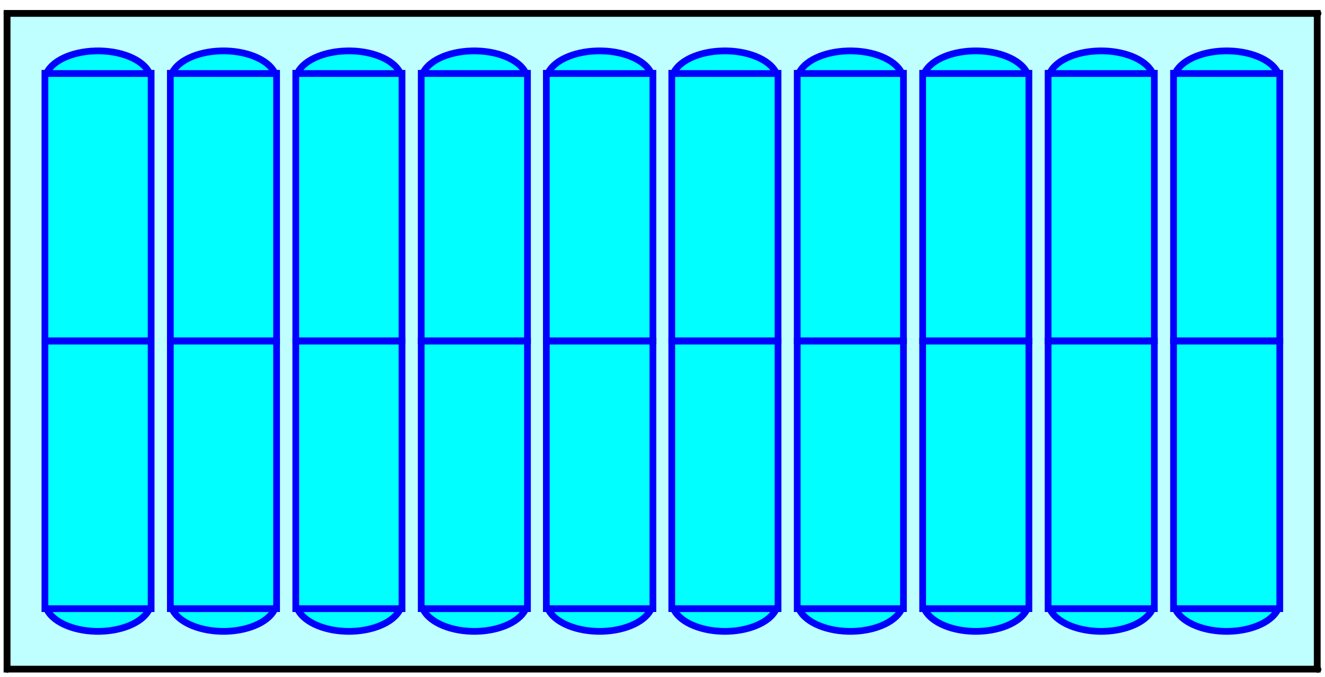
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
10 Rows x 34.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 34.83' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

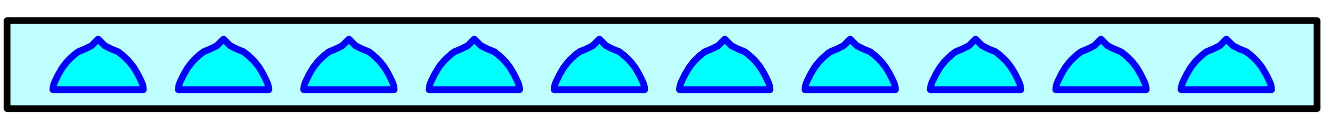
20 Chambers x 14.7 cf = 294.8 cf Chamber Storage

1,417.5 cf Field - 294.8 cf Chambers = 1,122.6 cf Stone x 40.0% Voids = 449.1 cf Stone Storage

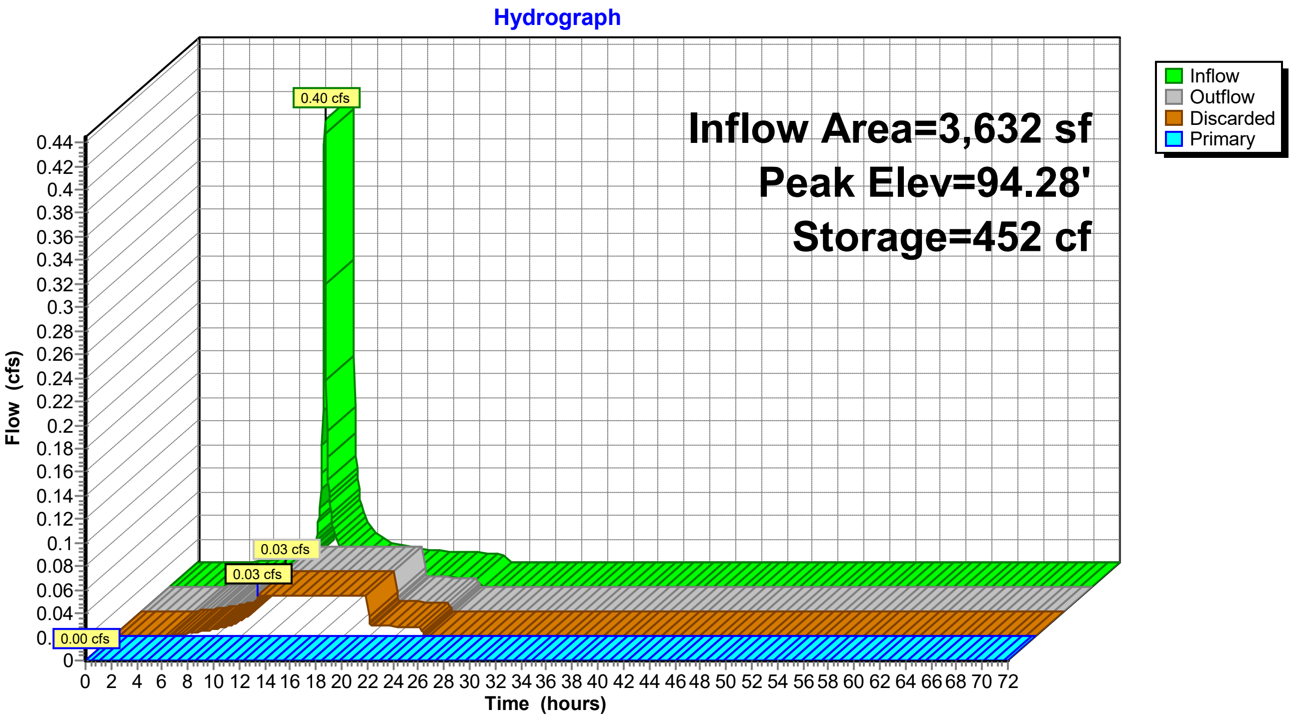
Chamber Storage + Stone Storage = 743.9 cf = 0.017 af
Overall Storage Efficiency = 52.5%
Overall System Size = 17.44' x 34.83' x 2.33'

20 Chambers
52.5 cy Field
41.6 cy Stone





Pond UIS-3: Underground Infiltration System #3

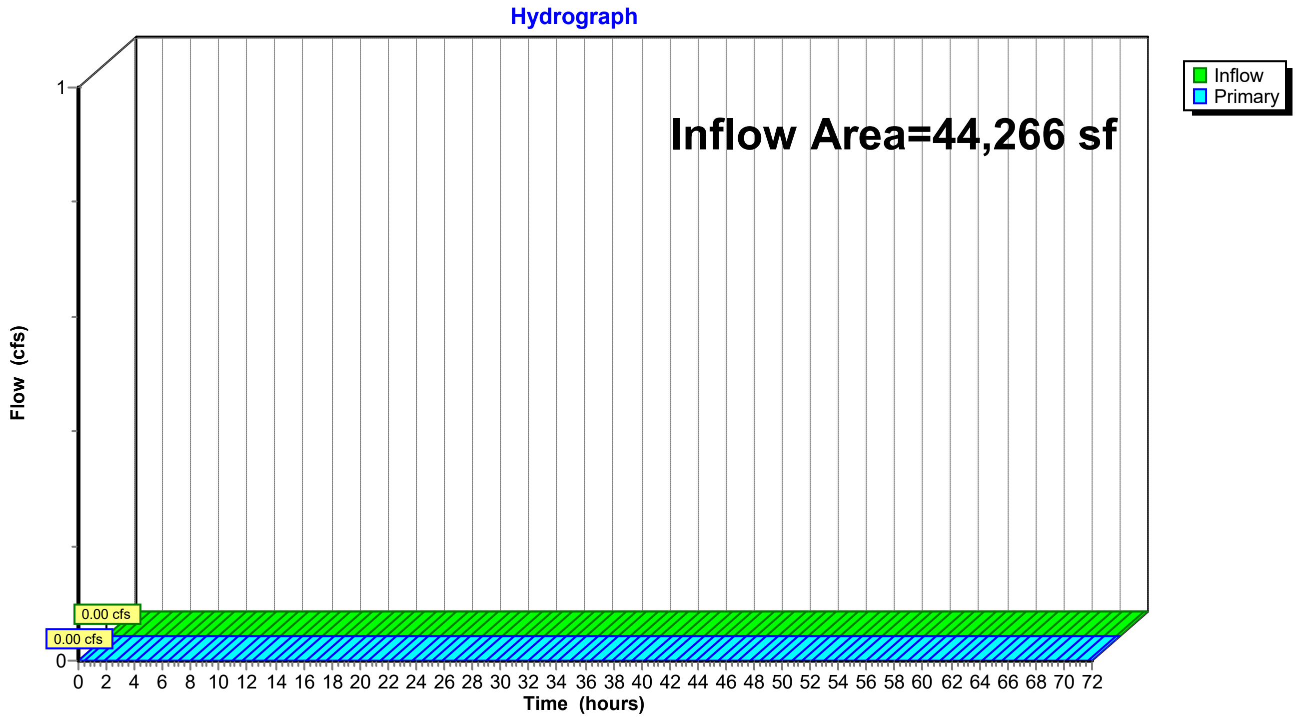


Summary for Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

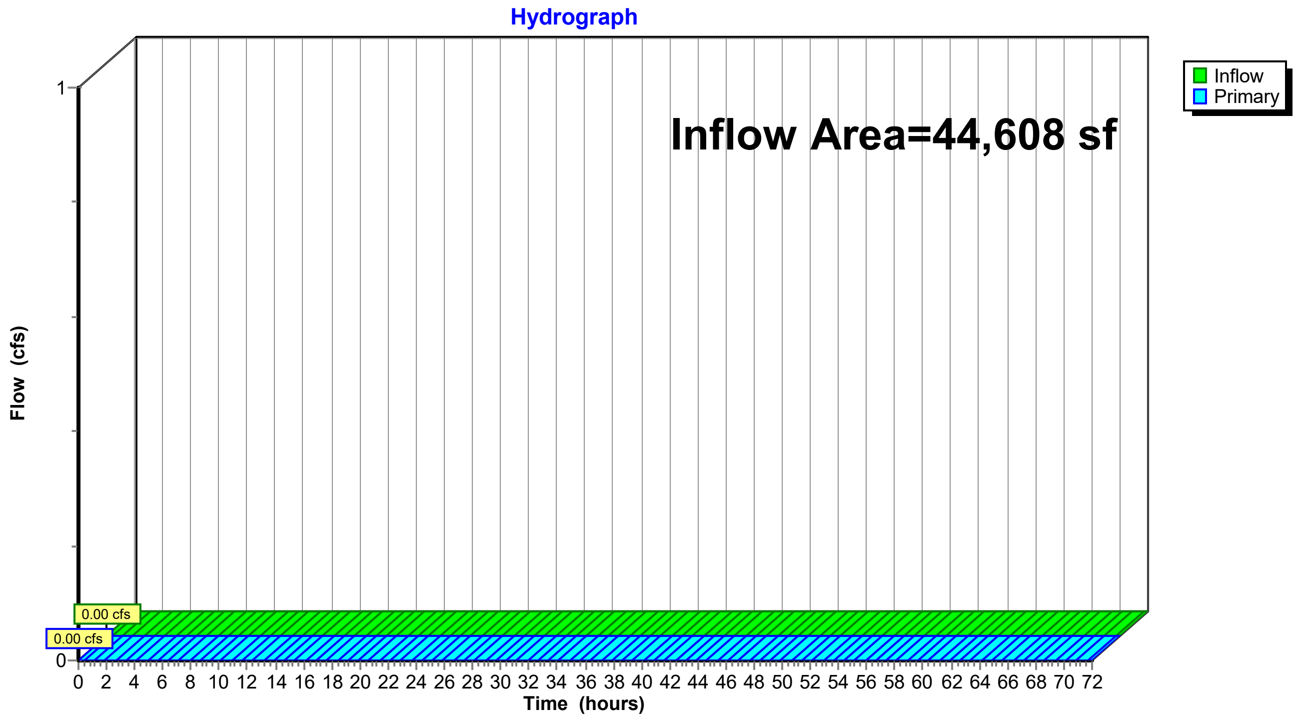


Summary for Link SP2: Flow to Exisitng Drainage on Main Street

Inflow Area =	44,608 sf,	85.11% Impervious,	Inflow Depth = 0.00"	for 25-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: Flow to Exisitng Drainage on Main Street

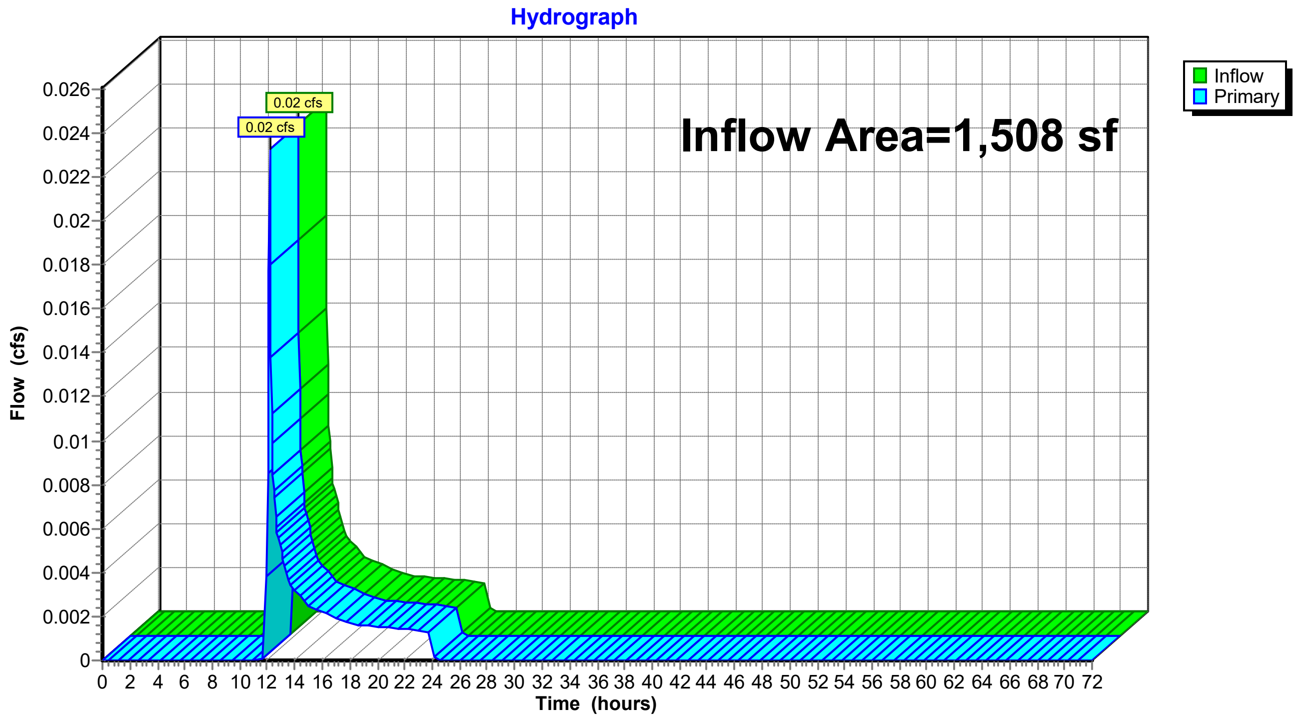


Summary for Link SP3: Flow to Wetlands

Inflow Area =	1,508 sf,	7.69% Impervious,	Inflow Depth = 0.90"	for 25-Year event
Inflow =	0.02 cfs @	12.15 hrs, Volume=	113 cf	
Primary =	0.02 cfs @	12.15 hrs, Volume=	113 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: Flow to Wetlands



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

Subcatchment P-1: Subcatchment P-1 Runoff Area=8,087 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=1.34 cfs 5,385 cf

Subcatchment P-2: Subcatchment P-2 Runoff Area=16,402 sf 93.02% Impervious Runoff Depth=7.51"
Tc=6.0 min CN=94 Runoff=2.68 cfs 10,266 cf

Subcatchment P-3: Subcatchment P-3 Runoff Area=3,632 sf 77.01% Impervious Runoff Depth=6.32"
Tc=6.0 min CN=84 Runoff=0.54 cfs 1,912 cf

Subcatchment P-4: Subcatchment P-4 Runoff Area=342 sf 6.43% Impervious Runoff Depth=1.65"
Tc=6.0 min CN=43 Runoff=0.01 cfs 47 cf

Subcatchment P-5: Subcatchment P-5 Runoff Area=6,397 sf 32.09% Impervious Runoff Depth=3.28"
Tc=6.0 min CN=58 Runoff=0.52 cfs 1,748 cf

Subcatchment P-6: Subcatchment P-6 Runoff Area=1,508 sf 7.69% Impervious Runoff Depth=1.76"
Tc=6.0 min CN=44 Runoff=0.06 cfs 221 cf

Subcatchment R-1: Subcatchment R-1 Runoff Area=9,748 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=1.62 cfs 6,491 cf

Pond DMH-10: DMH-10 Inflow=0.47 cfs 1,295 cf
Primary=0.47 cfs 1,295 cf

Pond DW-1: Drywell-1 Peak Elev=91.21' Storage=13 cf Inflow=0.01 cfs 47 cf
Discarded=0.00 cfs 47 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 47 cf

Pond UIS-1: Underground Infiltration Peak Elev=96.52' Storage=8,621 cf Inflow=6.11 cfs 19,752 cf
Discarded=0.22 cfs 18,470 cf Primary=0.47 cfs 1,282 cf Outflow=0.69 cfs 19,752 cf

Pond UIS-2: Underground Infiltration Peak Elev=96.47' Storage=1,399 cf Inflow=2.68 cfs 10,266 cf
Discarded=0.04 cfs 4,138 cf Primary=2.64 cfs 6,128 cf Outflow=2.68 cfs 10,266 cf

Pond UIS-3: Underground Infiltration System #3 Peak Elev=95.21' Storage=713 cf Inflow=0.54 cfs 1,912 cf
Discarded=0.03 cfs 1,899 cf Primary=0.01 cfs 13 cf Outflow=0.05 cfs 1,912 cf

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue Inflow=0.47 cfs 1,295 cf
Primary=0.47 cfs 1,295 cf

Link SP2: Flow to Exisitng Drainage on Main Street Inflow=0.47 cfs 1,295 cf
Primary=0.47 cfs 1,295 cf

Link SP3: Flow to Wetlands Inflow=0.06 cfs 221 cf
Primary=0.06 cfs 221 cf

Total Runoff Area = 46,116 sf Runoff Volume = 26,069 cf Average Runoff Depth = 6.78"
17.43% Pervious = 8,036 sf 82.57% Impervious = 38,080 sf

Summary for Subcatchment P-1: Subcatchment P-1

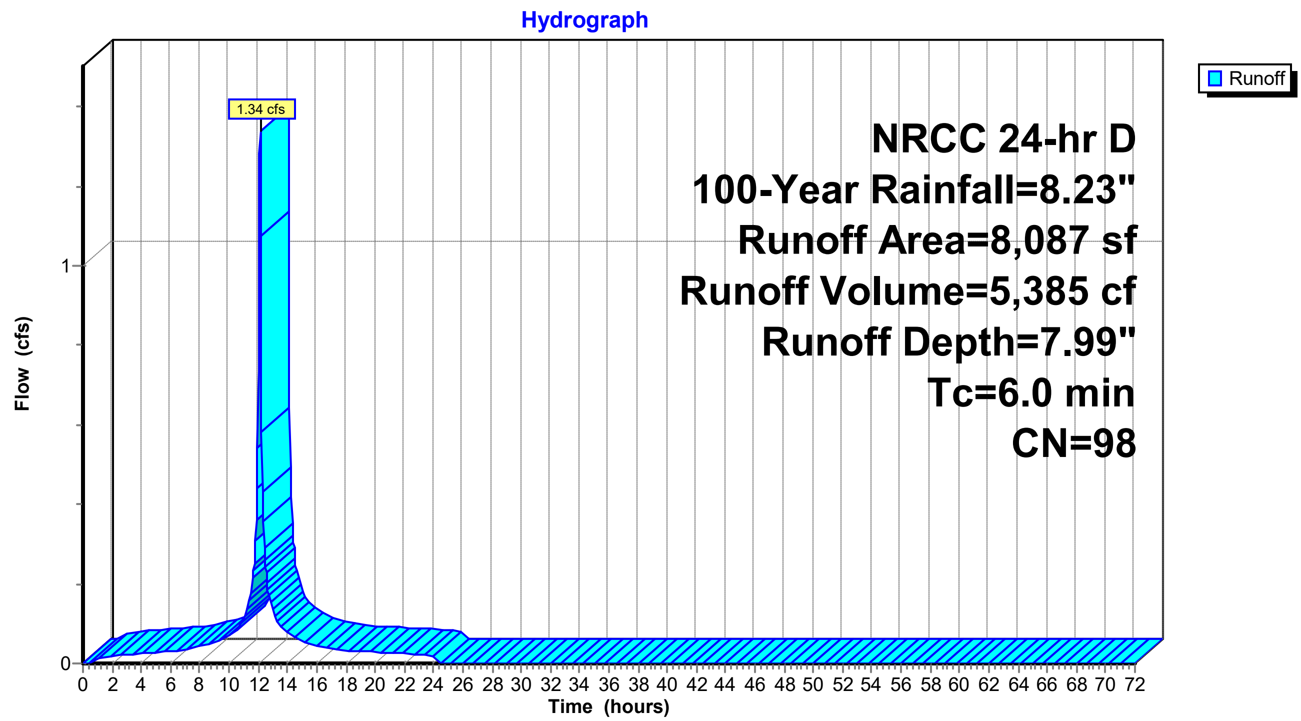
Runoff = 1.34 cfs @ 12.13 hrs, Volume= 5,385 cf, Depth= 7.99"
Routed to Pond UIS-1 : Underground Infiltration System #1

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

Area (sf)	CN	Description
8,087	98	Paved parking, HSG A
8,087		100.00% Impervious Area

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

Subcatchment P-1: Subcatchment P-1



Summary for Subcatchment P-2: Subcatchment P-2

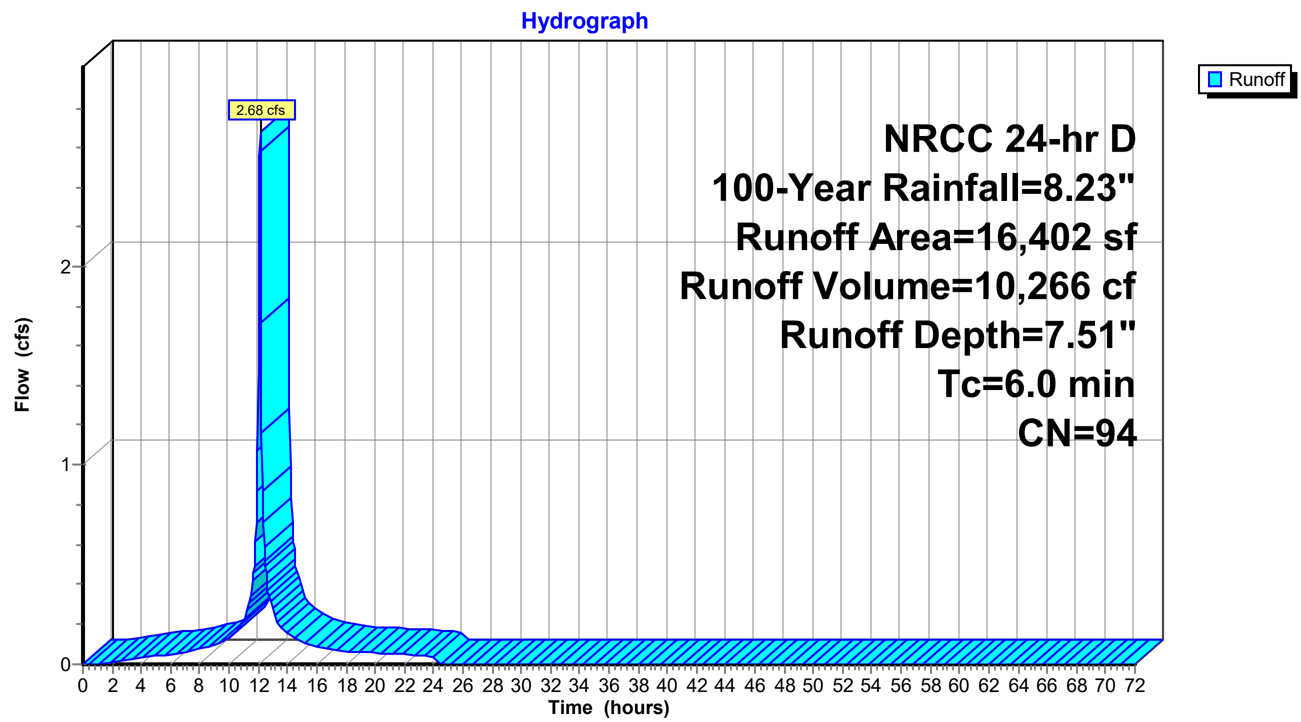
Runoff = 2.68 cfs @ 12.13 hrs, Volume= 10,266 cf, Depth= 7.51"
Routed to Pond UIS-2 : Underground Infiltration System #2

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

Area (sf)	CN	Description
1,145	39	>75% Grass cover, Good, HSG A
15,257	98	Paved parking, HSG A
16,402	94	Weighted Average
1,145		6.98% Pervious Area
15,257		93.02% Impervious Area

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

Subcatchment P-2: Subcatchment P-2



Summary for Subcatchment P-3: Subcatchment P-3

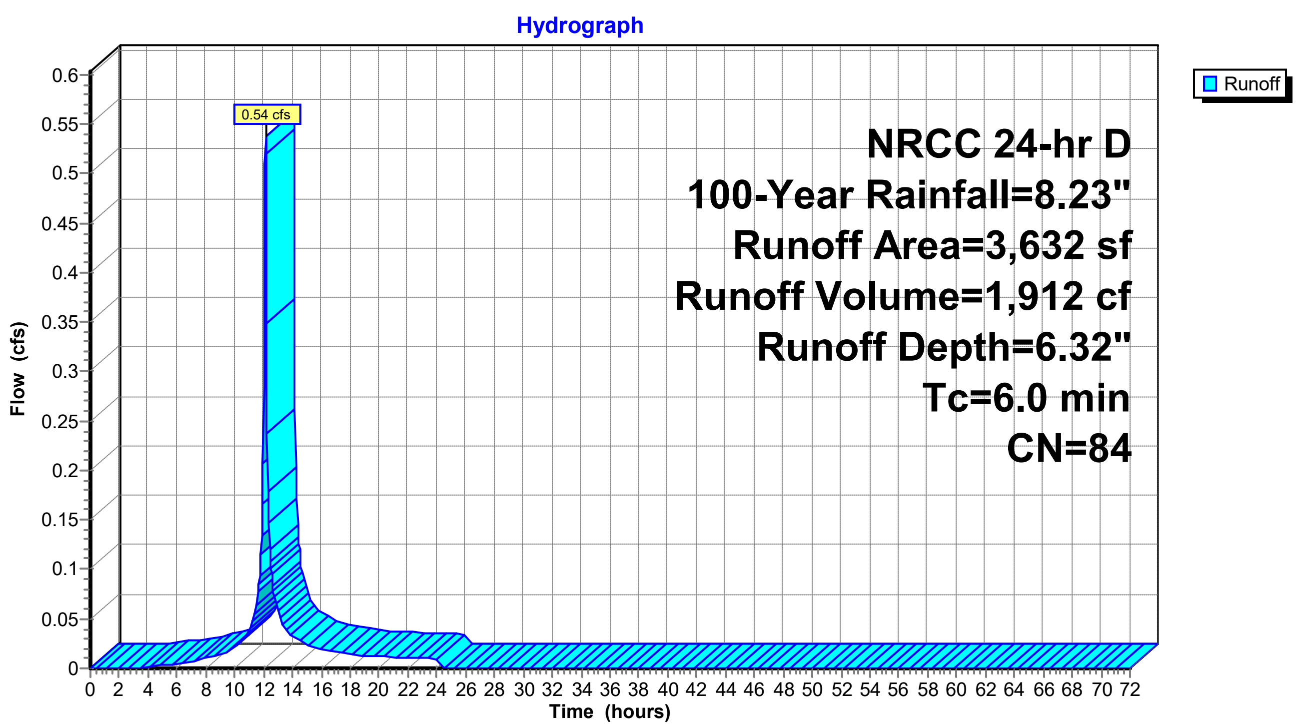
Runoff = 0.54 cfs @ 12.13 hrs, Volume= 1,912 cf, Depth= 6.32"
Routed to Pond UIS-3 : Underground Infiltration System #3

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

Area (sf)	CN	Description
835	39	>75% Grass cover, Good, HSG A
2,797	98	Paved parking, HSG A
3,632	84	Weighted Average
835		22.99% Pervious Area
2,797		77.01% Impervious Area

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

Subcatchment P-3: Subcatchment P-3



Summary for Subcatchment P-4: Subcatchment P-4

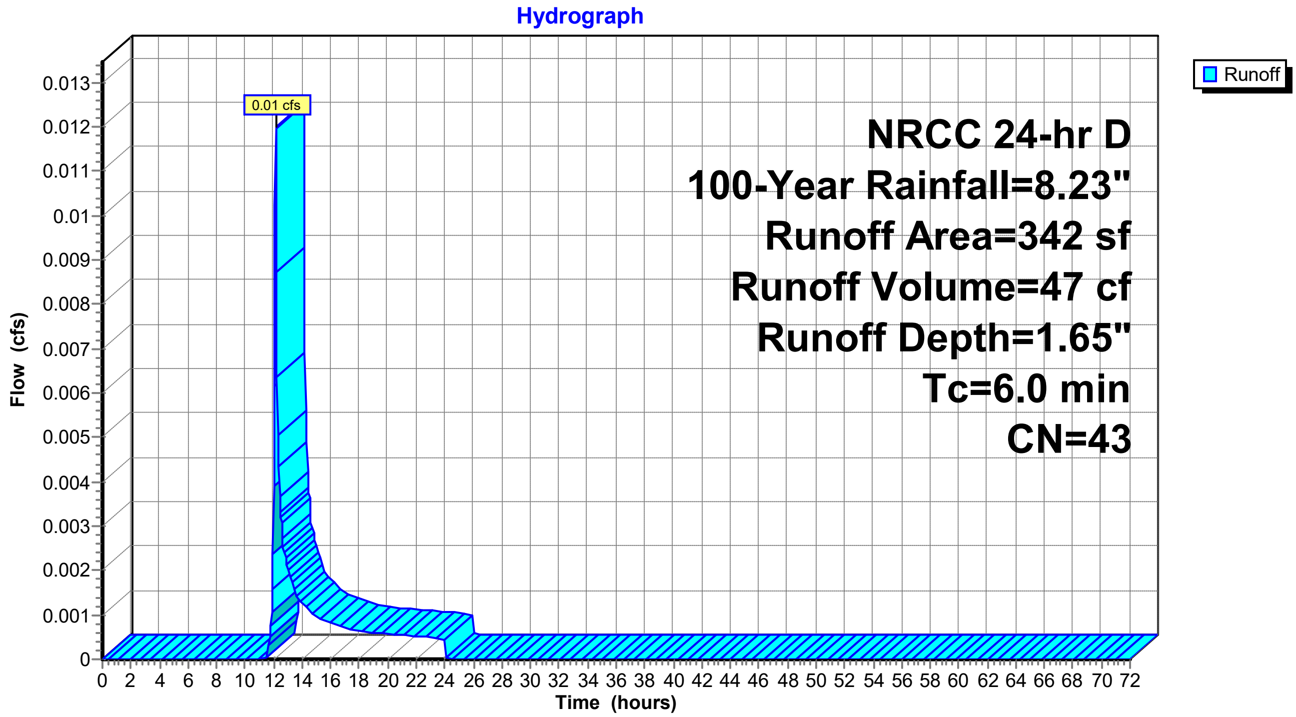
Runoff = 0.01 cfs @ 12.14 hrs, Volume= 47 cf, Depth= 1.65"
Routed to Pond DW-1 : Drywell-1

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

Area (sf)	CN	Description
320	39	>75% Grass cover, Good, HSG A
22	98	Paved parking, HSG A
342	43	Weighted Average
320		93.57% Pervious Area
22		6.43% Impervious Area

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

Subcatchment P-4: Subcatchment P-4



Summary for Subcatchment P-5: Subcatchment P-5

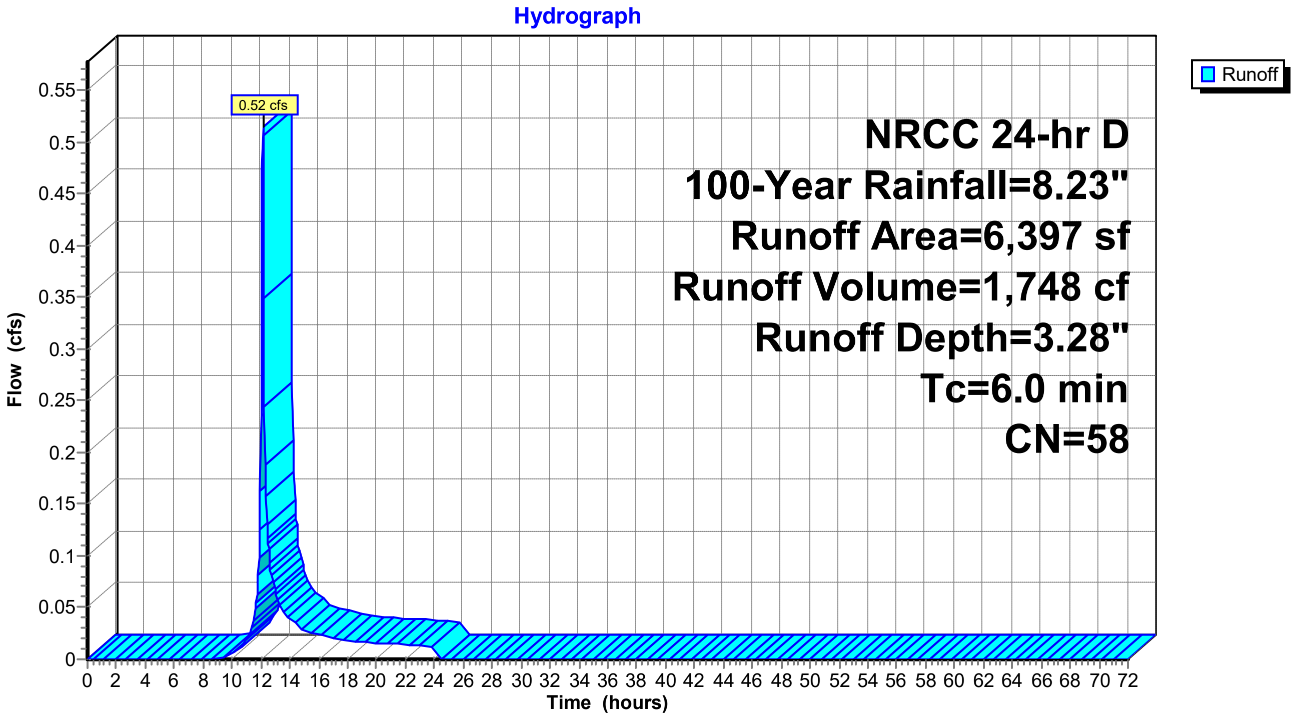
Runoff = 0.52 cfs @ 12.13 hrs, Volume= 1,748 cf, Depth= 3.28"
Routed to Pond UIS-1 : Underground Infiltration System #1

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

Area (sf)	CN	Description
4,344	39	>75% Grass cover, Good, HSG A
2,053	98	Paved parking, HSG A
6,397	58	Weighted Average
4,344		67.91% Pervious Area
2,053		32.09% Impervious Area

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

Subcatchment P-5: Subcatchment P-5



Summary for Subcatchment P-6: Subcatchment P-6

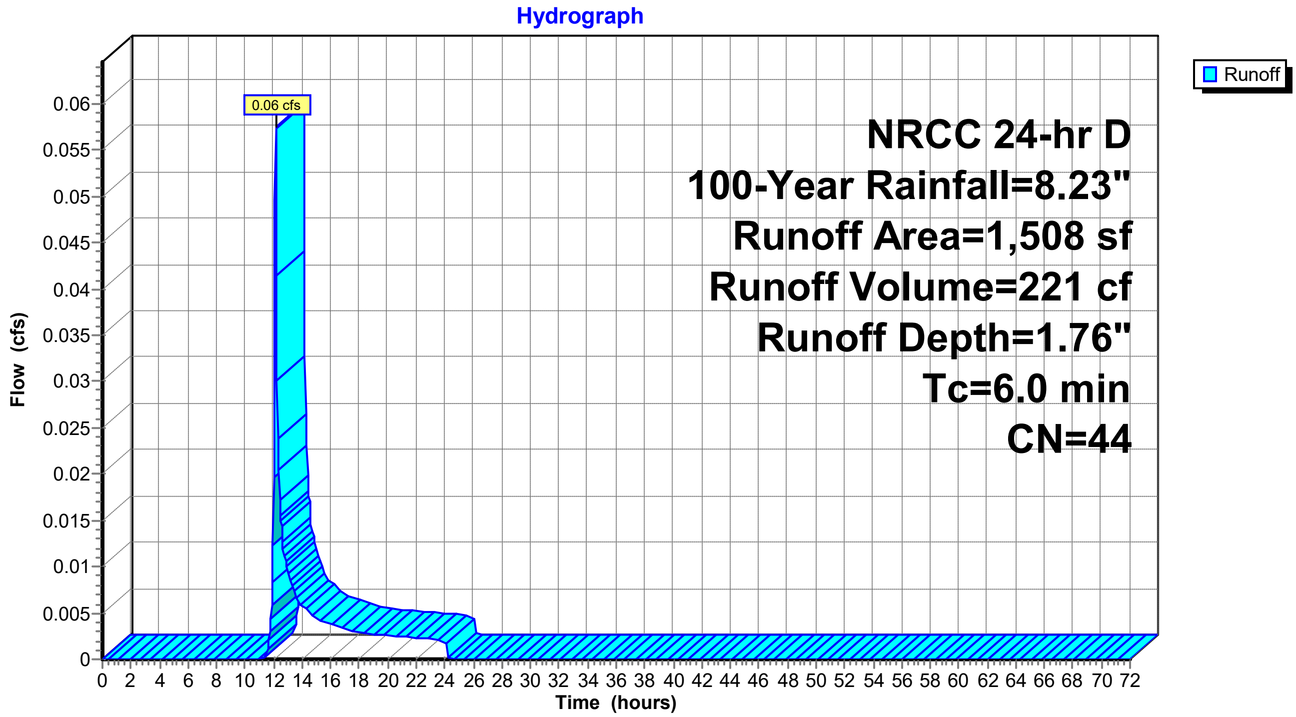
Runoff = 0.06 cfs @ 12.14 hrs, Volume= 221 cf, Depth= 1.76"
Routed to Link SP3 : Flow to Wetlands

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

Area (sf)	CN	Description
1,392	39	>75% Grass cover, Good, HSG A
116	98	Paved parking, HSG A
1,508	44	Weighted Average
1,392		92.31% Pervious Area
116		7.69% Impervious Area

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

Subcatchment P-6: Subcatchment P-6



Summary for Subcatchment R-1: Subcatchment R-1

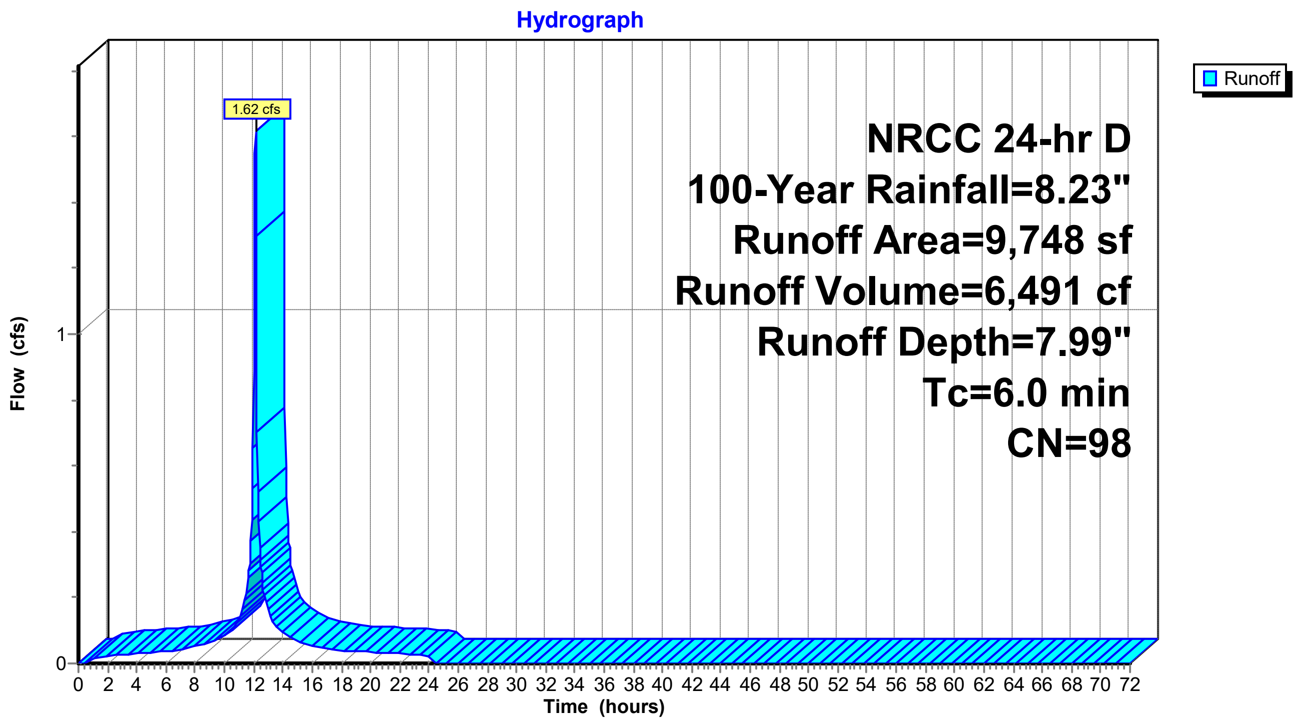
Runoff = 1.62 cfs @ 12.13 hrs, Volume= 6,491 cf, Depth= 7.99"
Routed to Pond UIS-1 : Underground Infiltration System #1

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

Area (sf)	CN	Description
9,748	98	Roofs, HSG A
9,748		100.00% Impervious Area

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

Subcatchment R-1: Subcatchment R-1

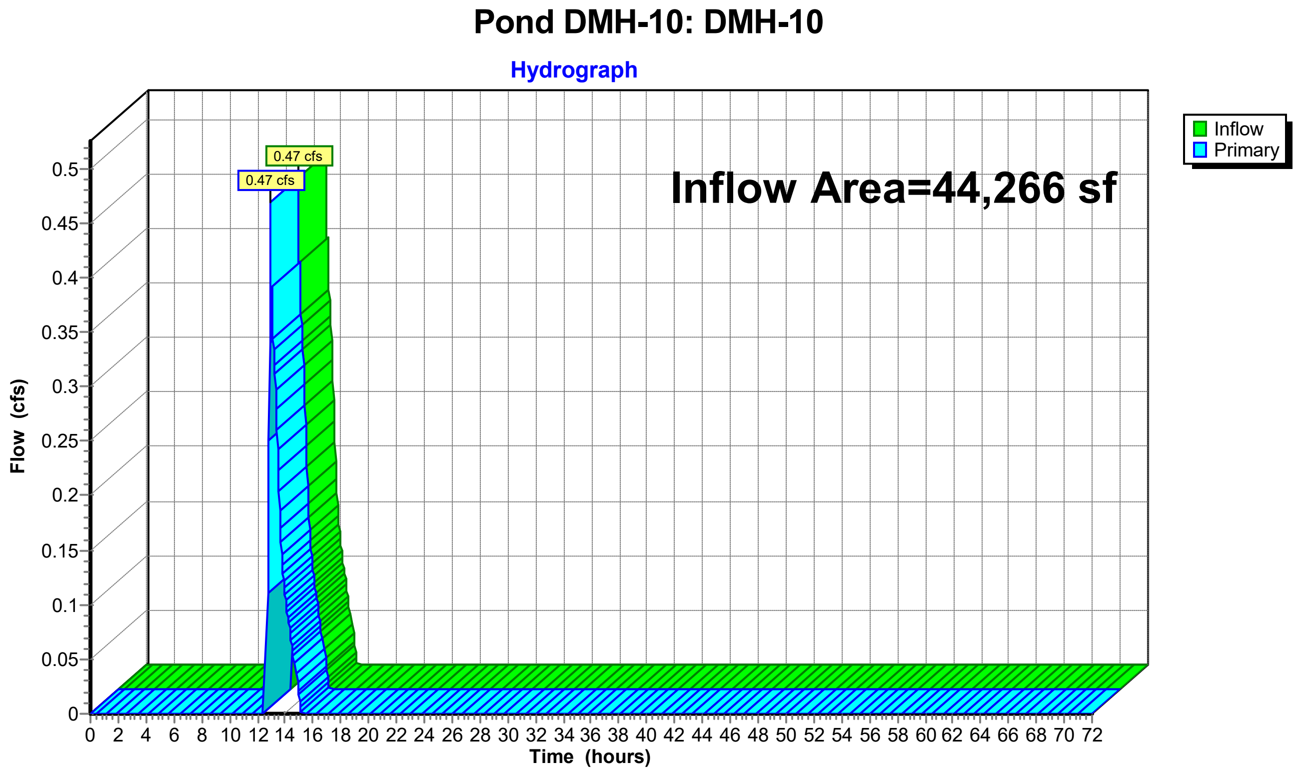


Summary for Pond DMH-10: DMH-10

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.35" for 100-Year event
Inflow = 0.47 cfs @ 12.95 hrs, Volume= 1,295 cf
Primary = 0.47 cfs @ 12.95 hrs, Volume= 1,295 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP1 : Flow to Exisitng Drainage on Pinevale Avenue

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



Summary for Pond DW-1: Drywell-1

Inflow Area = 342 sf, 6.43% Impervious, Inflow Depth = 1.65" for 100-Year event
Inflow = 0.01 cfs @ 12.14 hrs, Volume= 47 cf
Outflow = 0.00 cfs @ 12.00 hrs, Volume= 47 cf, Atten= 89%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.00 hrs, Volume= 47 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 91.21' @ 13.68 hrs Surf.Area= 24 sf Storage= 13 cf

Plug-Flow detention time= 87.8 min calculated for 47 cf (100% of inflow)
Center-of-Mass det. time= 87.8 min (1,018.5 - 930.7)

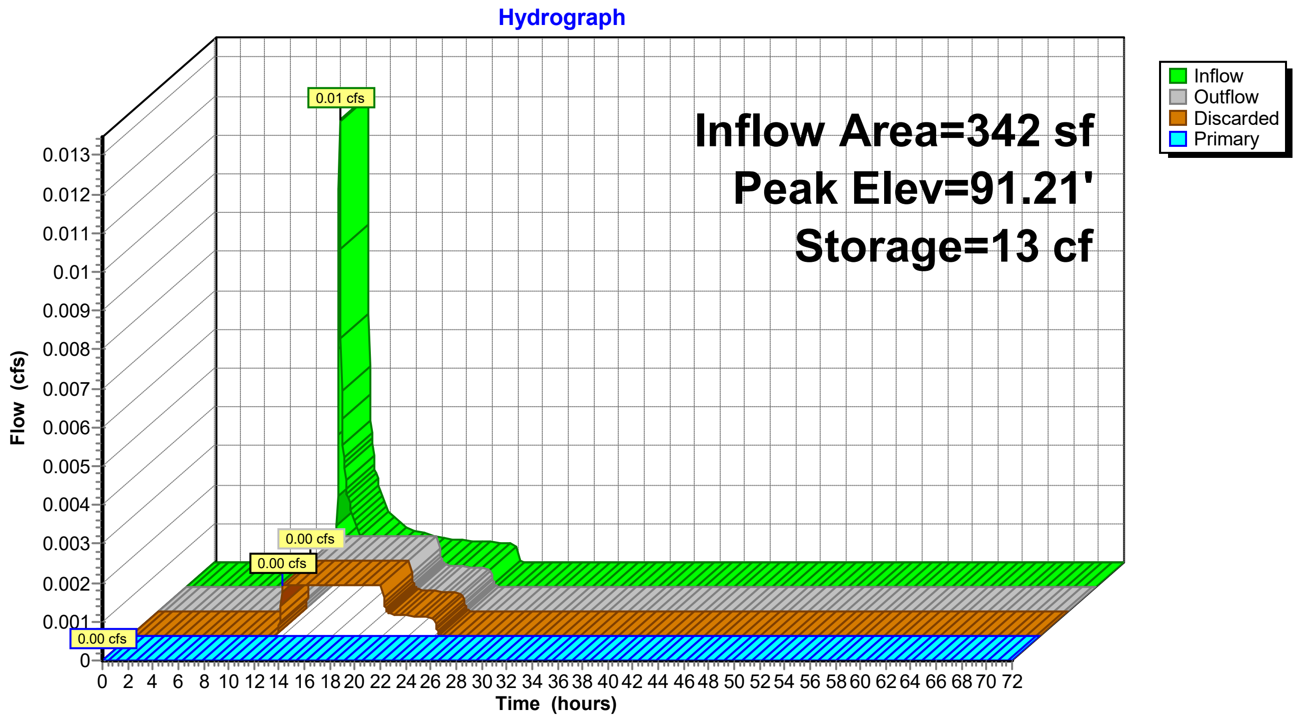
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	34 cf	**3.50'D x 3.50'H Drywell Base** Inside #2
#2	90.00'	29 cf	**5.50'D x 4.50'H stone**
			107 cf Overall - 34 cf Embedded = 73 cf x 40.0% Voids
#3	96.00'	79 cf	**10.00'D x 1.00'H Overflow Above Rim** -Impervious
#4	94.50'	5 cf	**2.00'D x 1.50'H Drywell Riser to Rim** -Impervious
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	96.00'	**2.0' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.00 cfs @ 12.00 hrs HW=90.10' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=90.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DW-1: Drywell-1



Summary for Pond UIS-1: Underground Infiltration System #1

[93] Warning: Storage range exceeded by 0.02'
[58] Hint: Peaked 2.49' above defined flood level
[81] Warning: Exceeded Pond UIS-2 by 0.34' @ 12.95 hrs

Inflow Area = 40,634 sf, 86.49% Impervious, Inflow Depth = 5.83" for 100-Year event
Inflow = 6.11 cfs @ 12.13 hrs, Volume= 19,752 cf
Outflow = 0.69 cfs @ 12.95 hrs, Volume= 19,752 cf, Atten= 89%, Lag= 49.2 min
Discarded = 0.22 cfs @ 10.80 hrs, Volume= 18,470 cf
Primary = 0.47 cfs @ 12.95 hrs, Volume= 1,282 cf
Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.52' @ 12.95 hrs Surf.Area= 4,031 sf Storage= 8,621 cf
Flood Elev= 94.03' Surf.Area= 4,031 sf Storage= 2,550 cf

Plug-Flow detention time= 314.6 min calculated for 19,738 cf (100% of inflow)
Center-of-Mass det. time= 314.6 min (1,084.9 - 770.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	3,659 cf	**87.00'W x 46.34'L x 3.50'H Field A** 14,110 cf Overall - 4,962 cf Embedded = 9,148 cf x 40.0% Voids
#2A	93.50'	4,962 cf	**ADS_StormTech SC-740 +Cap** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 108 Chambers in 18 Rows
		8,621 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	96.40'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.22 cfs @ 10.80 hrs HW=93.04' (Free Discharge)
└—**3=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.46 cfs @ 12.95 hrs HW=96.52' (Free Discharge)
└—**1=Culvert** (Passes 0.46 cfs of 5.19 cfs potential flow)
  └—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.46 cfs @ 0.97 fps)

Pond UIS-1: Underground Infiltration System #1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

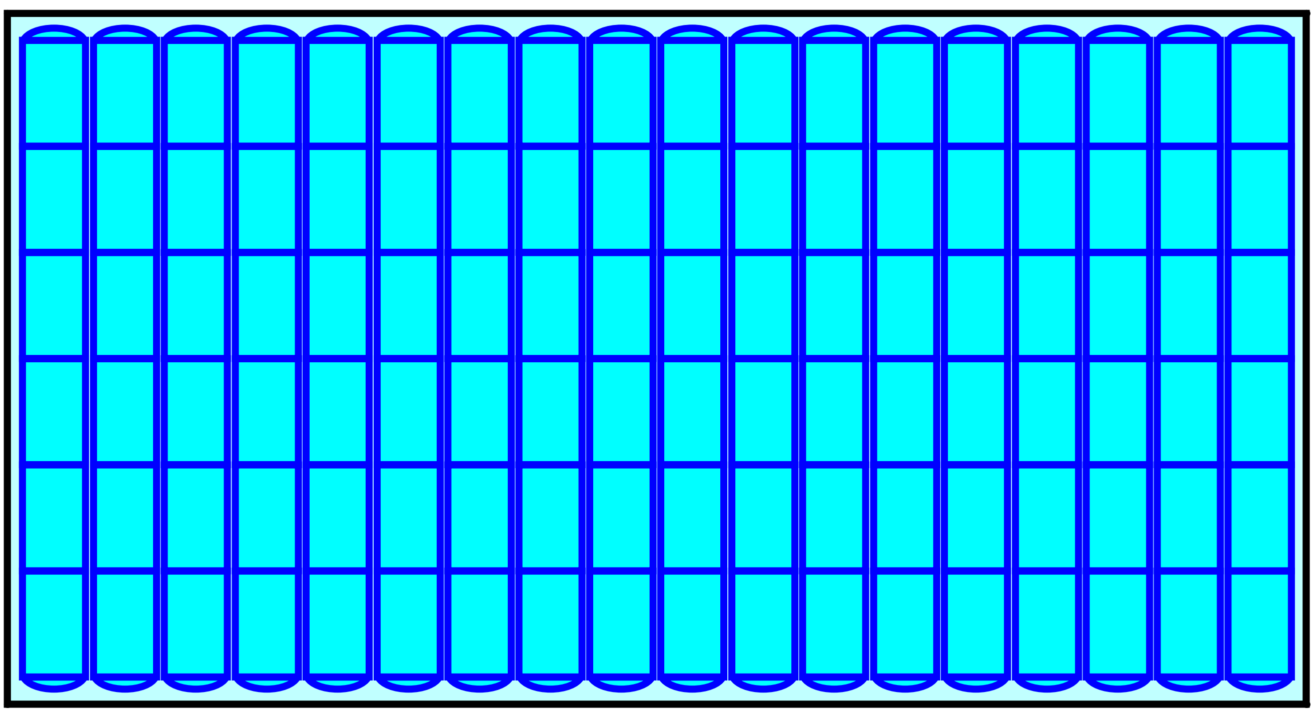
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
18 Rows x 51.0" Wide + 6.0" Spacing x 17 + 12.0" Side Stone x 2 = 87.00' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

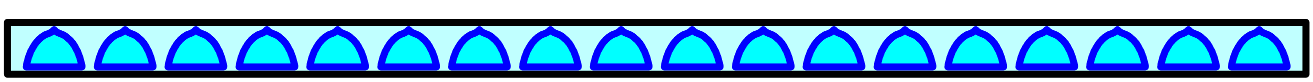
108 Chambers x 45.9 cf = 4,961.5 cf Chamber Storage

14,109.5 cf Field - 4,961.5 cf Chambers = 9,148.0 cf Stone x 40.0% Voids = 3,659.2 cf Stone Storage

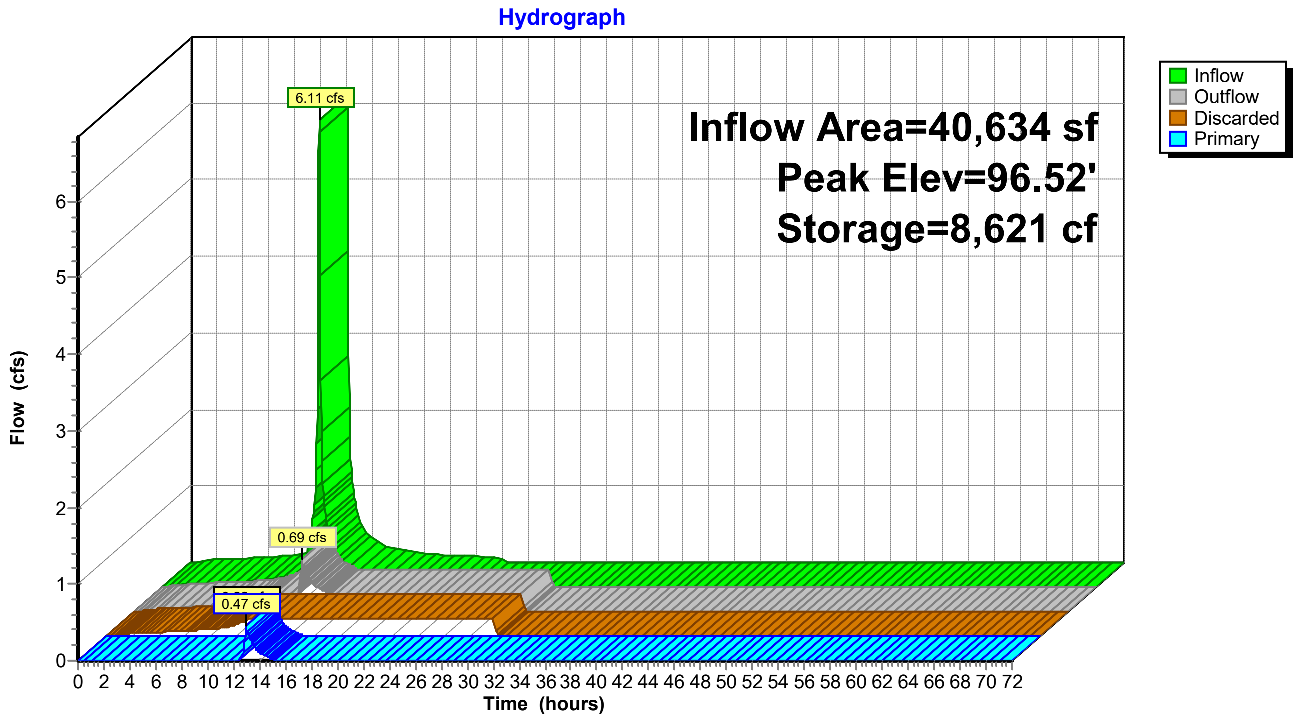
Chamber Storage + Stone Storage = 8,620.7 cf = 0.198 af
Overall Storage Efficiency = 61.1%
Overall System Size = 46.34' x 87.00' x 3.50'

108 Chambers
522.6 cy Field
338.8 cy Stone





Pond UIS-1: Underground Infiltration System #1



Summary for Pond UIS-2: Underground Infiltration System #2

[58] Hint: Peaked 2.44' above defined flood level
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area =	16,402 sf, 93.02% Impervious,	Inflow Depth = 7.51" for 100-Year event		
Inflow =	2.68 cfs @	12.13 hrs, Volume=	10,266 cf	
Outflow =	2.68 cfs @	12.14 hrs, Volume=	10,266 cf,	Atten= 0%, Lag= 0.6 min
Discarded =	0.04 cfs @	4.40 hrs, Volume=	4,138 cf	
Primary =	2.64 cfs @	12.14 hrs, Volume=	6,128 cf	

Routed to Pond UIS-1 : Underground Infiltration System #1

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.47' @ 12.14 hrs Surf.Area= 658 sf Storage= 1,399 cf
Flood Elev= 94.03' Surf.Area= 658 sf Storage= 416 cf

Plug-Flow detention time= 149.2 min calculated for 10,259 cf (100% of inflow)
Center-of-Mass det. time= 149.5 min (915.1 - 765.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	627 cf	**20.50'W x 32.10'L x 3.50'H Field A** 2,303 cf Overall - 735 cf Embedded = 1,568 cf x 40.0% Voids
#2A	93.50'	735 cf	**ADS_StormTech SC-740 +Cap** x 16 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 16 Chambers in 4 Rows
#3	93.00'	75 cf	**4.00'D x 6.00'H Vertical Cone/Cylinder** -Impervious
		1,438 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.50'	**15.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.50' / 93.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	96.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 4.40 hrs HW=93.06' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.54 cfs @ 12.14 hrs HW=96.46' (Free Discharge)
└─**1=Culvert** (Passes 2.54 cfs of 5.40 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.54 cfs @ 1.75 fps)

Pond UIS-2: Underground Infiltration System #2 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

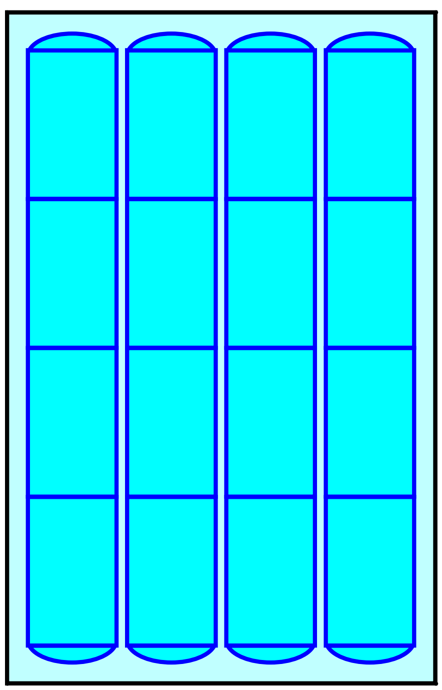
4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

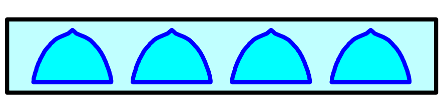
16 Chambers x 45.9 cf = 735.0 cf Chamber Storage

2,302.9 cf Field - 735.0 cf Chambers = 1,567.9 cf Stone x 40.0% Voids = 627.2 cf Stone Storage

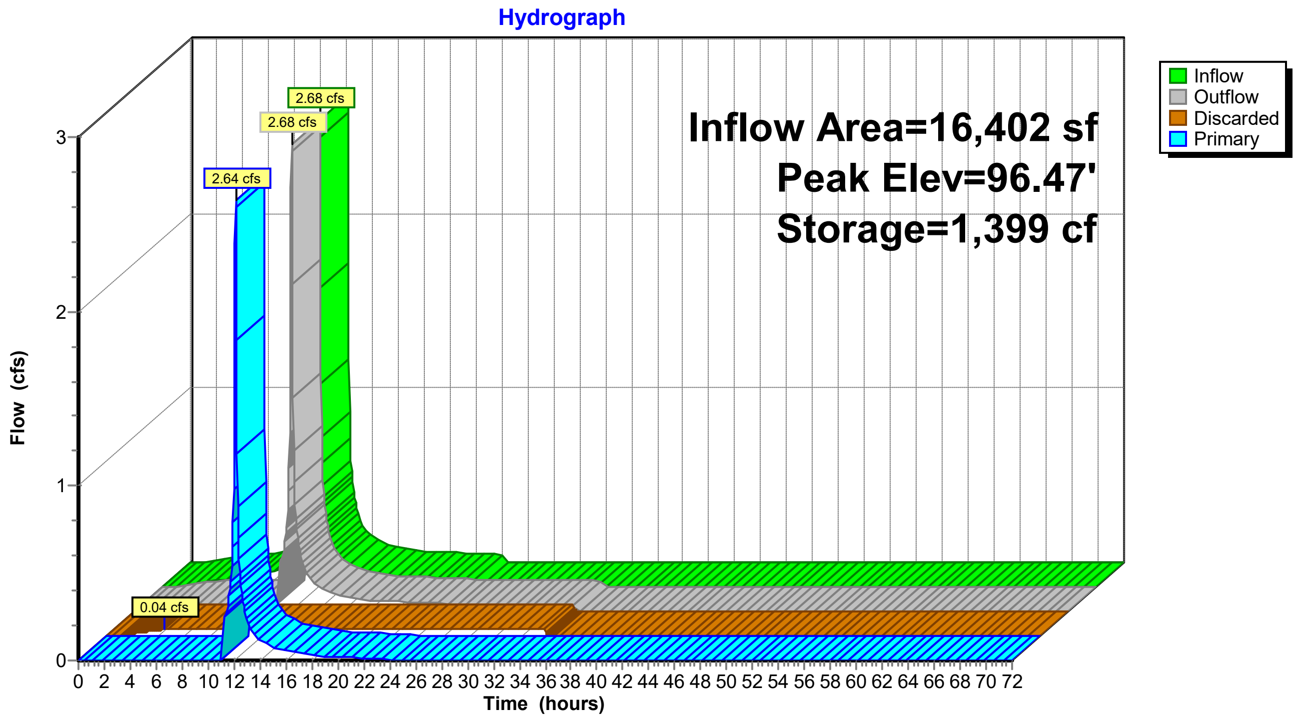
Chamber Storage + Stone Storage = 1,362.2 cf = 0.031 af
Overall Storage Efficiency = 59.2%
Overall System Size = 32.10' x 20.50' x 3.50'

16 Chambers
85.3 cy Field
58.1 cy Stone





Pond UIS-2: Underground Infiltration System #2



Summary for Pond UIS-3: Underground Infiltration System #3

[58] Hint: Peaked 1.18' above defined flood level

Inflow Area =	3,632 sf,	77.01% Impervious,	Inflow Depth = 6.32"	for 100-Year event
Inflow =	0.54 cfs @	12.13 hrs, Volume=	1,912 cf	
Outflow =	0.05 cfs @	13.32 hrs, Volume=	1,912 cf,	Atten= 92%, Lag= 71.5 min
Discarded =	0.03 cfs @	10.90 hrs, Volume=	1,899 cf	
Primary =	0.01 cfs @	13.32 hrs, Volume=	13 cf	

Routed to Pond DMH-10 : DMH-10

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 95.21' @ 13.32 hrs Surf.Area= 607 sf Storage= 713 cf
Flood Elev= 94.03' Surf.Area= 607 sf Storage= 351 cf

Plug-Flow detention time= 174.6 min calculated for 1,912 cf (100% of inflow)
Center-of-Mass det. time= 174.6 min (979.7 - 805.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.00'	449 cf	**34.83'W x 17.44'L x 2.33'H Field A** 1,417 cf Overall - 295 cf Embedded = 1,123 cf x 40.0% Voids
#2A	93.50'	295 cf	**ADS_StormTech SC-310 +Cap** x 20 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 20 Chambers in 10 Rows
		744 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.00'	**12.0" Round Culvert** L= 100.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 93.00' / 92.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	95.20'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	93.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 10.90 hrs HW=93.02' (Free Discharge)
└─**3=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.01 cfs @ 13.32 hrs HW=95.21' (Free Discharge)
└─**1=Culvert** (Passes 0.01 cfs of 3.90 cfs potential flow)
  └─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.25 fps)

Pond UIS-3: Underground Infiltration System #3 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-310 +Cap (ADS StormTech® SC-310 with cap length)
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C Row Spacing

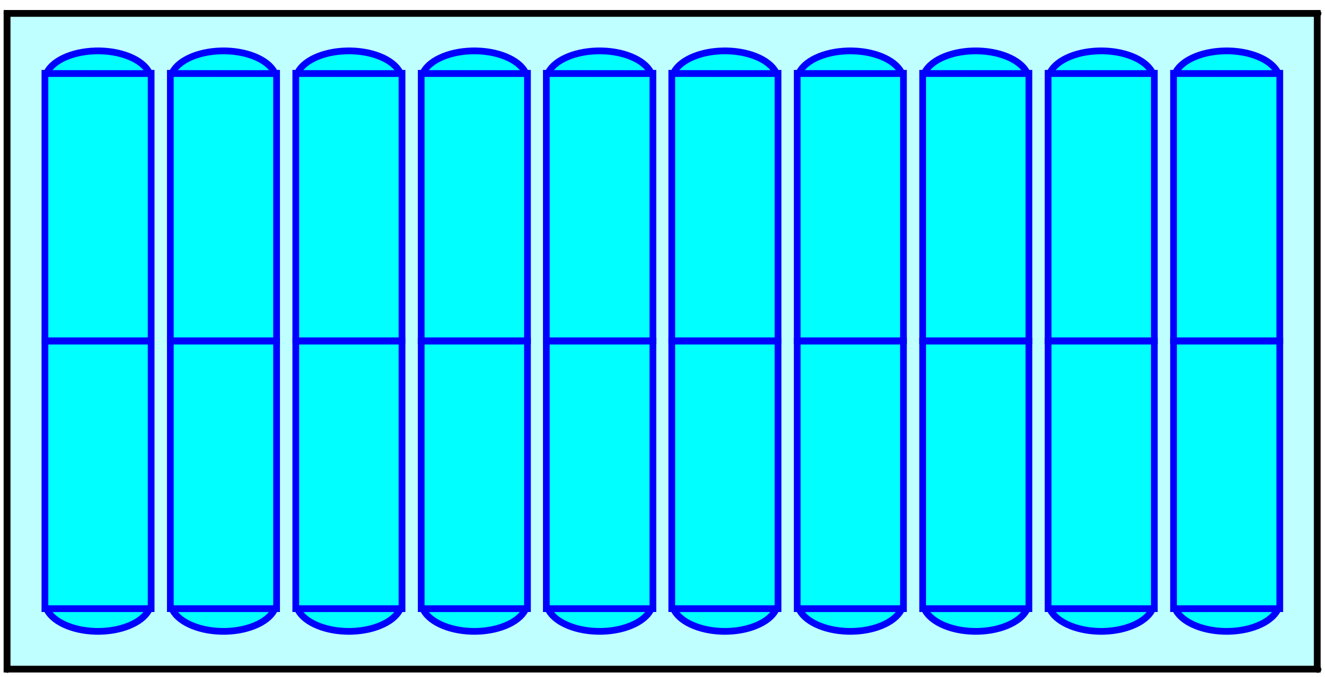
2 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 15.44' Row Length +12.0" End Stone x 2 = 17.44' Base Length
10 Rows x 34.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 34.83' Base Width
6.0" Stone Base + 16.0" Chamber Height + 6.0" Stone Cover = 2.33' Field Height

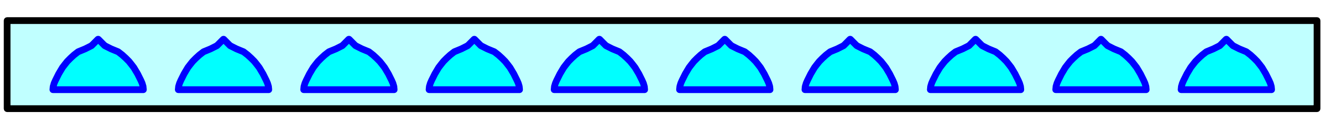
20 Chambers x 14.7 cf = 294.8 cf Chamber Storage

1,417.5 cf Field - 294.8 cf Chambers = 1,122.6 cf Stone x 40.0% Voids = 449.1 cf Stone Storage

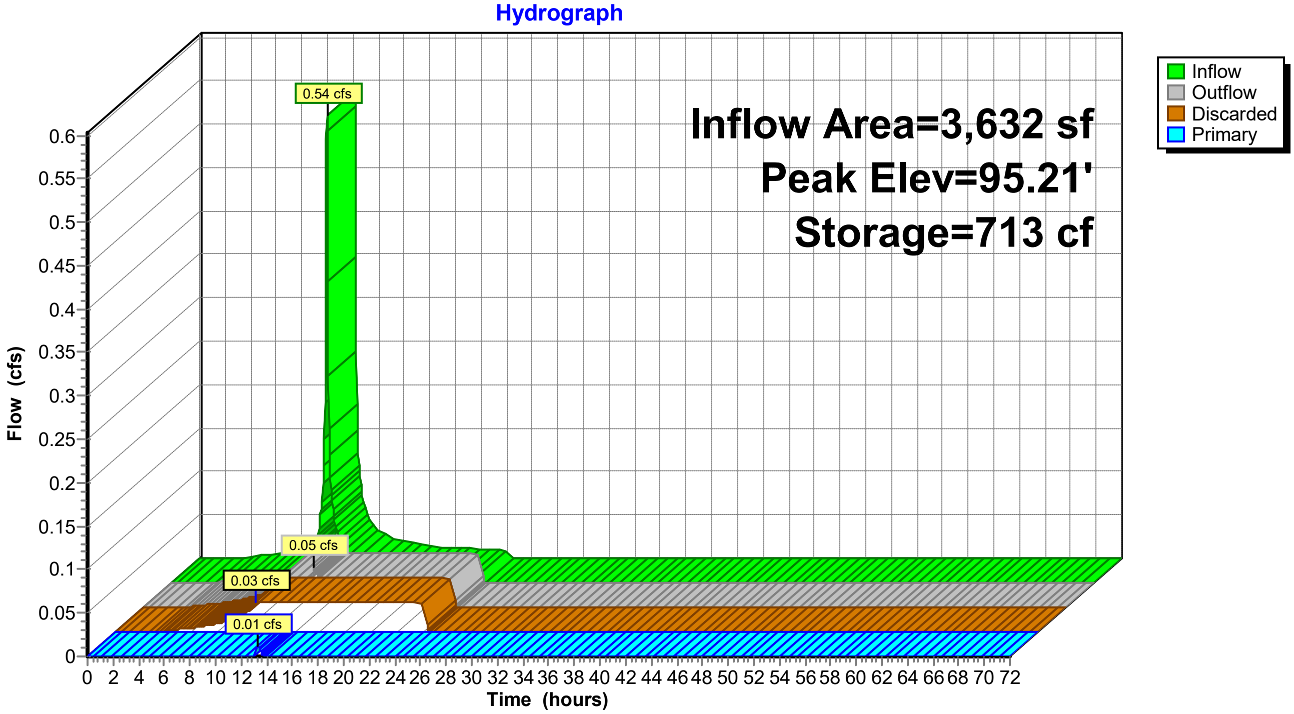
Chamber Storage + Stone Storage = 743.9 cf = 0.017 af
Overall Storage Efficiency = 52.5%
Overall System Size = 17.44' x 34.83' x 2.33'

20 Chambers
52.5 cy Field
41.6 cy Stone





Pond UIS-3: Underground Infiltration System #3

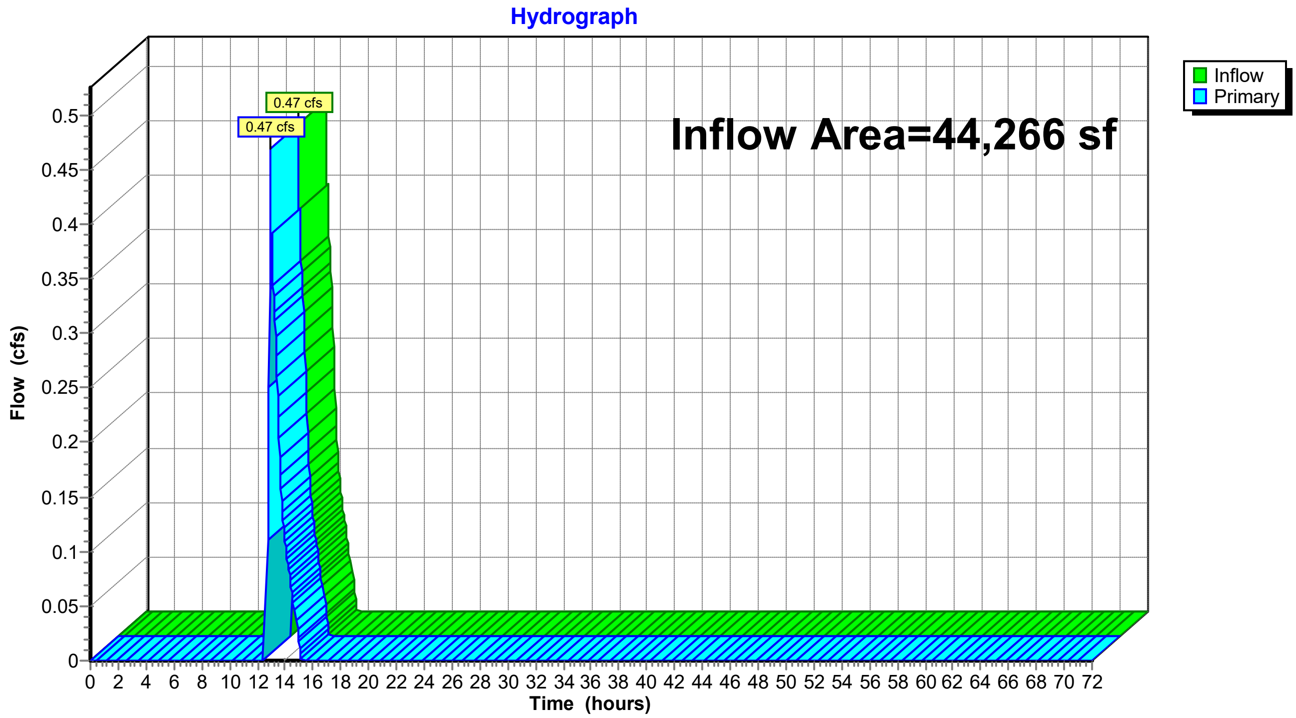


Summary for Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

Inflow Area = 44,266 sf, 85.71% Impervious, Inflow Depth = 0.35" for 100-Year event
Inflow = 0.47 cfs @ 12.95 hrs, Volume= 1,295 cf
Primary = 0.47 cfs @ 12.95 hrs, Volume= 1,295 cf, Atten= 0%, Lag= 0.0 min
Routed to Link SP2 : Flow to Exisitng Drainage on Main Street

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP1: Flow to Exisitng Drainage on Pinevale Avenue

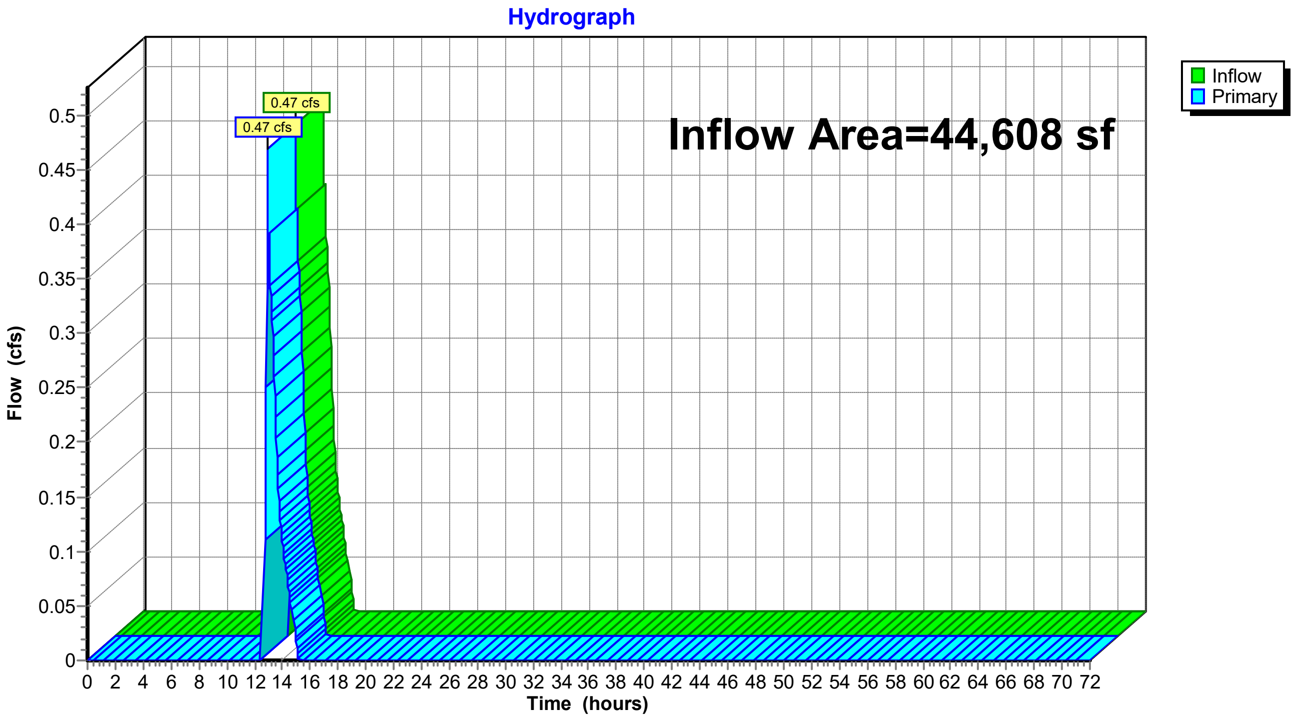


Summary for Link SP2: Flow to Exisitng Drainage on Main Street

Inflow Area =	44,608 sf,	85.11% Impervious,	Inflow Depth = 0.35"	for 100-Year event
Inflow =	0.47 cfs @	12.95 hrs, Volume=	1,295 cf	
Primary =	0.47 cfs @	12.95 hrs, Volume=	1,295 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP2: Flow to Exisitng Drainage on Main Street

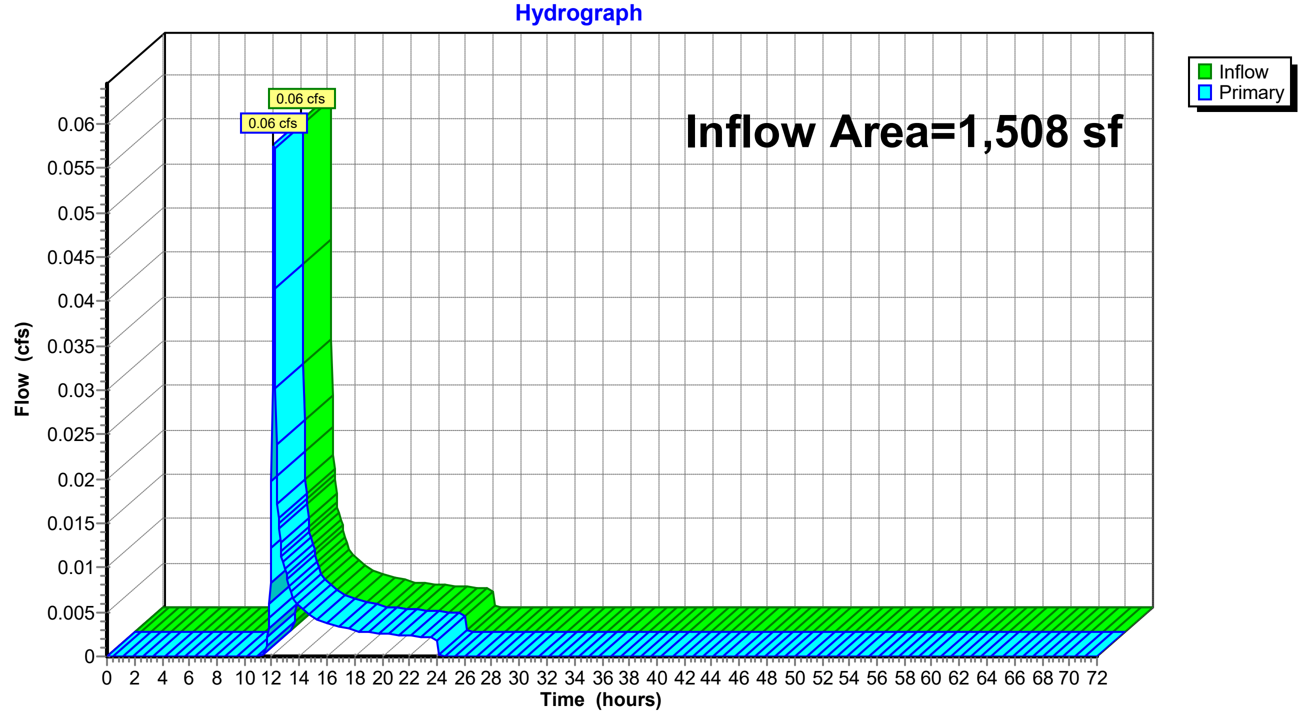


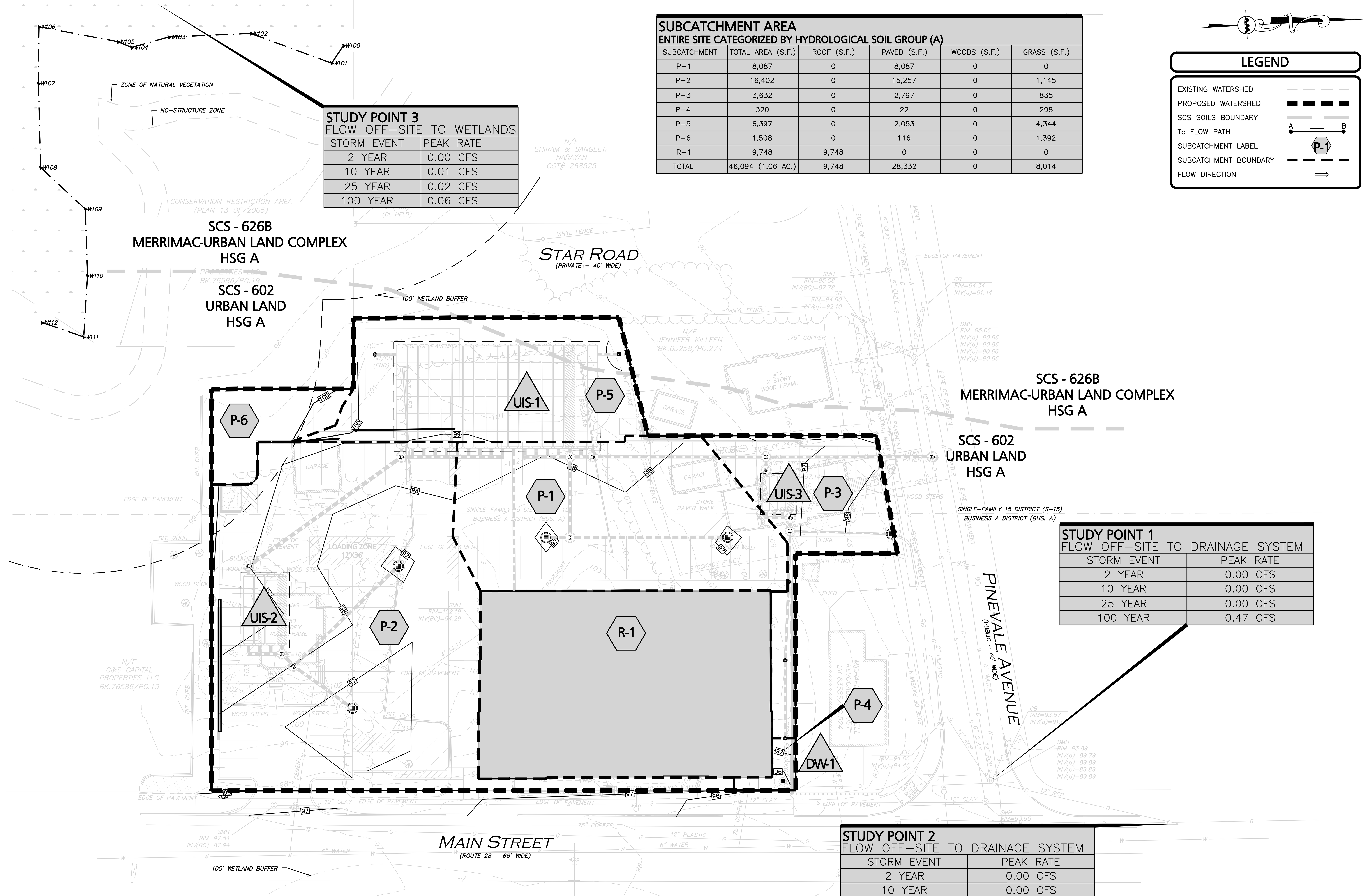
Summary for Link SP3: Flow to Wetlands

Inflow Area = 1,508 sf, 7.69% Impervious, Inflow Depth = 1.76" for 100-Year event
Inflow = 0.06 cfs @ 12.14 hrs, Volume= 221 cf
Primary = 0.06 cfs @ 12.14 hrs, Volume= 221 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link SP3: Flow to Wetlands





SUBCATCHMENT AREA

ENTIRE SITE CATEGORIZED BY HYDROLOGICAL SOIL GROUP (A)

SUBCATCHMENT	TOTAL AREA (S.F.)	ROOF (S.F.)	PAVED (S.F.)	WOODS (S.F.)	GRASS (S.F.)
P-1	8,087	0	8,087	0	0
P-2	16,402	0	15,257	0	1,145
P-3	3,632	0	2,797	0	835
P-4	320	0	22	0	298
P-5	6,397	0	2,053	0	4,344
P-6	1,508	0	116	0	1,392
R-1	9,748	9,748	0	0	0
TOTAL	46,094 (1.06 AC.)	9,748	28,332	0	8,014

STUDY POINT 3

FLOW OFF-SITE TO WETLANDS

STORM EVENT	PEAK RATE
2 YEAR	0.00 CFS
10 YEAR	0.01 CFS
25 YEAR	0.02 CFS
100 YEAR	0.06 CFS

STUDY POINT 1

FLOW OFF-SITE TO DRAINAGE SYSTEM

STORM EVENT	PEAK RATE
2 YEAR	0.00 CFS
10 YEAR	0.00 CFS
25 YEAR	0.00 CFS
100 YEAR	0.47 CFS

STUDY POINT 2

FLOW OFF-SITE TO DRAINAGE SYSTEM

STORM EVENT	PEAK RATE
2 YEAR	0.00 CFS
10 YEAR	0.00 CFS
25 YEAR	0.00 CFS
100 YEAR	0.47 CFS

LEGEND

- EXISTING WATERSHED
- PROPOSED WATERSHED
- SCS SOILS BOUNDARY
- Tc FLOW PATH
- SUBCATCHMENT LABEL
- SUBCATCHMENT BOUNDARY
- FLOW DIRECTION

DIG SAFE

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

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_WATERSHED-PROPOSED.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: PROPOSED WATERSHED PLAN

SHEET No. PWS-1

SECTION 6.0 -
APPENDIX

NOAA Atlas 14, Volume 10, Version 3
Location name: Reading, Massachusetts, USA*
Latitude: 42.5055°, Longitude: -71.1034°
Elevation: 182 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.309 (0.238-0.390)	0.373 (0.287-0.471)	0.478 (0.367-0.606)	0.566 (0.432-0.722)	0.686 (0.508-0.917)	0.775 (0.565-1.06)	0.871 (0.619-1.24)	0.983 (0.660-1.43)	1.15 (0.744-1.73)	1.29 (0.816-1.98)
10-min	0.438 (0.337-0.552)	0.529 (0.407-0.668)	0.678 (0.519-0.859)	0.801 (0.611-1.02)	0.971 (0.720-1.30)	1.10 (0.800-1.50)	1.23 (0.876-1.76)	1.39 (0.934-2.02)	1.63 (1.05-2.45)	1.83 (1.16-2.81)
15-min	0.515 (0.396-0.649)	0.622 (0.478-0.785)	0.797 (0.611-1.01)	0.943 (0.720-1.20)	1.14 (0.847-1.53)	1.29 (0.940-1.77)	1.45 (1.03-2.07)	1.64 (1.10-2.38)	1.92 (1.24-2.89)	2.15 (1.36-3.30)
30-min	0.708 (0.545-0.893)	0.855 (0.658-1.08)	1.10 (0.841-1.39)	1.30 (0.989-1.65)	1.57 (1.17-2.11)	1.78 (1.30-2.44)	2.00 (1.42-2.86)	2.26 (1.52-3.28)	2.65 (1.71-3.99)	2.97 (1.88-4.57)
60-min	0.901 (0.693-1.14)	1.09 (0.838-1.38)	1.40 (1.07-1.77)	1.65 (1.26-2.11)	2.00 (1.49-2.68)	2.27 (1.65-3.11)	2.55 (1.81-3.64)	2.88 (1.93-4.18)	3.38 (2.18-5.09)	3.80 (2.40-5.84)
2-hr	1.17 (0.904-1.46)	1.42 (1.10-1.78)	1.83 (1.42-2.31)	2.18 (1.67-2.76)	2.65 (1.98-3.54)	3.00 (2.20-4.10)	3.38 (2.43-4.83)	3.85 (2.59-5.56)	4.58 (2.97-6.85)	5.22 (3.31-7.95)
3-hr	1.36 (1.06-1.69)	1.65 (1.29-2.07)	2.14 (1.66-2.69)	2.55 (1.96-3.21)	3.11 (2.33-4.13)	3.52 (2.60-4.80)	3.97 (2.87-5.66)	4.53 (3.06-6.51)	5.41 (3.52-8.06)	6.18 (3.93-9.38)
6-hr	1.75 (1.37-2.17)	2.14 (1.67-2.66)	2.77 (2.16-3.46)	3.30 (2.56-4.14)	4.03 (3.04-5.32)	4.56 (3.38-6.17)	5.14 (3.74-7.28)	5.88 (3.98-8.38)	7.02 (4.58-10.4)	8.02 (5.12-12.1)
12-hr	2.23 (1.76-2.74)	2.72 (2.15-3.36)	3.54 (2.78-4.37)	4.21 (3.28-5.24)	5.13 (3.90-6.72)	5.81 (4.34-7.80)	6.56 (4.78-9.19)	7.48 (5.08-10.6)	8.90 (5.82-13.0)	10.1 (6.48-15.1)
24-hr	2.67 (2.12-3.27)	3.31 (2.62-4.05)	4.35 (3.44-5.34)	5.21 (4.10-6.44)	6.40 (4.89-8.33)	7.27 (5.46-9.70)	8.23 (6.04-11.5)	9.42 (6.43-13.2)	11.3 (7.42-16.4)	12.9 (8.30-19.1)
2-day	3.03 (2.42-3.68)	3.83 (3.06-4.66)	5.13 (4.08-6.26)	6.21 (4.92-7.62)	7.70 (5.93-9.99)	8.78 (6.65-11.7)	10.0 (7.42-14.0)	11.6 (7.92-16.1)	14.1 (9.27-20.3)	16.3 (10.5-24.0)
3-day	3.31 (2.66-4.01)	4.17 (3.35-5.06)	5.58 (4.46-6.78)	6.74 (5.36-8.24)	8.34 (6.45-10.8)	9.51 (7.23-12.6)	10.8 (8.05-15.0)	12.5 (8.59-17.4)	15.3 (10.1-21.9)	17.7 (11.4-25.9)
4-day	3.59 (2.89-4.33)	4.47 (3.60-5.40)	5.92 (4.75-7.18)	7.12 (5.67-8.68)	8.77 (6.80-11.3)	9.98 (7.60-13.2)	11.3 (8.45-15.7)	13.1 (9.00-18.1)	15.9 (10.5-22.8)	18.5 (11.9-26.9)
7-day	4.36 (3.53-5.23)	5.28 (4.27-6.34)	6.78 (5.47-8.17)	8.03 (6.43-9.73)	9.75 (7.59-12.4)	11.0 (8.41-14.4)	12.4 (9.26-17.0)	14.2 (9.80-19.5)	17.1 (11.3-24.3)	19.7 (12.7-28.4)
10-day	5.06 (4.11-6.05)	6.00 (4.88-7.19)	7.55 (6.11-9.07)	8.84 (7.11-10.7)	10.6 (8.27-13.5)	11.9 (9.10-15.5)	13.3 (9.94-18.1)	15.1 (10.5-20.7)	18.0 (12.0-25.4)	20.5 (13.3-29.5)
20-day	7.04 (5.76-8.36)	8.08 (6.61-9.60)	9.78 (7.97-11.7)	11.2 (9.07-13.4)	13.1 (10.3-16.4)	14.6 (11.2-18.6)	16.1 (11.9-21.4)	17.9 (12.5-24.2)	20.5 (13.7-28.7)	22.7 (14.7-32.3)
30-day	8.69 (7.14-10.3)	9.80 (8.05-11.6)	11.6 (9.51-13.8)	13.1 (10.7-15.7)	15.2 (11.9-18.9)	16.8 (12.8-21.2)	18.4 (13.6-24.1)	20.2 (14.1-27.1)	22.6 (15.1-31.3)	24.4 (15.9-34.7)
45-day	10.8 (8.90-12.7)	12.0 (9.88-14.1)	13.9 (11.4-16.5)	15.5 (12.7-18.5)	17.8 (14.0-21.8)	19.5 (14.9-24.4)	21.2 (15.6-27.3)	22.9 (16.1-30.6)	25.1 (16.9-34.6)	26.7 (17.4-37.7)
60-day	12.6 (10.4-14.8)	13.8 (11.4-16.2)	15.9 (13.1-18.7)	17.5 (14.4-20.8)	19.9 (15.6-24.3)	21.7 (16.6-27.0)	23.5 (17.2-30.0)	25.1 (17.7-33.4)	27.2 (18.3-37.4)	28.6 (18.7-40.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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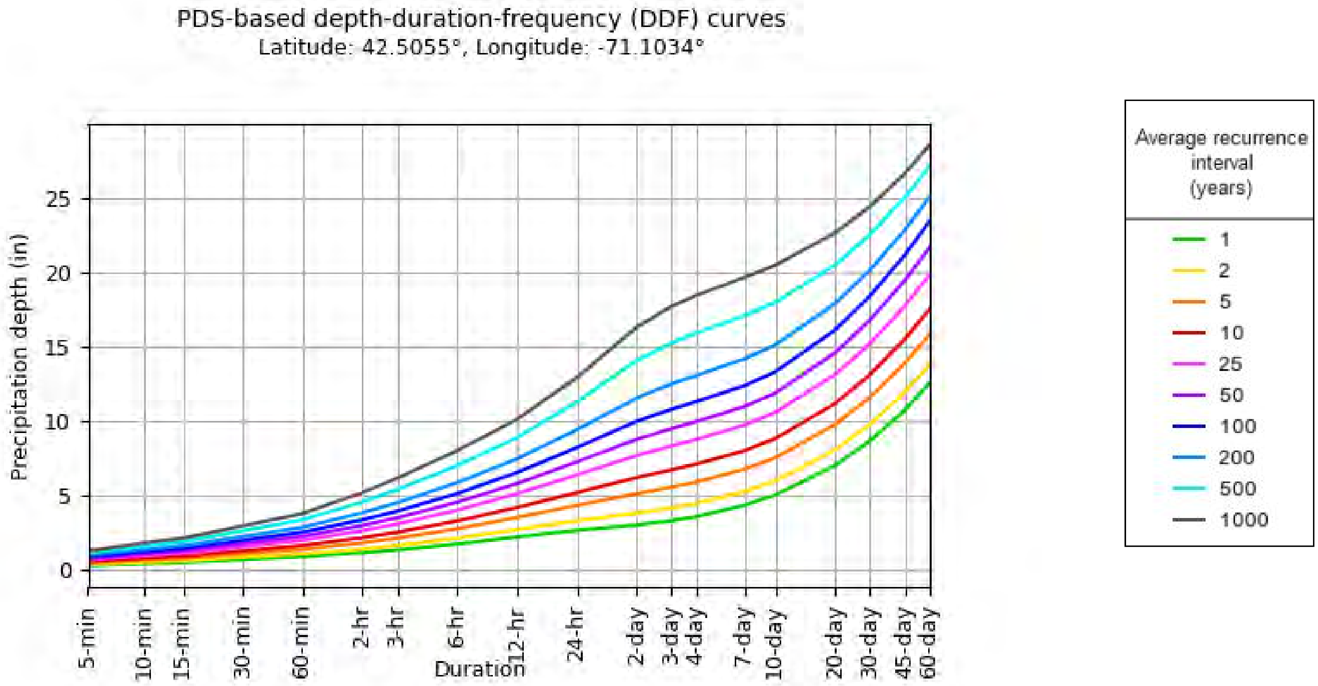
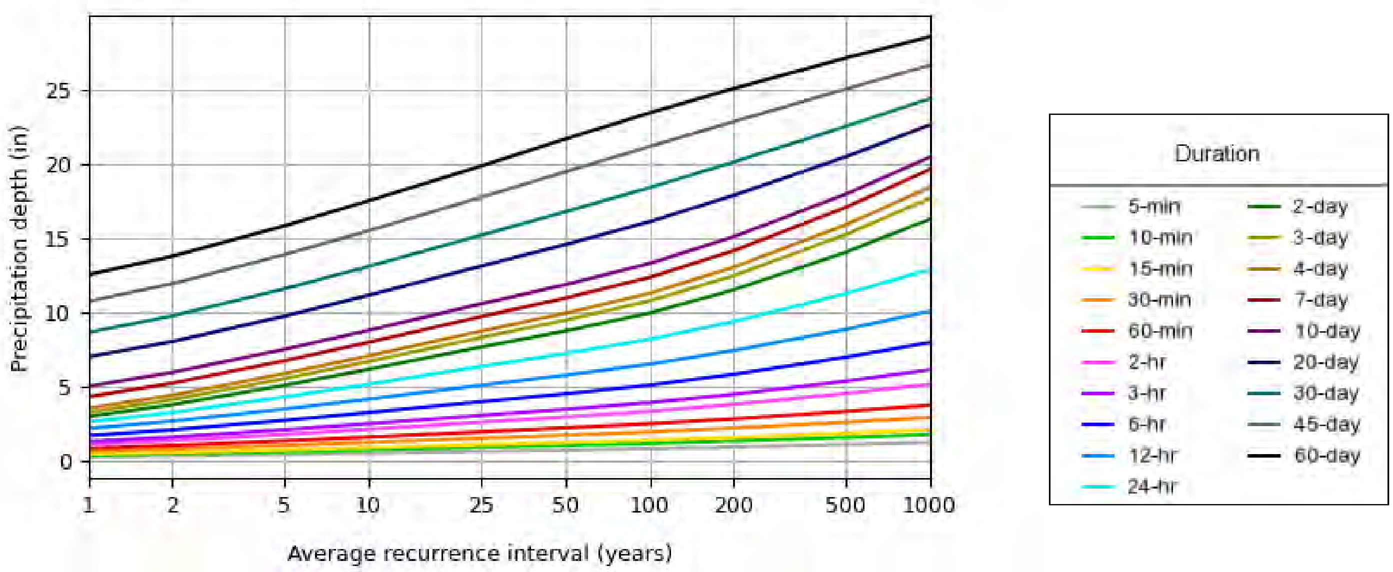
PF graphical





NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Mon Jun 26 20:41:01 2023

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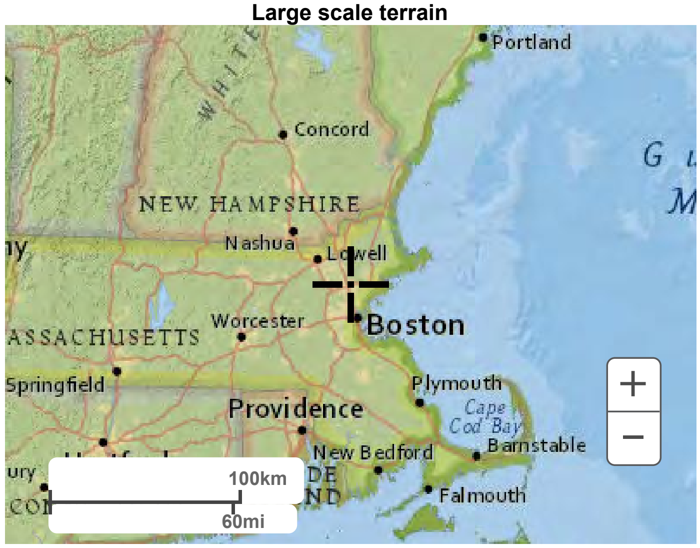
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Manning's Roughness Coefficients ("n")

Conduit	Manning's Coefficients
Closed Conduits	
Asbestos-Cement Pipe	0.011 to 0.015
Brick	0.013 to 0.017
Cast Iron Pipe	
Cement-lined and seal-coated	0.011 to 0.015
Concrete (Monolithic)	
Smooth forms	0.012 to 0.014
Rough forms	0.015 to 0.017
Concrete Pipe	0.011 to 0.015
Corrugated-Metal Pipe (1/2 - STUL 34470 2 1/2-inch corrgtn.)	
Plain	0.022 to 0.026
Paved invert	0.018 to 0.022
Spun asphalt-lined	0.011 to 0.015
Plastic Pipe (Smooth)	0.011 to 0.015
Vitrified Clay	
Pipes	0.011 to 0.015
Liner channels	0.013 to 0.017
Open Channels	
Lined Channels	
Asphalt	0.013 to 0.017
Brick	0.012 to 0.018
Concrete	0.011 to 0.020
Rubble or riprap	0.020 to 0.035
Vegetal	0.030 to 0.040
Excavated or Dredged	
Earth, straight and uniform	0.020 to 0.030
Earth, winding, fairly uniform	0.025 to 0.040
Rock	0.030 to 0.045
Unmaintained	0.050 to 0.140
Natural Channels (minor streams, top width at flood state < 100 feet)	
Fairly regular section	0.030 to 0.070
Irregular section with pools	0.040 to 0.100

Source: Design and Construction of Sanitary and Storm Sewers, American Society of Civil Engineers and the Water Pollution Control Federation, 1969.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Middlesex County, Massachusetts

July 17, 2023

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map

Map Scale: 1:738 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	1.6	57.1%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	1.2	42.9%
Totals for Area of Interest		**2.7**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Middlesex County, Massachusetts

602—Urban land

Map Unit Setting

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

Map Unit Composition

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

Description of Urban Land

Setting

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

Minor Components

Udorthents, loamy

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

Rock outcrop

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

Udorthents, wet substratum

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

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

Map Unit Setting

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

Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Crest, side slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, dunes, outwash plains, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, crest, side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

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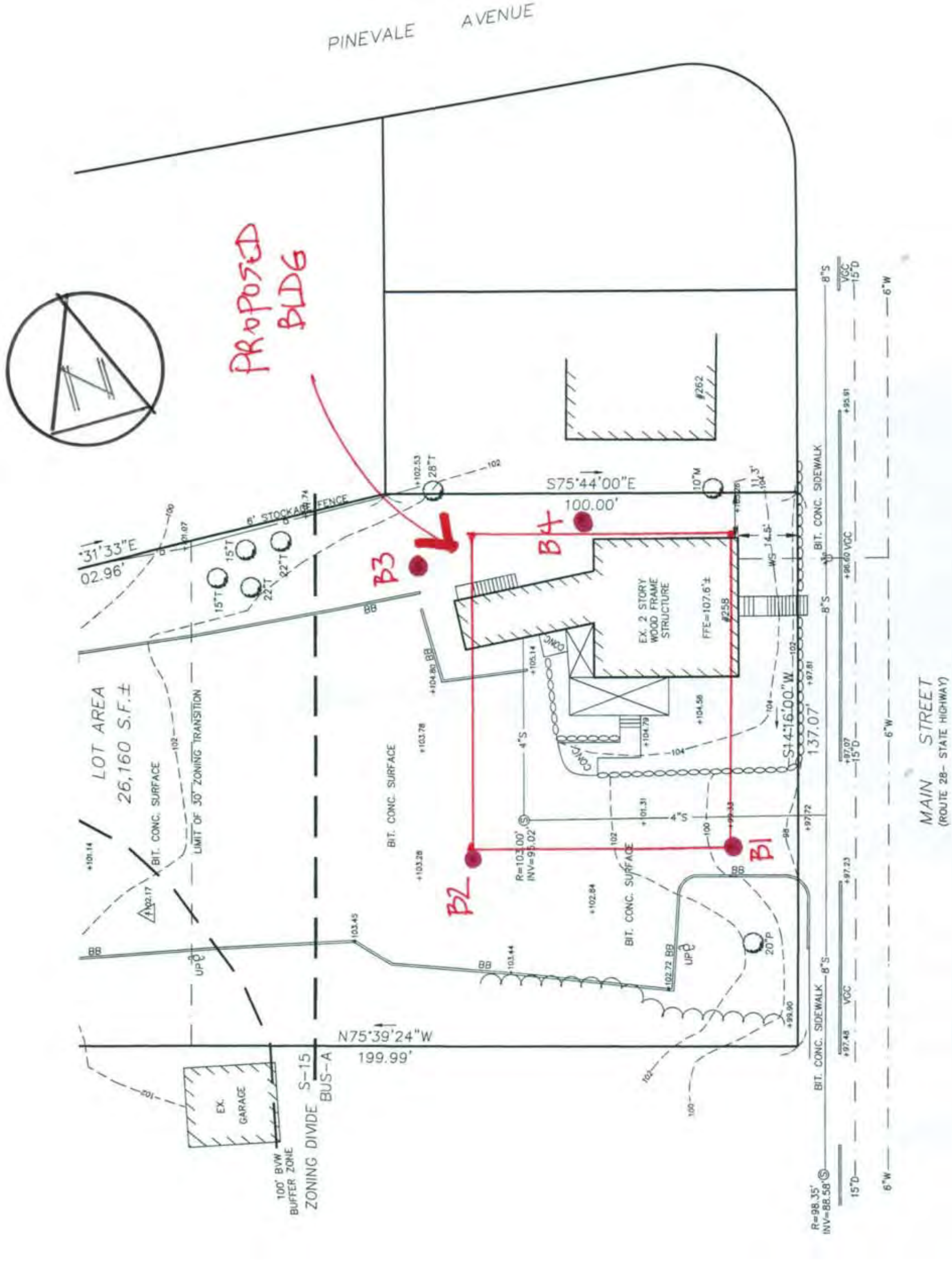


PINEVALE AVENUE
PROPOSED BLDG
B1
B2
B3
B4
S75°44'00"E
100.00'
N75°39'24"W
199.99'
S14°16'00"W
137.07'
6' STOCKADE FENCE
EX. 2 STORY WOOD FRAME STRUCTURE
FFE=107.6'±
#258
#262
EX. GARAGE
LOT AREA
26,160 S.F.±
BIT. CONC. SURFACE
LIMIT OF 30' ZONING TRANSITION
100' BVW BUFFER ZONE
ZONING DIVIDE
S-15
BUS-A
BIT. CONC. SIDEWALK
R=103.00'
INV=95.02'
R=98.35'
INV=88.58'
MAIN STREET
(ROUTE 28- STATE HIGHWAY)

TEST BORING LOG

SHEET 1

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Site: 258 Main Street
Reading, MA

BORING B-1

PROJECT NO. 13-0733

DATE: July 29, 2013

Ground Elevation: 100 ft+/-
Date Started: July 26, 2013
Date Finished: July 26, 2013
Driller: TF
Soil Engineer/Geologist: KM

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION
7/25/13	12 ft	n/a	Upon Completion

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
							Pavement
						4"	
1		1	10"	1'0"-3'0"	4-7-6-6		Brown, fine to coarse Sand, some silt, little gravel (FILL)
		2	12"	3'0"-5'0"	11-14-20-26	3'	
5		3	8"	5'0"-7'0"	16-21-28-29		Brown, fine to coarse Sand & Gravel, little silt (GLACIAL)
10		4	10"	10'0"-12'0"	19-16-23-20		Brown, fine to coarse Sand & Gravel, trace silt, cobbles,
15		5	8"	15'0"-17'0"	26-40-39-58		Same, wet
						18'	Auger Refusal at 18 ft
20							
25							
30							
35							

Notes: Hollow Stem Auger Size - 4-1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 2

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Site: 258 Main Street
Reading, MA

BORING B-2

PROJECT NO. 13-0733

DATE: July 29, 2013

Ground Elevation: 103 ft+/-
Date Started: July 26, 2013
Date Finished: July 26, 2013
Driller: TF
Soil Engineer/Geologist: KM

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION
7/26/13	14 ft	n/a	Upon Completion

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
							Pavement
1		1	8"	1'0"-3'0"	7-10-12-9		Brown, fine to medium Sand, some gravel, little silt, dry (FILL)
						3'	
		2	4"	3'0"-5'0"	12-16-17-21		Brown, fine to medium Sand & Gravel, trace silt, cobbles, dry
5		3	12"	5'0"-7'0"	28-29-31-34		Same, dry (GLACIAL) w/ cobbles
10		4	12"	10'0"-12'0"	23-20-29-35		Brown, fine to medium Sand, some gravel, little silt, cobbles, boulders
15		5	10"	15'0"-16'6"	42-68-87		Brown, fine to medium Sand & Gravel, little silt, cobbles, wet
						16'6"	
							Refusal at 16'6"
20							
25							
30							
35							

Notes: Hollow Stem Auger Size - 4-1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 3

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Site: 258 Main Street
Reading, MA

BORING B-3/B-3A

PROJECT NO. 13-0733

DATE: July 29, 2013

Ground Elevation: 103 ft+/-
Date Started: July 26, 2013
Date Finished: July 26, 2013
Driller: TF
Soil Engineer/Geologist: KM

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION
7/26/13	14 ft	n/a	Upon Completion

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6"	Strata	Visual Identification of Soil and / or Rock Sample
							Topsoil
1		1	6"	0"-2'0"	3-3-4-5	2'	
		2	4"	2'0"-4'0"	9-31-12-13		Rust Brown, fine to medium Sand, some silt, trace loam (SUBSOIL/FILL)
						5'	
5		3	8"	5'0"-7'0"	26-32-29-31		Brown, fine to medium Sand & Gravel, trace silt, cobbles, boulders, dry
10		4	10"	10'0"-12'0"	24-31-28-29		Brown, fine to coarse Sand & Gravel, little silt, cobbles
							(GLACIAL)
15		5	10"	15'0"-17'0"	34-51-72-68		Same, wet
						18'	B-3 refusal at 5 ft B-3A refusal at 18 ft
20							
25							
30							
35							

Notes: Hollow Stem Auger Size - 4-1/4"

Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

TEST BORING LOG

SHEET 4

Soil Exploration Corp.
Geotechnical Drilling
Groundwater Monitor Well
148 Pioneer Drive
Leominster, MA 01453
978 840-0391

Site: 258 Main Street
Reading, MA

BORING B-4

PROJECT NO. 13-0733

DATE: July 29, 2013

Ground Elevation:	103 ft+/-
Date Started:	July 26, 2013
Date Finished:	July 26, 2013
Driller:	TF
Soil Engineer/Geologist:	KM

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION
7/26/13	14 ft	n/a	Upon Completion

Depth Ft.	Casing bl/ft	Sample No.	Pen/Rec	Sample Depth	Blows/6”	Strata	Visual Identification of Soil and / or Rock Sample
1		1	4”	0”-2’0”	2-3-3-5		Black, Organic Silt, roots (TOPSOIL)
						2’	
		2	6”	2’0”-4’0”	5-8-9-12		Brown, fine to medium Sand & Gravel, little silt, dry (FILL)
						5’	
5		3	6”	5’0”-6’6”	18-29-85		Brown, fine to medium Sand & Gravel, little silt, cobbles, boulders, dry
10		4	6”	10’0”-12’0”	12-18-15-24		Same (GLACIAL)
15		5	10”	15’0”-15’10”	63-100/4”		Same, wet
						17’	Refusal at 17 ft
20							
25							
30							
35							

Notes: Hollow Stem Auger Size - 4-1/4"

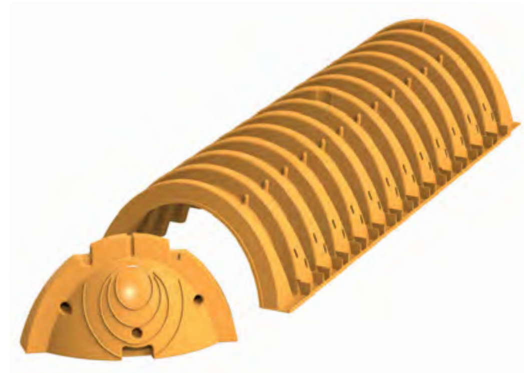
Cohesionless: 0 - 4 V. Loose, 4 - 10 Loose, 10 -30 M Dense, 30 -50 Dense, 50+ V
Cohesive: 0 -2 V Soft, 2 -4 Soft, 4 -8 M 8 -15 Stiff, 15 -30 V. Stiff, 30 + Hard.

Trace	0 to 10%
Little	10 to 20%
Some	20 to 35%
And	35% to 50%

	CASING	SAMPLE	CORE TYPE
ID SIZE (IN)		SS	
HAMMER WGT (LB)		140 lb.	
HAMMER FALL (IN)		30"	

StormTech® SC-310 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



Nominal Chamber Specifications
(not to scale)

Size (L x W x H)
85.4” x 34” x 16”
2170 mm x 864 mm x 406 mm

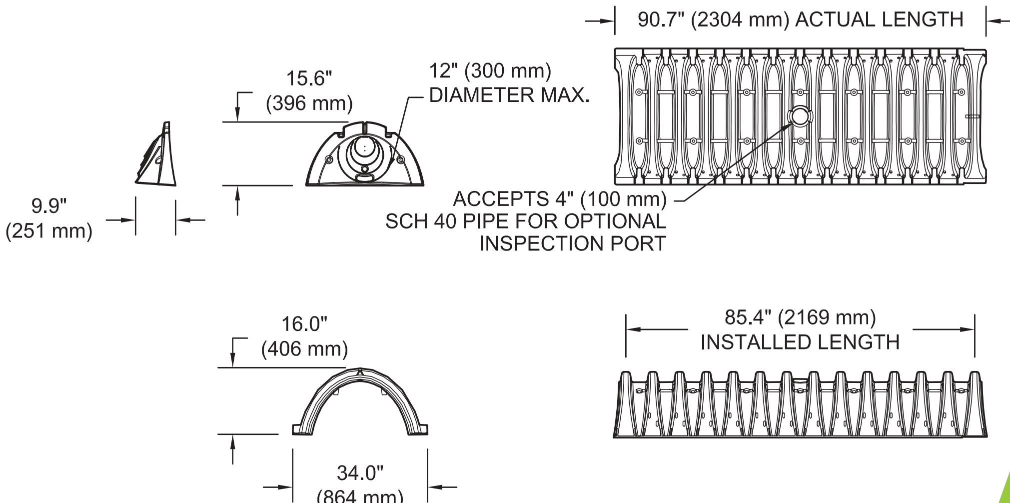
Chamber Storage
14.7 ft³ (0.42 m³)

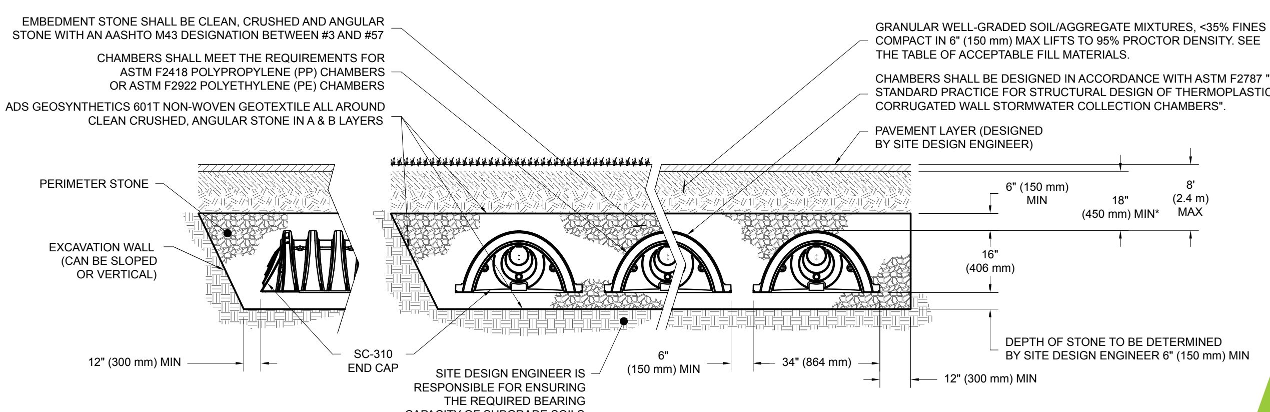
Min. Installed Storage*
31.0 ft³ (0.88 m³)

Weight
37.0 lbs (16.8 kg)

Shipping
55 chambers/pallet
108 end caps/pallet
18 pallets/truck

*Assumes 6” (150 mm) stone above and below chambers and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

ADS StormTech™

StormTech SC-310 Specifications

Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (660)	Stone Cover 14.70 (0.416)	29.42 (0.833)
25 (635)	14.70 (0.416)	28.63 (0.811)
24 (610)	14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.43 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.528)
14 (356)	10.23 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4 (102)	Stone Foundation 0	3.16 (0.090)
3 (76)	0	2.37 (0.067)
2 (51)	0	1.58 (0.046)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 ft³ (0.022 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-310 Chamber	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

English Tons (yds³)	Stone Foundation Depth		
	6"	12"	18"
SC-310	2.1 (1.5)	2.7 (1.9)	3.4 (2.4)
Metric Kilograms (m³)	**150 mm**	**300 mm**	**450 mm**
SC-310	1830 (1.1)	2490 (1.5)	2990 (1.8)

Note: Assumes 6" (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

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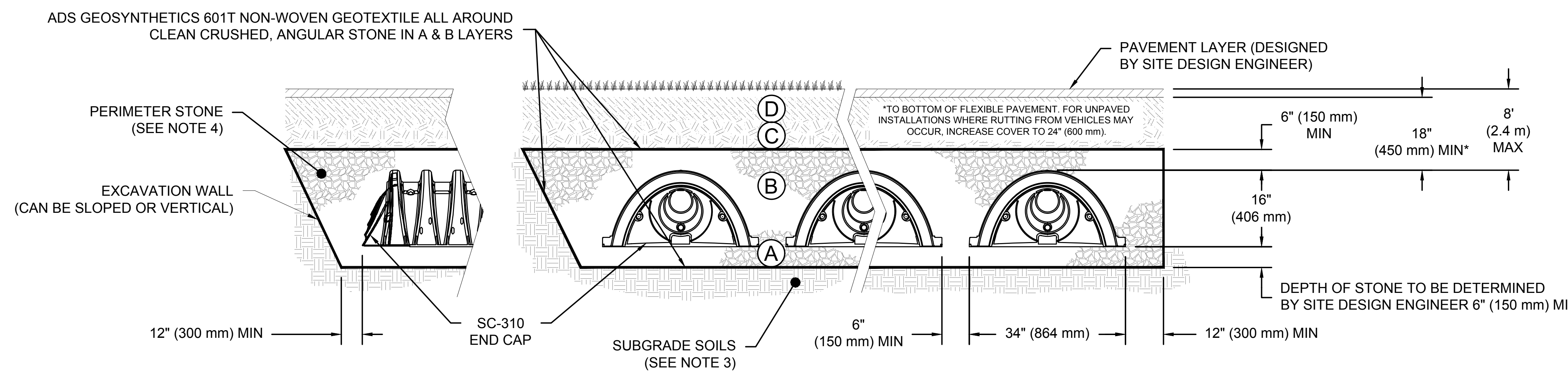
ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

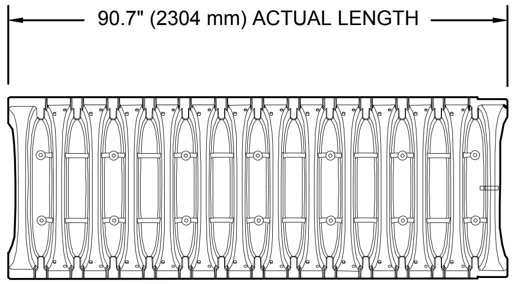
SC-310
STANDARD CROSS SECTION
DATE: 9/12/22
DRAWN: KLJ
PROJECT #:
CHECKED: KLJ

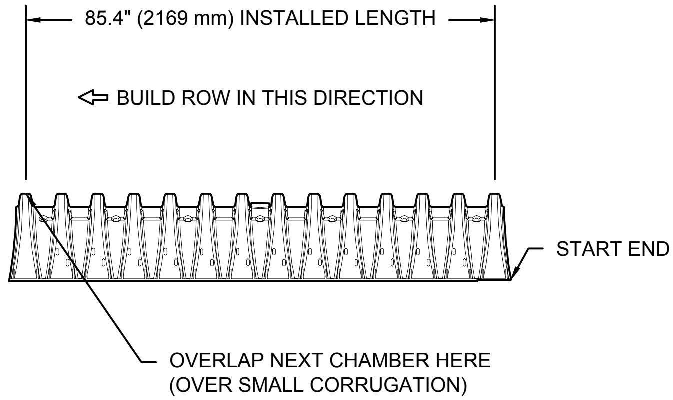
DATE	DRWN	CHKD	DESCRIPTION

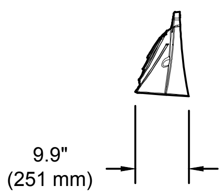
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

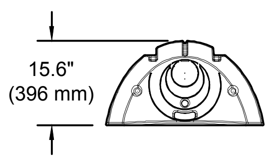
SC-310 TECHNICAL SPECIFICATION

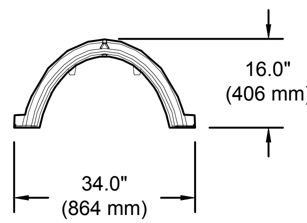
NTS







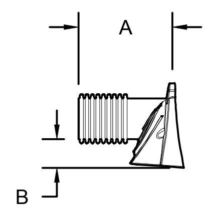


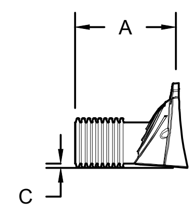


NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS





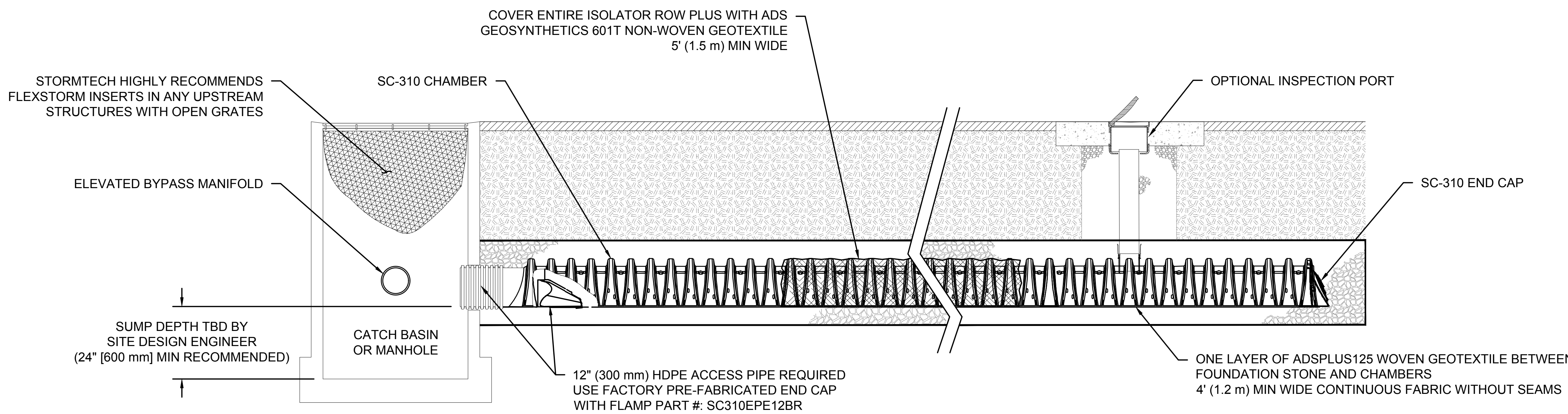
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310EPE12B	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310EPE12B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC310EPE12B THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL



SC-310 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

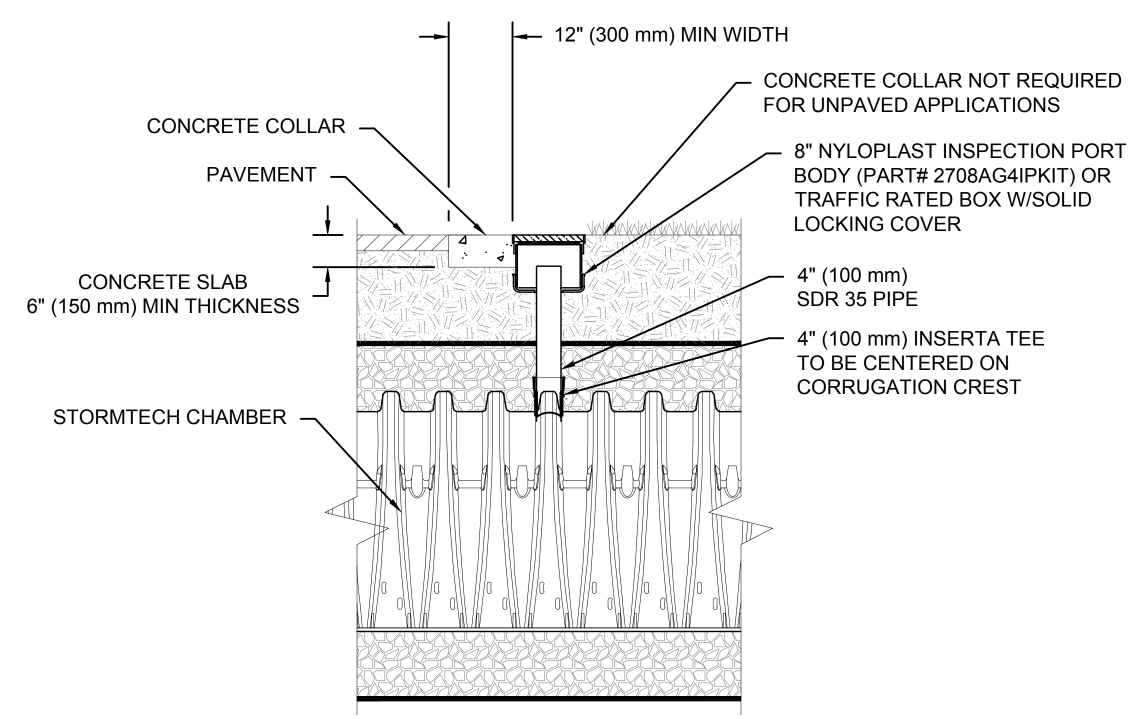
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

NTS

SC-310
ISOLATOR ROW PLUS DETAILS
DATE: 9/12/22 DRAWN: KLJ
PROJECT #: CHECKED: KLJ

DATE	DRWN	CHKD	DESCRIPTION

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

Isolator® Row Plus
O&M Manual

ADS StormTech™

The Isolator® Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-7200 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow stormwater to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row Plus chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the chamber’s sidewall. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-7200 models as these chambers do not have perforated side walls.

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

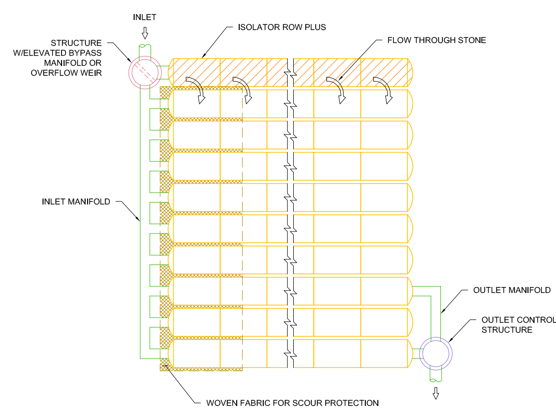
The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

Note: *See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.*

Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.

StormTech Isolator Row PLUS with Overflow Spillway (not to scale)



Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

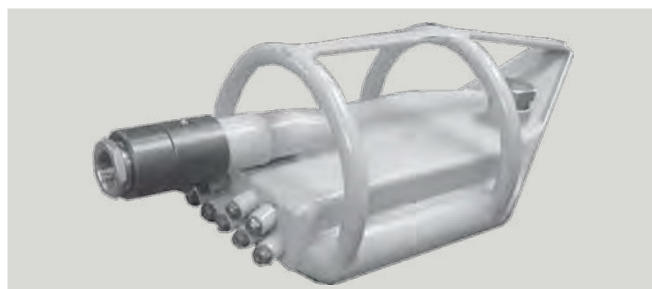
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

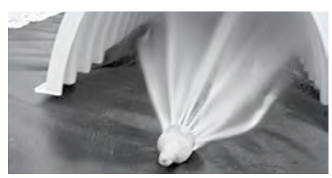
If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

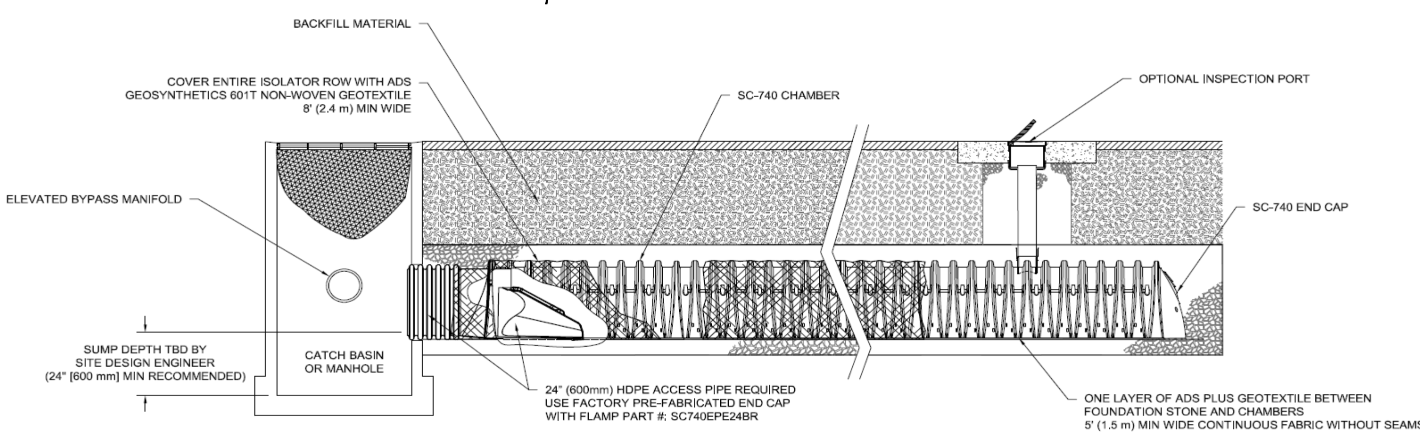
Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**





StormTech Isolator Row PLUS (*not to scale*)

Note: *Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-7200 chamber models and is not required over the entire Isolator Row PLUS.*



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
   i. Remove cover from manhole at upstream end of Isolator Row Plus
   ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
   If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

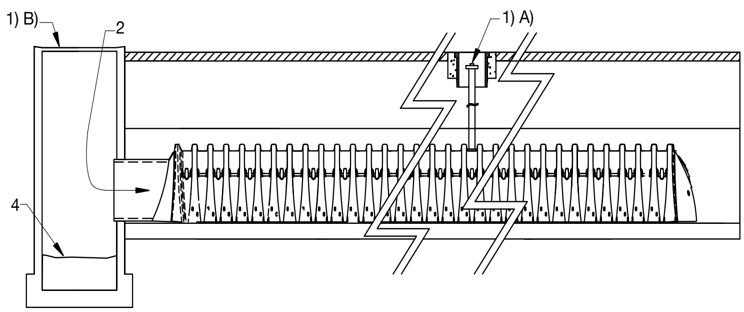
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



Sample Maintenance Log

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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ADS StormTech® Installation Guide
SC-310/SC-740/DC-780

StormTech
Installation Video

Required Materials and Equipment List

- Acceptable fill materials per Table 1
- ADS Plus and non-woven geotextile fabrics
- StormTech solid end caps and pre-cored end caps
- StormTech chambers
- StormTech manifolds and fittings

Important Notes:

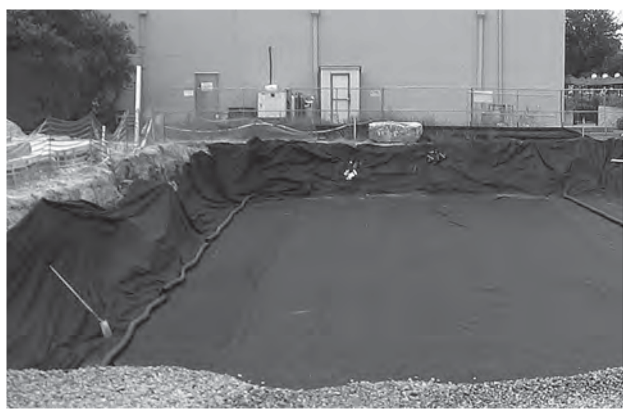
A. This installation guide provides the minimum requirements for proper installation of chambers. Non-adherence to this guide may result in damage to chambers during installation. Replacement of damaged chambers during or after backfilling is costly and very time consuming. It is recommended that all installers are familiar with this guide, and that the contractor inspects the chambers for distortion, damage and joint integrity as work progresses.

B. Use of a dozer to push embedment stone between the rows of chambers may cause damage to chambers and is not an acceptable backfill method. Any chambers damaged by using the "dump and push" method are not covered under the StormTech standard warranty.

C. Care should be taken in the handling of chambers and end caps. Avoid dropping, prying or excessive force on chambers during removal from pallet and initial placement.

Requirements for System Installation

Excavate bed and prepare subgrade per engineer's plans.



Place non-woven geotextile over prepared soils and up excavation walls. Install underdrains if required.

Place clean, crushed, angular stone foundation 6" (150 mm) min. Compact to achieve a flat surface.

Manifold, Scour Fabric and Chamber Assembly

Install manifolds and lay out ADS Plus fabric at inlet rows (min. 12.5 ft (3.8 m)) at each inlet end cap. Place a continuous piece along entire length of Isolator® Plus Row(s).

Align the first chamber and end cap of each row with inlet pipes. Contractor may choose to postpone stone placement around end chambers and leave ends of rows open for easy inspection of chambers during the backfill process.

Continue installing chambers by overlapping chamber end corrugations. Chamber joints are labeled “Lower Joint – Overlap Here” and “Build this direction – Upper Joint” Be sure that the chamber placement does not exceed the reach of the construction equipment used to place the stone. Maintain minimum 6” (150 mm) spacing between rows.

Attaching the End Caps

Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber’s end corrugation.

Prefabricated End Caps

24” (600 mm) inlets are the maximum size that can fit into a SC-740/DC-780 end cap and must be prefabricated with a 24” (600 mm) pipe stub. SC-310 chambers with a 12” (300 mm) inlet pipe must use a prefabricated end cap with a 12” (300 mm) pipe stub. When used on an Isolator Row Plus, these end caps will contain a welded FLAMP (flared end ramp) that will lay on top of the ADS Plus fabric (shown above)

Isolator Row Plus

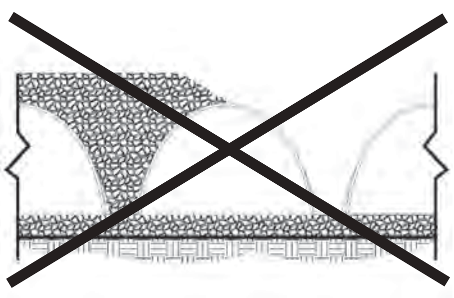
Place a continuous layer of ADS Plus fabric between the foundation stone and the Isolator Row Plus chambers, making sure the fabric lays flat and extends the entire width of the chamber feet. Drape a strip of ADS non-woven geotextile over the row of chambers (not required over DC-780). This is the same type of non-woven geotextile used as a separation layer around the angular stone of the StormTech system.

Initial Anchoring of Chambers – Embedment Stone

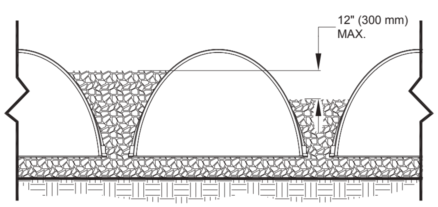
Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. This is best accomplished with a stone conveyor or excavator reaching along the row.

No equipment shall be operated on the bed at this stage of the installation. Excavators must be located off the bed. Dump trucks shall not dump stone directly on to the bed. Dozers or loaders are not allowed on the bed at this time.

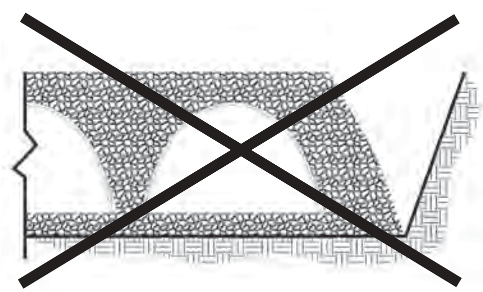
Backfill of Chambers – Embedment Stone



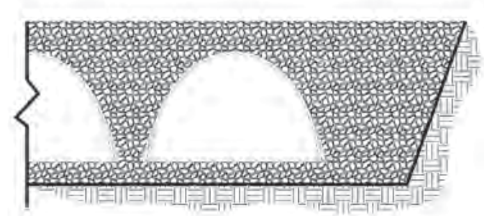
Uneven Backfill



Even Backfill



Perimeter Not Backfilled



Perimeter Fully Backfilled

Backfill chambers evenly. Stone column height should never differ by more than 12" (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

Perimeter stone must be brought up evenly with chamber rows. Perimeter must be fully backfilled, with stone extended horizontally to the excavation wall.

Backfill - Embedment Stone & Cover Stone

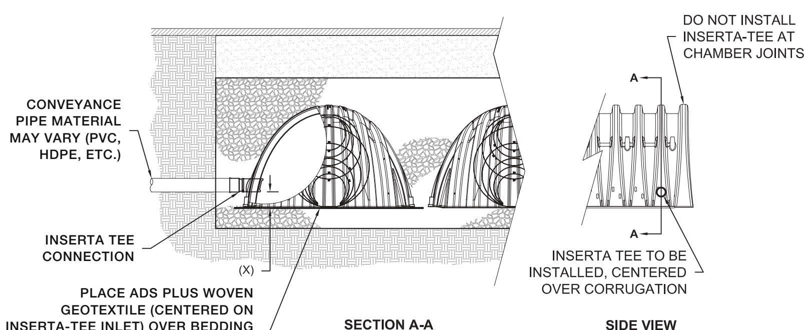
Continue evenly backfilling between rows and around perimeter until embedment stone reaches tops of chambers. Perimeter stone must extend horizontally to the excavation wall for both straight or sloped sidewalls. **Only after chambers have been backfilled to top of chamber and with a minimum 6" (150 mm) of cover stone on top of chambers can small dozers be used over the chambers for backfilling remaining cover stone.**

Small dozers and skid loaders may be used to finish grading stone backfill in accordance with ground pressure limits in Table 2. They must push material parallel to rows only. Never push perpendicular to rows. StormTech recommends that the contractor inspect chambers before placing final backfill. Any chambers damaged by construction shall be removed and replaced.

Final Backfill of Chambers – Fill Material

Install non-woven geotextile over stone. Geotextile must overlap 24" (600 mm) min. where edges meet. Compact each lift of backfill as specified in the site design engineer's drawings. Roller travel parallel with rows.

Inserta Tee Detail



NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 36, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON.		

StormTech Isolator Row Plus Detail

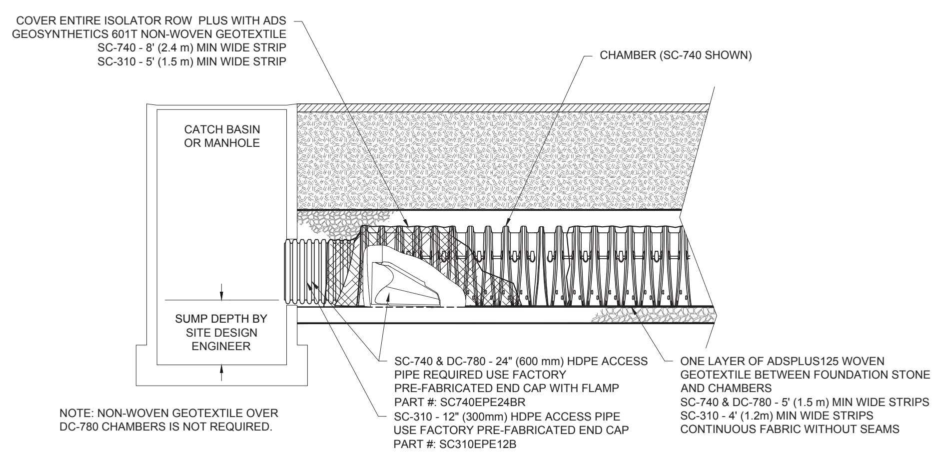


Table 1- Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
(D) **Final Fill:** Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per site design engineer's plans. Paved installations may have stringent material and preparation requirements.
(C) **Initial Fill:** Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (450 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines or processed aggregate. Most pavement subbase materials can be used in lieu of this layer.	AASHTO M45 A-1, A-2-4, A-3 or AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (300 mm) of material over the chambers is reached. Compact additional layers in 6" (150 mm) max. lifts to a min. 95% Proctor density for well-graded material and 95% relative density for processed aggregate materials. Roller gross vehicle weight not to exceed 12,000 lbs (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN)
(B) **Embedment Stone:** Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	No compaction required.
(A) **Foundation Stone:** Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone,	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	Place and compact in 6" (150 mm) lifts using two full coverages with a vibratory compactor.[2,3]

Please Note:
1. The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone".
2. StormTech compaction requirements are met for 'A' location materials when placed and compacted in 6" (150 mm) (max) lifts using two full coverages with a vibratory compactor.
3. Where infiltration surfaces may be comprised by compaction, for standard installations and standard design load conditions, a flat surface may be achieved by raking or dragging without compaction equipment. For special load designs, contact StormTech for compaction requirements.

Figure 1- Inspection Port Detail

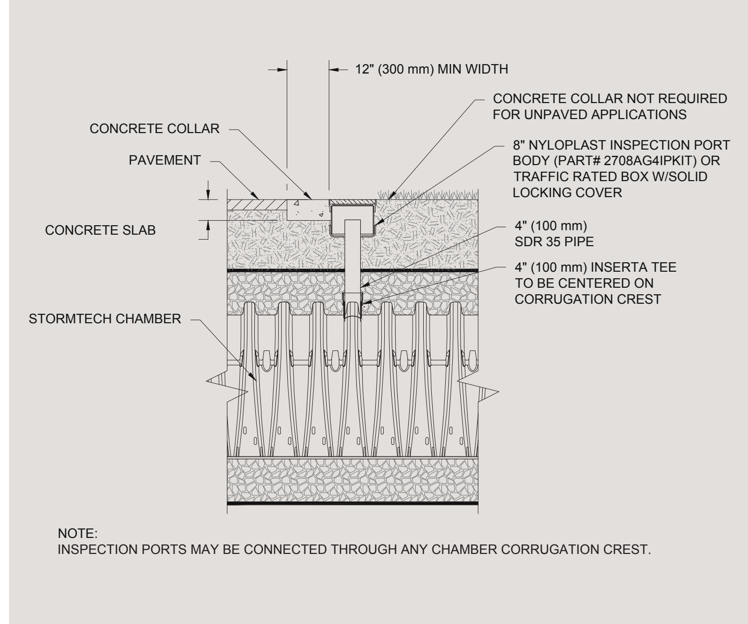
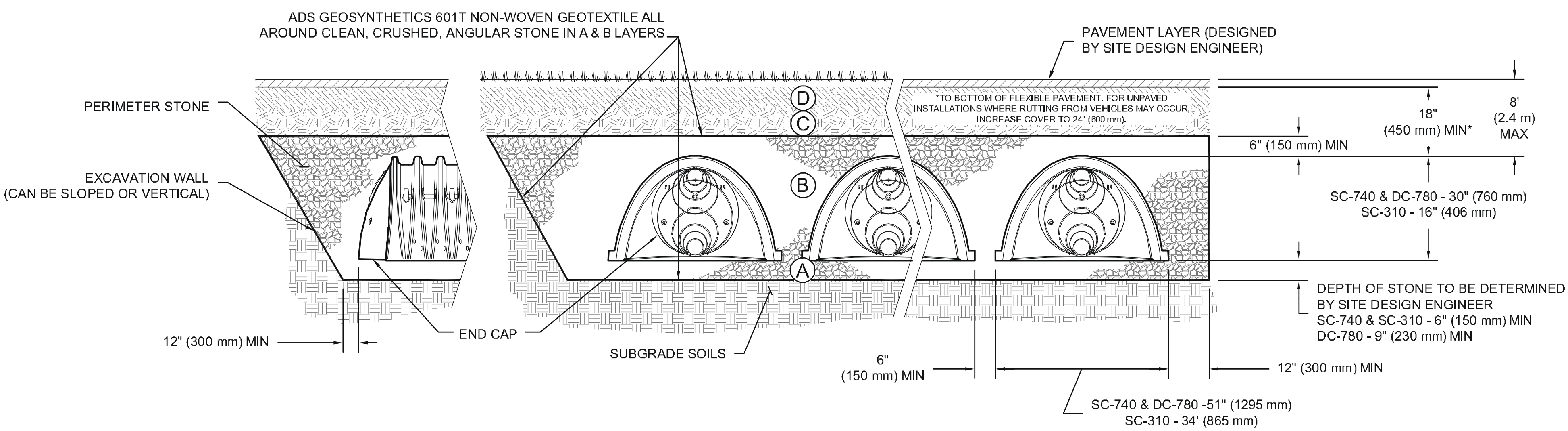


Figure 2 - Fill Material Locations



Notes:

1. 36” (900 mm) of stabilized cover materials over the chambers is recommended during the construction phase if general construction activities, such as full dump truck travel and dumping, are to occur over the bed.
2. During paving operations, dump truck axle loads on 18” (450 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18” (450 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.
3. Ground pressure for track dozers is the vehicle operating weight divided by total ground contact area for both tracks. Excavators will exert higher ground pressures based on loaded bucket weight and boom extension.
4. Mini-excavators (< 8,000lbs/3,628 kg) can be used with at least 12” (300 mm) of stone over the chambers and are limited by the maximum ground pressures in Table 2 based on a full bucket at maximum boom extension.
5. Storage of materials such as construction materials, equipment, spoils, etc. should not be located over the StormTech system. The use of equipment over the StormTech system not covered in Table 2 (ex. soil mixing equipment, cranes, etc) is limited. Please contact StormTech for more information.
6. Allowable track loads based on vehicle travel only. Excavators shall not operate on chamber beds until the total backfill reaches 3 feet (900 mm) over the entire bed.

Table 2 - Maximum Allowable Construction Vehicle Loads[6]

Material Location	Fill Depth over Chambers in. (mm)	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads[6]		Maximum Allowable Roller Loads
		Max Axle Load for Trucks lbs (kN)	Max Wheel Load for Loaders lbs (kN)	Track Width in. (mm)	Max Ground Pressure psf (kPa)	Max Drum Weight or Dynamic Force lbs (kN)
Ⓓ Final Fill Material	36” (900) Compacted	32,000 (142)	16,000 (71)	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	3880 (186) 2640 (126) 2040 (97) 1690 (81) 1470 (70)	38,000 (169)
Ⓒ Initial Fill Material	24” (600) Compacted	32,000 (142)	16,000 (71)	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	2690 (128) 1880 (90) 1490 (71) 1280 (61) 1150 (55)	20,000 (89)
	24” (600) Loose/ Dumped	32,000 (142)	16,000 (71)	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	2390 (114) 1700 (81) 1370 (65) 1190 (57) 1080 (51)	20,000 (89) Roller gross vehicle weight not toexceed 12,000 lbs. (53 kN)
	18” (450)	32,000 (142)	16,000 (71)	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	2110 (101) 1510 (72) 1250 (59) 1100 (52) 1020 (48)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
Ⓑ Embedment Stone	12” (300)	16,000 (71)	NOT ALLOWED	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	1540 (74) 1190 (57) 1010 (48) 910 (43) 840 (40)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
	6” (150)	8,000 (35)	NOT ALLOWED	12” (305) 18” (457) 24” (610) 30” (762) 36” (914)	1070 (51) 900 (43) 800 (38) 760 (36) 720 (34)	NOT ALLOWED

Table 3 - Placement Methods and Descriptions

Material Location	Placement Methods/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Roller Load Restrictions
		See Table 2 for Maximum Construction Loads		
Ⓓ Final Fill Material	A variety of placement methods may be used. All construction loads must not exceed the maximum limits in Table 2.	36” (900 mm) minimum cover required for dump trucks to dump over chambers.	Dozers to push parallel to rows until 36” (900mm) compacted cover is reached.[4]	Roller travel parallel to rows only until 36” (900 mm) compacted cover is reached.
Ⓒ Initial Fill Material	Excavator positioned off bed recommended. Small excavator allowed over chambers. Small dozer allowed.	Asphalt can be dumped into paver when compacted pavement subbase reaches 18” (450 mm) above top of chambers.	Small LGP track dozers & skid loaders allowed to grade cover stone with at least 6” (150 mm) stone under tracks at all times. Equipment must push parallel to rows at all times.	Use dynamic force of roller only after compacted fill depth reaches 12” (300 mm) over chambers. Roller travel parallel to chamber rows only.
Ⓑ Embedment Stone	No equipment allowed on bare chambers. Use excavator or stone conveyor positioned off bed or on foundation stone to evenly fill around all chambers to at least the top of chambers.	No wheel loads allowed. Material must be placed outside the limits of the chamber bed.	No tracked equipment is allowed on chambers until a min. 6” (150 mm) cover stone is in place.	No rollers allowed.
Ⓐ Foundation Stone	No StormTech restrictions. Contractor responsible for any conditions or requirements by others relative to subgrade bearing capacity, dewatering or protection of subgrade.			

StormTech® Standard Limited Warranty

STANDARD LIMITED WARRANTY OF STORMTECH LLC (“STORMTECH”): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and end plates manufactured by StormTech and sold to the original purchaser (the “Purchaser”). The chambers and end plates are collectively referred to as the “Products.”

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech’s written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech’s corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech’s liability specifically excludes the cost of removal and/or installation of the Products.

(C) THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech’s written installation instructions.

(G) THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH’S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. A PRODUCT ALSO IS EXCLUDED FROM LIMITED WARRANTY COVERAGE IF SUCH PRODUCT IS USED IN A PROJECT OR SYSTEM IN WHICH ANY GEOTEXTILE PRODUCTS OTHER THAN THOSE PROVIDED BY ADVANCED DRAINAGE SYSTEMS ARE USED. THIS LIMITED WARRANTY REPRESENTS STORMTECH’S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.

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800-821-6710

Drainage Filtration Separation

ADS 0601T/O NONWOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 0601T/O nonwoven geotextile.

Filter Fabric Requirements

ADS 0601T/O is an orange nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. ADS 0601T/O is inert to biological degradation and resists naturally encountered chemicals, alkali and acids. ADS 0601T/O conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	Typical Value[1] MD	Typical Value[1] CD
Grab Tensile Strength	ASTM D4632	lbs (N)	175 (779)	175 (779)
Grab Tensile Elongation	ASTM D4632	%	75	75
Trapezoid Tear Strength	ASTM D4533	lbs (N)	85 (378)	85 (378)
CBR Puncture Strength	ASTM D6241	lbs (N)	480 (2136)	480 (2136)
Permittivity	ASTM D4491	sec^{-1}	1.5	1.5
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	105 (4278)	105 (4278)
UV Resistance (at 500 hours)[1]	ASTM D4355	% strength retained	80	80

Physical Properties

Property	Test Method	Unit	Typical Value[2]
Weight	ASTM D5161	oz/yd^2 (g/m^2)	6.5 (220)
Thickness	ASTM D5199	mils (mm)	65 (1.7)
Roll Dimensions (W x L)	-	ft (m)	15 x 300 (4.5 x 91)
Roll Area	-	yd^2 (m^2)	500 (418)
Estimated Roll Weight	-	lb (kg)	220 (100)

1 Modified, Minimum Test Value
2 ASTM D4439 Standard Terminology for Geosynthetics: typical value, n-*for geosynthetics*, the mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with on specific property.

Separation

ADS 315W WOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 315W woven geotextile.

Filter Fabric Requirements

ADS 315W is manufactured using high-tenacity polypropylene yarns that are woven to form a dimensionally stable network, which allows the yarns to maintain their relative position. ADS 315W resists ultraviolet deterioration, rotting and biological degradation and is inert to commonly encountered soil chemicals. ADS 315W conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	M.A.R.V. (Minimum Average Roll Value)[2]
Tensile Strength (Grab)	ASTM D4632	lbs (N)	315 (1400)
Elongation	ASTM D4632	%	15
CBR Puncture	ASTM D6241	lbs (N)	900 (4005)
Puncture	ASTM D4833	lbs (N)	150 (667)
Mullen Burst	ASTM D3786	psi (kPa)	600 (4134)
Trapezoidal Tear	ASTM D4533	lbs (N)	120 (533)
UV Resistance (at 500 hours)	ASTM D4355	%	70
Apparent Opening Size (AOS)*	ASTM D4751	U.S. Sieve (mm)	40 (.425)
Permittivity	ASTM D4491	sec^{-1}	.05
Water Flow Rate	ASTM D4491	gpm/ft^2 (l/min/m^2)	4 (163)

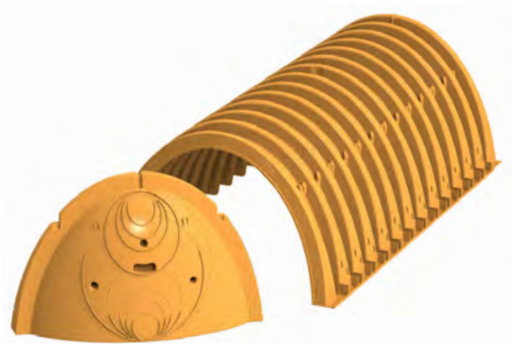
* Maximum average roll value.

Packaging

Roll Dimensions (W x L) - ft. (m)	12.5 x 360/ 15 x 300 / 17.5 x 258 (3.81 x 109.8/ 4.57 x 91.5 / 5.33 x 78.6)

StormTech® SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



Nominal Chamber Specifications
(not to scale)

Size (L x W x H)
85.4” x 51” x 30”
2,170 mm x 1,295 mm x 762 mm

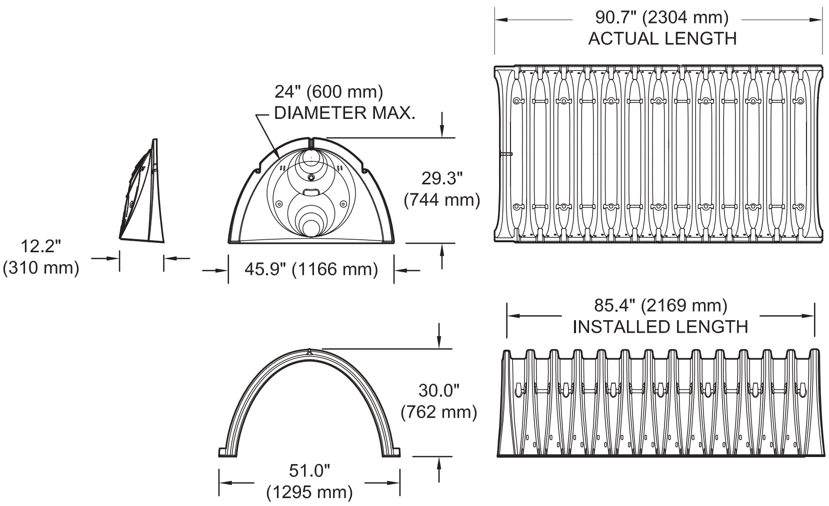
Chamber Storage
45.9 ft³ (1.30 m³)

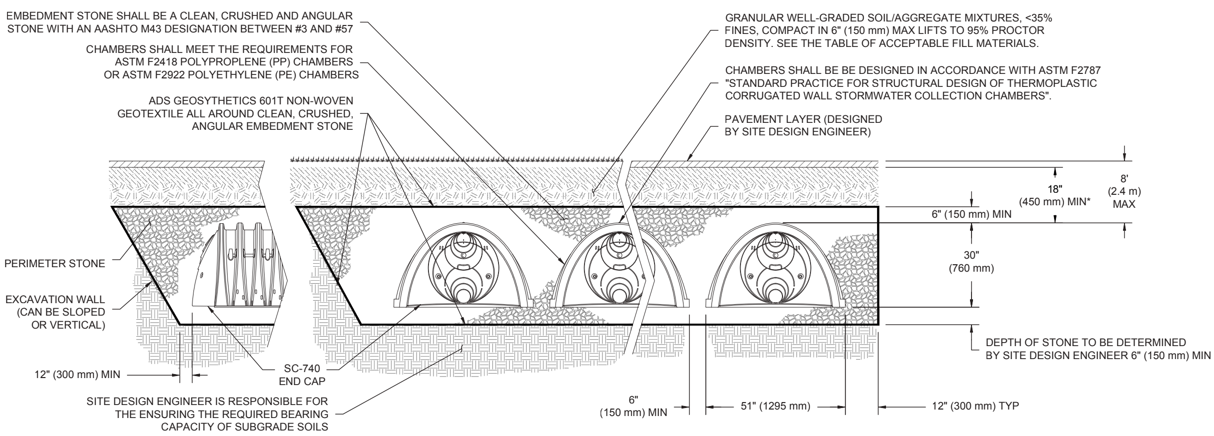
Min. Installed Storage*
74.9 ft³ (2.12 m³)

Weight
74.0 lbs (33.6 kg)

Shipping
30 chambers/pallet
60 end caps/pallet
12 pallets/truck

*Assumes 6” (150 mm) stone above, below and between chambers and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

ADS StormTech™

StormTech SC-740 Specifications

Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6” (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)		Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
42 (1067)	Stone Cover	45.90 (1.300)	74.90 (2.121)
41 (1041)		45.90 (1.300)	73.77 (2.089)
40 (1016)		45.90 (1.300)	72.64 (2.057)
39 (991)		45.90 (1.300)	71.52 (2.025)
38 (965)		45.90 (1.300)	70.39 (1.993)
37 (940)		45.90 (1.300)	69.26 (1.961)
36 (914)		45.90 (1.300)	68.14 (1.929)
35 (889)		45.85 (1.298)	66.98 (1.897)
34 (864)		45.69 (1.294)	65.75 (1.862)
33 (838)		45.41 (1.286)	64.46 (1.825)
32 (813)		44.81 (1.269)	62.97 (1.783)
31 (787)		44.01 (1.246)	61.36 (1.737)
30 (762)		43.06 (1.219)	59.66 (1.689)
29 (737)		41.98 (1.189)	57.89 (1.639)
28 (711)		40.80 (1.155)	56.05 (1.587)
27 (686)		39.54 (1.120)	54.17 (1.534)
26 (660)		38.18 (1.081)	52.23 (1.479)
25 (635)		36.74 (1.040)	50.23 (1.422)
24 (610)		35.22 (0.977)	48.19 (1.365)
23 (584)		33.64 (0.953)	46.11 (1.306)
22 (559)		31.99 (0.906)	44.00 (1.246)
21 (533)		30.29 (0.858)	1.85 (1.185)
20 (508)		28.54 (0.808)	39.67 (1.123)
19 (483)		26.74 (0.757)	37.47 (1.061)
18 (457)		24.89 (0.705)	35.23 (0.997)
17 (432)		23.00 (0.651)	32.96 (0.939)
16 (406)		21.06 (0.596)	30.68 (0.869)
15 (381)		19.09 (0.541)	28.36 (0.803)
14 (356)		17.08 (0.484)	26.03 (0.737)
13 (330)		15.04 (0.426)	23.68 (0.670)
12 (305)		12.97 (0.367)	21.31 (0.608)
11 (279)		10.87 (0.309)	18.92 (0.535)
10 (254)		8.74 (0.247)	16.51 (0.468)
9 (229)		6.58 (0.186)	14.09 (0.399)
8 (203)		4.41 (0.125)	11.66 (0.330)
7 (178)		2.21 (0.063)	9.21 (0.264)
6 (152)	Stone Foundation	0 (0)	6.76 (0.191)
5 (127)		0 (0)	5.63 (0.160)
4 (102)		0 (0)	4.51 (0.128)
3 (76)		0 (0)	3.38 (0.096)
2 (51)		0 (0)	2.25 (0.064)
1 (25)		0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6” (150 mm) stone above chambers, 6” (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

English Tons (yds³)	Stone Foundation Depth		
	6”	12”	16”
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
Metric Kilograms (m³)	**150 mm**	**300 mm**	**450 mm**
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6” (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6” (150 mm) of row separation and 18” (450 mm) of cover. The volume of excavation will vary as depth of cover increases.

ADS StormTech products, manufactured in accordance with ASTM F2418 or ASTMF2922, comply with all requirements in the Build America, Buy America (BABA) Act.

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ADS StormTech

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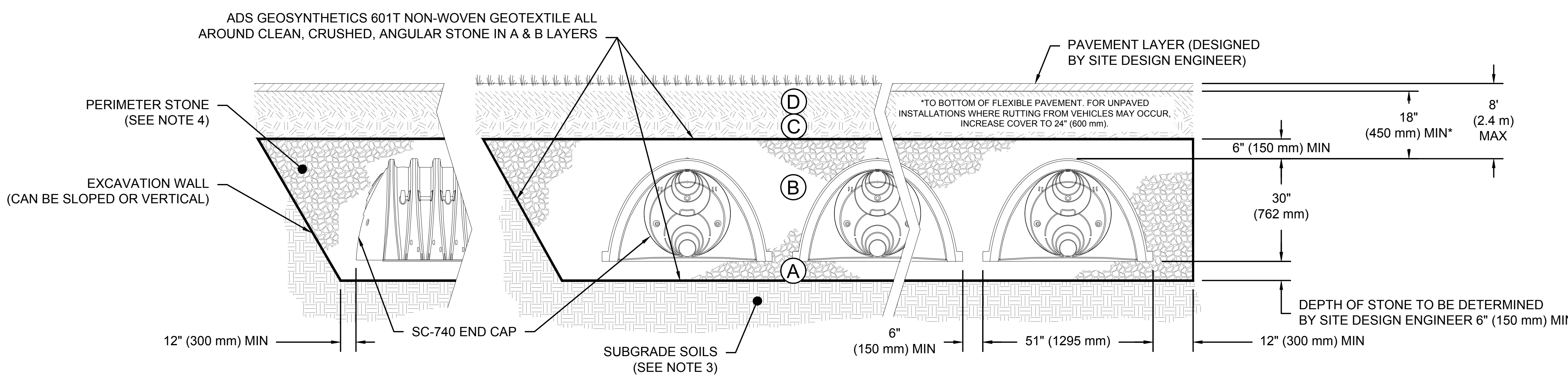
ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-740
STANDARD CROSS SECTION
DATE: 9/12/22
DRAWN: KLJ
PROJECT #:
CHECKED: KLJ

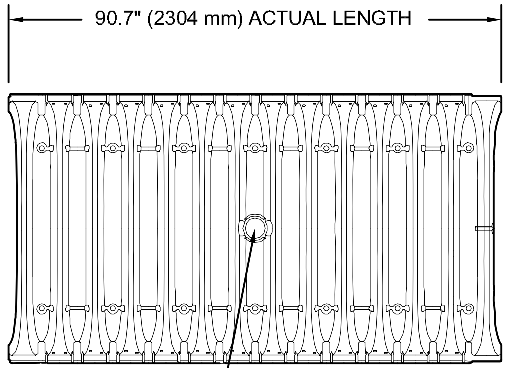
DATE	DRWN	CHKD	DESCRIPTION

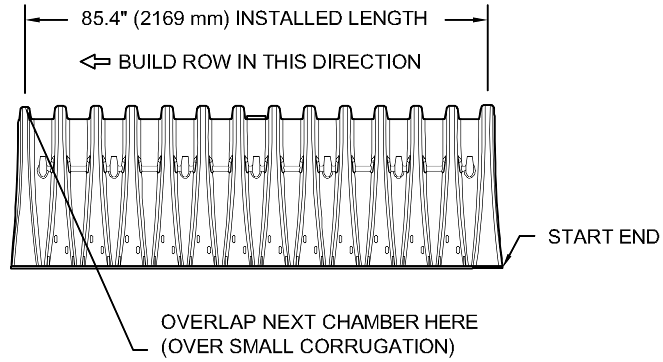
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

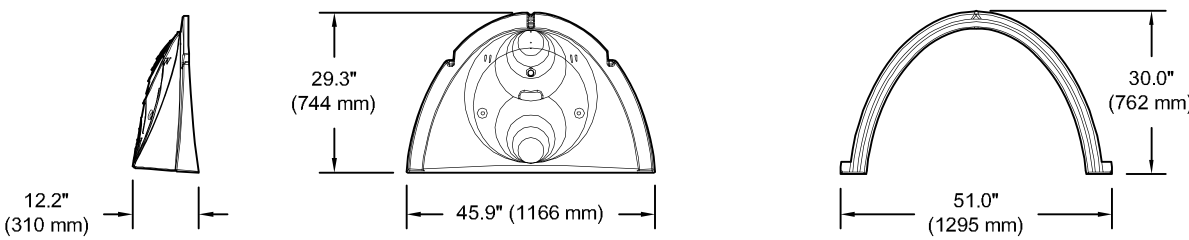
SC-740 TECHNICAL SPECIFICATION

NTS





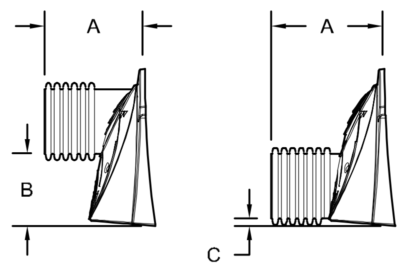
ACCEPTS 4" (100 mm) SCH 40 PVC PIPE FOR INSPECTION PORT. FOR PIPE SIZES LARGER THAN 4" (100 mm) UP TO 10" (250 mm) USE INSERTA TEE CONNECTION CENTERED ON A CHAMBER CREST CORRUGATION



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



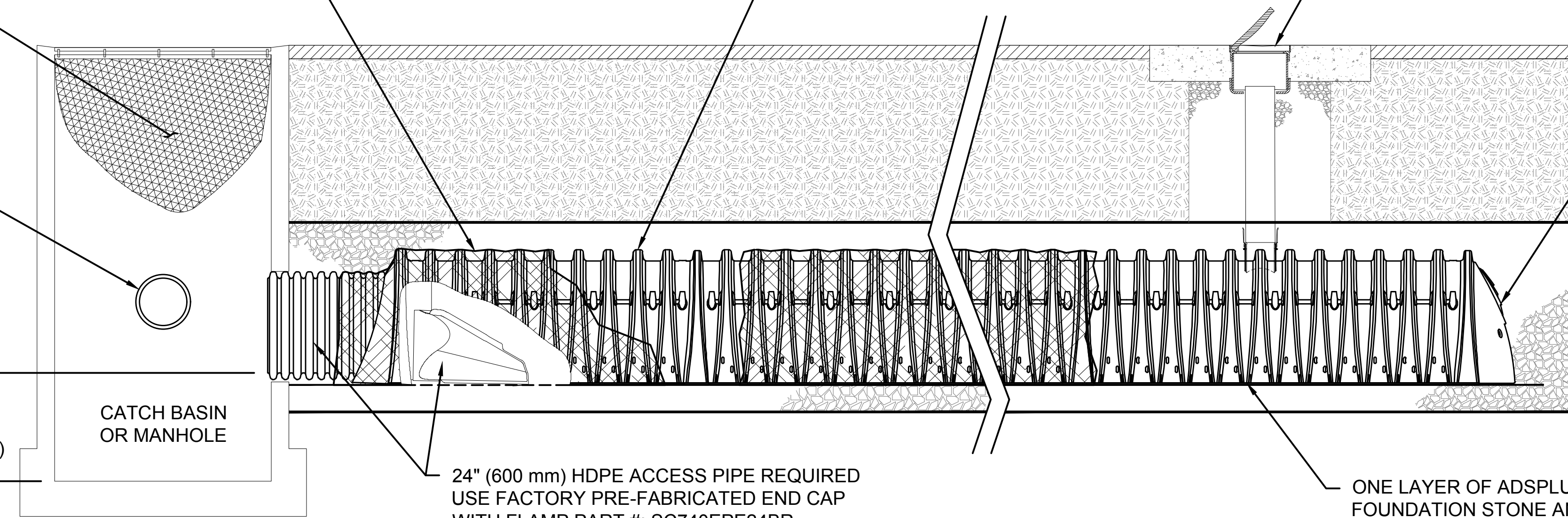
STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL



SC-740 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

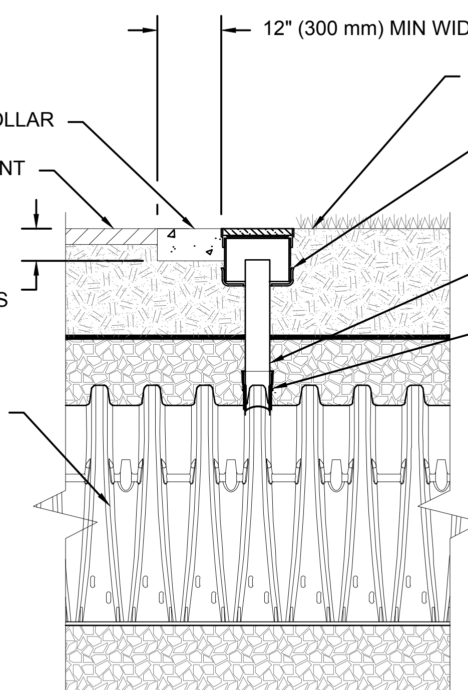
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER)

NTS

SC-740
ISOLATOR ROW PLUS DETAILS

DATE: 9/12/22 | DRAWN: KLJ
PROJECT #: | CHECKED: KLJ

DATE	DRWN	CHKD	DESCRIPTION

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

SHEET 1 OF 1

Isolator® Row Plus
O&M Manual

ADS StormTech™

The Isolator® Row Plus

Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row Plus is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

The Isolator Row Plus

The Isolator Row Plus is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-7200 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row Plus and passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow stormwater to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row Plus protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row Plus chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the chamber’s sidewall. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-7200 models as these chambers do not have perforated side walls.

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row Plus and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. After Stormwater flows through the Isolator Row Plus and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

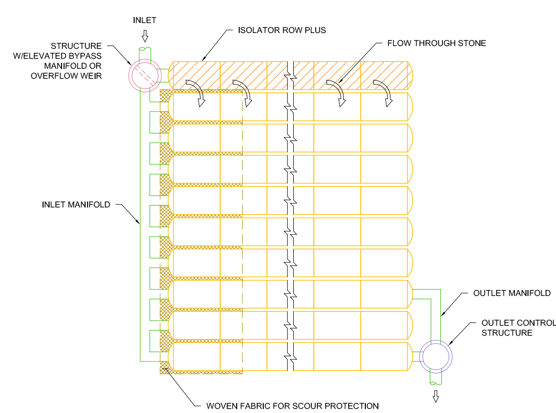
The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance by enhancing outflow of solid debris that would otherwise collect at the chamber's end. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row Plus may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row Plus to minimize maintenance requirements and maintenance costs.

***Note:** See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row Plus.*

Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.

StormTech Isolator Row PLUS with Overflow Spillway (not to scale)



Isolator Row Plus Inspection/Maintenance

Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row Plus should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

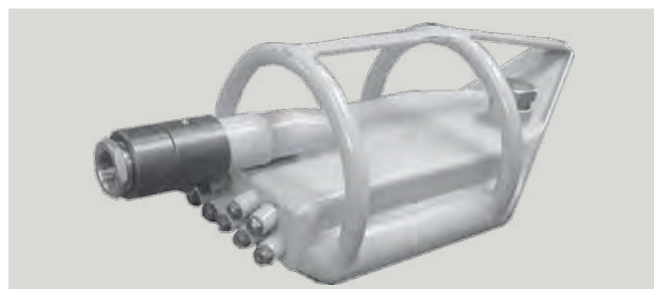
The Isolator Row Plus incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

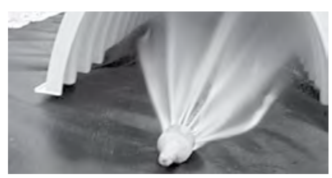
If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row Plus, clean-out should be performed.

Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

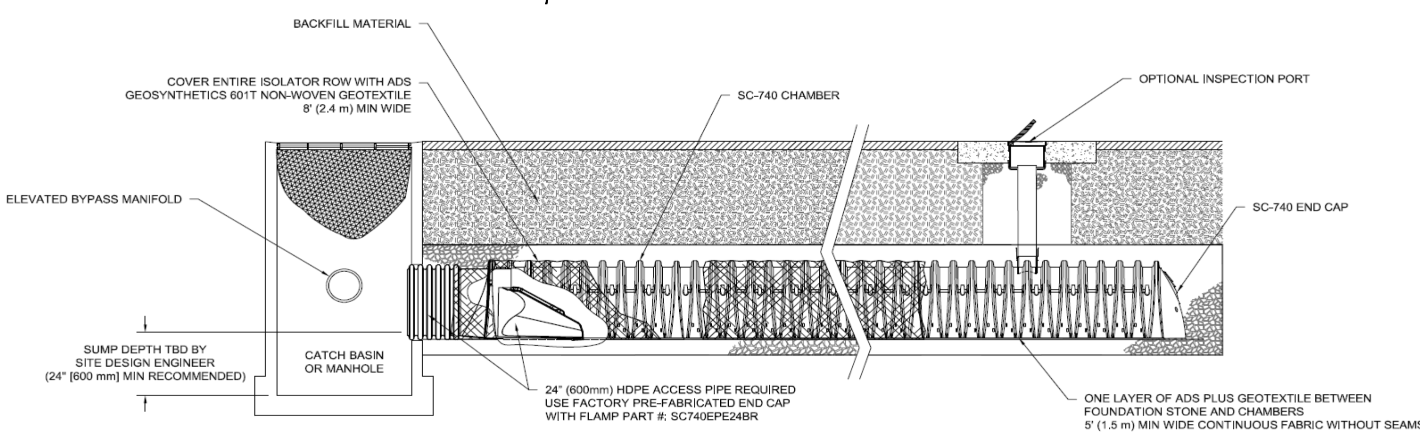
Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row Plus lengths up to 200' (61 m). **The JetVac process shall only be performed on StormTech Isolator Row Plus that have ADS Plus Fabric (as specified by StormTech) over their angular base stone.**





StormTech Isolator Row PLUS (*not to scale*)

Note: *Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-7200 chamber models and is not required over the entire Isolator Row PLUS.*



Isolator Row Plus Step By Step Maintenance Procedures

Step 1

Inspect Isolator Row Plus for sediment.

A) Inspection ports (if present)
  i. Remove lid from floor box frame
  ii. Remove cap from inspection riser
  iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
  iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Row Plus
  i. Remove cover from manhole at upstream end of Isolator Row Plus
  ii. Using a flashlight, inspect down Isolator Row Plus through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2.
  If not, proceed to Step 3.

Step 2

Clean out Isolator Row Plus using the JetVac process.

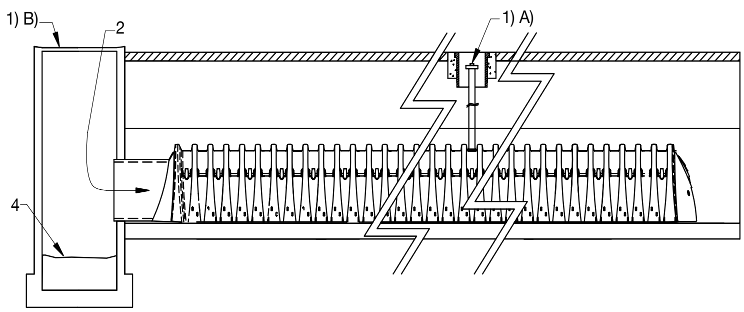
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

Step 3

Replace all caps, lids and covers, record observations and actions.

Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



Sample Maintenance Log

Date	Stadia Rod Readings: Fixed point to chamber bottom (1)	Stadia Rod Readings: Fixed point to top of sediment (2)	Sediment Depth (1)–(2)	Observations/Actions	Inspector
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

adspipe.com
800-821-6710

ADS StormTech® Installation Guide

SC-310/SC-740/DC-780

StormTech
Installation Video

Required Materials and Equipment List

- Acceptable fill materials per Table 1
- ADS Plus and non-woven geotextile fabrics
- StormTech solid end caps and pre-cored end caps
- StormTech chambers
- StormTech manifolds and fittings

Important Notes:

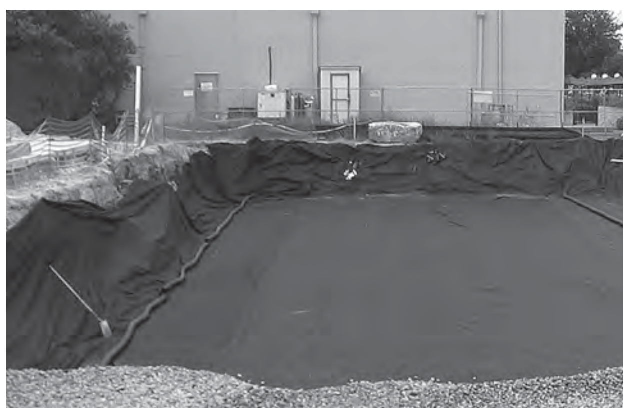
A. This installation guide provides the minimum requirements for proper installation of chambers. Non-adherence to this guide may result in damage to chambers during installation. Replacement of damaged chambers during or after backfilling is costly and very time consuming. It is recommended that all installers are familiar with this guide, and that the contractor inspects the chambers for distortion, damage and joint integrity as work progresses.

B. Use of a dozer to push embedment stone between the rows of chambers may cause damage to chambers and is not an acceptable backfill method. Any chambers damaged by using the “dump and push” method are not covered under the StormTech standard warranty.

C. Care should be taken in the handling of chambers and end caps. Avoid dropping, prying or excessive force on chambers during removal from pallet and initial placement.

Requirements for System Installation

Excavate bed and prepare subgrade per engineer’s plans.



Place non-woven geotextile over prepared soils and up excavation walls. Install underdrains if required.

Place clean, crushed, angular stone foundation 6” (150 mm) min. Compact to achieve a flat surface.

Manifold, Scour Fabric and Chamber Assembly

Install manifolds and lay out ADS Plus fabric at inlet rows (min. 12.5 ft (3.8 m)) at each inlet end cap. Place a continuous piece along entire length of Isolator® Plus Row(s).

Align the first chamber and end cap of each row with inlet pipes. Contractor may choose to postpone stone placement around end chambers and leave ends of rows open for easy inspection of chambers during the backfill process.

Continue installing chambers by overlapping chamber end corrugations. Chamber joints are labeled “Lower Joint – Overlap Here” and “Build this direction – Upper Joint” Be sure that the chamber placement does not exceed the reach of the construction equipment used to place the stone. Maintain minimum 6” (150 mm) spacing between rows.

Attaching the End Caps

Lift the end of the chamber a few inches off the ground. With the curved face of the end cap facing outward, place the end cap into the chamber’s end corrugation.

Prefabricated End Caps

24” (600 mm) inlets are the maximum size that can fit into a SC-740/DC-780 end cap and must be prefabricated with a 24” (600 mm) pipe stub. SC-310 chambers with a 12” (300 mm) inlet pipe must use a prefabricated end cap with a 12” (300 mm) pipe stub. When used on an Isolator Row Plus, these end caps will contain a welded FLAMP (flared end ramp) that will lay on top of the ADS Plus fabric (shown above)

Isolator Row Plus

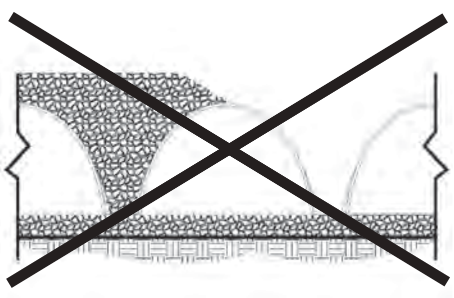
Place a continuous layer of ADS Plus fabric between the foundation stone and the Isolator Row Plus chambers, making sure the fabric lays flat and extends the entire width of the chamber feet. Drape a strip of ADS non-woven geotextile over the row of chambers (not required over DC-780). This is the same type of non-woven geotextile used as a separation layer around the angular stone of the StormTech system.

Initial Anchoring of Chambers – Embedment Stone

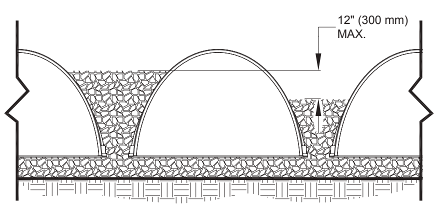
Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. This is best accomplished with a stone conveyor or excavator reaching along the row.

No equipment shall be operated on the bed at this stage of the installation. Excavators must be located off the bed. Dump trucks shall not dump stone directly on to the bed. Dozers or loaders are not allowed on the bed at this time.

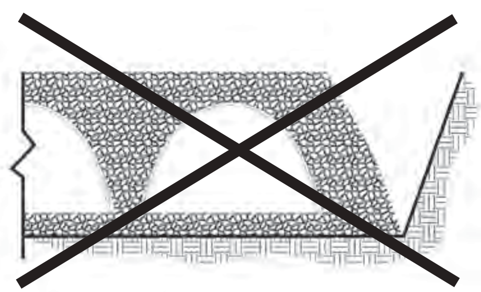
Backfill of Chambers – Embedment Stone



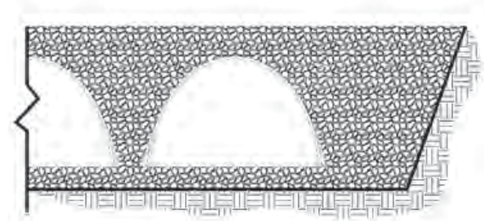
Uneven Backfill



Even Backfill



Perimeter Not Backfilled



Perimeter Fully Backfilled

Backfill chambers evenly. Stone column height should never differ by more than 12” (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

Perimeter stone must be brought up evenly with chamber rows. Perimeter must be fully backfilled, with stone extended horizontally to the excavation wall.

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Backfill - Embedment Stone & Cover Stone

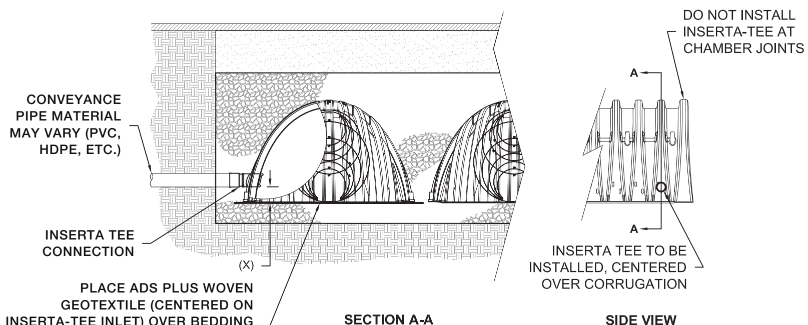
Continue evenly backfilling between rows and around perimeter until embedment stone reaches tops of chambers. Perimeter stone must extend horizontally to the excavation wall for both straight or sloped sidewalls. **Only after chambers have been backfilled to top of chamber and with a minimum 6” (150 mm) of cover stone on top of chambers can small dozers be used over the chambers for backfilling remaining cover stone.**

Small dozers and skid loaders may be used to finish grading stone backfill in accordance with ground pressure limits in Table 2. They must push material parallel to rows only. Never push perpendicular to rows. StormTech recommends that the contractor inspect chambers before placing final backfill. Any chambers damaged by construction shall be removed and replaced.

Final Backfill of Chambers – Fill Material

Install non-woven geotextile over stone. Geotextile must overlap 24” (600 mm) min. where edges meet. Compact each lift of backfill as specified in the site design engineer’s drawings. Roller travel parallel with rows.

Inserta Tee Detail



NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6” (150 mm)	4” (100 mm)
SC-740	10” (250 mm)	4” (100 mm)
DC-780	10” (250 mm)	4” (100 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 36, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON.		

StormTech Isolator Row Plus Detail

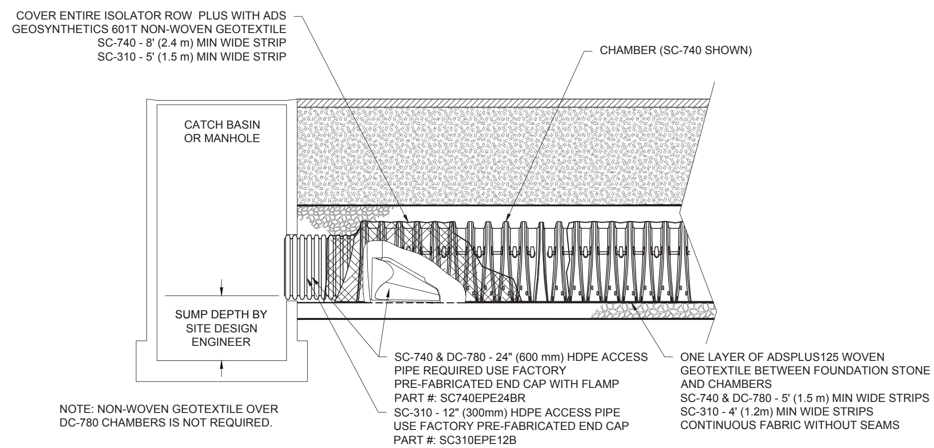


Table 1- Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ **Final Fill:** Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per site design engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ **Initial Fill:** Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (450 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines or processed aggregate. Most pavement subbase materials can be used in lieu of this layer.	AASHTO M45 A-1, A-2-4, A-3 or AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (300 mm) of material over the chambers is reached. Compact additional layers in 6" (150 mm) max. lifts to a min. 95% Proctor density for well-graded material and 95% relative density for processed aggregate materials. Roller gross vehicle weight not to exceed 12,000 lbs (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN)
Ⓑ **Embedment Stone:** Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	No compaction required.
Ⓐ **Foundation Stone:** Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone,	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	Place and compact in 6" (150 mm) lifts using two full coverages with a vibratory compactor.[2, 3]

Please Note:

1. The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone".
2. StormTech compaction requirements are met for 'A' location materials when placed and compacted in 6" (150 mm) (max) lifts using two full coverages with a vibratory compactor.
3. Where infiltration surfaces may be comprised by compaction, for standard installations and standard design load conditions, a flat surface may be achieved by raking or dragging without compaction equipment. For special load designs, contact StormTech for compaction requirements.

Figure 1- Inspection Port Detail

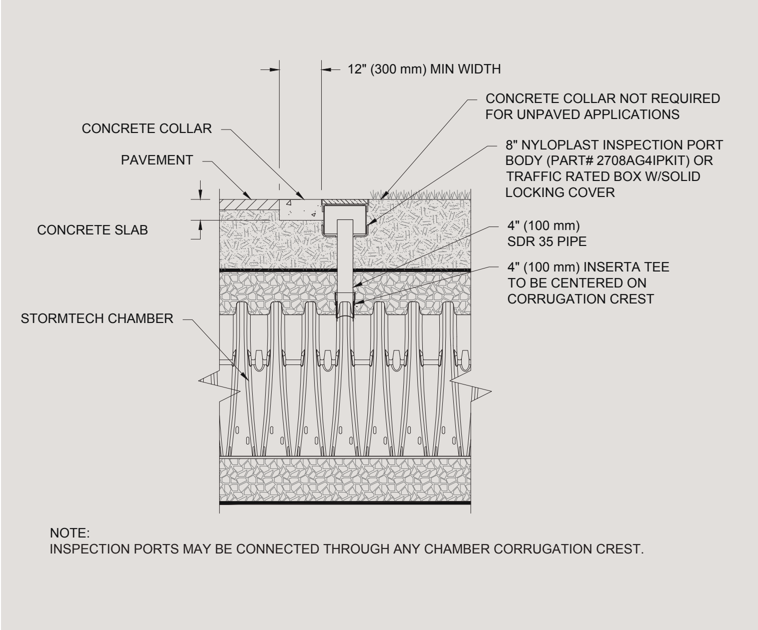
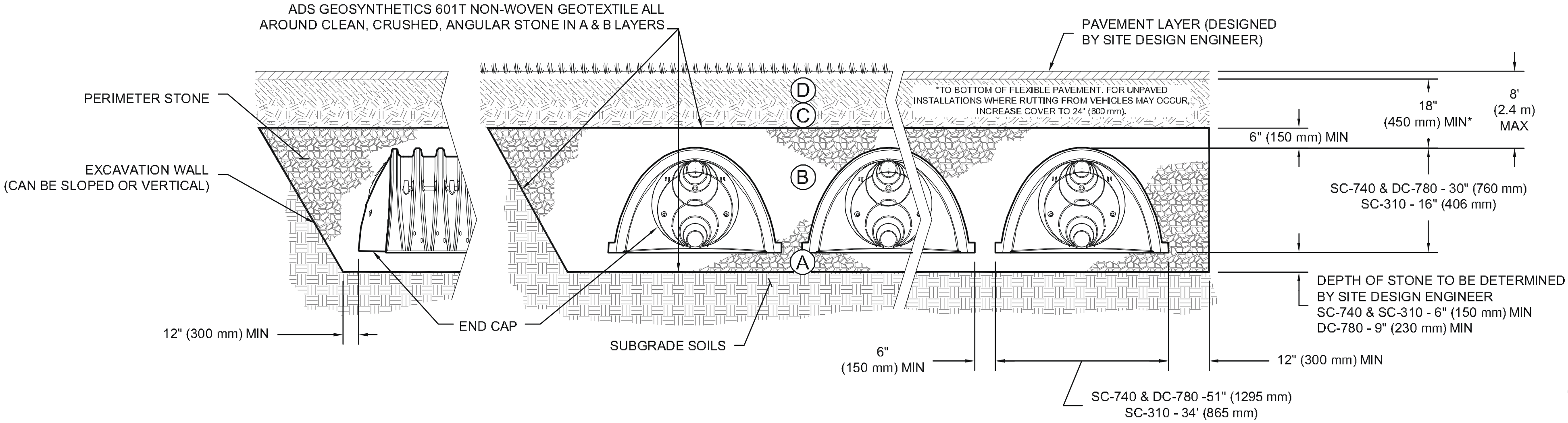


Figure 2 - Fill Material Locations



Notes:

1. 36" (900 mm) of stabilized cover materials over the chambers is recommended during the construction phase if general construction activities, such as full dump truck travel and dumping, are to occur over the bed.
2. During paving operations, dump truck axle loads on 18" (450 mm) of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 18" (450 mm) of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.
3. Ground pressure for track dozers is the vehicle operating weight divided by total ground contact area for both tracks. Excavators will exert higher ground pressures based on loaded bucket weight and boom extension.
4. Mini-excavators (< 8,000lbs/3,628 kg) can be used with at least 12" (300 mm) of stone over the chambers and are limited by the maximum ground pressures in Table 2 based on a full bucket at maximum boom extension.
5. Storage of materials such as construction materials, equipment, spoils, etc. should not be located over the StormTech system. The use of equipment over the StormTech system not covered in Table 2 (ex. soil mixing equipment, cranes, etc) is limited. Please contact StormTech for more information.
6. Allowable track loads based on vehicle travel only. Excavators shall not operate on chamber beds until the total backfill reaches 3 feet (900 mm) over the entire bed.

Table 2 - Maximum Allowable Construction Vehicle Loads[6]

Material Location	Fill Depth over Chambers in. (mm)	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads[6]		Maximum Allowable Roller Loads
		Max Axle Load for Trucks lbs (kN)	Max Wheel Load for Loaders lbs (kN)	Track Width in. (mm)	Max Ground Pressure psf (kPa)	Max Drum Weight or Dynamic Force lbs (kN)
Ⓓ Final Fill Material	36" (900) Compacted	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	3880 (186) 2640 (126) 2040 (97) 1690 (81) 1470 (70)	38,000 (169)
Ⓒ Initial Fill Material	24" (600) Compacted	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2690 (128) 1880 (90) 1490 (71) 1280 (61) 1150 (55)	20,000 (89)
	24" (600) Loose/ Dumped	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2390 (114) 1700 (81) 1370 (65) 1190 (57) 1080 (51)	20,000 (89) Roller gross vehicle weight not toexceed 12,000 lbs. (53 kN)
	18" (450)	32,000 (142)	16,000 (71)	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	2110 (101) 1510 (72) 1250 (59) 1100 (52) 1020 (48)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
Ⓑ Embedment Stone	12" (300)	16,000 (71)	NOT ALLOWED	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	1540 (74) 1190 (57) 1010 (48) 910 (43) 840 (40)	20,000 (89) Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN)
	6" (150)	8,000 (35)	NOT ALLOWED	12" (305) 18" (457) 24" (610) 30" (762) 36" (914)	1070 (51) 900 (43) 800 (38) 760 (36) 720 (34)	NOT ALLOWED

Table 3 - Placement Methods and Descriptions

Material Location	Placement Methods/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Roller Load Restrictions
		See Table 2 for Maximum Construction Loads		
Ⓓ Final Fill Material	A variety of placement methods may be used. All construction loads must not exceed the maximum limits in Table 2.	36" (900 mm) minimum cover required for dump trucks to dump over chambers.	Dozers to push parallel to rows until 36" (900mm) compacted cover is reached.[4]	Roller travel parallel to rows only until 36" (900 mm) compacted cover is reached.
Ⓒ Initial Fill Material	Excavator positioned off bed recommended. Small excavator allowed over chambers. Small dozer allowed.	Asphalt can be dumped into paver when compacted pavement subbase reaches 18" (450 mm) above top of chambers.	Small LGP track dozers & skid loaders allowed to grade cover stone with at least 6" (150 mm) stone under tracks at all times. Equipment must push parallel to rows at all times.	Use dynamic force of roller only after compacted fill depth reaches 12" (300 mm) over chambers. Roller travel parallel to chamber rows only.
Ⓑ Embedment Stone	No equipment allowed on bare chambers. Use excavator or stone conveyor positioned off bed or on foundation stone to evenly fill around all chambers to at least the top of chambers.	No wheel loads allowed. Material must be placed outside the limits of the chamber bed.	No tracked equipment is allowed on chambers until a min. 6" (150 mm) cover stone is in place.	No rollers allowed.
Ⓐ Foundation Stone	No StormTech restrictions. Contractor responsible for any conditions or requirements by others relative to subgrade bearing capacity, dewatering or protection of subgrade.			

ADS StormTech™

StormTech® Standard Limited Warranty

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and end plates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and end plates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.

(G) THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. A PRODUCT ALSO IS EXCLUDED FROM LIMITED WARRANTY COVERAGE IF SUCH PRODUCT IS USED IN A PROJECT OR SYSTEM IN WHICH ANY GEOTEXTILE PRODUCTS OTHER THAN THOSE PROVIDED BY ADVANCED DRAINAGE SYSTEMS ARE USED. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.

adspipe.com
800-821-6710

Drainage Filtration Separation

ADS 0601T/O NONWOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 0601T/O nonwoven geotextile.

Filter Fabric Requirements

ADS 0601T/O is an orange nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. ADS 0601T/O is inert to biological degradation and resists naturally encountered chemicals, alkali and acids. ADS 0601T/O conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	Typical Value[1] MD	Typical Value[1] CD
Grab Tensile Strength	ASTM D4632	lbs (N)	175 (779)	175 (779)
Grab Tensile Elongation	ASTM D4632	%	75	75
Trapezoid Tear Strength	ASTM D4533	lbs (N)	85 (378)	85 (378)
CBR Puncture Strength	ASTM D6241	lbs (N)	480 (2136)	480 (2136)
Permittivity	ASTM D4491	sec^{-1}	1.5	1.5
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	105 (4278)	105 (4278)
UV Resistance (at 500 hours)[1]	ASTM D4355	% strength retained	80	80

Physical Properties

Property	Test Method	Unit	Typical Value[2]
Weight	ASTM D5161	oz/yd^2 (g/m^2)	6.5 (220)
Thickness	ASTM D5199	mils (mm)	65 (1.7)
Roll Dimensions (W x L)	-	ft (m)	15 x 300 (4.5 x 91)
Roll Area	-	yd^2 (m^2)	500 (418)
Estimated Roll Weight	-	lb (kg)	220 (100)

1 Modified, Minimum Test Value
2 ASTM D4439 Standard Terminology for Geosynthetics: typical value, n-*for geosynthetics*, the mean value calculated from documented manufacturing quality control test results for a defined population obtained from one test method associated with on specific property.

Separation

ADS 315W WOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 315W woven geotextile.

Filter Fabric Requirements

ADS 315W is manufactured using high-tenacity polypropylene yarns that are woven to form a dimensionally stable network, which allows the yarns to maintain their relative position. ADS 315W resists ultraviolet deterioration, rotting and biological degradation and is inert to commonly encountered soil chemicals. ADS 315W conforms to the physical property values listed below:

Filter Fabric Properties

Property	Test Method	Unit	M.A.R.V. (Minimum Average Roll Value)[2]
Tensile Strength (Grab)	ASTM D4632	lbs (N)	315 (1400)
Elongation	ASTM D4632	%	15
CBR Puncture	ASTM D6241	lbs (N)	900 (4005)
Puncture	ASTM D4833	lbs (N)	150 (667)
Mullen Burst	ASTM D3786	psi (kPa)	600 (4134)
Trapezoidal Tear	ASTM D4533	lbs (N)	120 (533)
UV Resistance (at 500 hours)	ASTM D4355	%	70
Apparent Opening Size (AOS)*	ASTM D4751	U.S. Sieve (mm)	40 (.425)
Permittivity	ASTM D4491	sec^{-1}	.05
Water Flow Rate	ASTM D4491	gpm/ft^2 (l/min/m^2)	4 (163)

* Maximum average roll value.

Packaging

Roll Dimensions (W x L) - ft. (m)	12.5 x 360/ 15 x 300 / 17.5 x 258 (3.81 x 109.8/ 4.57 x 91.5 / 5.33 x 78.6)

Allen & Major Associates, Inc.		Computation Sheet	
Title	***Pipe Sizing Table***	By	MTB
Project	*STRADA Mixed Use Building*	Chk'd	CMQ
Location	258 MAIN STREET, READING	Apprv'd	CMQ
Date	October 5, 2023		
Revised			

Minimum Slope:	0.005
Minimum Pipe Size:	12"
Rainfall Intensity (in/hr):	6.40 (25 year storm)
Manning's n:	0.013 HDPE (SMOOTH BORE)
Minimum Pipe Cover:	1.5'

Line						Req'd. Capac.	Pipe Size	Slope	Flow at Inv. Slope		Drop	Invert Elevation		Rim Elev.		Pipe
From Upper	To Lower	Length (feet)	Area (acres)	wgt. *C*	*C* A	*Qd* (cfs)	*D* (in)	*s* (%)	Q_{full} (cfs)	V_{full} (fps)	(feet)	Upper (ft)	Lower (ft)	Upper (ft)	Cover (ft)	Material
CB-1A	DMH-1(WQU)	31	0.194	0.86	0.166	1.07	12	1.00%	3.57	4.54	0.31	93.98	93.67	96.50	1.40	HDPE
CB-1B	DMH-1(WQU)	61	0.176	0.89	0.156	1.00	12	1.00%	3.57	4.53	0.61	94.28	93.67	96.85	1.44	HDPE
DMH-1(WQU)	DMH-4	7				2.06	12	0.99%	3.56	4.52	0.07	93.57	93.50	98.15	3.45	HDPE
RD-1	EC1B-IN	60	0.224	0.90	0.201	1.29	10	1.00%	2.20	4.02	0.60	94.10	93.50	98.00	2.94	HDPE
CB-2A	DMH-2(WQU)	10	0.104	0.90	0.094	0.60	12	1.00%	3.58	4.55	0.10	94.04	93.94	96.85	1.68	HDPE
CB-2B	DMH-2(WQU)	67	0.082	0.90	0.073	0.47	12	1.00%	3.57	4.53	0.67	94.61	93.94	96.85	1.11	HDPE
DMH-2(WQU)	DMH-7	34				1.07	12	1.00%	3.57	4.54	0.34	93.84	93.50	97.10	2.13	HDPE
CB-3	DMH-3(WQU)	43	0.069	0.77	0.053	0.34	8	0.50%	0.86	2.45	0.21	93.87	93.66	95.50	0.84	PVC
AD-5	AD-4	33	0.004	0.71	0.003	0.02	10	1.00%	2.20	4.02	0.33	94.73	94.40	97.35	1.66	HDPE
AD-4	AD-3	33	0.004	0.71	0.003	0.04	10	1.00%	2.19	4.01	0.33	94.30	93.97	97.35	2.09	HDPE
AD-3	DMH-3(WQU)	21	0.004	0.71	0.003	0.06	10	1.00%	2.20	4.02	0.21	93.87	93.66	97.35	2.52	HDPE
DMH-3(WQU)	DMH-12	6				0.40	12	1.00%	3.57	4.54	0.06	93.56	93.50	97.30	2.62	HDPE
AD-1	EC-1E-IN	9	0.073	0.53	0.039	0.25	10	1.00%	2.20	4.02	0.09	93.59	93.50	99.50	4.95	HDPE
AD-2	EC-1D-IN	9	0.073	0.53	0.039	0.25	10	1.00%	2.20	4.02	0.09	93.59	93.50	98.60	4.05	HDPE
DMH-10	DMH-11	70	**HYDROCAD: 25 YEAR STORM**			0.00	10	1.00%	2.20	4.03	0.71	95.05	94.34	97.50	1.50	HDPE
			Both systems (UIS-1),(UIS-3) have a primary outflow of zero for 25 year storm													

Allen & Major Associates, Inc.			Computation Sheet	
Title	MA DEP Standard Calculations		By	MTB
Project	Strada, Mixed Use Building		Chk'd	CMQ
Location	258 Main Street, Reading MA		Apprv'd	CMQ
Date	October 5, 2023			
Revised				

Stormwater Recharge/Water Quality Volume Table

Rv = F * Impervious Area

Rv *= Required Recharge Volume, expressed in* ft^3*, cubic yards or acre-feet*

F *= Target Depth Factor associated with each Hydraulic Soil Group*

Impervious Area *= pavement & rooftop area on site*

A_{WQ} *= Required Water Quality Treatment Volume, expressed in* ft^3

D_{WQ} *= Water Quality Depth*

A_{IMP} *= Impervious Area (excluding non-metal roofs)*

Watershed	Area (Sq. Ft.)	Landscaped	Impervious Area (Square Feet)		Recharge Required			Water Quality Volume Required	
			HSG A (F=.6)	HSG B (F=.35)	F Avg. (Inches)	Impervious Area (Feet)	Rv (ft^3)	D_{WQ} (Inch)	A_{WQ}
P-1	8,087	0	8,087	0	0.6	8,087	404	1.0	674
P-2	16,402	1,145	15,257	0	0.6	15,257	763	1.0	1,271
P-3	3,632	835	2,797	0	0.6	2,797	140	1.0	233
P-4	320	22	22	0	0.6	22	1	1.0	2
P-5	6,397	4,344	2,053	0	0.6	2,053	103	1.0	171
P-6	1,508	1,392	116	0	0.6	116	6	1.0	10
R-1	9,748	0	9,748	0	0.6	9,748	487	1.0	812
Total	**46,094**	**7,738**	**38,080**	**0**	0.6	**38,080**	**1,904**	1.0	**3,173**

Rv = F * Impervious Area

Rv *= Required Recharge Volume, expressed in* ft^3*, cubic yards or acre-feet*

F *= Target Depth Factor associated with each Hydraulic Soil Group*

Impervious Area *= pavement & rooftop area on site*

	Required (cf)	Provided (cf)	
ARv =	994	2,550	Underground Infiltration System #1 (P-1,R-1,P-5)
ARv =	994	2,550	Total

	Required (cf)	Provided (cf)	
ARv =	763	416	Underground Infiltration System #2 (P-2)
ARv =	763	416	Total

	Required (cf)	Provided (cf)	
ARv =	140	351	Underground Infiltration System #3 (P-3)
ARv =	140	351	Total

Water Quality Volume

A_{WQ} *= Required Water Quality Treatment Volume, expressed in* ft^3

D_{WQ} *= Water Quality Depth*

A_{IMP} *= Impervious Area (excluding non-metal roofs)*

Allen & Major Associates, Inc.			Computation Sheet	
Title	***MA DEP Standard Calculations***		By	MTB
Project	*Strada, Mixed Use Building*		Chk'd	CMQ
Location	258 Main Street, Reading MA		Apprv'd	CMQ
Date	October 5, 2023			

	Required (cf)	***Provided (cf)***	
A_{WQ} =	***1,657***	***2,550***	***Underground Infiltration System #1 (P-1,R-1,P-5)***
A_{WQ} =	***1,657***	***2,550***	***Total***

	Required (cf)	***Provided (cf)***	
A_{WQ} =	***1,271***	***416***	***Underground Infiltration System #2 (P-2)***
A_{WQ} =	***1,271***	***416***	***Total***

	Required (cf)	***Provided (cf)***	
A_{WQ} =	***233***	***351***	***Underground Infiltration System #3 (P-3)***
A_{WQ} =	***233***	***351***	***Total***

Allen & Major Associates, Inc.			Computation Sheet	
Title	***MA DEP Standard Calculations***		By	MTB
Project	*Strada, Mixed Use Building*		Chk'd	CMQ
Location	258 Main Street, Reading MA		Apprv'd	CMQ
Date	October 5, 2023			

Draindown Within 72 Hours

Time$_{\mathbf{drawdown}}$=(Rv) (1/Design Infiltration Rate in inches per hour) (Conversion for inches to feet) (1/bottom area in feet)

Infiltration Pond #1 - HSG A	
Infiltration Rate (in/Hr)=	2.41
Bottom Area (ft^2) =	4,032
Infiltration Volume (ft^3) =	2,550
Time$_{\mathbf{drawdown}}$ **(Hours)**=	3.15

Infiltration Pond #2 - HSG A	
Infiltration Rate (in/Hr)=	2.41
Bottom Area (ft^2) =	658
Infiltration Volume (ft^3) =	416
Time$_{\mathbf{drawdown}}$ **(Hours)**=	3.15

Infiltration Pond #3 - HSG A	
Infiltration Rate (in/Hr)=	2.41
Bottom Area (ft^2) =	607
Infiltration Volume (ft^3) =	351
Time$_{\mathbf{drawdown}}$ **(Hours)**=	2.88

TSS Removal Worksheet

Location:	258 Main Street, Reading MA
Date:	10/05/23
Project:	Strada - Mixed Use Builidng
Prepared By:	MTB
Date:	10/05/23

Underground Infiltration System #1,2,3

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump Catch Basins	**0.25**	**1.00**	**0.25**	**0.75**
Water Quality Unit	**0.50**	**0.75**	**0.38**	**0.38**
StormTech Chambers	**0.80**	**0.38**	**0.30**	**0.08**

Total TSS Removal = 93%

*Equals remaining load from previous BMP (E) which enters the BMP

Illicit Discharge Compliance Statement

Responsibility:

The Owner is responsible for ultimate compliance with all provisions of the Massachusetts Stormwater Management Policy, the USEPA NPDES Construction General Permit and responsible for identifying and eliminating illicit discharges (as defined by the USEPA).

OWNER NAME: BLVD Reading, LLC

ADDRESS: 1 Sylvan Road

Peabody, MA 01960

TEL. NUMBER: (781) 389-5989

Engineer's Compliance Statement:

To the best of my knowledge, the attached plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system and that no detectable illicit discharges exist on the site. All documents and attachments were prepared under my direction and qualified personnel properly gathered and evaluated the information submitted, to the best of my knowledge.

Included with this statement are site plans, drawn to scale, that identify the location of systems for conveying stormwater on the site and show that these systems do not allow the entry of any illicit discharges into the stormwater management system. The plans also show any systems for conveying wastewater and/or groundwater on the site and show that there are no connections between the stormwater and wastewater systems.

For a redevelopment project (if applicable), all actions taken to identify and remove illicit discharges, including without limitation, visual screening, dye or smoke testing, and the removal of any sources of illicit discharges to the stormwater management system are documented and included with this statement.

Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing, and water used to clean residential buildings without detergents.

RECEIVED
By Town Clerk GP at 9:11 am, Nov 20, 2023

Town of Reading

16 Lowell Street
Reading, MA 01867-2683
Phone: 781-942-6670
Email: amacnichol@ci.reading.ma.us

Community Planning and Development Commission

NOTICE OF PUBLIC HEARING

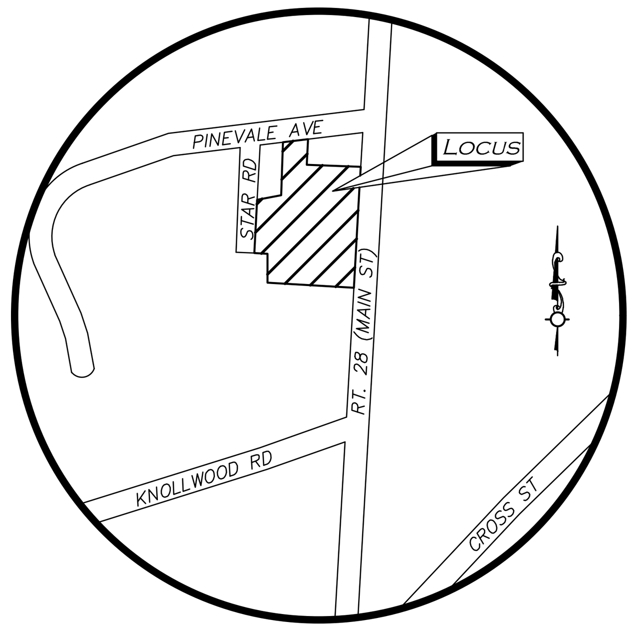
Notice is hereby given that, pursuant to M.G.L. Ch. 40A §9, under Reading Zoning Bylaw Sections 4.3, 4.4, 4.6, 5.3, and 5.6.7, General Bylaw Section 7.9 and Reading Stormwater Management and Erosion Control Regulations Section 4.5, the Community Planning and Development Commission (CPDC) will hold a Public Hearing on **Monday, December 11, 2023 at 8:00 PM, in the Select Board Meeting Room at Reading Town Hall, 16 Lowell Street**, **Reading MA, and through the remote and online measures below**, to hear the Special Permit/Site Plan Review/Stormwater Permit application submitted by BLVD Reading, LLC, for the property located at **252, 258, 262 Main Street & 10 Pinevale Ave** (Assessors Map 11, Lots 192, 193, 194, 196). The Applicant is proposing to demolish the existing structures to construct a four-story mixed-use building, with multi-family residential units, including Affordable units, street-level commercial space, surface parking, outdoor programming space and associated site improvements. A copy of the application and accompanying plans are available to the public at Town Hall by appointment and on the Town website the Thursday prior to the hearing.

Join Zoom Meeting
https://us06web.zoom.us/j/81680360845

Meeting ID: 816 8036 0845
Dial by your location: +1 646 518 9805

If you have any questions, comments, or difficulty accessing the meeting, please email Community Development Director Andrew MacNichol at amacnichol@ci.reading.ma.us.

Reading Community Planning & Development Commission



LOCUS MAP
(NOT TO SCALE)

CIVIL SITE PLANS FOR:
STRADA
MIXED USE BUILDING
252-262 MAIN STREET &
10 PINEVALE AVE. READING, MA

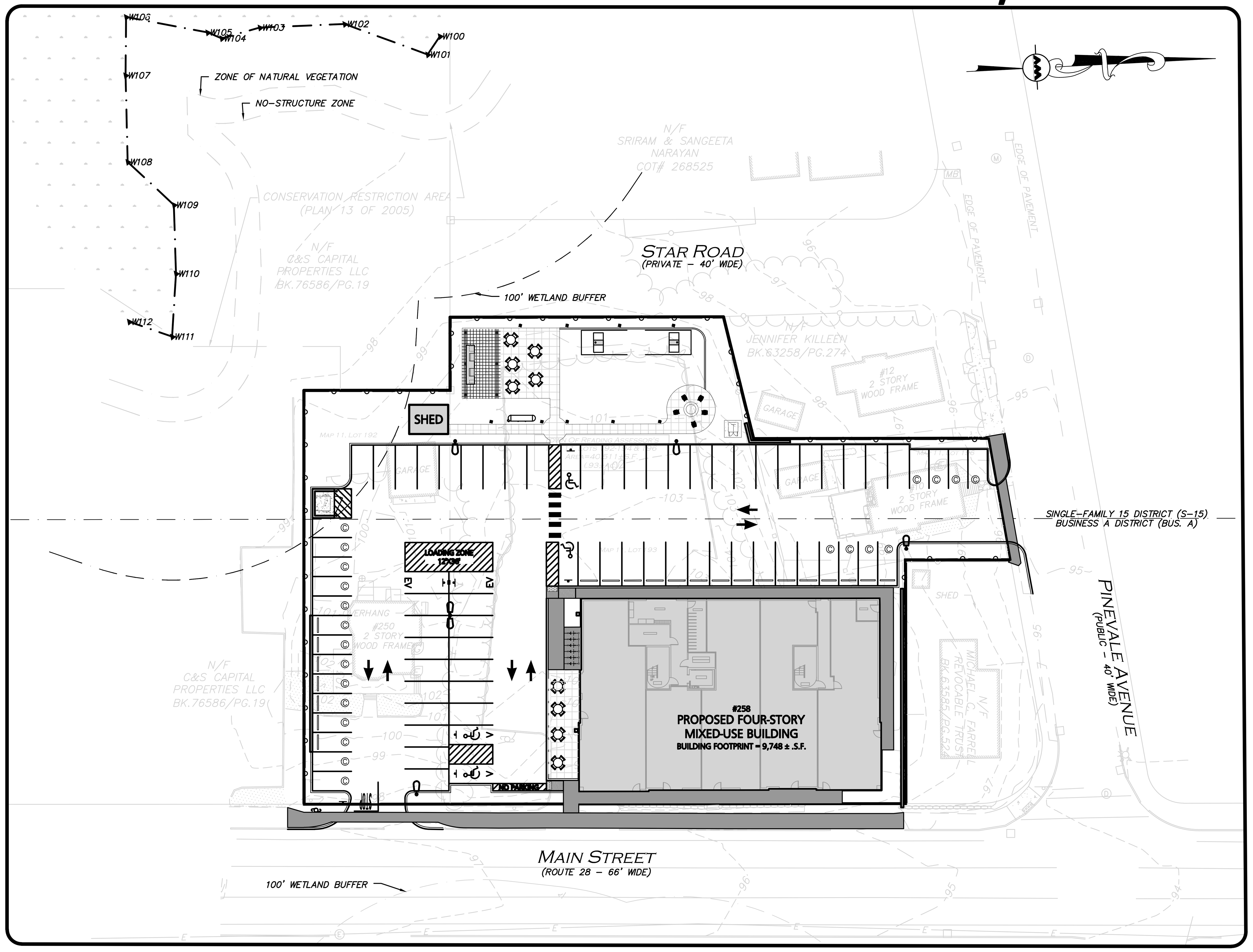
ASSESSOR'S INFORMATION			
MAP	LOT	BLOCK	AREA (ACRES)
11	192	000	0.23
11	193	000	0.60
11	194	000	0.11
11	196	000	0.11

OWNER / APPLICANT:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

CIVIL ENGINEER/LANDSCAPE ARCHITECT
& LAND SURVEYOR:
ALLEN & MAJOR ASSOCIATES
100 COMMERCE WAY, SUITE 5
WOBURN, MA 01801
781.935.6889

ARCHITECT:
RP ARCHITECTURAL STUDIO
78 HIGHLAND CIRCLE
WAYLAND, MA O1778
617.794.7759

WETLAND SCIENTIST:
GODDARD CONSULTING, LLC
291 MAIN STREET, SUITE 8
NORTHBOROUGH, MA 01532
508.393.3784



LIST OF DRAWINGS			
DRAWING TITLE	SHEET NO.	ISSUED	LAST REVISED
PROPERTY LINE/EXISTING CONDITIONS	V-101	09-06-2023	
ABBREVIATIONS & NOTES	C-001 - 002	10-05-2023	
EROSION CONTROL PLAN	C-100	10-05-2023	
SITE PREPARATION PLAN	C-101	10-05-2023	
LAYOUT & MATERIALS PLAN	C-102	10-05-2023	
GRADING & DRAINAGE PLAN	C-103	10-05-2023	
UTILITIES PLAN	C-104	10-05-2023	
LIGHTING PLAN	C-105	10-05-2023	
SNOW STORAGE PLAN	C-106	10-05-2023	
VEHICLE MOVEMENT PLAN	C-107A - C-107B	10-05-2023	
FIRE TRUCK TURNING PLAN	C-108	10-05-2023	
ABUTTING PROPERTY DIMENSION PLAN	C-109	10-05-2023	
ALTERNATIVE LAYOUT & MATERIALS PLAN	C-110	10-05-2023	
DETAILS	C-501 - C-509	10-05-2023	
LANDSCAPE PLAN	L-101	10-05-2023	
SITE AMENITIES PLAN	L-102	10-05-2023	
LANDSCAPE NOTES & DETAILS	L-501 - L-502	10-05-2023	
SITE AMENITY DETAILS	L-503 - L-505	10-05-2023	
AMENITIES RENDERINGS	L-600	10-05-2023	

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

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

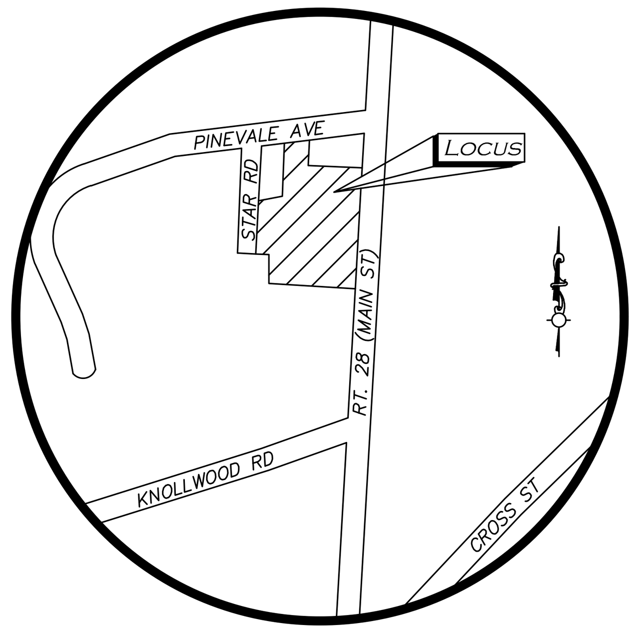
PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

ISSUED FOR APPROVAL: OCTOBER 5, 2023

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_COVER.DWG

Notes

1. NORTH ARROW IS BASED ON MASSACHUSETTS GRID COORDINATE SYSTEM (MAINLAND ZONE) (NAD 83).
2. BOOK/PAGE AND PLAN REFERENCES ARE TAKEN FROM MIDDLESEX (SOUTH) REGISTRY OF DEEDS IN CAMBRIDGE, MA.
3. VERTICAL DATUM IS NAVD 88.
4. CONTOUR INTERVAL IS ONE FOOT (1').
5. ALL CURBING SHOWN HEREON IS GRANITE, UNLESS OTHERWISE NOTED.
6. WETLAND FLAGS DELINEATED BY GODDARD CONSULTING, LLC ON MARCH 7, 2023.

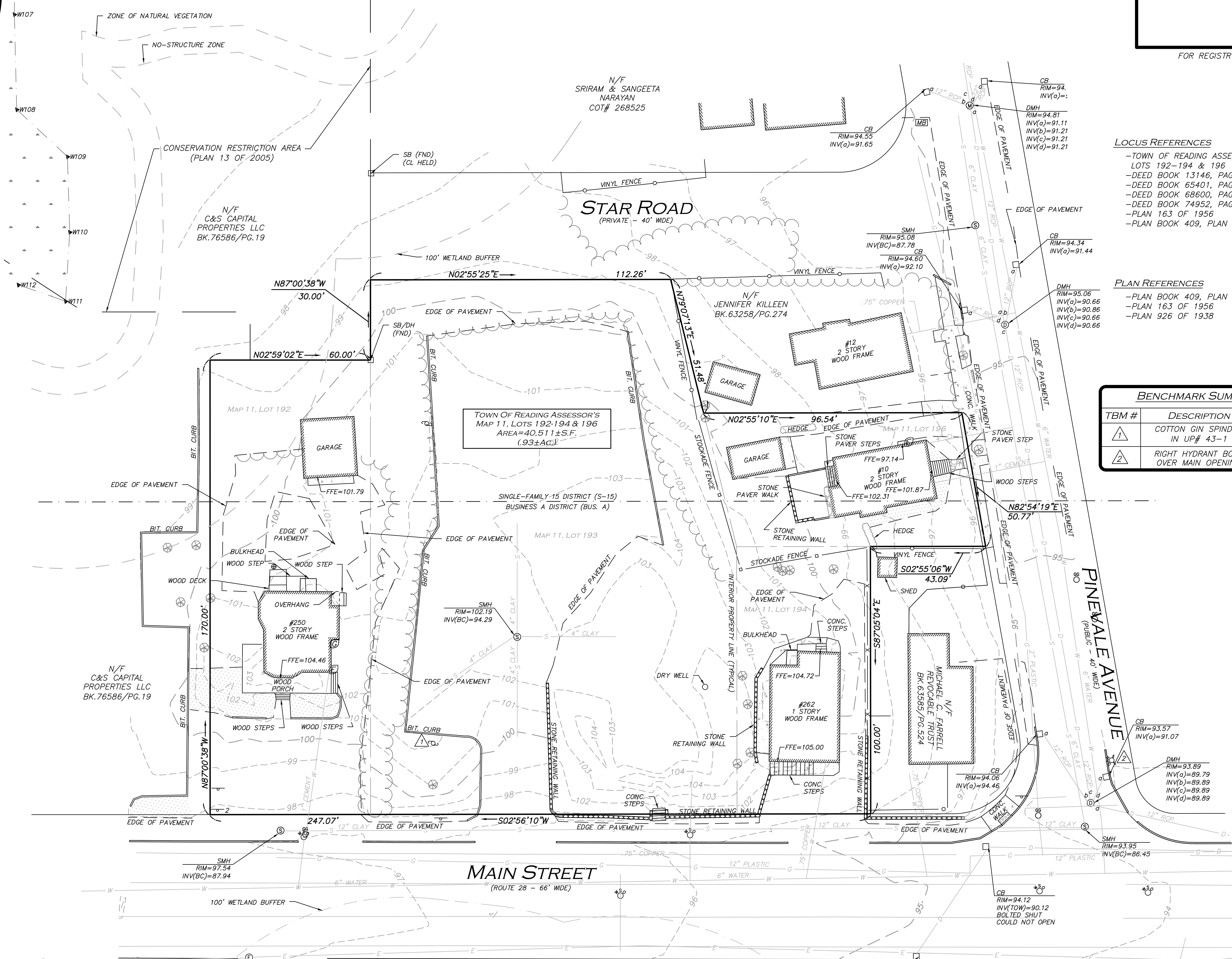


Locus Map

(NOT TO SCALE)

LEGEND

STONE BOUND (SB)	
DRAIN MANHOLE (DMH)	
SEWER MANHOLE (SMH)	
ELECTRIC MANHOLE (EMH)	
MISC. MANHOLE (MH)	
CATCH BASIN (CB)	
UTILITY POLE	
FIRE HYDRANT	
WATER GATE	
GAS GATE	
TREE	
SIGN	
MAILBOX	MB
WETLAND FLAG	A31
GAS METER	G
ELECTRIC METER	E
CONCRETE	
LANDSCAPED AREA (LSA)	
STONE PAVERS	
TACTILE DOME STRIP	
BUILDING	
BUILDING OVERHANG	
WETLAND	
BUFFER ZONE	
1' CONTOUR	53
5' CONTOUR	55
PROPERTY LINE	
ABUTTERS LINE	
INTERIOR PROPERTY LINE	
ZONE LINE	
STONE RETAINING WALL	
TREE LINE	
EDGE OF PAVEMENT	
CURB	
CHAIN LINK FENCE	x
STOCKADE FENCE	
VINYL FENCE	o
WATER LINE	W
SEWER LINE	S
DRAIN LINE	D
GAS LINE	G
ELECTRIC LINE	E
TELEPHONE LINE	T
FINISHED FLOOR ELEVATION	FFE
CONCRETE	CONC.
STONE BOUND W/DRILL HOLE	SB/DH
CENTER LINE	CL
FOUND	FND
NOW OR FORMERLY	N/F
BOOK	BK.
PAGE	PG.



Locus References

- TOWN OF READING ASSESSORS MAP 11, LOTS 192-194 & 196
- DEED BOOK 13146, PAGE 170
- DEED BOOK 65401, PAGE 284
- DEED BOOK 68600, PAGE 99
- DEED BOOK 74952, PAGE 257
- PLAN 163 OF 1956
- PLAN BOOK 409, PLAN 22

Plan References

- PLAN BOOK 409, PLAN 22
- PLAN 163 OF 1956
- PLAN 926 OF 1938

Benchmark Summary

TBM #	Description	Elev.
1	COTTON GIN SPINDLE IN UP# 43-1	103.55
2	RIGHT HYDRANT BOLT OVER MAIN OPENING	96.53

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

Utility Statement

THE UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. ALLEN & MAJOR ASSOCIATES, INC. (A&M) MAKES NO GUARANTEE THAT THE UTILITIES SHOWN HEREON COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. A&M FURTHER DOES NOT WARRANT THAT THE UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. A&M HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

N:\PROJECTS\2398-01A\SURVEY\DRAWINGS\CURRENT\S-2398-01A-EC.DWG

FOR REGISTRY USE ONLY

WE HEREBY CERTIFY THAT:

THIS PLAN IS THE RESULT OF AN ACTUAL ON THE GROUND SURVEY PERFORMED ON OR BETWEEN APRIL 3, 2023 AND APRIL 13, 2023.

THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS DATED JANUARY 1, 1976 AND REVISED JANUARY 12, 1988.

ACCORDING TO DEEDS AND PLANS OF RECORD, THE PROPERTY LINES SHOWN ON THIS PLAN ARE THE LINES DIVIDING EXISTING OWNERSHIP, AND THE LINES OF THE STREETS OR WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS AND WAYS ALREADY ESTABLISHED, AND THAT NO NEW LINES FOR THE DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

THE ABOVE CERTIFICATION IS INTENDED TO MEET REGISTRY OF DEEDS REQUIREMENTS FOR THE RECORDING OF PLANS AND IS NOT A CERTIFICATION TO THE TITLE OR OWNERSHIP OF THE PROPERTY SHOWN. OWNERS OF ADJOINING PROPERTIES ARE SHOWN ACCORDING TO CURRENT TOWN OF READING ASSESSOR'S INFORMATION.

THE ABOVE IS CERTIFIED TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF.

ALLEN & MAJOR ASSOCIATES, INC.

Sept. 6, 2023

PROFESSIONAL LAND SURVEYOR FOR ALLEN & MAJOR ASSOCIATES, INC.

COMMONWEALTH OF MASSACHUSETTS
NORMAN I. LIPSITZ
No.28446
PROFESSIONAL LAND SURVEYOR

9/6/23

REV	DATE	DESCRIPTION

APPLICANT\OWNER:

ONE SYLVAN LLC
PO BOX 4449
PEABODY, MA 01961

PROJECT:

252-260 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	09/06/23
SCALE:	1" = 20'	DWG. NAME:	S-2398-01A-EC
DRAFTED BY:	COB/SMM	CHECKED BY:	COB/NIL

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:

PROPERTY LINE/
EXISTING CONDITIONS

SHEET No.

V-101

NOTES

GENERAL NOTES:

1. TOPOGRAPHIC INFORMATION AND EXISTING SITE FEATURES WERE OBTAINED FROM AN ACTUAL FIELD SURVEY PERFORMED BY ALLEN & MAJOR ASSOCIATES, INC, 100 COMMERCE WAY, WOBURN, MASSACHUSETTS.

2. ZONING DISTRICT IS SINGLE–FAMILY 15 DISTRICT (S–15) AND BUSINESS A DISTRICT (BUS.A).

3. OVERALL LOT SIZE: 1.05± ACRES

4. DURING CONSTRUCTION, ALL VEHICLES MUST BE PARKED ON SITE.

5. DURING CONSTRUCTION, ALL STAGING AND DELIVERIES WILL OCCUR ON SITE.

6. THIS PROJECT WILL BE SERVED BY PUBLIC WATER AND SEWER AND PRIVATE, NATURAL GAS, TELEPHONE, CABLE AND ELECTRIC. ALL UTILITY LINES WILL BE INSTALLED UNDERGROUND UNLESS OTHERWISE NOTED.

7. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY, AND "DIGSAFE" AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST EXACT FIELD LOCATION OF UTILITIES AND THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION TAKEN BEFORE PROCEEDING WITH THE WORK. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS AT NO ADDITIONAL COST.

8. ALL PROPOSED MAIN BUILDING ENTRANCES AND WALKS SHALL BE HANDICAP ACCESSIBLE PER FEDERAL ADA & MA AAB REGULATIONS.

9. ALL SITE WORK DONE FOR THIS PROJECT SHALL BE IN STRICT ACCORDANCE WITH THE SITE PLANS AND SITE WORK SPECIFICATIONS FOR CONSTRUCTION.

10. ANY DAMAGE TO PRIVATE OR PUBLIC PROPERTIES DUE TO THE CONTRACTOR'S ACTIVITIES SHALL BE REPAIRED AND RESTORED BY THE CONTRACTOR AT THEIR OWN EXPENSE.

11. ALL PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED DURING CONSTRUCTION. ANY DAMAGE TO THESE ITEMS SHALL BE REPAIRED AND RESTORED BY A SURVEYOR REGISTERED IN THE STATE OF MASSACHUSETTS AT THE CONTRACTOR'S EXPENSE.

12. ALL APPLICABLE PERMITS AND AN APPROVED SET OF PLANS SHALL BE AVAILABLE AT THE CONSTRUCTION SITE.

13. THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING A PRE–CONSTRUCTION MEETING THE WITH THE APPROPRIATE CITY DEPARTMENTS, THE APPROPRIATE UTILITY COMPANIES, THE OWNER AND OWNER'S REPRESENTATIVE. THE MEETING SHALL TAKE PLACE PRIOR TO THE START OF CONSTRUCTION AND THE CONTRACTOR MUST PROVIDE 48 HOURS NOTICE TO ALL ATTENDEES PRIOR TO THE START OF THE MEETING.

14. APPROPRIATE WARNING SIGNS, MARKERS, BARRICADES AND/OR FLAG MEN SHALL BE PROVIDED TO REGULATE TRAFFIC. CONSTRUCTION TRAFFIC CONTROLS SHALL BE IMPLEMENTED AND OPERATED ACCORDING TO THE MASS DEPARTMENT OF TRANSPORTATION, THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AND THE LOCAL AUTHORITY.

15. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ADDITIONAL BENCHMARK INFORMATION IF REQUIRED. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING BENCHMARKS. IF IT IS NECESSARY TO RELOCATE A BENCHMARK, IT SHALL BE RELOCATED BY A MASSACHUSETTS PROFESSIONAL LAND SURVEYOR AND DONE SO AT THE CONTRACTOR'S EXPENSE.

16. ALL BUILDING DIMENSIONS ARE MEASURED TO THE OUTSIDE FACE OF THE BUILDING.

17. ALL RADII ARE 3 FEET UNLESS OTHERWISE NOTED.

18. ALL PARKING LOT AND AISLE DIMENSIONS ARE TAKEN FROM THE FACE OF CURB AND INDICATE EDGE OF PAVEMENT.

19. CONSTRUCTION DURING WET WEATHER OR WINTER CONDITIONS IS TO BE ANTICIPATED AND PROVISIONS TO ADEQUATELY ADDRESS THESE CONDITIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO ADDITIONAL COST.

20. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND PAYING FOR ANY PERMITS AND/OR CONNECTION FEES REQUIRED TO CARRY OUT THE WORK INCLUDING BUT NOT LIMITED TO DEMOLITION.

21. DISPOSAL OF ALL DEMOLISHED MATERIALS INCLUDING EXISTING MISC. CONSTRUCTION DEBRIS IS THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE DISPOSED OF OFF–SITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL MUNICIPAL REQUIREMENTS AT NO ADDITIONAL COST.

22. ALL DISTURBED AREAS NOT NOTED TO RECEIVE OTHER TREATMENT ARE TO RECEIVE SIX INCHES (6") MINIMUM OF TOPSOIL & SEED, AND BE MAINTAINED UNTIL ESTABLISHED & ACCEPTED.

23. EXISTING STRUCTURES WITHIN CONSTRUCTION LIMITS ARE TO BE PROTECTED, ABANDONED, REMOVED OR RELOCATED AS NECESSARY.

24. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RELOCATIONS, INCLUDING BUT NOT LIMITED TO, ALL UTILITIES, STORM DRAINAGE, SIGNS, & POLES, ETC. AS REQUIRED. ALL WORK SHALL BE IN ACCORDANCE WITH THE LOCAL MUNICIPALITY'S GOVERNING AUTHORITY'S SPECIFICATIONS AND SHALL BE APPROVED BY SAME.

25. THE CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO DETERMINE EXACT POINT OF SERVICE CONNECTION AND DISCONNECTION AT EXISTING UTILITY.

26. ALL ELEVATIONS SHOWN ARE IN REFERENCE TO THE BENCHMARKS SHOWN ON THE EXISTING CONDITIONS SITE PLAN AND MUST BE VERIFIED BY THE GENERAL CONTRACTOR AT GROUNDBREAKING.

27. CONTRACTOR IS RESPONSIBLE FOR DIGGING TEST HOLES AND VERIFYING ANY EXISTING UTILITY OR STRUCTURE PRIOR TO CONSTRUCTION. CONTRACTOR SHALL VERIFY THAT BASED ON EXACT LOCATION OF EXISTING UTILITIES, THERE ARE NO CONFLICTS BETWEEN THE EXISTING AND THE PROPOSED UTILITIES/DRAINAGE STRUCTURES.

28. THE CONTRACTOR SHALL ADHERE TO ALL PERMIT CONDITIONS PROVIDED BY ALL GOVERNING AGENCIES AT NO ADDITIONAL COSTS. THIS INCLUDES BUT IS NOT LIMITED TO BUILDING PERMITS, DEMOLITION PERMITS, PLUMBING, GAS, AND ELECTRICAL PERMITS. PERMITS FROM THE PLANNING BOARD OR CITY COUNCIL.

29. DURING EXCAVATION, ANY EXISTING EARTH CUT MATERIALS THAT DO NOT MEET THE "ORDINARY FILL" SPECIFICATIONS OR "LOAM" SPECIFICATIONS AND CANNOT BE REUSED SHALL BE REMOVED OFFSITE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNERS. MATERIAL WHICH DOES NOT MEET THE SPECIFICATION INCLUDES ALL BOULDERS, ROCKS, CONSTRUCTION DEBRIS, AND MISC. MATERIAL. PRIOR TO REUSE, CONTRACTOR TO PROVIDE TESTING REPORT OF SIEVE ANALYSIS TO ENGINEER FOR APPROVAL. CONTRACTOR CAN AMEND MATERIALS AND CONTINUE TO RETEST AS NECESSARY AT NO ADDITIONAL COST TO OWNER. AFTER AMENDING, IF MATERIAL STILL DOES NOT MEET THE SPECIFICATIONS, IT IS TO BE REMOVED FROM SITE AT NO ADDITIONAL COST TO THE OWNER AND IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS.

30. ANY PROPOSED SIGNAGE SHALL BE APPROVED BY SEPARATE APPLICATION TO THE APPROPRIATE MUNICIPAL AUTHORITY INCLUDING BUT NOT LIMITED TO THE ZONING BOARD OF APPEALS AND CITY COUNCIL. ALL PROPOSED SIGNAGE MUST MEET THE REQUIREMENTS OF THE LOCAL ZONING CODE.

GRADING & DRAINAGE NOTES:

1. EXISTING PAVEMENT SHALL BE SAW–CUT AND PAVEMENT JOINT SHALL BE INSTALLED WHERE NECESSARY TO ENSURE A SMOOTH CONTINUOUS GRADE.

2. PITCH EVENLY BETWEEN SPOT GRADES. ALL PAVED AREAS MUST PITCH TO DRAIN AT A MINIMUM OF 1/8" PER FOOT UNLESS OTHERWISE SPECIFIED. ANY DISCREPANCIES NOT ALLOWING THIS MINIMUM PITCH SHALL BE REPORTED TO THE ENGINEER PRIOR TO CONTINUING WORK.

3. ALL GRADING OPERATIONS SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANIES.

4. IN LANDSCAPED AREAS THE TOP ELEVATION OF MANHOLES SHALL MATCH THE FINISH GRADE OF THE TOPSOIL. IN PAVED AREAS THE TOP ELEVATIONS OF MANHOLES SHALL MATCH FINISH GRADE.

5. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE STABILIZED AS SOON AS POSSIBLE UPON COMPLETION OF CONSTRUCTION WORK IN THE AREA.

6. TEMPORARY TUBULAR BARRIER PROTECTION AND/OR SILT SACKS SHALL BE INSTALLED AND MAINTAINED AT EXISTING DRAINAGE STRUCTURES DURING CONSTRUCTION, TO PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE DRAINAGE SYSTEM.

7. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF EXISTING STRUCTURES INCLUDING REMOVAL OF ANY EXISTING UTILITIES SERVING THE STRUCTURE PER DEMOLITION PLAN.

8. ALL CATCH BASINS, MANHOLES, INFILTRATION SYSTEMS, AND WATER QUALITY STRUCTURES ARE TO BE CLEANED TO REMOVE ALL CONSTRUCTION SILT AND DEBRIS PRIOR TO FINAL APPROVAL.

9. IF ANY EXISTING UTILITY STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER AT NO ADDITIONAL COST.

10. ALL STORM PIPES ENTERING STRUCTURES SHALL BE GROUTED TO ENSURE CONNECTION AT STRUCTURE IS WATERTIGHT.

11. ALL STORM DRAIN MANHOLES SHALL HAVE TRAFFIC BEARING RING & COVERS & SHALL BE LABELED "DRAIN".

12. THE CONTRACTOR SHALL ADHERE TO ALL TERMS & CONDITIONS AS OUTLINED IN THE GENERAL N.P.D.E.S. PERMIT FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITIES.

13. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.

14. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES STEEPER THAN 3H:1V.

15. ALL DRAINAGE SYSTEM COMPONENTS SHALL CONFORM TO LOCAL REQUIREMENTS.

UTILITY NOTES:

1. THE LATEST STANDARDS OF THE LOCAL MUNICIPALITY SHALL BE FOLLOWED WHEN INSTALLING ANY STORM DRAIN WORK. STORM DRAIN WORK WILL BE INSPECTED BY THE LOCAL GOVERNING AUTHORITY PERSONNEL AND ALL COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION.

3. ABANDONED EXISTING UTILITIES AND UTILITIES TO BE ABANDONED SHALL EITHER BE ABANDONED IN PLACE AS NOTED OR SHALL BE REMOVED AND DISPOSED OF AS SPECIFIED. ALL UTILITIES SCHEDULED FOR ABANDONMENT OR REMOVAL AND DISPOSAL MUST BE COORDINATED BY THE CONTRACTOR WITH THE RESPECTIVE UTILITY OWNER. WHEN ABANDONED UTILITIES ARE TO BE LEFT IN PLACE, PLUG OR CAP THE ENDS OF THE CONDUITS AND PIPES. REMOVE ABANDONED UTILITY MANHOLES, JUNCTION BOXES AND SIMILAR STRUCTURES TO A MINIMUM DEPTH OF 4 FEET BELOW FINISHED GRADE AND PUNCTURE OR BREAK THE BOTTOM SLABS OF MANHOLES AND SIMILAR STRUCTURE TO ALLOW DRAINAGE. BACKFILL AND COMPACT EXCAVATIONS RESULTING FROM REMOVAL OF UTILITY FACILITATES, AS REQUIRED TO RESTORE THE ORIGINAL GRADE.

4. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENTS OF NATURAL GAS, ELECTRIC, TELEPHONE AND ANY OTHER UTILITY BY THE UTILITY OWNER.

5. THE CONTRACTOR SHALL USE THE FOLLOWING PIPE MATERIALS:
   - DRAIN – HDPE (HIGH DENSITY CORRUGATED POLYETHYLENE PIPE WITH SMOOTH INNER WALL), ASTM D2321 (UNLESS OTHERWISE SPECIFIED ON PLAN)

8. BEFORE UTILITY WORK BEGINS, THE CONTRACTOR WILL COORDINATE WITH THE LOCAL MUNICIPALITY FOR THE APPROPRIATE PERMIT AND INSPECTION FEES.

9. A MINIMUM OF 10 FEET CLEAR HORIZONTALLY SHALL BE MAINTAINED BETWEEN WATER MAINS AND SANITARY SEWER MAINS AND/OR STORM DRAINS. WHENEVER CONDITIONS PREVENT A LATERAL SEPARATION OF 10 FEET TO A WATER MAIN, THE WATER MAIN SHALL BE LAID IN A SEPARATE TRENCH AND THE DIFFERENCE IN ELEVATION BETWEEN THE WATER MAIN AND THE SEWER MAIN SHALL BE AT LEAST 18 INCHES.

10. ALL FILL MATERIAL IS TO BE IN PLACE, AND COMPACTED BEFORE INSTALLATION OF PROPOSED UTILITIES.

11. CONTRACTOR SHALL NOTIFY THE UTILITY AUTHORITY'S INSPECTORS 72 HOURS BEFORE CONNECTING TO ANY EXISTING LINE.

12. MINIMUM TRENCH WIDTH SHALL BE 2 FEET.

13. CONTRACTOR SHALL MAINTAIN A MINIMUM OF 5'–0" COVER AND A MAXIMUM OF 8'–0" COVER ON ALL WATERLINES.

14. IN THE EVENT OF A VERTICAL CONFLICT BETWEEN WATERLINES, SANITARY LINES, STORM LINES AND GAS LINES (EXISTING AND PROPOSED), THE SANITARY LINE SHALL BE DUCTILE IRON PIPE WITH MECHANICAL JOINTS AT LEAST 10 FEET ON BOTH SIDES OF CROSSING, THE WATERLINE SHALL HAVE MECHANICAL JOINTS WITH APPROPRIATE THRUST BLOCKING AS REQUIRED TO PROVIDE A MINIMUM OF 18" CLEARANCE BETWEEN THE PIPES. WHERE THE WATERLINE IS LESS THAN THE 18" VERTICAL CLEARANCE AND MEETING 10' HORIZONTAL CLEARANCE CANNOT BE MET, THE WATER MUST BE ENCASED IN CONCRETE.

15. ALL CONCRETE FOR ENCASEMENTS SHALL HAVE A MINIMUM 28 DAY COMPRESSION STRENGTH OF 3000 P.S.I.

16. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH THE SPECIFICATIONS OF THE LOCAL AUTHORITIES WITH REGARDS TO MATERIALS AND INSTALLATION OF THE WATER, SEWER, GAS AND ELECTRICAL AND TELECOMMUNICATIONS LINES.

17. ALL NECESSARY INSPECTIONS AND/OR CERTIFICATIONS REQUIRED BY CODES AND/OR UTILITY SERVICE COMPANIES SHALL BE PERFORMED PRIOR TO ANNOUNCED BUILDING POSSESSION AND THE FINAL CONNECTION OF SERVICE.

18. DRAWINGS DO NOT NECESSARILY SHOW ALL EXISTING UTILITIES.

ABBREVIATIONS

ABAN	ABANDON
ADJ	ADJUST
B	BORING
BC	BOTTOM OF CURB
BIT	BITUMINOUS
BCB	BITUMINOUS CONCRETE BERM
BLDG	BUILDING
BM	BENCH MARK
BOS	BOTTOM OF SLOPE
BOW	BOTTOM OF WALL
BRK	BRICK
BV&B	BUTTERFLY VALVE & BOX
BVW	BORDERING VEGETATED WETLAND
CATV	CABLE TELEVISION
CB	CATCH BASIN
CF	CUBIC FEET
CFS	CUBIC FEET PER SECOND
CI	CAST IRON (PIPE)
CL	CENTERLINE
CLDI	CEMENT LINED DUCTILE IRON (PIPE)
CM	CONSTRUCTION MANAGER
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTRACTOR
CRD	COORDINATE
CPP	CORRUGATED POLYETHYLENE PIPE
CUL	CULVERT
CY	CUBIC YARD
DB	DISTRIBUTION BOX
DBL	DOUBLE
DEM	DEMOLISH
DET	DETENTION
DI	DUCTILE IRON (PIPE)
DIA	DIAMETER
DIM	DIMENSION
DMH	DRAIN MANHOLE
DW	DOMESTIC WATER (OR DRY WELL)
DWG	DRAWING
DYCL	DOUBLE YELLOW CENTERLINE
EHH	ELECTRIC HANDHOLE
EL	ELEVATION
ELEC	ELECTRIC
EMH	ELECTRIC MANHOLE
EOP	EDGE OF PAVEMENT
EOR	EDGE OF ROAD
EOW	EDGE OF WETLANDS
ETC	ELECTRIC, TELEPHONE, CABLE
EXIST	EXISTING
EXT	EXTERIOR
FA	FIRE ALARM
FCC	FLUSH CONCRETE CURB
FES	FLARED END SECTION
FFE	FINISH FLOOR ELEVATION
FLNP	FIRE LANE NO PARKING
FPS	FEET PER SECOND
FS	FIRE SERVICE
FT	FOOT/FEET
GC	GENERAL CONTRACTOR
GEN	GENERAL
GG	GAS GATE
GR	GUIDE RAIL
GRAN	GRANITE
GV	GATE VALVE
GV&B	GATE VALVE & BOX
GW	GROUND WATER
HCR	HANDICAP RAMP
HOR	HORIZONTAL
HT	HEIGHT
HW	HEADWALL
HWY	HIGHWAY
HYD	HYDRANT
ID	INSIDE DIAMETER
IN	INCHES
INCL	INCLUDE
INST	INSTALLED
INV, I.E.	INVERT, INVERT ELEVATION
L	LENGTH
LB	LEACHING BASIN
LP	LIGHT POLE
MAT	MATERIAL
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MW	MONITORING WELL
N	NORTH
NIC	NOT IN CONTRACT
NO	NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OHW	OVERHEAD WIRE
OVHD	OVERHEAD
OW	OBSERVATION WELL
PC	POINT OF CURVATURE
PCC	PRECAST CONCRETE CURB
PI	POINT OF INTERSECTION
PKG	PARKING
PL	PROPERTY LINE
PLMB	PLUMBING
POC	POINT ON CURVATURE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROP, P	PROPOSED
PT	POINT (OR POINT OF TANGENT)
PVC	POLYVINYL CHLORIDE (PIPE)
R&R	REMOVE & RESET/REPLACE
R&S	REMOVE & STACK
RCP	REINFORCED CONCRETE PIPE
RD	ROAD (OR ROOF DRAIN)
RED	REDUCER
RELOC	RELOCATE
REM	REMOVE
RET	RETAIN, RETAINING OR RETENTION
ROW	RIGHT OF WAY
RR	RAILROAD
RWL	RAIN WATER LEADER
RWY	ROADWAY
SD	SUBDRAIN
SF	SQUARE FEET
SGC	SLOPED GRANITE CURB
SMH	SEWER MANHOLE
SP	STANDPIPE
SPEC	SPECIFICATION
STA	STATION
STC	STORMCEPTOR
STD	STANDARD
STRTL	STRUCTURAL
SWEL	SOLID WHITE EDGE LINE
SW	SIDEWALK
SWLL	SOLID WHITE LANE LINE
SYCL	SOLID YELLOW CENTERLINE
TB	TEST BORING
TC	TOP OF CURB
TD	TRENCH DRAIN
TEL, T	TELEPHONE
TMH	TELEPHONE MANHOLE
TOS	TOP OF SLOPE
TOW	TOP OF WALL
TP	TEST PIT
TS&V	TAPPING SLEEVE & VALVE
TYP	TYPICAL
UD	UNDERDRAIN
UL	UNDERWRITERS LABORATORY
UP	UTILITY POLE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VGC	VERTICAL GRANITE CURB
WD	WOOD
WG	WATER GATE
WM	WATER MAIN
WMH	WATER MANHOLE
WSO	WATER SHUTOFF

N:\PROJECTS\2398–01A\CIVIL\DRAWINGS\CURRENT\C–2398–01A_ABBREVIATIONS & NOTES.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	NONE	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR
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DRAWING TITLE:	SHEET No.
ABBREVIATIONS & NOTES	C-001

EROSION CONTROL NOTES

EROSION & SEDIMENTATION CONTROL NOTES:

1. EROSION CONTROL SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND SHALL BE ADEQUATE TO MAINTAIN SEDIMENT ON SITE. ANY MODIFICATIONS TO SILT CONTROLS SHOWN ON THE APPROVED PLANS AS A RESULT OF ACTUAL FIELD CONDITIONS OR CONSTRUCTION PRACTICES SHALL BE INSTALLED IN ACCORDANCE WITH B.M.P. (BEST MANAGEMENT PRACTICES) PER THE E.P.A. 2017 "CONSTRUCTION GENERAL PERMIT" MANUAL, AND MASSACHUSETTS 2003 EROSION & SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS. ANY SUCH MODIFICATIONS FROM THE ABOVE MANUALS SHALL BE INSTALLED AS APPROVED BY THE ENGINEER OR THE LOCAL MUNICIPALITY.
2. AREAS OF EXPOSED SOIL UNDERGOING CONSTRUCTION THAT WILL NOT BE COVERED AND OR FINISHED GRADED SHALL BE STABILIZED AS SOON AS PRACTICABLE BUT IN NO CASE MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY (UNLESS MUNICIPALITY HAS STRICTER REQUIREMENTS WHICH SHALL BE FOLLOWED) IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. TEMPORARY EROSION CONTROL MEASURES SHALL INCLUDE EROSION CONTROL MESH, NETTING OR MULCH AS DIRECTED BY THE OWNER'S REPRESENTATIVE AND SHOWN ON THE DESIGN PLANS. IF MULCH IS USED, STRAW MULCH SHALL BE APPLIED AT THE RATE OF 4 BALES PER 1,000 SQUARE FEET. APPLICATION AREA SHALL BE SUFFICIENTLY COVERED WITH MULCH TO AVOID ANY VISIBLE SOIL EXPOSURE. MULCH SHALL BE KEPT MOIST TO AVOID LOSS DUE TO WIND. MULCH AND NETTING SHALL BE APPLIED IN THE BASE OF ALL GRASSED WATERWAYS, IN VEGETATIVE SLOPES WHICH EXCEED 15% AND DISTURBED AREAS WITHIN 100 FEET OF WETLANDS OR STREAMS.
3. IF DISTURBED AREAS DO NOT RECEIVE FINAL SEEDING BY OCTOBER 1ST OF THE CONSTRUCTION YEAR, THEN ALL DISTURBED AREAS SHALL BE SEEDED WITH A WINTER COVER CROP AT THE RATE OF 3 LBS PER 1,000 SQUARE FEET. WINTER SEEDING SHALL BE COVERED WITH EROSION CONTROL MESH (MULCH AND NETTING). HEAVY GRADE MATS SHALL BE USED IN THE BASE OF ALL GRASSED WATERWAYS ON VEGETATED SLOPES IN EXCESS OF 15%, AND ANY DISTURBED AREAS WITHIN 100 FEET OF WETLANDS OR STREAMS. MULCH AND NETTING SHALL ALSO BE PROVIDED FOR ADDITIONAL WINTER PROTECTION.
4. ALL TOPSOIL SHALL BE COLLECTED, STOCKPILED, SEEDED WITH RYE AT 3LBS PER 1,000 SQUARE FOOT AND MULCHED, AND REUSED AS REQUIRED. TUBULAR BARRIERS SHALL BE PLACED DOWN GRADIENT FROM STOCKPILED LOAM. LOAM SHALL BE STOCKPILED AT LOCATIONS DESIGNATED BY THE OWNER AND ENGINEER.
5. ALL TUBULAR BARRIERS, SILT SACKS, AND EROSION CONTROL BERMS SHALL BE INSTALLED ACCORDING TO THE SITE PREPARATION PLAN. THESE SHALL BE MAINTAINED DURING DEVELOPMENT TO REMOVE SEDIMENT FROM RUNOFF WATER. ALL THE FILTER BARRIERS AND EROSION CONTROL BERMS SHALL BE INSPECTED AFTER ANY RAINFALL OR RUNOFF EVENT, MAINTAINED AND CLEANED UNTIL ALL AREAS HAVE AT LEAST 85-90% VIGOROUS PERENNIAL COVER OF GRASSES.
6. ADJACENT ROADS SHALL BE PERIODICALLY SWEPT OR WASHED TO AVOID TRACKING MUD, DUST OR DEBRIS FROM THE CONSTRUCTION AREA AS OFTEN AS NECESSARY (WHICH COULD BE ON A DAILY BASIS) TO REMOVE ANY SOIL OR SEDIMENTS AT NO ADDITIONAL COST TO THE OWNER. A WATERING TRUCK WILL BE USED TO PERIODICALLY SPRINKLE CONSTRUCTION AREAS IN ORDER TO KEEP THE LEVEL OF DUST TO A MINIMUM DURING THE DRY MONTHS AT NO ADDITIONAL COST TO THE OWNER.
7. THE CONTRACTOR SHALL USE EXTREME CAUTION TO AVOID ALLOWING SEDIMENTS TO ENTER THE STORM DRAIN SYSTEM DURING CONSTRUCTION. BOTH EXISTING AND PROPOSED CATCH BASIN INLETS SHALL BE PROTECTED DURING CONSTRUCTION BY THE USE SILT SACKS AND/OR TUBULAR BARRIERS AROUND EACH INLET AS NOTED ON THE PLANS. INLET PROTECTION MAY BE REMOVED ONLY AFTER FINISHED AREAS ARE PAVED AND THE VEGETATED SLOPES ARE ESTABLISHED WITH AT LEAST 85-90% OF VIGOROUS PERENNIAL GROWTH.
8. AS APPLICABLE, EROSION CONTROL MESH SHALL BE APPLIED IN ACCORDANCE WITH THE PLANS OVER ALL FINISHED SEEDED AREAS AS SPECIFIED ON THE DESIGN PLANS.
9. AT A MINIMUM, ALL TUBULAR BARRIERS AND FILTER FABRIC SHALL REMAIN IN PLACE UNTIL SEEDINGS OR PLANTINGS HAVE BECOME 85-90% ESTABLISHED. THE LOCAL CONSERVATION COMMISSION MUST APPROVE THE REMOVAL OR RELOCATION OF ANY OF THE TUBULAR BARRIERS AND FILTER FABRIC. ONCE THE TUBULAR BARRIERS ARE REMOVED THE AREAS ARE TO BE LOAMED AND SEEDED TO ACHIEVE FULL STABILIZATION.
10. AT THE OWNER'S DISCRETION ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED TO MAINTAIN STABILITY OF EARTHWORKS AND FINISHED GRADED AREAS. THE CONTRACTOR, AT HIS EXPENSE, WILL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ANY ADDITIONAL MEASURES AS SPECIFIED BY THE OWNER. THIS INCLUDES BUT IS NOT LIMITED TO REQUESTS BY MA DEP, THE ENGINEER AND THE LOCAL MUNICIPALITY, AS AUTHORIZED BY THE OWNER. FAILURE TO COMPLY WITH THE OWNER'S DIRECTIONS WILL RESULT IN DISCONTINUATION OF CONSTRUCTION ACTIVITIES.
11. INSPECTIONS AND MONITORING MAINTENANCE MEASURES SHALL BE APPLIED AS NEEDED DURING THE ENTIRE CONSTRUCTION CYCLE. WEEKLY INSPECTIONS SHALL BE HELD THROUGH THE DURATION OF CONSTRUCTION ACTIVITY. WEEKLY INSPECTION REPORTS SHALL BE MAINTAINED BY THE CONTRACTOR AND LOCATED IN THE CONTRACTORS FIELD OFFICE ONSITE. IN ADDITION TO THE NORMAL WEEKLY INSPECTIONS, THE CONTRACTOR SHALL PERFORM AN INSPECTION OF ALL EROSION CONTROL MEASURES AFTER EACH RAINFALL OR RUNOFF EVENT, AND PERFORM THE NECESSARY REPAIRS. THE INSPECTIONS SHALL INCLUDE BUT NOT BE LIMITED TO THE SITE'S DOWN STREAM DISCHARGE POINTS.
12. IF ANY EVIDENCE OF SEDIMENTATION IS OBSERVED AT THE STORMWATER MANAGEMENT AREA INLETS, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, PROVIDE A PLAN TO THE ENGINEER TO REMOVE ANY ACCUMULATED SEDIMENT IN THESE AREAS. THE CONTRACTOR SHALL ALSO IMMEDIATELY PROVIDE ADDITIONAL ON SITE EROSION AND SEDIMENTATION CONTROL MEASURES TO PREVENT FURTHER DEGRADATION OF THE AREA.
13. FOLLOWING THE TEMPORARY OR FINAL SEEDINGS, THE CONTRACTOR SHALL INSPECT THE WORK AREA SEMI-MONTHLY TO ENSURE THE AREAS HAVE A MINIMUM OF 85-90% VEGETATED VIGOROUS GROWTH. RE-SEEDING SHALL BE CARRIED OUT BY THE CONTRACTOR WITH FOLLOW UP INSPECTIONS IN THE EVENT OF ANY FAILURES UNTIL VEGETATION IS ADEQUATELY ESTABLISHED.
14. CONTRACTOR & ALL SITE SUBCONTRACTORS SHALL BE FAMILIAR WITH & FOLLOW ALL APPROVED PERMITS AND CONDITIONS. CONTRACTOR SHALL MAINTAIN A COPY OF ALL APPROVED PERMITS ONSITE. ALL CONDITIONS & RECOMMENDATIONS WITHIN THE APPROVED PERMITS SHALL BE COMPLETED.
15. ALL EROSION MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND SHALL BE ADEQUATE TO MAINTAIN SEDIMENT ON SITE. ANY MODIFICATIONS SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER OR THE LOCAL MUNICIPALITY.
16. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITE WORK IS COMPLETE AND GROUND COVER IS ESTABLISHED.
17. TOP OF STOCKPILES SHALL BE COVERED IN SUCH MANNER THAT STORMWATER DOES NOT INFILTRATE THE MATERIALS AND THEREBY RENDER THE SAME UNSUITABLE FOR FILL USE.
18. ALL DISTURBED OR EXPOSED AREAS SUBJECT TO EROSION SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER. NO AREA, SUBJECT TO EROSION SHALL BE LEFT DISTURBED AND UNSTABILIZED FOR PERIODS LONGER THAN IS ABSOLUTELY NECESSARY TO CARRY OUT THAT PORTION OF THE CONSTRUCTION WORK OR SIX MONTHS AFTER SOIL HAS BEEN DISTURBED WHICHEVER IS LESS.
19. CULVERT/PIPE INLETS AND OUTFALLS SHALL BE PROTECTED BY TUBULAR BARRIER FILTERS AND STONE CHECK DAMS UNTIL DISTURBED AREAS ARE PERMANENTLY STABILIZED.
20. TUBULAR BARRIER DIKES SHALL BE CONSTRUCTED AT ALL EXISTING & PROPOSED CATCH BASINS. NO SEDIMENTATION SHALL ENTER THE ON-SITE OR OFF-SITE DRAINAGE SYSTEMS AT ANY TIME.
21. ALL EROSION CONTROL MEASURES SHALL BE ROUTINELY INSPECTED, CLEANED AND REPAIRED OR REPLACED AS NECESSARY THROUGHOUT ALL PHASES OF CONSTRUCTION. IN ADDITION, INSPECTIONS SHALL TAKE PLACE WEEKLY AND BEFORE AND AFTER EACH RAINFALL EVENT.
22. ALL PROPOSED SLOPES STEEPER THAN 3:1 SHALL BE STABILIZED WITH JUTE MESH AND PROTECTED FROM EROSION UNTIL WORK IS COMPLETE AND GROUND COVER IS ESTABLISHED.
23. THE CONTRACTOR SHALL KEEP ON SITE AT ALL TIMES ADDITIONAL TUBULAR BARRIERS FOR INSTALLATION AT THE DIRECTION OF THE ENGINEER OR THE TOWN ENGINEER TO MITIGATE ANY EMERGENCY CONDITION.
24. AS CONSTRUCTION DISTURBANCE IS GREATER THAN 1 ACRE, A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) CONSTRUCTION GENERAL PERMIT NOI, AND STORM WATER POLLUTION PREVENTION PLAN (SWPPP) WILL NEED TO BE SUBMITTED TO THE EPA. THE NPDES PERMIT FOR STORM WATER DISCHARGE, & CONSTRUCTION GENERAL PERMIT NOI WILL BE REQUIRED TO BE SUBMITTED AT LEAST 14 DAYS PRIOR TO COMMENCING CONSTRUCTION BY THE CONTRACTOR.
25. OWNER AND CONTRACTOR ARE RESPONSIBLE FOR COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT NOI. WEEKLY SWPPP INSPECTION REPORTS TO BE PERFORMED BY CONTRACTOR. COPIES OF ALL SWPPP INSPECTION REPORTS SHALL BE PROVIDED TO THE LOCAL MUNICIPALITY, EPA, DEP, OR ANY OTHER AUTHORITY REQUESTING WITHIN 3 DAYS OF EACH INSPECTION.
26. APPLICABLE WORK AND MATERIALS SHALL COMPLY WITH ALL LOCAL, MA DEP, EPA CONSTRUCTION GENERAL PERMIT STANDARDS. ALL CONSTRUCTION SHALL CONFORM TO THE APPLICABLE SITE PLAN REGULATIONS FROM THE LOCAL AND USDA SOIL CONSERVATION SERVICE VEGETATIVE PRACTICES IN SITE DEVELOPMENT.
27. A WATERING TRUCK SHALL BE USED TO PERIODICALLY SPRINKLE CONSTRUCTION AREAS IN ORDER TO KEEP THE LEVEL OF DUST TO A MINIMUM DURING THE DRY MONTHS AND AS REQUIRED.
28. IF DEWATERING IS NECESSARY IT SHALL ONLY BE COMPLETED AS FOLLOWS: THE DISCHARGE SHALL BE STOPPED IMMEDIATELY IF THE RECEIVING AREA SHOWS ANY SIGN OF INSTABILITY OR EROSION. ALL CHANNELS, SWALES, AND DITCHES DUG FOR DISCHARGING WATER FROM THE EXCAVATED AREA SHALL BE STABLE PRIOR TO DIRECTING DISCHARGE TO THEM. IF A CONSTRUCTION EQUIPMENT BUCKET IS USED, IT SHALL EMPTY THE MATERIAL TO A STABLE AREA. NO DEWATERING SHALL OCCUR DURING PERIODS OF INTENSE, HEAVY RAIN. FLOW TO THE SEDIMENT REMOVAL STRUCTURE SHALL NOT EXCEED THE STRUCTURE'S CAPACITY TO SETTLE AND FILTER FLOW OR ITS VOLUME CAPACITY. WHENEVER POSSIBLE, THE DISCHARGE FROM THE SEDIMENT REMOVAL STRUCTURE SHALL DRAIN TO A WELL-VEGETATED BUFFER BY SHEET FLOW WHILE MAXIMIZING THE DISTANCE TO THE NEAREST WATER RESOURCE AND MINIMIZING THE SLOPE OF THE BUFFER AREA. THERE SHALL BE NO DIRECT DISCHARGE TO EXISTING WETLANDS OR STREAMS. ALL DISCHARGE SHALL BE IN COMPLIANCE WITH STATE, LOCAL, AND FEDERAL REQUIREMENTS.
29. INITIATE STABILIZATION OF EXPOSED AREAS IMMEDIATELY IF CONSTRUCTION WORK TEMPORARILY OR PERMANENTLY CEASES.
30. ALL DISCHARGES FROM POLLUTION SOURCES ARE PROHIBITED ONSITE SUCH AS FUELS, WASTEWATER FROM WASH OUT OF CONCRETE, WASTEWATER FROM CLEAN OUT OF PAINTS, FORM RELEASE OILS, SOLVENTS, ADHESIVES, CURING COMPOUNDS, POLLUTANTS USED FOR MAINTENANCE OF VEHICLES AND EQUIPMENT, SOAPS & SOLVENTS, TOXIC OR HAZARDOUS SUBSTANCES, CHEMICALS AND OILS. IF A POLLUTANT IS DISCHARGED IT NEEDS TO BE IMMEDIATELY CLEANED UP BY REMOVING THE CHEMICAL AND AFFECTED SOIL OR AREA OF SPILL FROM THE SITE IN ACCORDANCE WITH BOTH THE MANUFACTURER RECOMMENDATIONS, FEDERAL, STATE, AND LOCAL REQUIREMENTS. DO NOT HOSE DOWN AND SPREAD SPILLED ITEM. ALL CHEMICALS USED ON THE SITE SHALL BE IN LEAK-PROOF CONTAINERS STORED AWAY FROM WETLANDS, SURFACE WATERS, STORMWATER INLETS, AND DRAINAGE MEASURES. SPILL KITS SHALL BE AVAILABLE ONSITE FOR EMERGENCY USE. THERE SHALL BE A SECONDARY CONTAINMENT MEASURE OF ALL CHEMICALS IN ADDITION TO SPILL-PROOF CONTAINERS.
31. PRIOR TO COMMENCEMENT OF CONSTRUCTION, APPLICABLE CONTRACTOR PERSONNEL MUST HAVE AN UNDERSTANDING OF THE EPA CONSTRUCTION GENERAL PERMIT REQUIREMENTS AND THEIR SPECIFIC RESPONSIBILITIES UNDER THE PERMIT. AT A MINIMUM, PERSONNEL MUST BE TRAINED AND UNDERSTAND THE FOLLOWING: LOCATION OF ALL STORMWATER CONTROLS AND HOW TO MAINTAIN THEM, PROCEDURES FOR COMPLYING WITH THE POLLUTION PREVENTION REQUIREMENTS. PROCEDURES FOR CONDUCTING INSPECTIONS, RECORDING FINDINGS, AND TAKING CORRECTIVE ACTION.
32. ALL SEDIMENT TRACKED ONTO ROADWAYS MUST BE REMOVED AT END OF EACH WORK DAY.
33. ALL USE OF CATIONIC TREATMENT CHEMICALS (EXAMPLES INCLUDE POLYMERS, CHITOSAN, CATIONIC PAM, FLOCCULANTS OR OTHER CHEMICAL UTILIZED FOR STABILIZATION) ARE PROHIBITED. IF ALL OTHER AVAILABLE STABILIZATION MEASURES ARE NOT POSSIBLE AND USE OF CATIONIC CHEMICALS IS ABSOLUTELY NECESSARY THE CONTRACTOR WILL NEED TO CONTACT THE EPA NEW ENGLAND OFFICE IN WRITING FOR APPROVAL AND SPECIFIC REQUIREMENTS (MAXIMUM DOSAGE RATE, RESIDUAL TESTING, SPECIFIC LIMITATIONS, ETC) PRIOR TO USE.
34. IF USING NON-VEGETATIVE STABILIZATION MEASURES, IT MUST BE COMPLETED NO LATER THAN 14 DAYS AFTER INITIATING STABILIZATION. ALL AREAS OF EXPOSED SOILS MUST BE COVERED.
35. INSPECTIONS OF EROSION CONTROL MEASURES SHALL BE AT LEAST ONCE EVERY 7 DAYS BY THE CONTRACTOR. AT A MINIMUM INSPECTIONS SHALL INCLUDE ALL DISTURBED AREAS, ALL STORMWATER CONTROLS AND POLLUTION PREVENTION MEASURES, ALL LOCATIONS WHERE STABILIZATION MEASURES HAVE BEEN IMPLEMENTED, EQUIPMENT AND MATERIAL STORAGE AREAS, ALL AREAS WHERE STORMWATER FLOWS AND ALL POINTS OF DISCHARGE. WHEN CORRECTIVE ACTIONS ARE REQUIRED, THE CONTRACTOR MUST IMMEDIATELY TAKE ALL STEPS TO PREVENT POLLUTANT DISCHARGES UNTIL A PERMANENT SOLUTION IS IMPLEMENTED. AS NECESSARY NEW OR MODIFIED CONTROLS MUST BE INSTALLED AND OPERATIONAL, THE REPAIR MUST BE COMPLETED WITHIN 7 DAYS FROM THE TIME OF DISCOVERY. WITHIN 24 HOURS OF A TRIGGERING CONDITION OCCURRING THAT REQUIRES A CORRECTIVE ACTION, A CORRECTIVE ACTION REPORT MUST BE COMPLETED.

MAINTENANCE:

1. ALL MEASURES STATED ON THE STORMWATER POLLUTION PREVENTION PLANS, SHALL BE MAINTAINED IN FULLY FUNCTIONAL CONDITION BY CONTRACTOR UNTIL NO LONGER REQUIRED FOR A COMPLETED PHASE OF WORK OR FINAL STABILIZATION OF THE SITE. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CHECKED BY A QUALIFIED PERSON IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR THE APPLICABLE PERMIT, WHICHEVER IS MORE STRINGENT, AND REPAIRED IN ACCORDANCE WITH THE FOLLOWING:
   - INLET PROTECTION DEVICES AND BARRIERS SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING, OR DETERIORATION.
   - ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A HEALTHY STAND OF GRASS IS MAINTAINED. AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
   - ALL SEDIMENT CONTROLS SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE TUBULAR SEDIMENT CONTROLS WHEN IT REACHES HALF THE HEIGHT OF THE CONTROL MEASURE OR AS REQUESTED BY THE OWNER OR ENGINEER.
   - THE CONSTRUCTION ENTRANCES SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE CONSTRUCTION ENTRANCES AS CONDITIONS DEMAND.
   - THE TEMPORARY PARKING AND STORAGE AREA SHALL BE KEPT IN GOOD CONDITION (SUITABLE FOR PARKING AND STORAGE). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE TEMPORARY PARKING AS CONDITIONS DEMAND.
   - OUTLET STRUCTURES IN THE SEDIMENTATION BASINS SHALL BE MAINTAINED IN OPERATIONAL CONDITIONS AT ALL TIMES. SEDIMENT SHALL BE REMOVED FROM SEDIMENT BASINS OR TRAPS WHEN THE DESIGN CAPACITY HAS BEEN REDUCED BY 50%.

CONSTRUCTION GENERAL PERMIT NOTES AND NARRATIVE:

1. NARRATIVE: THE STORMWATER POLLUTION PREVENTION PLANS CONSIST OF THE SITE PREPARATION PLAN TOGETHER WITH AN EXISTING CONDITIONS PLANS, GRADING PLANS, ABBREVIATIONS AND NOTES SHEETS, AND DETAIL SHEETS.
2. THE EROSION CONTROL PLAN WILL BE IMPLEMENTED TO:
3. TREAT EROSION AS SOON AS POSSIBLE AFTER DISTURBANCE.
4. PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION AREA AND ENTERING THE RECEIVING WATERS.
5. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE EROSION.
6. ONLY DISTURB, CLEAR, OR GRADE AREAS NECESSARY FOR CONSTRUCTION.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_ABBREVIATIONS & NOTES.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	NONE	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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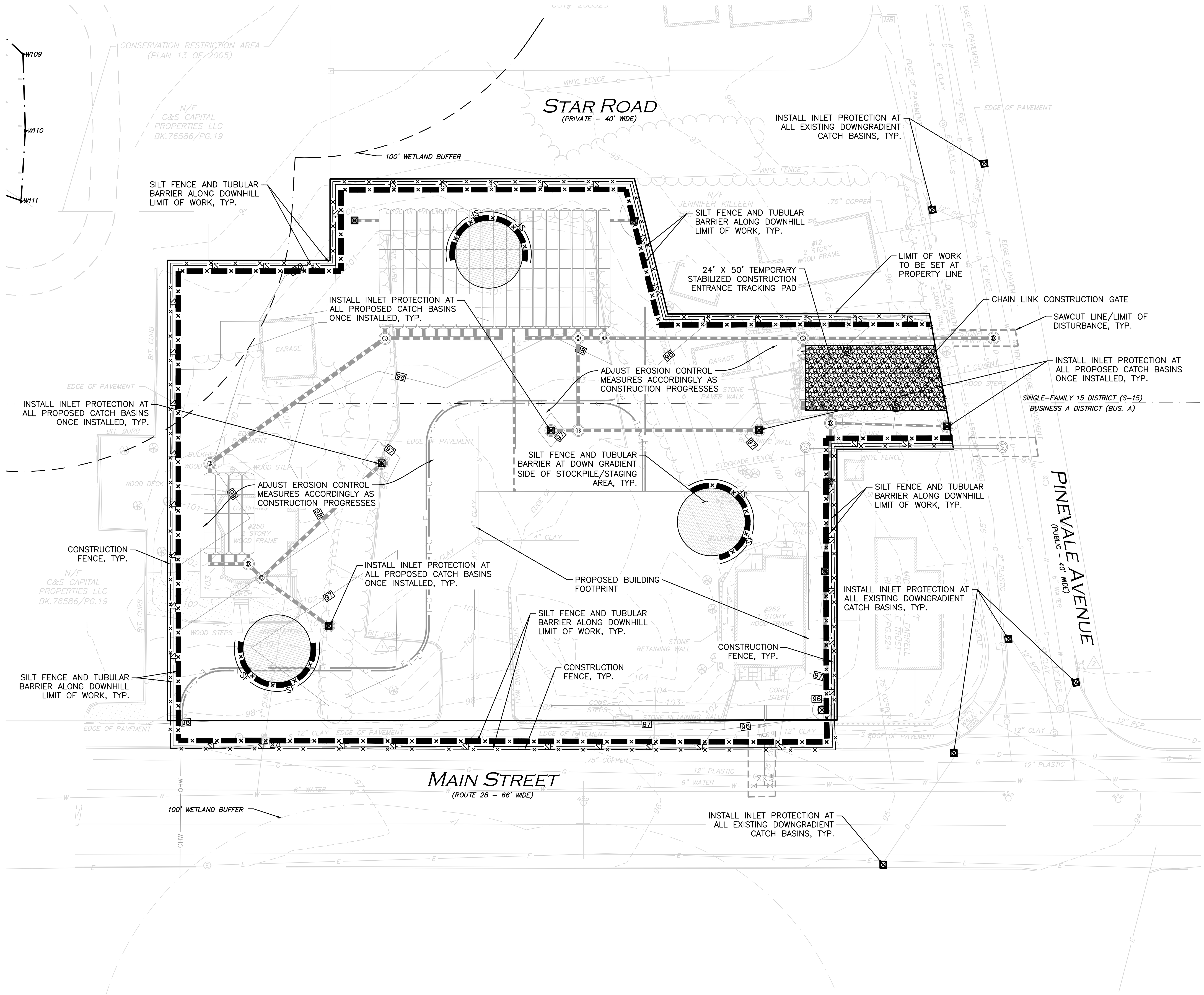
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: ABBREVIATIONS & NOTES

SHEET No. C-002



LEGEND

SILT FENCE	——SF——
TUBULAR BARRIER	
EROSION CONTROL FABRIC	
CATCH BASIN FILTER	
STONE CHECK DAM	
STABILIZED ENTRANCE	
CONSTRUCTION FENCE	—x—x—
STOCKPILE/STAGING AREA	

NOTES:

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2. ALL ELEVATIONS REFER TO NAVD 88.
3. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.
4. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE TOWN OF READING DEPARTMENT OF PUBLIC WORKS AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   DIGSAFE: 1-800-344-7233
   READING DEPT. OF PUBLIC WORKS: 1-781-942-9092
5. SEE THE ABBREVIATIONS AND NOTES PLAN, C-001 AND C-002 FOR GENERAL NOTES, AND EROSION CONTROL NOTES.
6. EXISTING CONDITIONS BASE PLAN TAKEN FROM PLANS ENTITLED "PROPERTY LINE/EXISTING CONDITIONS 252-260 MAIN STREET READING" PREPARED BY ALLEN & MAJOR ASSOCIATES, SHEET V-101, ORIGINAL SCALE 1"=20', DATED SEPTEMEBR 6, 2023.

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

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

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_EROSION CONTROL.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

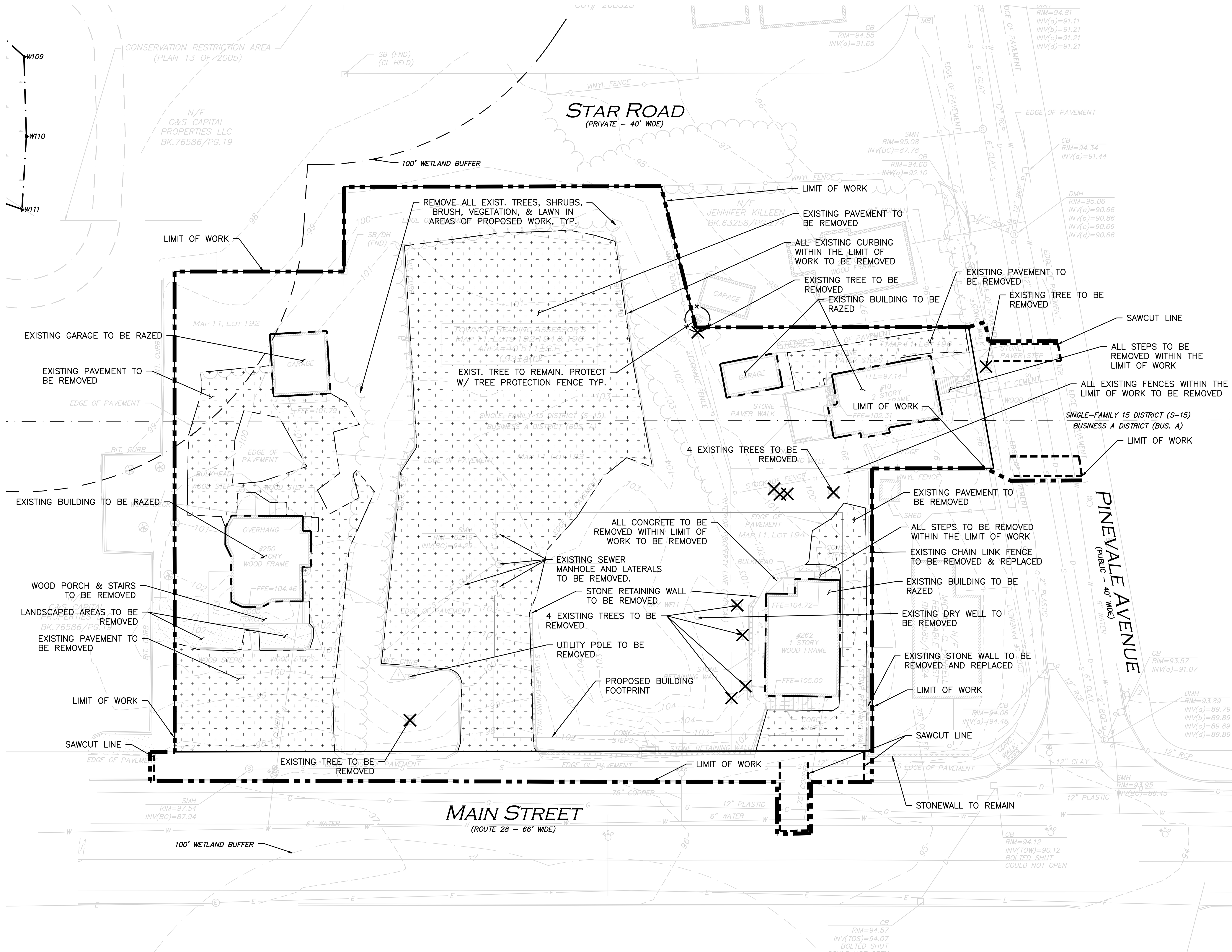
PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
EROSION CONTROL PLAN	C-100



LEGEND

LIMIT OF WORK	
TREE TO BE REMOVED	
BUILDING TO BE REMOVED	
PAVEMENT TO BE REMOVED	
UTILITY CUT AND CAP	
TEMPORARY FENCE	
SAWCUT LINE	

NOTES:

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   DIGSAFE: 1-800-344-7233
   READING DEPT. OF PUBLIC WORKS: 1-781-942-9092
3. ALTHOUGH CERTAIN ITEMS HAVE BEEN NOTED ON THIS DRAWING FOR DEMOLITION, NO ATTEMPT HAS BEEN MADE TO DELINEATE EACH AND EVERY ITEM THAT REQUIRES DEMOLITION FOR THE COMPLETION OF THE PROJECT. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL NECESSARY DEMOLITION WORK TO COMPLETE THE PROJECT AT NO ADDITIONAL COST TO THE OWNER. ALLEN & MAJOR ASSOCIATES, INC. IS NOT RESPONSIBLE FOR SITE DEMOLITION ITEMS NOT SHOWN ON THE SURVEY, OR SPECIFICALLY NOTED. THE DEMOLITION NOTES AND ARROWS ON THIS PLAN ARE TYPICAL AND DO NOT REFLECT QUANTITY.

DIG SAFE

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

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_SITE PREPERATION.DWG

COMMONWEALTH OF MASSACHUSETTS CARLTON M. QUINN CIVIL No.49923 REGISTERED PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

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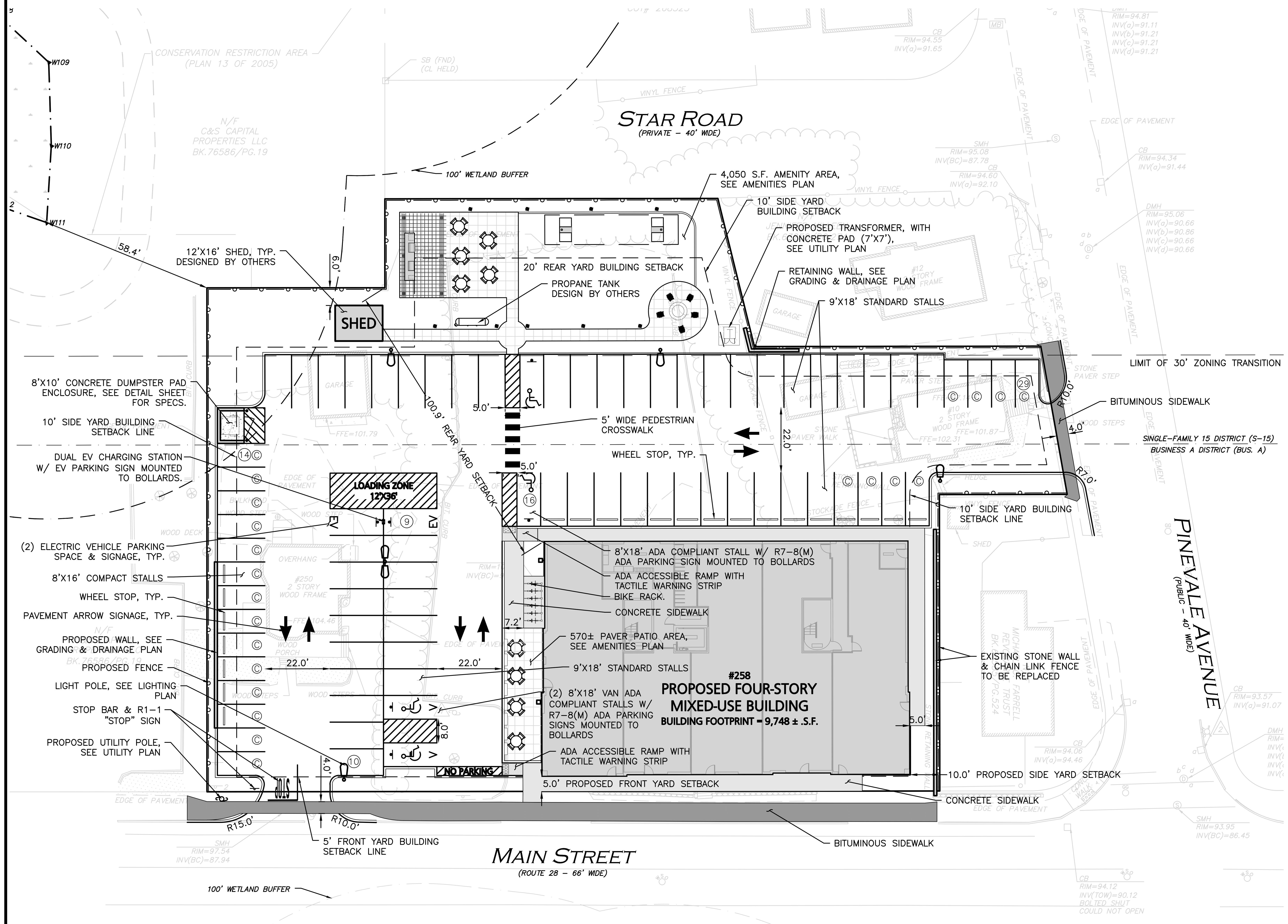
DRAWING TITLE:	SHEET No.
SITE PREPARATION PLAN	C-101



LEGEND

- PROP. PROPERTY LINE
- SIGN
- BOLLARD
- BUILDING
- BUILDING ARCHITECTURE
- BUILDING INTERIOR WALLS
- CURB
- RETAINING WALL
- PARKING STRIPING
- ROADWAY STRIPING
- TRAFFIC ARROWS
- SIDEWALK
- ADA ACCESSIBLE RAMP
- ADA DET. WARNING SURFACE
- SETBACK LINE
- PARKING COUNT
- COMPACT PARKING STALL
- DECORATIVE FENCE
- TRANSFORMER
- LIGHTING

DIMENSIONAL REQUIREMENTS: BUSINESS-A DISTRICT (BUS. A) MIXED-USE DEVELOPMENT

ITEM	REQUIRED/ALLOWED	PROPOSED
LOT AREA (MIN.)	N/A	46,094± S.F. 1.05± ACRES
LOT FRONTAGE (MIN.)	N/A	247'.0
FRONT YARD BUILDING SETBACK	5' (MIN.)	5'.0
SIDE YARD BUILDING SETBACK	10' (MIN.)	10.0'
REAR YARD BUILDING SETBACK	20' (MIN.)	100.9'
BUILDING LOT COVERAGE (MAX.)	60%	21.1%
BUILDING HEIGHT (MAX.)	45'	45.0'
OPEN SPACE	N/A	28.0%

OFF-STREET PARKING SUMMARY

USE: RETAIL STORES/OFFICES/CONSUMER ESTABLISHMENTS
ONE SPACE PER 300 SQUARE FEET (S.F.) OF GROSS FLOOR AREA

RESIDENTIAL
1.25 SPACES PER DWELLING UNIT

PARKING SUMMARY:
USE: 8,100 S.F. RETAIL (NET)
8,100/300 = 27 REQUIRED SPACES.

USE: 40 UNITS
40*1.25 = 50 REQUIRED SPACES

ADA REQUIRED: THERE ARE BETWEEN 76–100 PROPOSED PARKING SPACES, REQUIRING 4 TOTAL PARKING STALLS TO BE ACCESSIBLE AND ONE VAN ACCESSIBLE.

ADA PROVIDED: 4 TOTAL ACCESSIBLE WITH 2 VAN ACCESSIBLE

EV PROVIDED: 2 EV ACCESSIBLE PARKING SPACES EQUIPPED WITH DUAL CHARING PORT

STANDARD (9'x18')	COMPACT (8'x16') (1)	TANDEM (9'x18')	ACCESSIBLE (8'x18')	TOTAL PROVIDED	TOTAL REQUIRED
52	22 (28%)	0	4	78	77

(1) PER READING ZONING BYLAW DATED APRIL 2022 SECTION 5.6.7.4(C), UP TO 30% OF THE TOTAL REQUIRED PARKING SPACES FOR A MIXED-USE PROJECT MAY BE STRIPED AND MARKED AS COMPACT SPACES (8'X16').

GENERAL NOTES:

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DIG SAFE

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

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_LAYOUT & MATERIALS.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN CIVIL No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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WOBURN MA 01801
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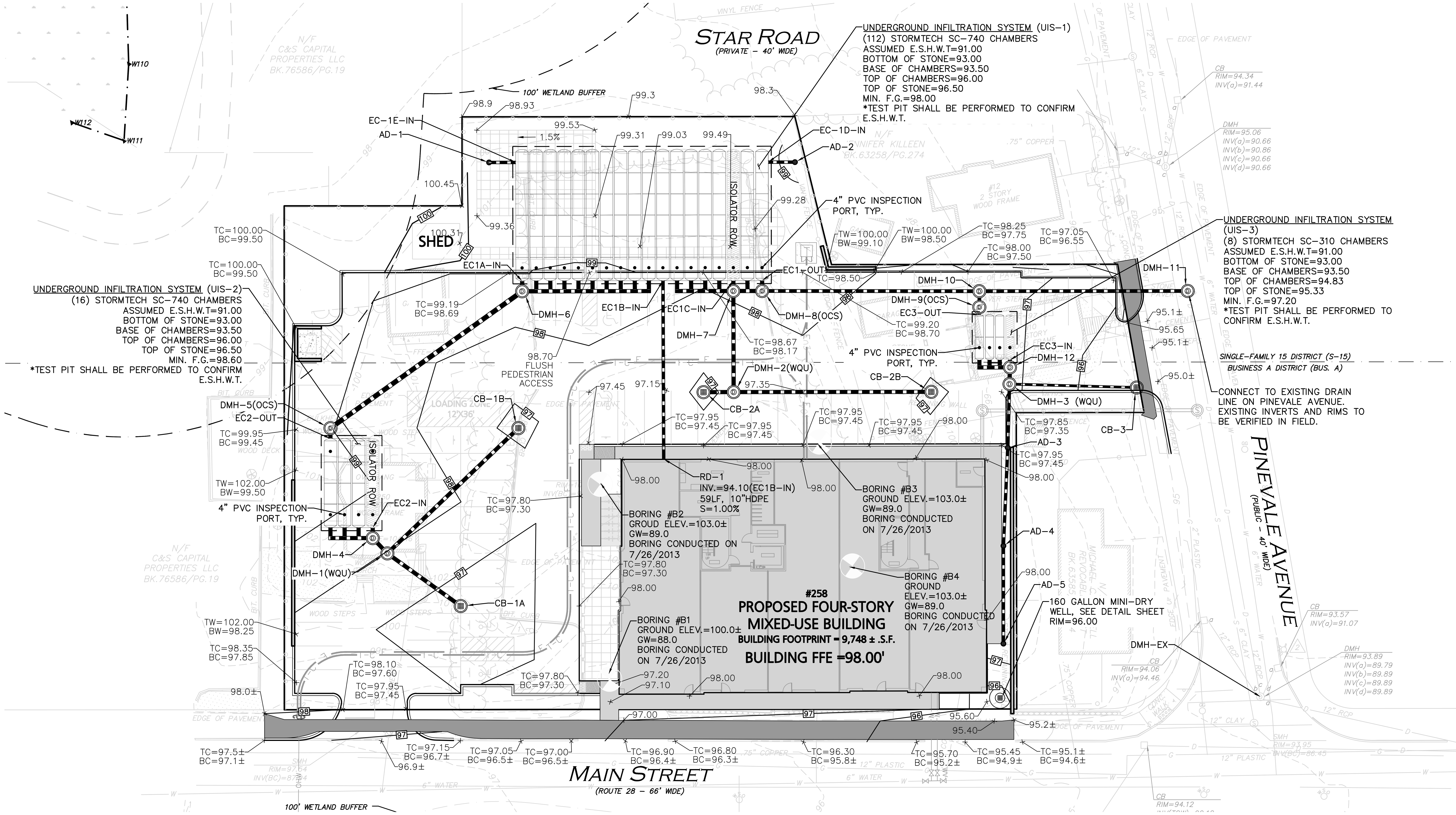
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: LAYOUT & MATERIALS PLAN

SHEET No. C-102



LEGEND

DRAIN MANHOLE (DMH)	
CATCH BASIN (CB)	
OUTLET CONTROL STRUCTURE	OCS
WATER QUALITY UNIT	WQU
ISOLATOR ROW	
DRAIN LINE	
10' CONTOUR	150
2' CONTOUR	148
SPOT GRADE	TC=98.00 BC=97.50
INFILTRATION SYSTEM	
END CAP	EC
AREA DRAIN (AD)	
INFILTRATION CHAMBERS	

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   DIGSAFE: 1–800–344–7233
   READING DEPT. OF PUBLIC WORKS: 1–781–942–9092
3. PIPE DIMENSIONS ARE MEASURED FROM CENTER TO CENTER OF EACH STRUCTURE.
4. ALL ELEVATIONS REFER TO NAVD 88.

DRAIN STRUCTURE TABLE

STRUCTURE	STRUCTURE DETAILS
AD–1	RIM = 99.50 INV OUT = 93.59 (EC–1E–IN)
AD–2	RIM = 98.60 INV OUT = 93.59 (EC–1D–IN)
AD–3	RIM = 97.35 INV IN = 93.97 (AD–4) INV OUT = 93.87 (DMH–3 (WQU))
AD–4	RIM = 97.35 INV IN = 94.40 (AD–5) INV OUT = 94.30 (AD–3)
AD–5	RIM = 97.35 INV OUT = 94.73 (AD–4)
CB–1A	RIM = 96.50 INV OUT = 93.98 (DMH–1(WQU))
CB–1B	RIM = 96.85 INV OUT = 94.28 (DMH–1(WQU))
CB–2A	RIM = 96.85 INV OUT = 94.04 (DMH–2(WQU))
CB–2B	RIM = 96.85 INV OUT = 94.61 (DMH–2(WQU))
CB–3	RIM = 95.50 INV OUT = 93.87 (DMH–3 (WQU))
DMH–1(WQU)	RIM = 98.15 INV IN = 93.67 (CB–1A) INV IN = 93.67 (CB–1B) INV OUT = 93.57 (DMH–4)
DMH–2(WQU)	RIM = 97.10 INV IN = 93.94 (CB–2A) INV IN = 93.94 (CB–2B) INV OUT = 93.84 (DMH–7)

DRAIN STRUCTURE TABLE

STRUCTURE	STRUCTURE DETAILS
DMH–3 (WQU)	RIM = 97.30 INV IN = 93.66 (AD–3) INV IN = 93.66 (CB–3) INV OUT = 93.56 (DMH–12)
DMH–4	RIM = 98.40 INV IN = 93.50 (DMH–1(WQU)) INV OUT = 93.50 (EC2–IN)
DMH–5(OCS)	RIM = 99.00 INV IN = 93.50 (EC2–OUT) INV OUT = 96.10 (DMH–6)
DMH–6	RIM = 98.70 INV IN = 93.50 (DMH–5(OCS)) INV OUT = 93.50 (EC1A–IN)
DMH–7	RIM = 98.20 INV IN = 93.50 (DMH–2(WQU)) INV OUT = 93.50 (EC1C–IN)
DMH–8(OCS)	RIM = 98.30 INV IN = 93.50 (EC1–OUT) INV OUT = 96.40 (DMH–10)
DMH–9(OCS)	RIM = 97.40 INV IN = 93.50 (EC3–OUT) INV OUT = 95.20 (DMH–10)
DMH–10	RIM = 97.50 INV IN = 95.15 (DMH–9(OCS)) INV IN = 95.15 (DMH–8(OCS)) INV OUT = 95.05 (DMH–11)
DMH–12	RIM = 97.20 INV IN = 93.50 (DMH–3 (WQU)) INV OUT = 93.50 (EC3–IN)

DRAIN PIPE TABLE

PIPE SEGMENT	SIZE	LENGTH	SLOPE	MATERIAL
AD–1 – EC–1E–IN	10"	9.00'	1.00%	HDPE
AD–2 – EC–1D–IN	10"	9.00'	1.00%	HDPE
AD–3 – DMH–3 (WQU)	10"	21.48'	1.00%	HDPE
AD–4 – AD–3	10"	33.14'	1.00%	HDPE
AD–5 – AD–4	10"	33.01'	1.00%	HDPE
CB–1A – DMH–1(WQU)	12"	30.46'	1.00%	HDPE
CB–1B – DMH–1(WQU)	12"	61.16'	1.00%	HDPE
CB–2A – DMH–2(WQU)	12"	10.15'	1.00%	HDPE
CB–2B – DMH–2(WQU)	12"	66.67'	1.00%	HDPE
CB–3 – DMH–3 (WQU)	8"	42.94'	0.50%	PVC
DMH–1(WQU) – DMH–4	12"	7.14'	0.99%	HDPE
DMH–2(WQU) – DMH–7	12"	34.09'	1.00%	HDPE
DMH–3 (WQU) – DMH–12	12"	5.63'	1.00%	HDPE
DMH–5(OCS) – DMH–6	15"	79.46'	3.27%	HDPE
DMH–8(OCS) – DMH–10	12"	73.28'	1.71%	HDPE
DMH–9(OCS) – DMH–10	12"	5.38'	1.00%	HDPE
DMH–10 – DMH–11	12"	70.30'	1.00%	HDPE
RD–1 – EC1B–IN	12"	60.16'	1.00%	HDPE

DIG SAFE

BEFORE YOU DIG
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1-888-344-7233

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398–01A\CIVIL\DRAWINGS\CURRENT\C–2398–01A_GRADING & DRAINAGE.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO. 2398-01A	DATE: 10-05-2023
SCALE: 1" = 20'	DWG. NAME: C-2398-01A
DESIGNED BY: MTB	CHECKED BY: CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
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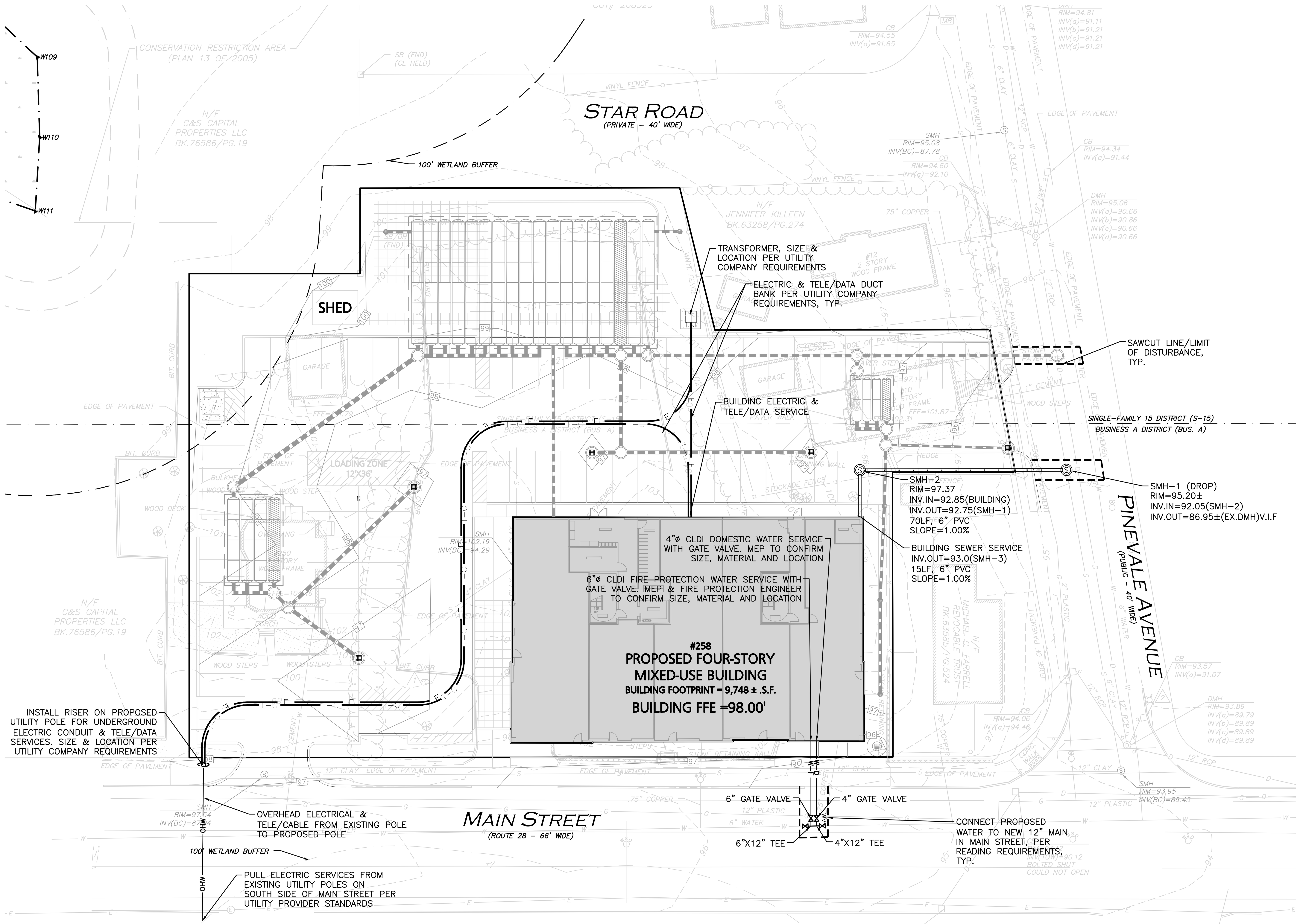
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: GRADING & DRAINAGE PLAN

SHEET No. C-103



LEGEND

SEWER MANHOLE	
SEWER LINE	
WATER LINE	W
WATER (FIRE SERVICE)	W-F
WATER (DOMESTIC SERVICE)	W-D
WATER VALVE	WV
OVER HEAD WIRE	OHW
UTILITY POLE	
ELECTRICAL CONDUIT	E
TELE/CABLE CONDUIT	T-C
SAWCUT LINE	

NOTES:

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   DIGSAFE: 1-800-344-7233
   READING DEPT. OF PUBLIC WORKS: 1-781-942-9092
5. ALL WATER CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH TOWN OF READING STANDARDS, TYP.

DIG SAFE

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

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_UTILITIES.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
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c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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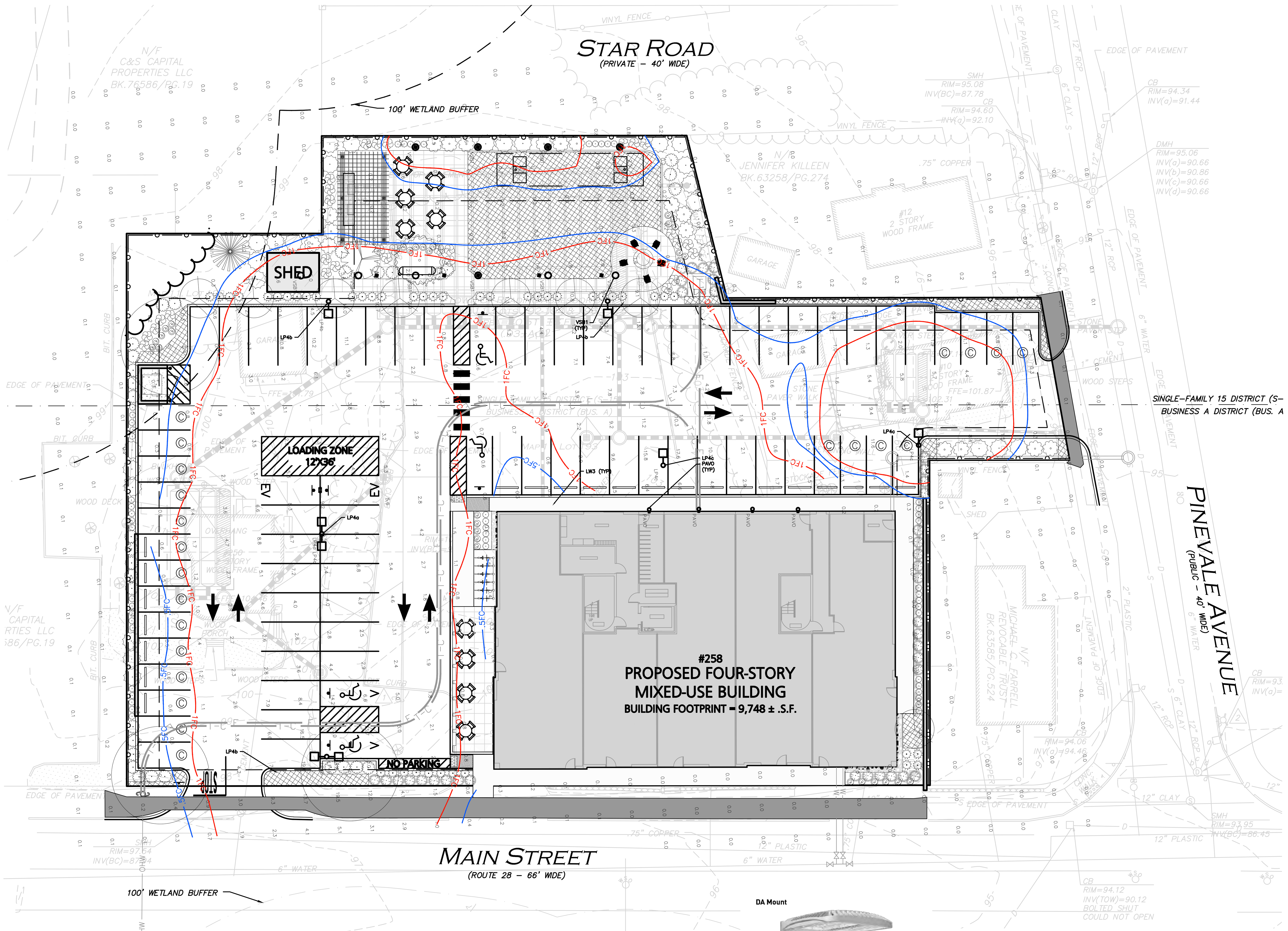
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

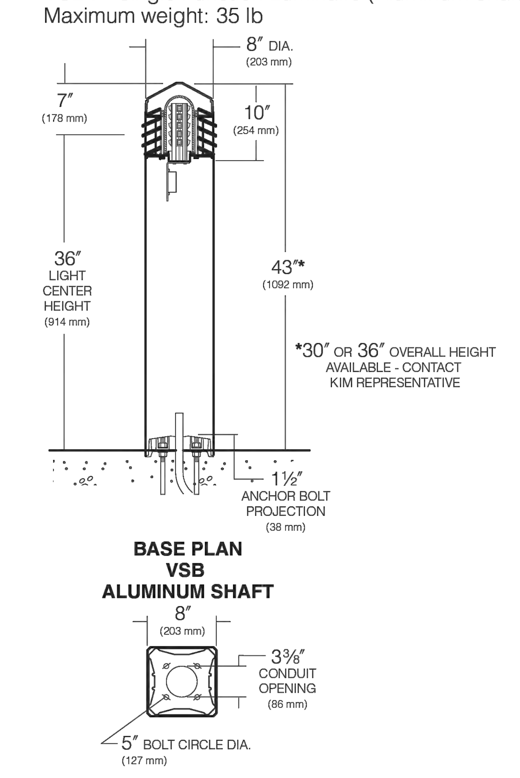
DRAWING TITLE:	SHEET No.
UTILITIES PLAN	C-104



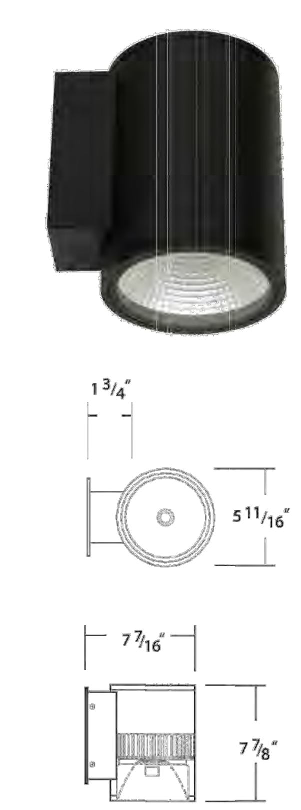
Specifications

VSB Models
10 - 20 Diodes

VSB1 - Single Function Luminaire (Aluminum Shaft)
Maximum weight: 35 lb



WALKWAY BOLLARD LIGHT FIXTURE
KIM LIGHTING, VSB1 LED



WALL MOUNT
ALCON LIGHTING - PAVO

LEGEND

DOUBLE POLE LIGHT	
SINGLE POLE LIGHT	
WALL MOUNT LIGHT	
BOLLARD LIGHT	
1 FOOTCANDLE CONTOUR	1FC
.5 FOOTCANDLE CONTOUR	.5FC
LIGHTING LEVELS GIVEN IN FOOT-CANDLES	0.0 0.1 0.2 0.4 0.6

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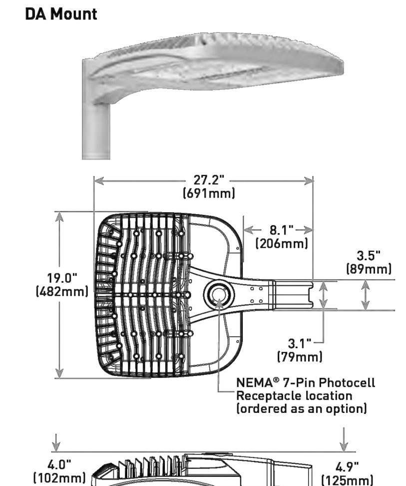
3. FOOT CANDLE VALUES SHOWN ON THE PLAN ARE PRODUCED UTILIZING DESIGN MASTER PHOTOMETRICS SOFTWARE AND ASSOCIATED IES FILES BY THE MANUFACTURER FOR THE PROPOSED LIGHT FIXTURE.
4. ALL PHOTOMETRIC DATA REFERS TO UNITS IN FOOT CANDLES (FC). THE LIMIT OF 1.0 FC ILLUMINATION IS SHOWN IN A RED SOLID LINE AND THE LIMIT OF THE 0.5 FOOT CANDLE (FC) ILLUMINATION IS SHOWN IN BLUE.
5. QUANTITY SHOWN IN LUMINAIRE SCHEDULE TABLE DENOTES NUMBER OF FIXTURE HEADS. REFER TO PLAN FOR POLES WITH DOUBLE FIXTURES.
6. ALL ILLUMINATION ON PARKING LOTS MUST BE SHIELDED SO AS NOT TO SHINE UPON ABUTTING PROPERTIES.
7. SEE ARCHITECTURAL DRAWINGS FOR ADDITIONAL LIGHTING INFORMATION.
8. ALL PROPOSED LIGHTING FIXTURES SHALL BE DARK SKY COMPLIANT.
9. LIGHT POLES ADJACENT TO PARKING SHALL HAVE THE 3'-0" REVEAL FOOTING. LIGHT POLES ADJACENT TO SIDEWALKS SHALL HAVE FOOTING IN A FLUSH CONDITION.

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

DA Mount



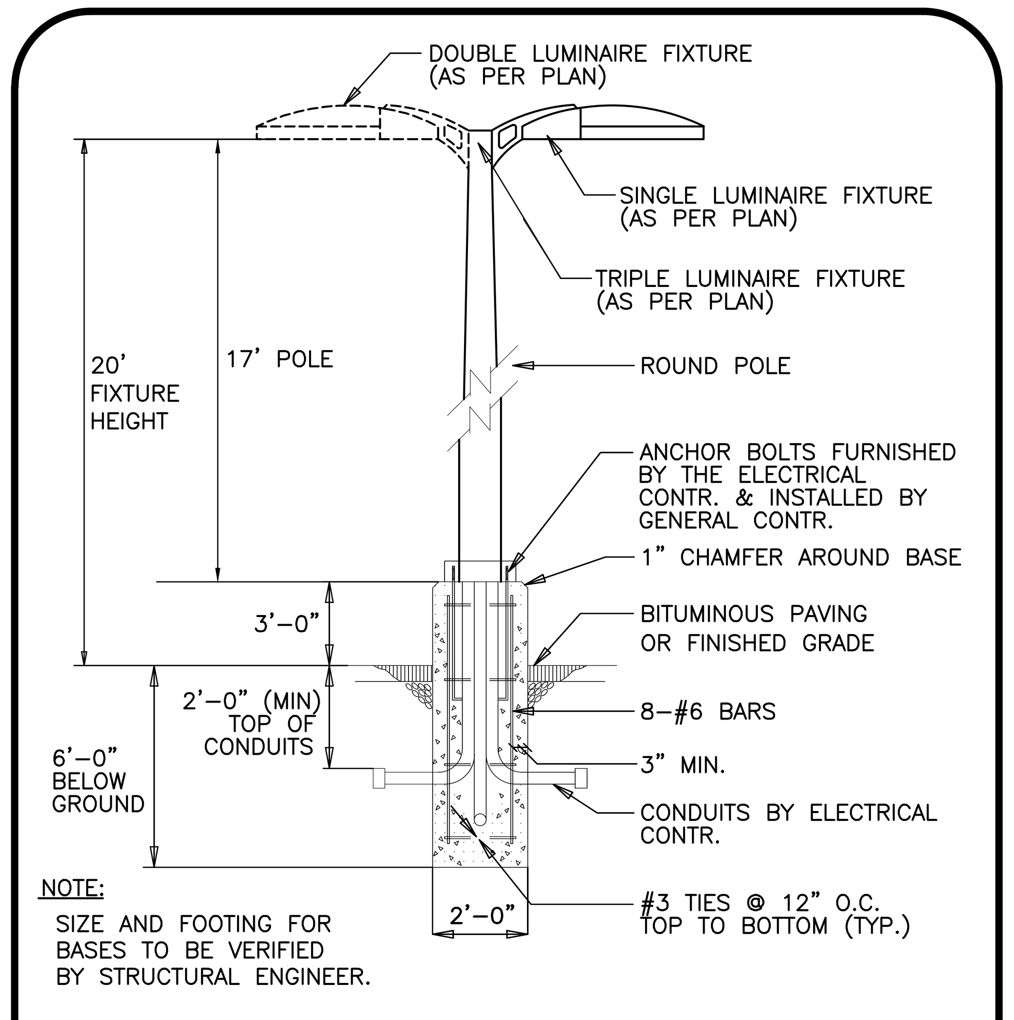
LIGHT FIXTURE - OSQ LED AREA - LARGE
CREE LIGHTING - OSQ SERIES

GENERAL PHOTOMETRIC SCHEDULE

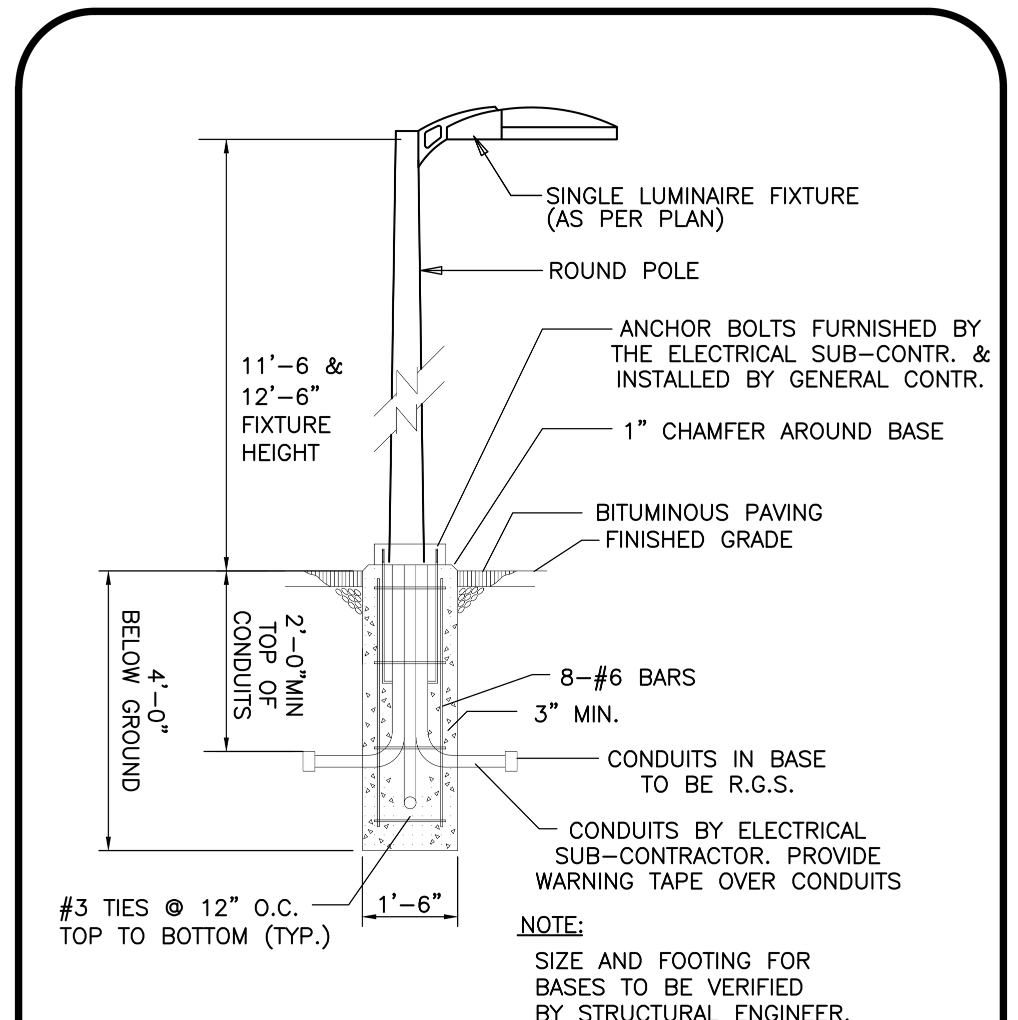
AVERAGE FOOT-CANDLES	2.01
MAXIMUM FOOT-CANDLES	25.8
MINIMUM FOOT-CANDLES	0.0

LUMINAIRE SCHEDULE

CALLOUT	QUANTITY	SYMBOL	DESCRIPTION	MOUNTING	MOUNTING HEIGHT	COLOR	TOTAL LUMENS	LAMP DEPRECIATION
LP4a	2		Cree OSQ Series Area Luminaire, Type IV Medium w/ Backlight Shield, T Input Power Designator, 4000K	POLE	20'-0"	Grey	20427	0.9
LP4b	4		Cree OSQ Series Area Luminaire, Type IV Medium w/ Backlight Shield, T Input Power Designator, 4000K	POLE	12'-6"	Grey	20427	0.9
LP4c	2		Cree OSQ Series Area Luminaire, Type IV Medium w/ Backlight Shield, T Input Power Designator, 4000K	POLE	11'-6"	Grey	20427	0.9
PAVO	4		ALCON LIGHTING, INC. 6" ROUND 1-DIRECTION WALL MOUNT (IP65) 1500LM	WALL	16'-0"	White	1650	0.9
VSB1	11		KIM LIGHTING, VSB1-15L4K SQUARE BOLLARD LED	SURFACE	3'-0"	Grey	804	0.9



SITE LIGHTING POLE & BASE DETAIL
NOT TO SCALE



LIGHT POLE & BASE DETAIL
NOT TO SCALE

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1-888-344-7233

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\LIGHTING [DO NOT MOVE FOLDER]\C-2398-01A_LIGHTING.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S
STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

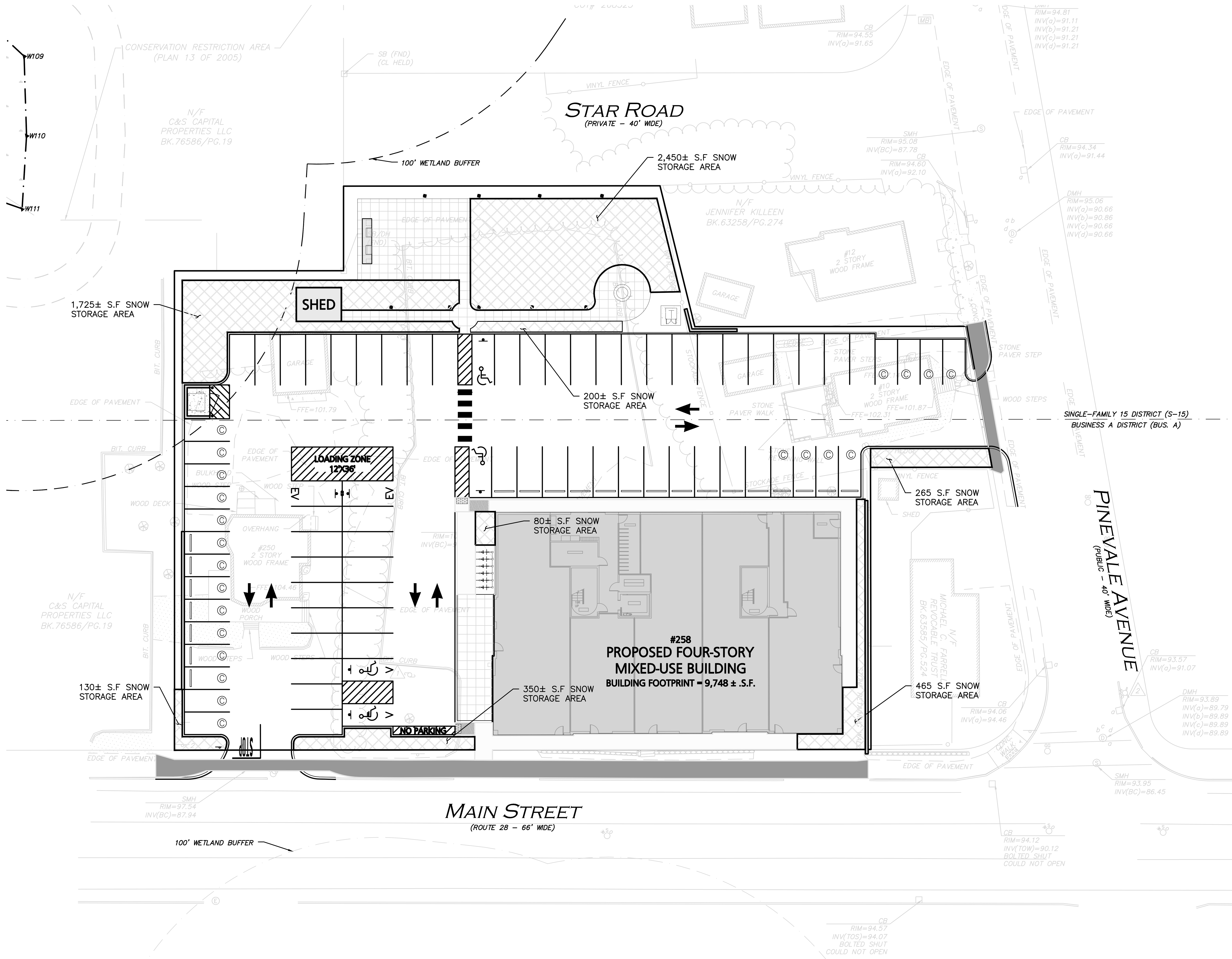
PREPARED BY:

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

WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

DRAWING TITLE: LIGHTING PLAN

SHEET No. C-105



LEGEND

SNOW STORAGE AREA

NOTES:

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2. THE PROPOSED PROJECT AREA HAS APPROXIMATELY 27,990 S.F. OF PAVED VEHICULAR AREA, SIDEWALK AND OTHER AMENITY AREAS.
3. THE PLAN DEPICTS APPROXIMATELY 5,600 S.F. OF AREA AVAILABLE FOR PRIMARY SNOW STORAGE WITHIN THE PROJECT AREA. THE AREA IS ESTIMATED TO ACCOMMODATE AN APPROXIMATE 4.00' OF SNOWFALL, ASSUMING A 5:1 COMPACTION AND AN AVERAGE SNOW PILE HEIGHT OF 4.0'. ADDITIONAL SNOW SECONDARY SNOW STORAGE AREAS ARE AVAILABLE ON–SITE IS NECESSARY.
4. IT IS UNLIKELY THIS PROJECT WOULD NEED SNOW TO BE REMOVED OFF–SITE, BUT IF NECESSARY: SNOW WILL BE STOCKPILED ON SITE UNTIL THERE IS NOT ENOUGH SPACE. AS NECESSARY, THE SNOW WILL BE REMOVED AND DISPOSED OF OFF–SITE. IT WILL BE THE RESPONSIBILITY OF THE SNOW REMOVAL CONTRACTOR TO PROPERLY DISPOSE OF TRANSPORTED SNOW ACCORDING TO MASSACHUSETTS DEP, BUREAU OF RESOURCE PROTECTION – MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WATER RESOURCES SNOW DISPOSAL GUIDANCE EFFECTIVE DATE: DECEMBER 23, 2019, GOVERNING THE PROPER DISPOSAL OF SNOW. IT WILL BE THE RESPONSIBILITY OF THE SNOW REMOVAL CONTRACTOR TO FOLLOW THESE GUIDELINES AND ALL APPLICABLE LAWS AND REGULATIONS.
5. UNDER NO CIRCUMSTANCES SHALL SNOW BE STORED IN ANY WETLAND RESOURCE AREA OF PROPOSED STORMWATER MANAGEMENT SYSTEM.
6. SNOW STORAGE WILL BE IMPLEMENTED TO AVOID HYDRANTS, FENCES LANDSCAPING AND OTHER PERMANENT FEATURES.

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1-888-344-7233

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_SNOW STORAGE.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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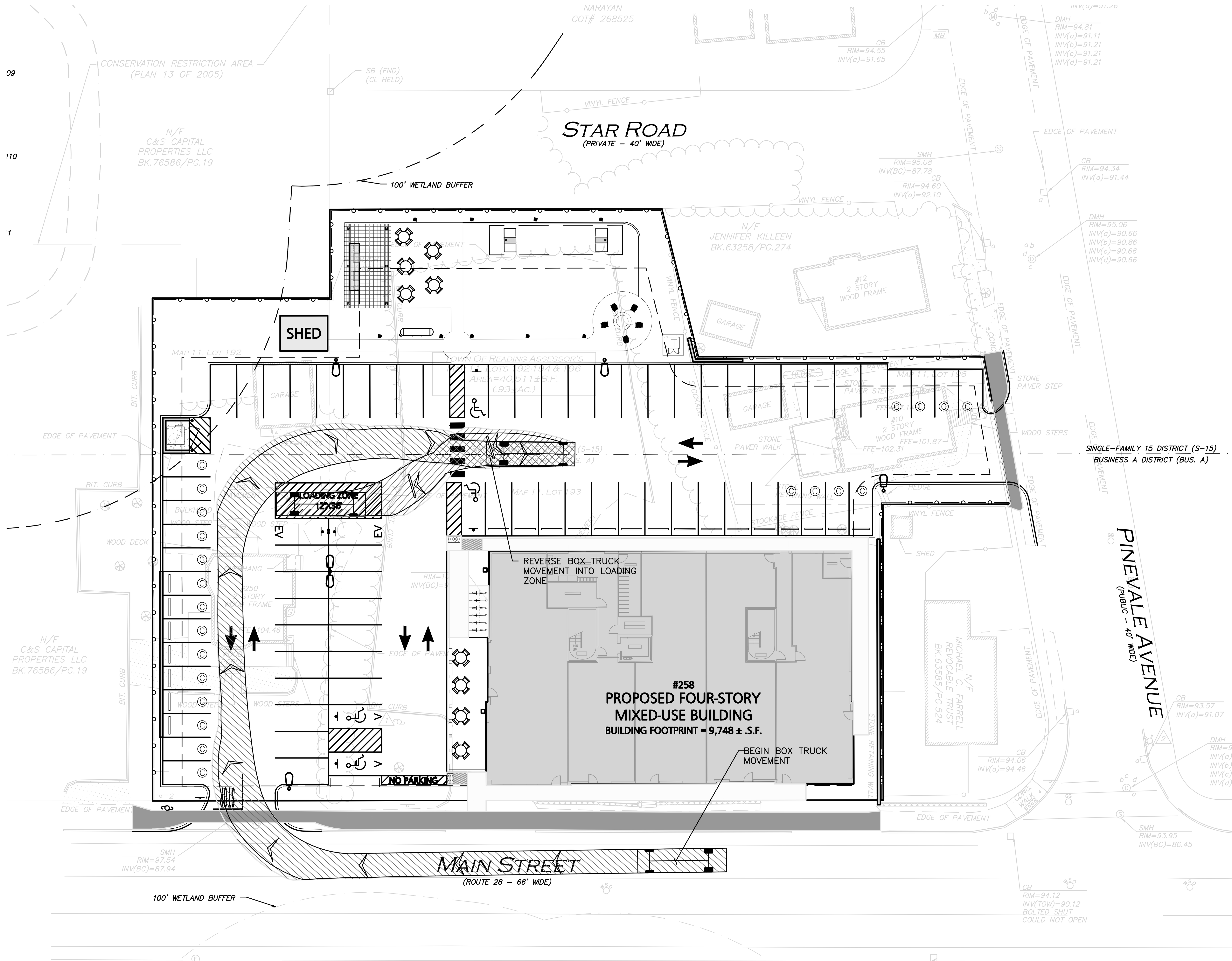
DRAWING TITLE:	SHEET No.
SNOW STORAGE PLAN	C-106



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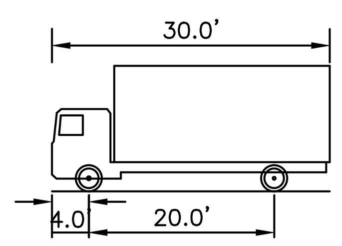

SU-30 – Single Unit Truck	
Overall Length	30.0ft
Overall Width	8.0ft
Overall Body Height	13.5ft
Min Body Ground Clearance	1.4ft
Track Width	8.0ft
Lock-to-lock time	5.0s
Max Steering Angle (Virtual)	31.8°

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1-888-344-7233

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_VEHICLE MOVEMENT.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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DRAWING TITLE:	SHEET No.
VEHICLE MOVEMENT PLAN	C-107A

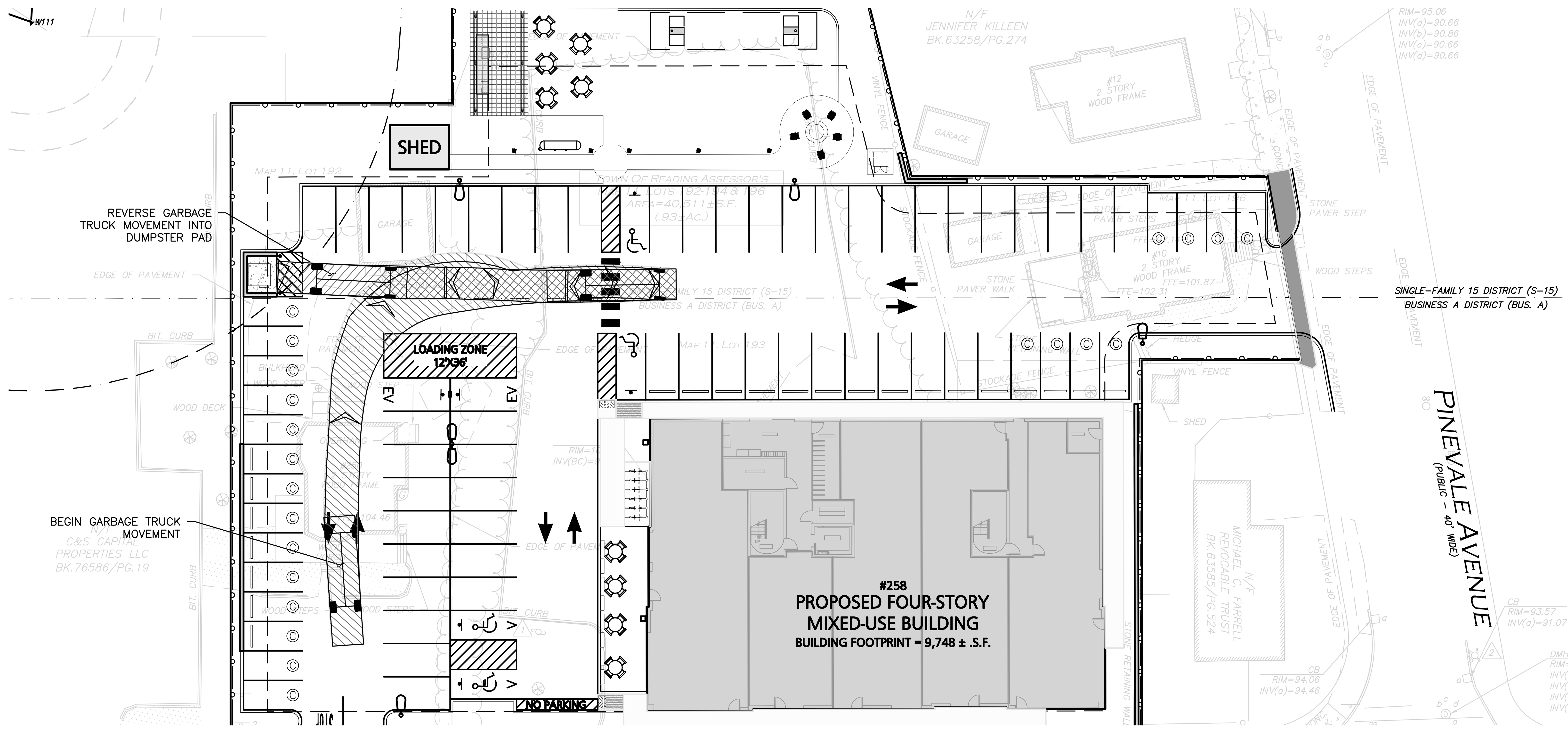

EXHIBIT 1: REAR LOAD GARBAGE TRUCK CIRCULATION

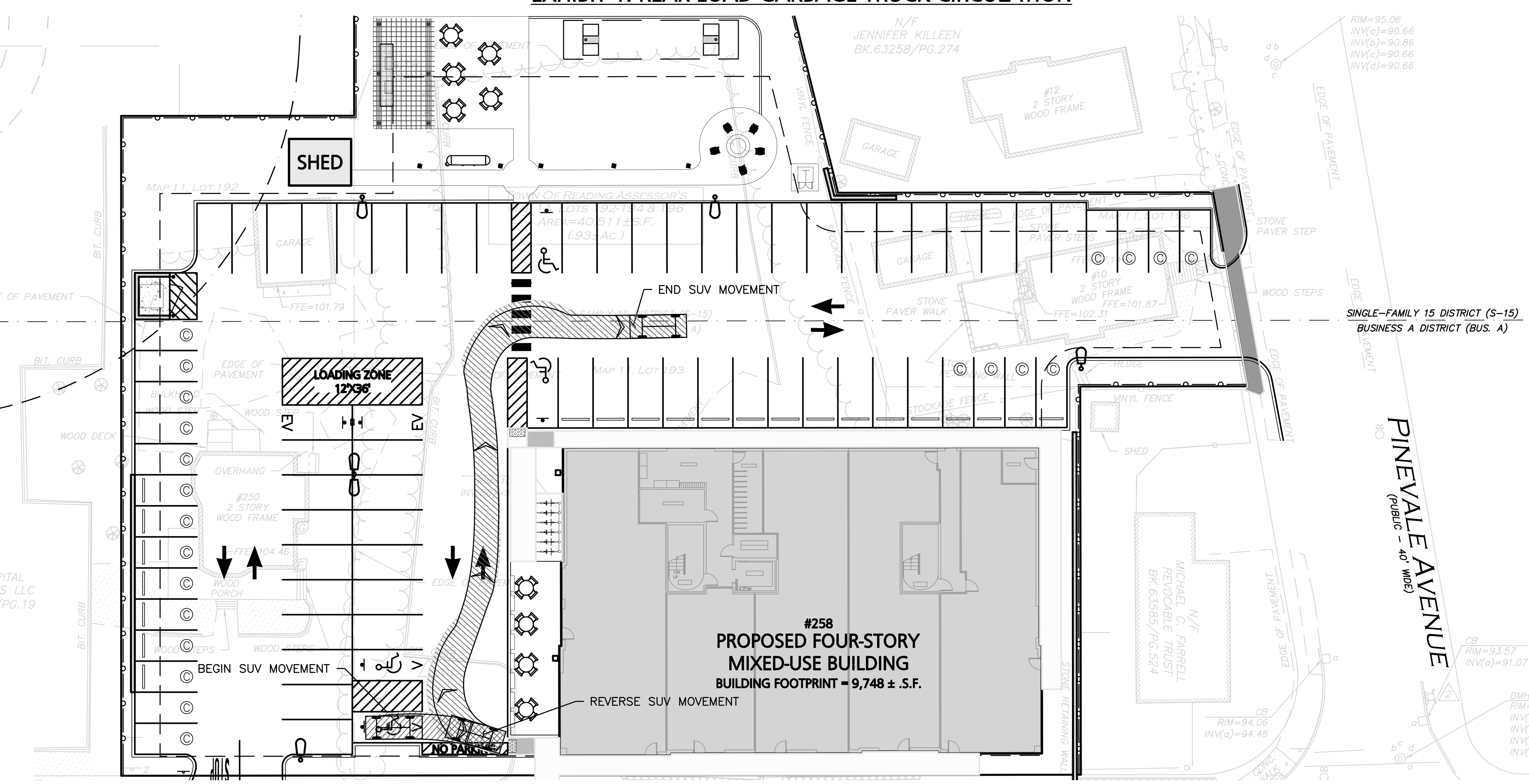

EXHIBIT 2: 4WD SUV CIRCULATION

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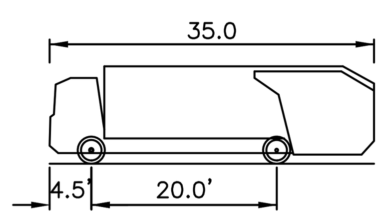
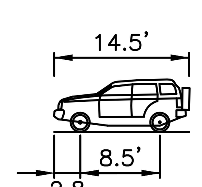


Rear-Load Garbage Truck	
Overall Length	35.0ft
Overall Width	8.3ft
Overall Body Height	10.5ft
Min Body Ground Clearance	1.0ft
Track Width	8.3ft
Lock-to-lock time	6.0s
Curb to Curb Turning Radius	29.3ft



4WD SUV	
Overall Length	14.5ft
Overall Width	5.9ft
Overall Body Height	5.6ft
Min Body Ground Clearance	0.6ft
Track Width	5.9ft
Lock-to-lock time	4.0s
Curb to Curb Turning Radius	18.3ft

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_VEHICLE MOVEMENT.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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civil engineering ♦ land surveying
environmental consulting ♦ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801
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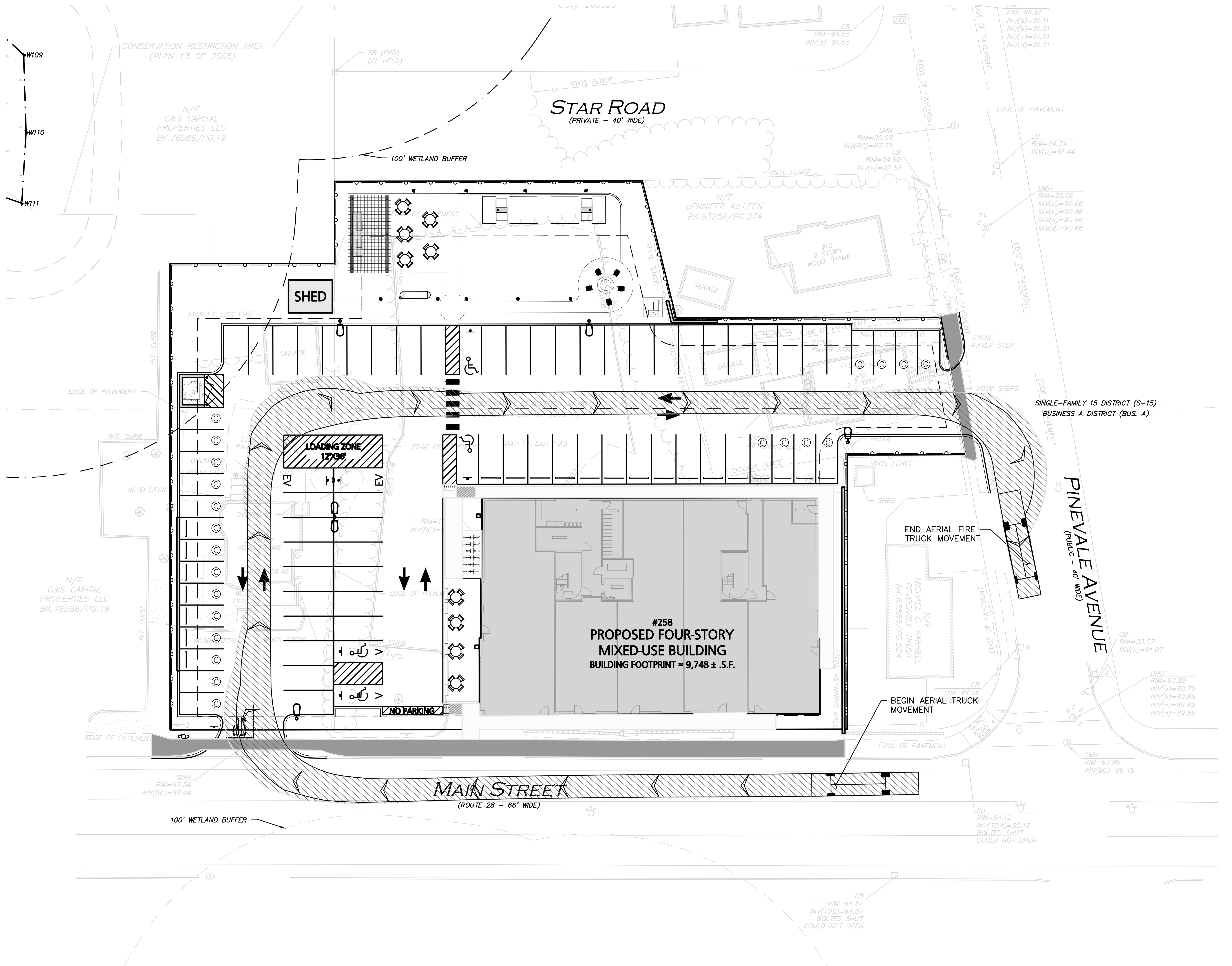
DRAWING TITLE:	SHEET No.
VEHICLE MOVEMENT PLAN	C-107B



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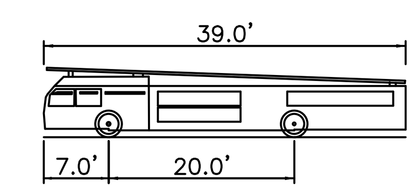

Aerial Fire Truck	
Overall Length	39.0ft
Overall Width	8.2ft
Overall Body Height	7.5ft
Min Body Ground Clearance	0.7ft
Track Width	8.1ft
Lock-to-lock time	5.0s
Max Wheel Angle	45.0°

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1-888-344-7233

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_ FIRE TRUCK TURNING.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

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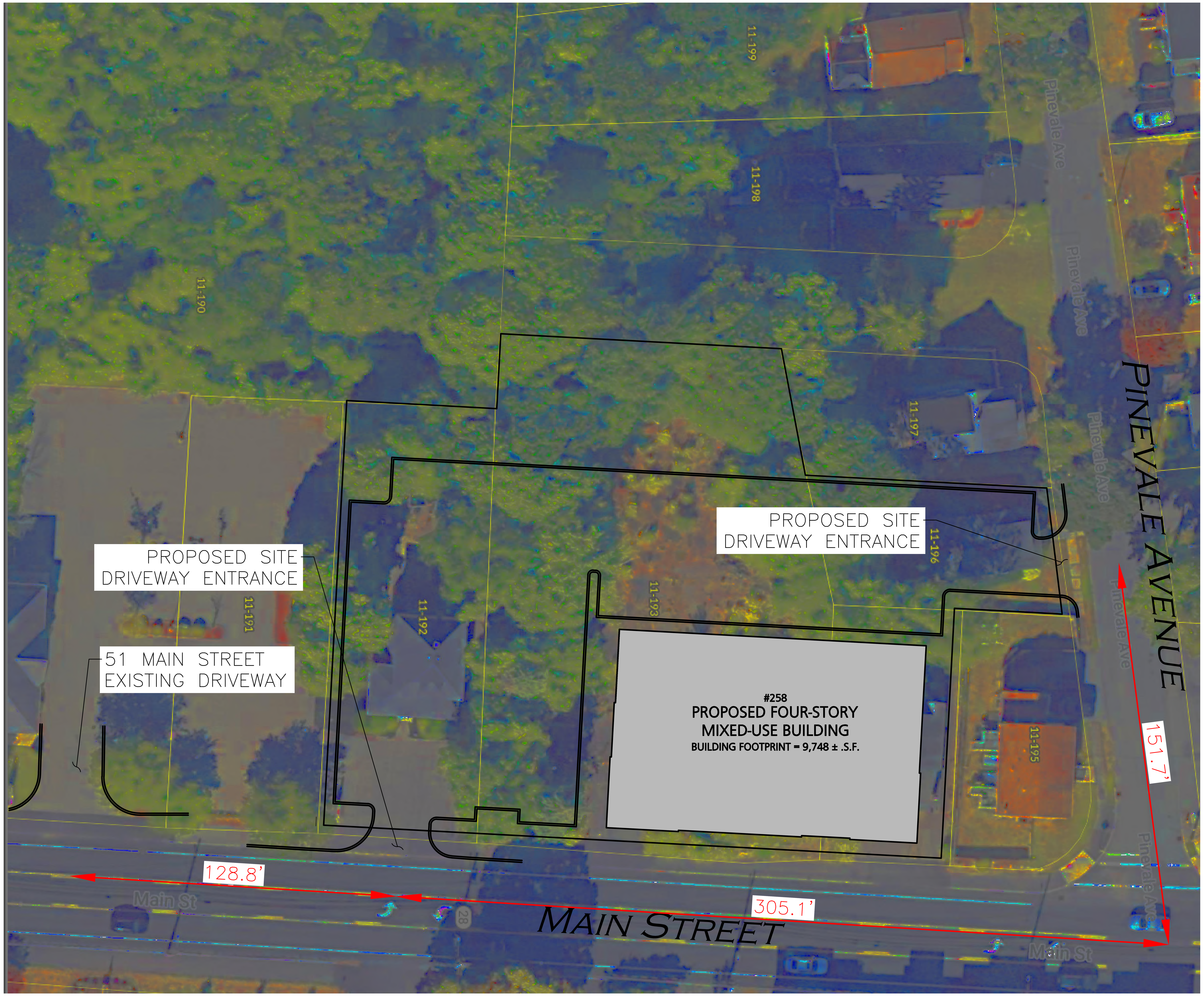
DRAWING TITLE:	SHEET No.
FIRE TRUCK TURNING PLAN	C-108



GENERAL NOTES

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1-888-344-7233

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_ABUTTING PROPERTY DIMENSION PLAN.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No. 49923
REGISTERED PROFESSIONAL ENGINEER

10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
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c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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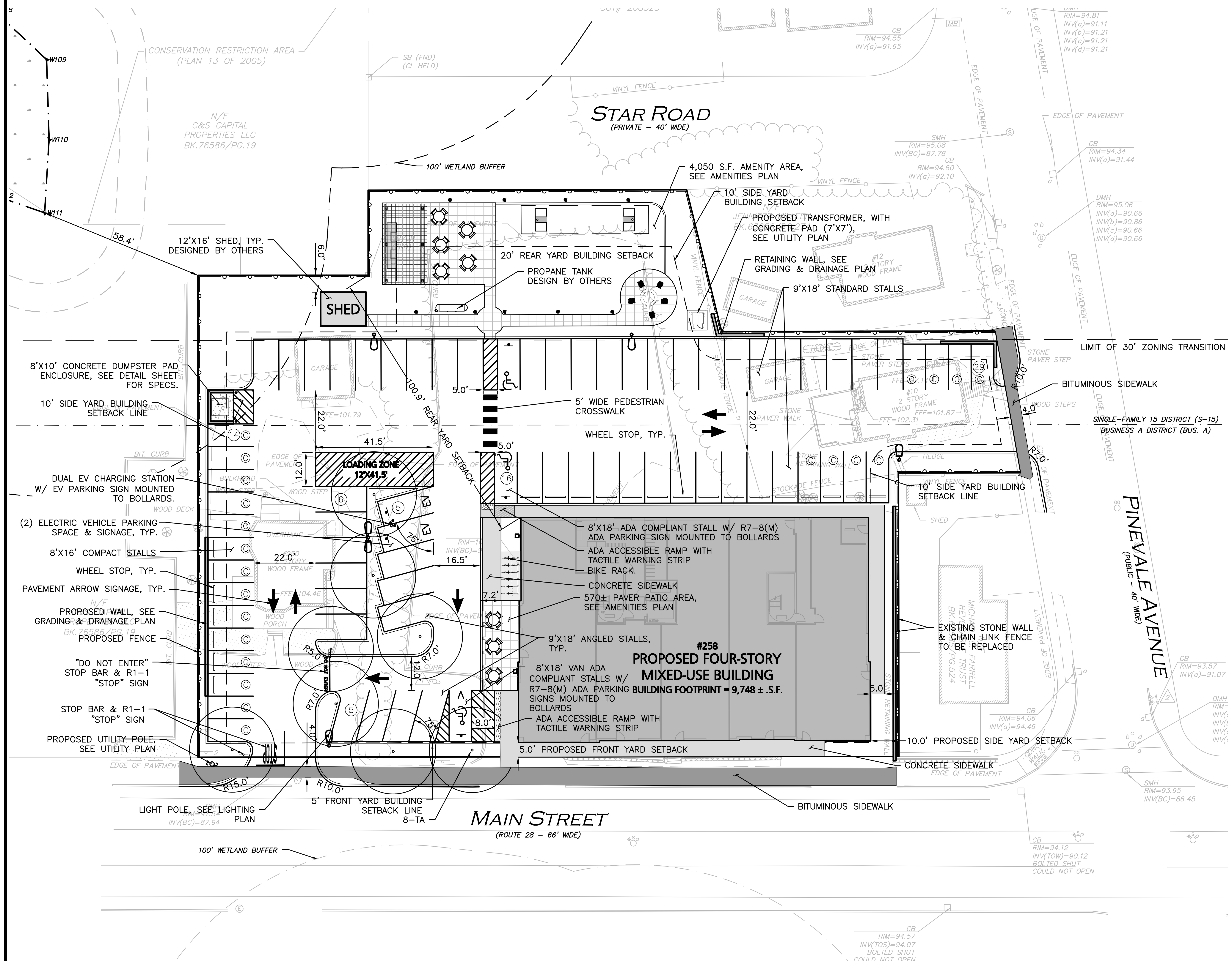
DRAWING TITLE:
ABUTTING PROPERTY DIMENSION PLAN

SHEET No.
C-109



LEGEND

- PROP. PROPERTY LINE
- SIGN
- BOLLARD
- BUILDING
- BUILDING ARCHITECTURE
- BUILDING INTERIOR WALLS
- CURB
- RETAINING WALL
- PARKING STRIPING
- ROADWAY STRIPING
- TRAFFIC ARROWS
- SIDEWALK
- ADA ACCESSIBLE RAMP
- ADA DET. WARNING SURFACE
- SETBACK LINE
- PARKING COUNT
- COMPACT PARKING STALL
- DECORATIVE FENCE
- TRANSFORMER
- LIGHTING

DIMENSIONAL REQUIREMENTS: BUSINESS-A DISTRICT (BUS. A) MIXED-USE DEVELOPMENT

ITEM	REQUIRED/ALLOWED	PROPOSED
LOT AREA (MIN.)	N/A	46,094± S.F. 1.05± ACRES
LOT FRONTAGE (MIN.)	N/A	247'.0
FRONT YARD BUILDING SETBACK	5' (MIN.)	5'.0
SIDE YARD BUILDING SETBACK	10' (MIN.)	10.0'
REAR YARD BUILDING SETBACK	20' (MIN.)	100.9'
BUILDING LOT COVERAGE (MAX.)	60%	21.1%
BUILDING HEIGHT (MAX.)	45'	45.0'
OPEN SPACE	N/A	29.2%

OFF-STREET PARKING SUMMARY

USE: RETAIL STORES/OFFICES/CONSUMER ESTABLISHMENTS
ONE SPACE PER 300 SQUARE FEET (S.F.) OF GROSS FLOOR AREA

RESIDENTIAL
1.25 SPACES PER DWELLING UNIT

PARKING SUMMARY:
USE: 8,100 S.F. RETAIL (NET)
8,100/300 = 27 REQUIRED SPACES.

USE: 40 UNITS
40*1.25 = 50 REQUIRED SPACES

ADA REQUIRED: THERE ARE BETWEEN 76–100 PROPOSED PARKING SPACES, REQUIRING 3 TOTAL PARKING STALLS TO BE ACCESSIBLE AND ONE VAN ACCESSIBLE.

ADA PROVIDED: 3 TOTAL ACCESSIBLE WITH 1 VAN ACCESSIBLE

EV PROVIDED: 2 EV ACCESSIBLE PARKING SPACES EQUIPPED WITH DUAL CHARGING PORT

STANDARD (9'x18')	COMPACT (8'x16') (1)	TANDEM (9'x18')	ACCESSIBLE (8'x18')	TOTAL PROVIDED	TOTAL REQUIRED
50	22 (29%)	0	3	75	77

(1) PER READING ZONING BYLAW DATED APRIL 2022 SECTION 5.6.7.4(C), UP TO 30% OF THE TOTAL REQUIRED PARKING SPACES FOR A MIXED–USE PROJECT MAY BE STRIPED AND MARKED AS COMPACT SPACES (8'X16').

GENERAL NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
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PLANTING SCHEDULE -TREES

	KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	COMMENTS
DECIDUOUS SHADE TREES							
*	TA	8	TILIA AMERICANA 'REDMOND'	REDMOND AMERICAN LINDEN	3" CAL.	AS SHOWN	B&B
* DENOTES NATIVE SPECIES OR NATIVE CULTIVAR							

DIG SAFE

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

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_LAYOUT & MATERIALS-ALT CONCEPT.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

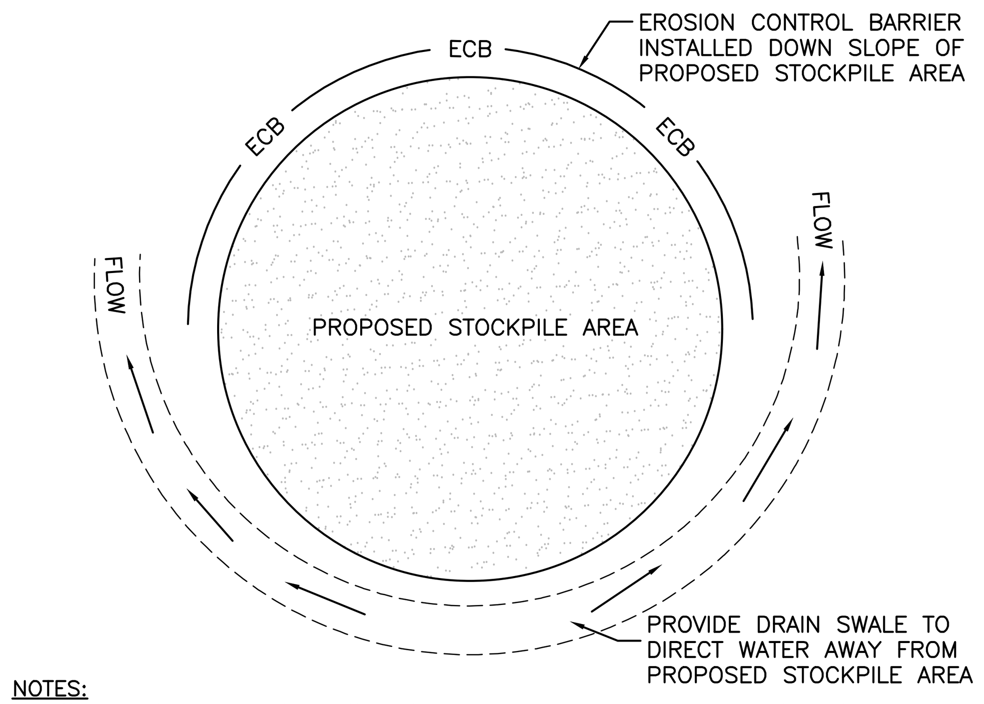
PREPARED BY:

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

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

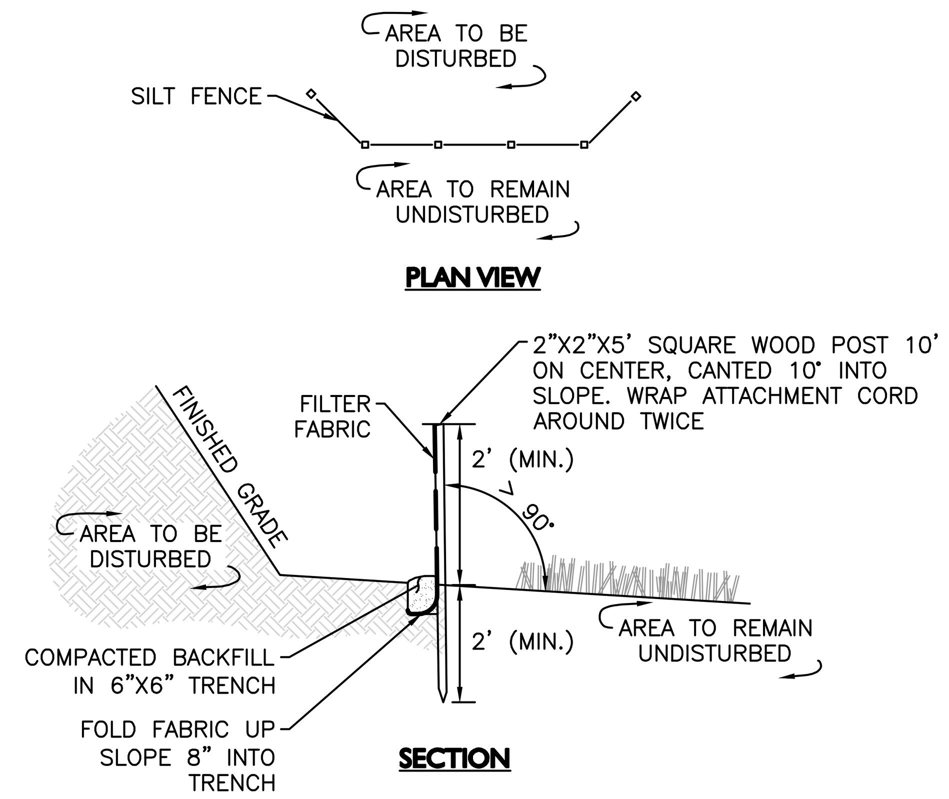
DRAWING TITLE:
ALTERNATIVE
LAYOUT & MATERIALS PLAN

SHEET No.
C-110



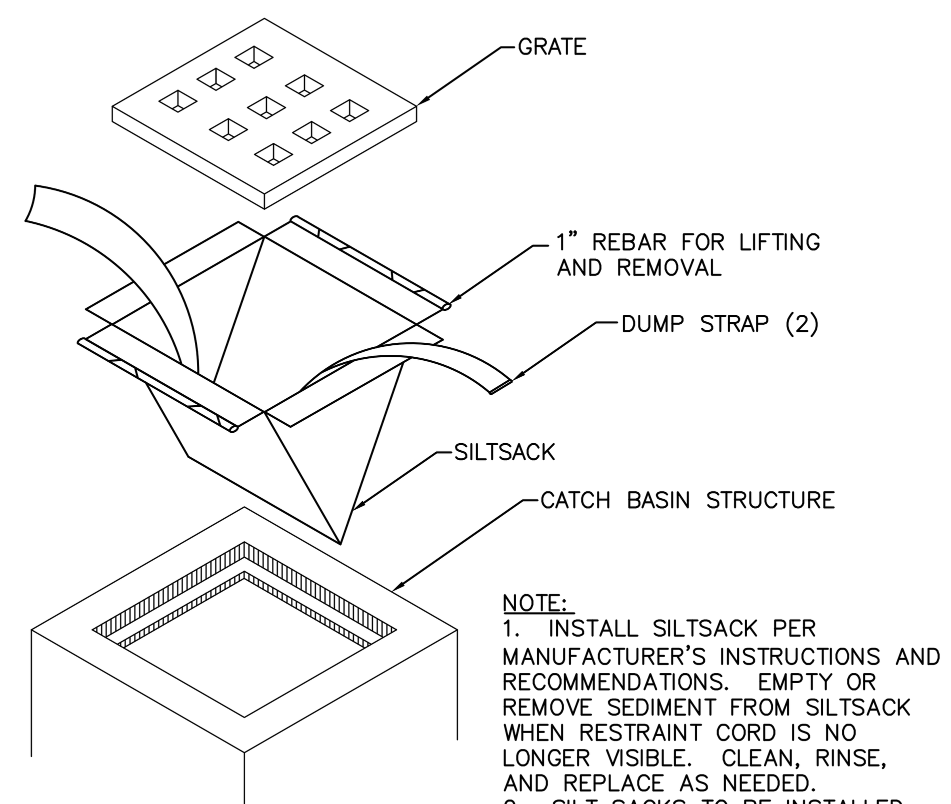
NOTES:
1. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR LESS THAN 90 DAYS SHALL BE COVERED WITH STRAW AND MULCH (AT 100LBS/1,000 SF), OR WITH AN ANCHORED TARP WITHIN 7 DAYS OR PRIOR TO ANY RAINFALL.
2. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR 90 DAYS OR MORE SHALL BE SEEDED WITH WINTER RYE (FOR FALL SEEDING AT 1LB/1,000 SF) OR OATS (FOR SUMMER SEEDING AT 2LB/1,000 SF) AND THEN COVERED WITH HAY MULCH (AT 100LB/1,000 SF) OR AN ANCHORED TARP WITHIN 7 DAYS OR PRIOR TO ANY RAINFALL.

STOCKPILE PROTECTION (1)
NOT TO SCALE



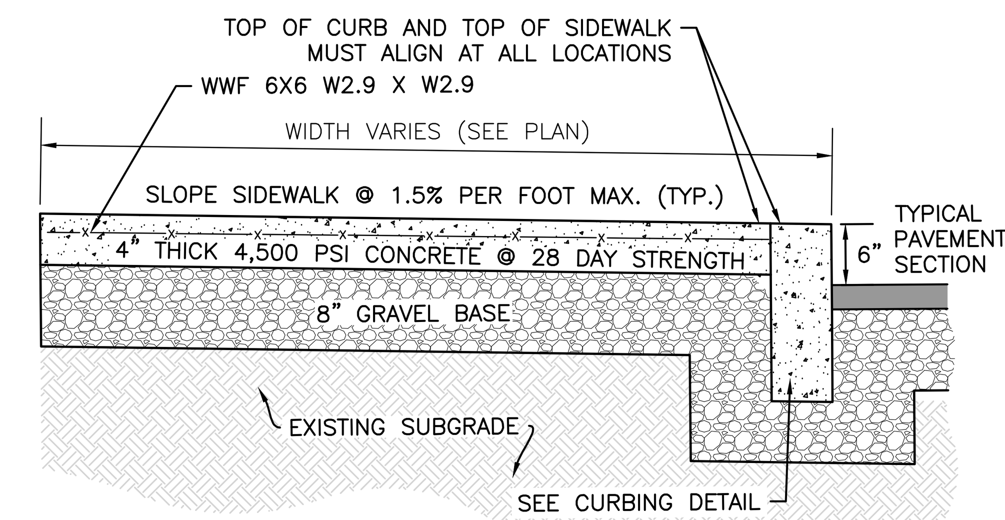
NOTE:
DEPTH TO BE 2' UNLESS POST IS TO BE SET IN PEAT THEN 3' OR DEPTH POSSIBLE BY PUSHING BY HAND SHALL BE REQUIRED.

SILT FENCE (2)
NOT TO SCALE



NOTE:
1. INSTALL SILTSACK PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS. EMPTY OR REMOVE SEDIMENT FROM SILTSACK WHEN RESTRAINT CORD IS NO LONGER VISIBLE. CLEAN, RINSE, AND REPLACE AS NEEDED.
2. SILT SACKS TO BE INSTALLED DURING CONSTRUCTION OPERATIONS WHEN THE POTENTIAL FOR SEDIMENT TO ENTER EXISTING & PROPOSED BASINS EXISTS.

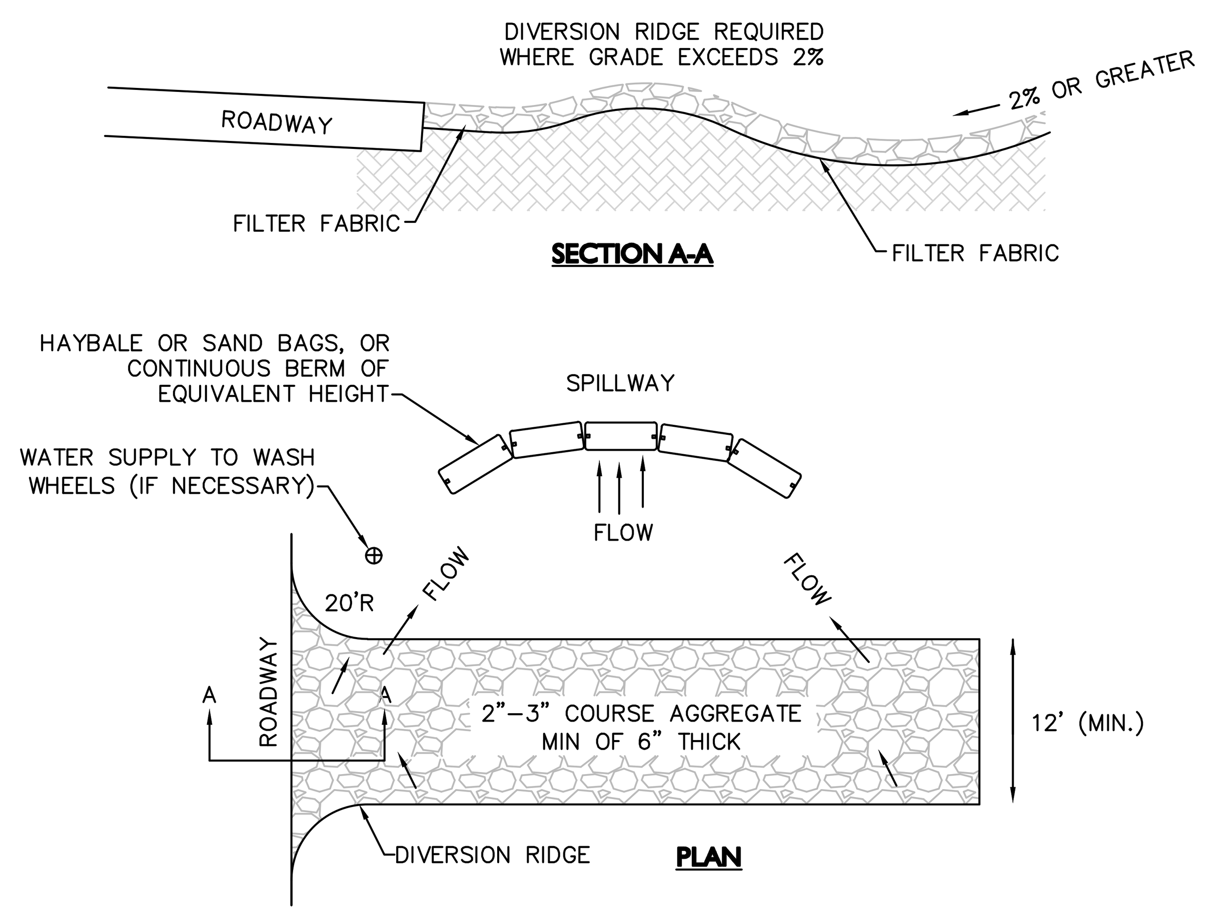
SILTSACK INLET DETAIL (3)
NOT TO SCALE



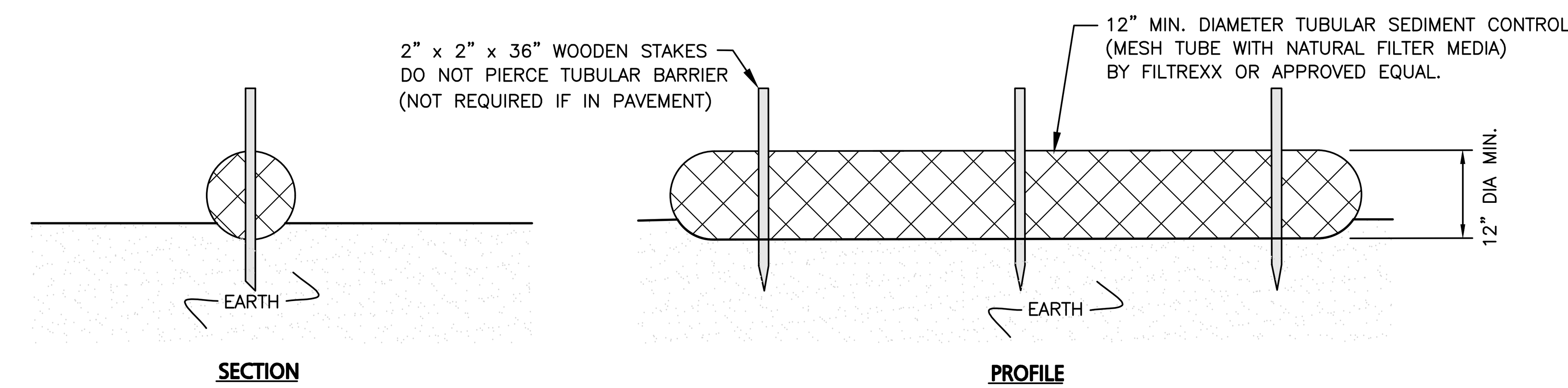
NOTES:
1. SIDEWALK TO HAVE TOOLED JOINTS IN A 5' x 5' (TYP.) GRID WITH EXPANSION JOINTS 15' ON CENTER AND PREMOLDED FILLER
2. TOOLED JOINT 6" FROM FACE OF CURB
3. SEE PLAN FOR ELEVATIONS AT CURB
4. SIDEWALK CROSS SLOPE TO BE 1.5% MAX & SIDEWALK LONGITUDINAL SLOPE TO BE 4.5% MAX, TYP.

CONCRETE SIDEWALK WITH CURB (4)
NOT TO SCALE

NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTERING THE PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
4. USE SANDBAGS, HAYBALES, OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED.

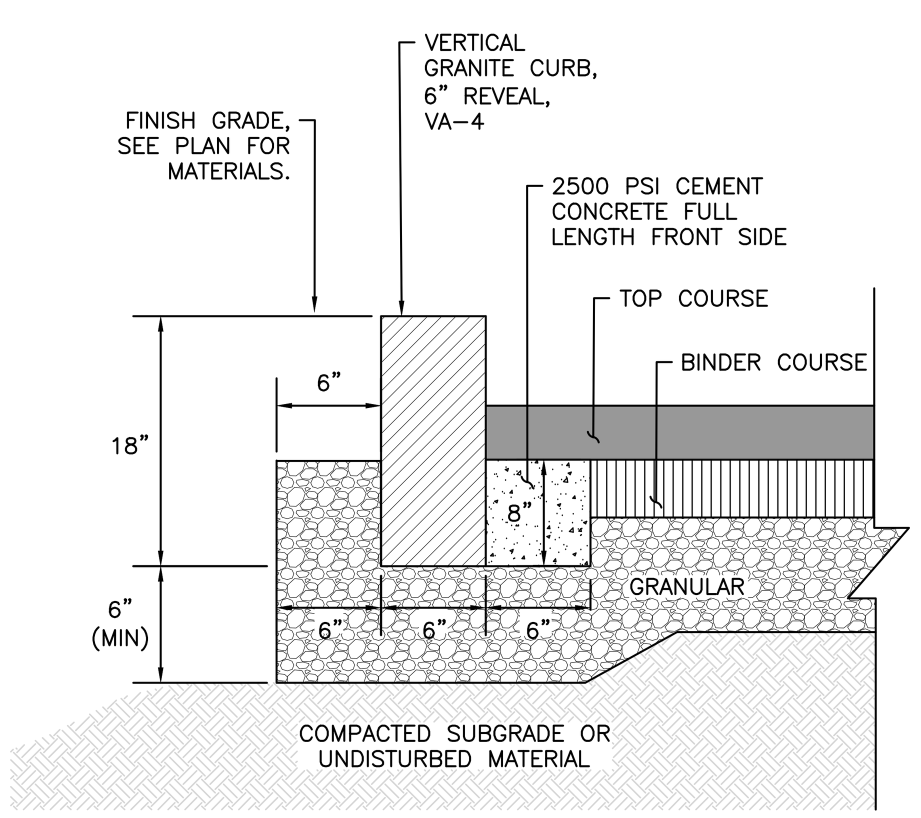


TEMPORARY CONSTRUCTION ENTRANCE/EXIT (5)
NOT TO SCALE

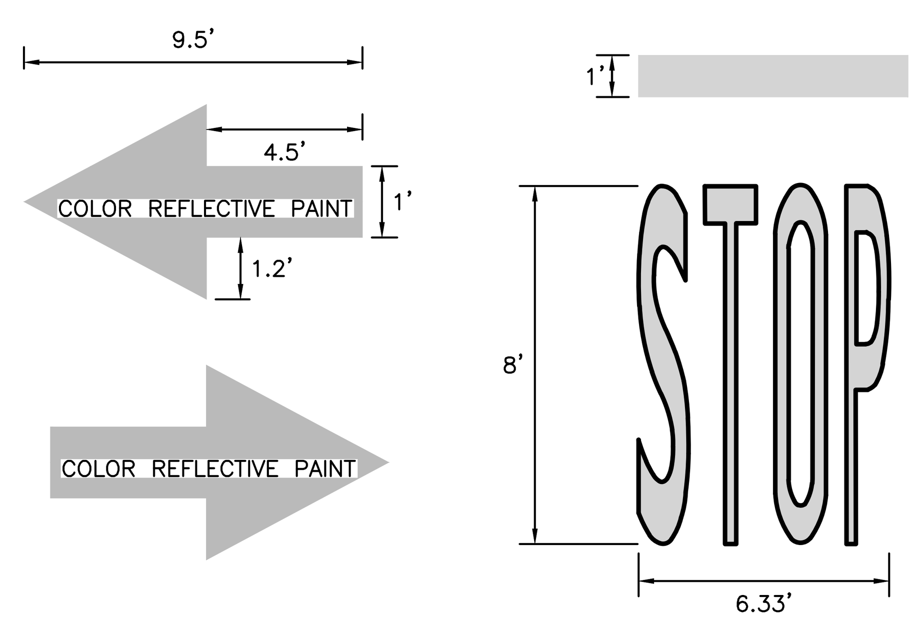


NOTES:
1. ALL MATERIALS TO MEET MANUFACTURERS SPECIFICATIONS.
2. INSTALL WOODEN STAKES IN A CRISS-CROSS PATTERN EVERY 8' ON CENTER.
2. OVERLAP TUBULAR BARRIER SEGMENTS A MINIMUM OF 12".
3. THE CONTRACTOR SHALL MAINTAIN THE TUBULAR BARRIERS IN A FUNCTIONAL CONDITION AT ALL TIMES. THE CONTROLS SHALL BE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

TUBULAR SEDIMENT BARRIER (6)
NOT TO SCALE

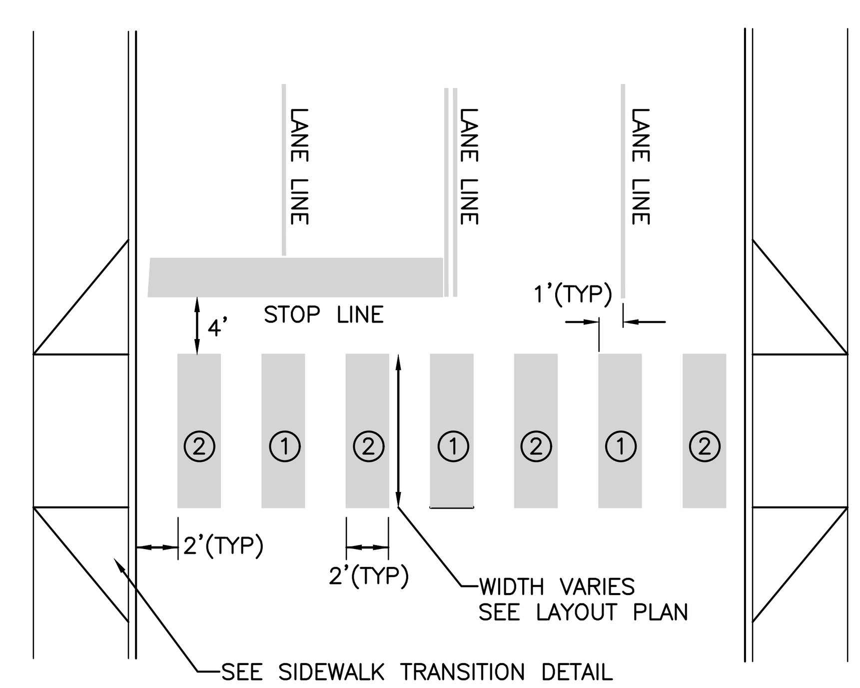


VERTICAL GRANITE CURB (7)
NOT TO SCALE



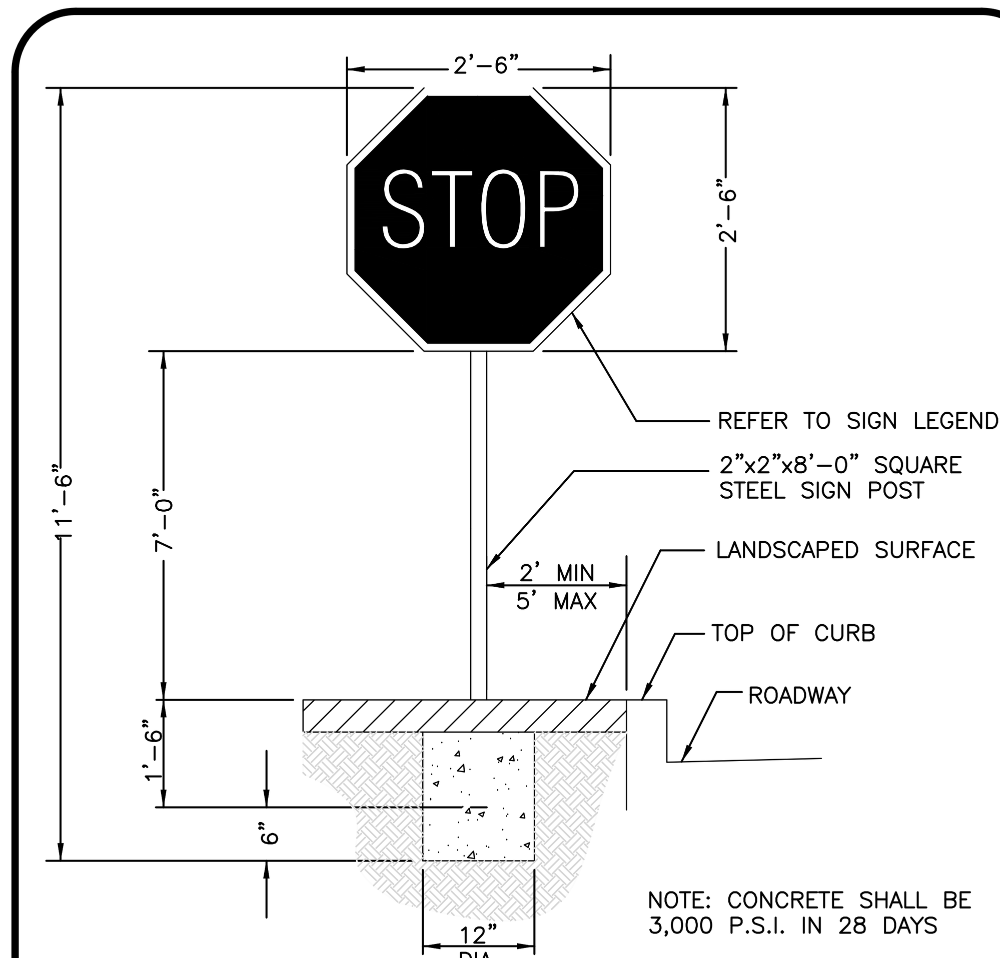
NOTES:
1. ALL WORDS AND SYMBOLS SHALL CONFORM TO THE LATEST VERSION OF THE M.U.T.C.D.
2. ARROW SIZES MAY BE REDUCED APPROXIMATELY ONE-THIRD FOR LOW-SPEED URBAN CONDITIONS

PAINTED STOP LINE & STRAIGHT ARROWS (8)
NOT TO SCALE



NOTE:
1 LANE LINE STRIP: THIS IS LOCATED IN THE LINE WITH EACH LANE LINE AND HALF THE STRIP ON EACH SIDE.
2 MID LINE STRIP: THIS IS LOCATED MIDWAY BETWEEN EACH LANE LINE STRIP.

CROSSWALK STRIPING (9)
NOT TO SCALE



NOTE: CONCRETE SHALL BE 3,000 P.S.I. IN 28 DAYS

STOP SIGN (10)
NOT TO SCALE

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_DETAILS.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR
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SCALE:	AS SHOWN	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:
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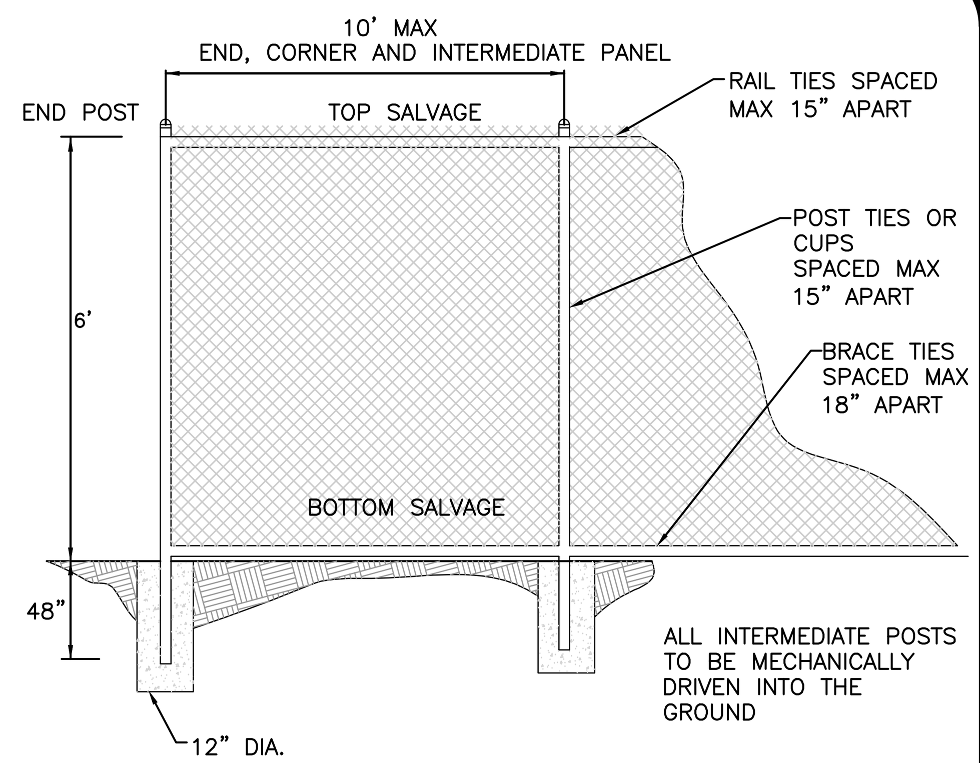
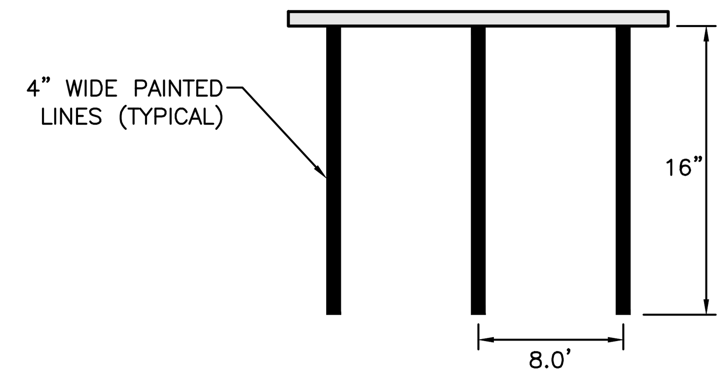
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

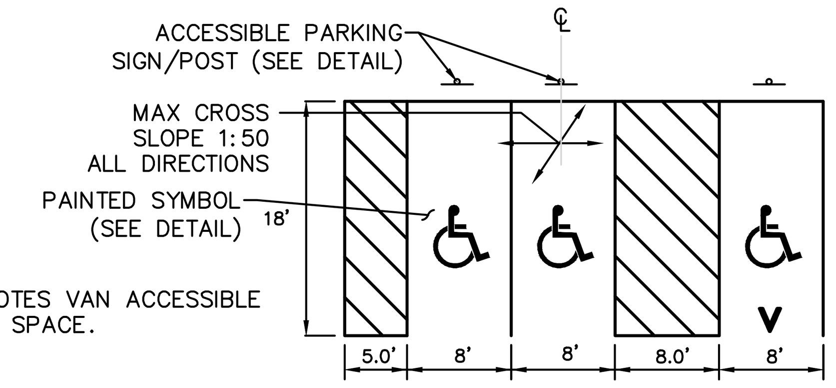
DRAWING TITLE:	SHEET No.
DETAILS	C-501



CHAIN LINK FENCE
NOT TO SCALE
1



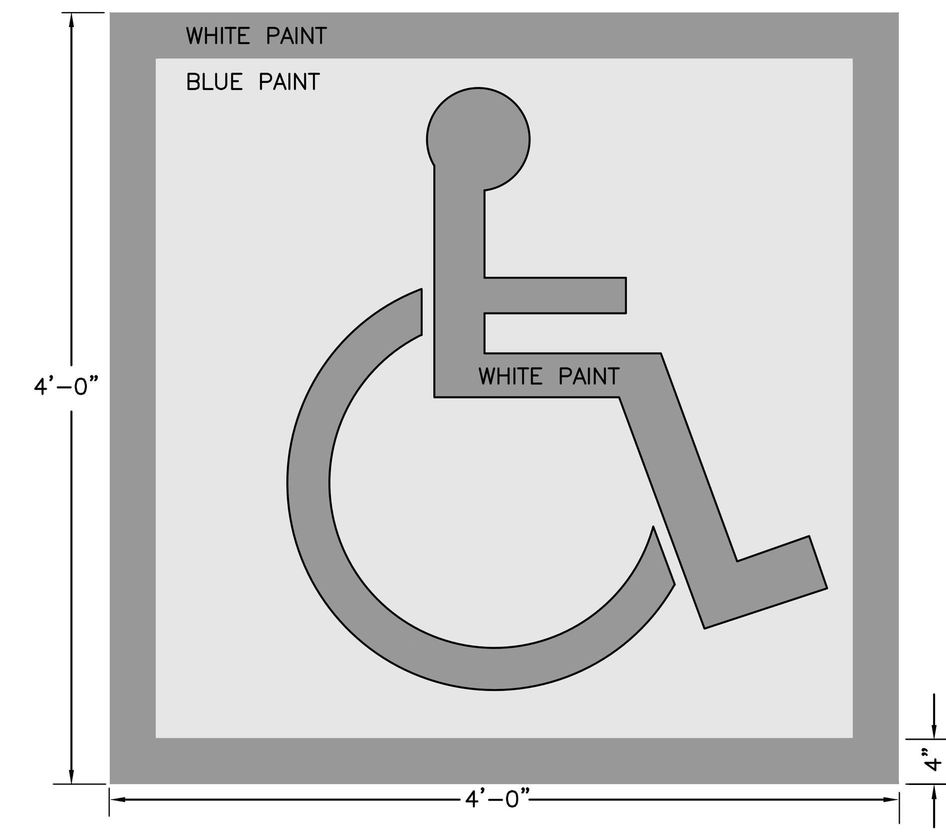
COMPACT PARKING SPACE



NOTE:
1. "V" DENOTES VAN ACCESSIBLE PARKING SPACE.

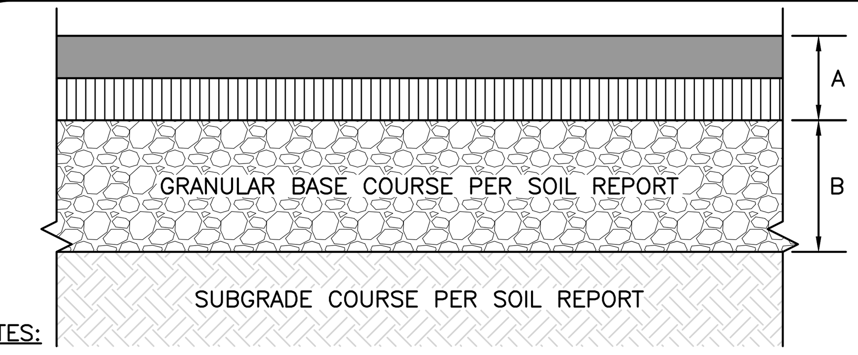
ADA STANDARD AND VAN ACCESSIBLE PARKING SPACE

ADA AND COMPACT PARKING STRIPING
NOT TO SCALE
2



1. SYMBOL SHALL BE CENTERED WITHIN THE PARKING STALL.
2. SYMBOL IS REQUIRED TO CONTRAST WITH BACKGROUND. USE WHITE PAINT ON BLACK ASPHALT, BLUE ON WHITE WHERE APPLICABLE.

ACCESSIBLE PARKING STALL PAVEMENT MARKING
NOT TO SCALE
3

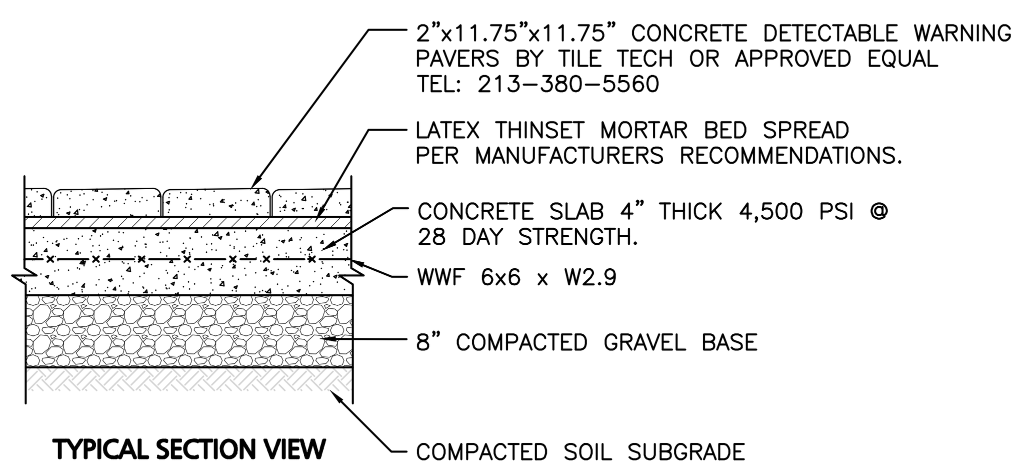


NOTES:
1. COMPACT SOIL SUBGRADE UNIFORMLY TO AT LEAST 95 PERCENT OF ASTM D1557 LABORATORY DENSITY.
2. PROOF–ROLL PREPARED SUBGRADE TO IDENTIFY SIFT POCKETS AND AREAS OF EXCESS YIELDING. EXCAVATE SOFT SPOTS, UNSATISFACTORY SOILS, AND AREAS OF EXCESSIVE PUMPING OR RUTTING, AS DETERMINED BY GEOTECHNICAL ENGINEER AND REPLACE WITH COMPACTED BACKFILL OR FILL AS DIRECTED.
3. CONTRACTOR SHALL COORDINATE SURFACE, BINDER, BASE, AND SUBBASE COURSES WITH GEOTECHNICAL OR SOILS REPORT. REFER TO REPORT FOR RECOMMENDATIONS FOR LOCAL SOILS OR DRAINAGE CONDITIONS AND/OR METHODS.
4. BASE COURSE SHALL EXTEND 6 INCHES BEYOND PAVEMENT EDGE WHERE PAVEMENT DOES NOT ABUT CURB, WALL, STEPS, OR FIXED OBJECT.
5. PAVEMENT EDGES SHALL BE TAMPED WHERE PAVEMENT DOES NOT ABUT CURB, WALL, STEPS, OR FIXED OBJECT

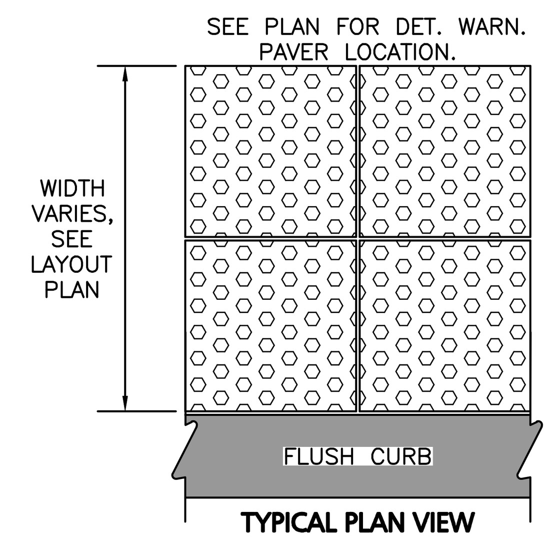
STANDARD DUTY PAVING
A= 1.5" ASPHALT CONCRETE – SURFACE COURSE (M.3.11.0, TABLE A, TOP COURSE)
1.5" ASPHALT CONCRETE – BINDER COURSE (M.3.11.0, TABLE A, BINDER COURSE)

B= 4" BASE COURSE (MHD 2.01.7)
C= 12" SUBBASE COURSE (MHD 1.03.0, TYPE B)

STANDARD DUTY BITUMINOUS PAVEMENT
NOT TO SCALE
3



TYPICAL SECTION VIEW

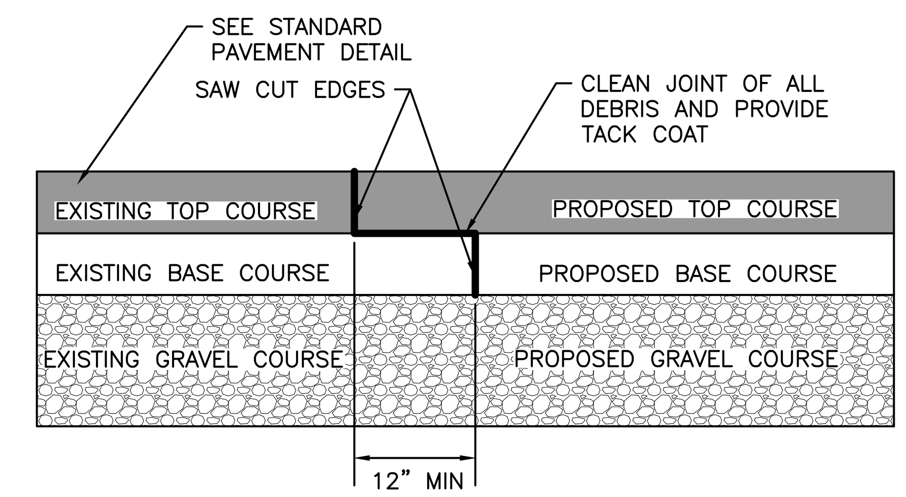


TYPICAL PLAN VIEW

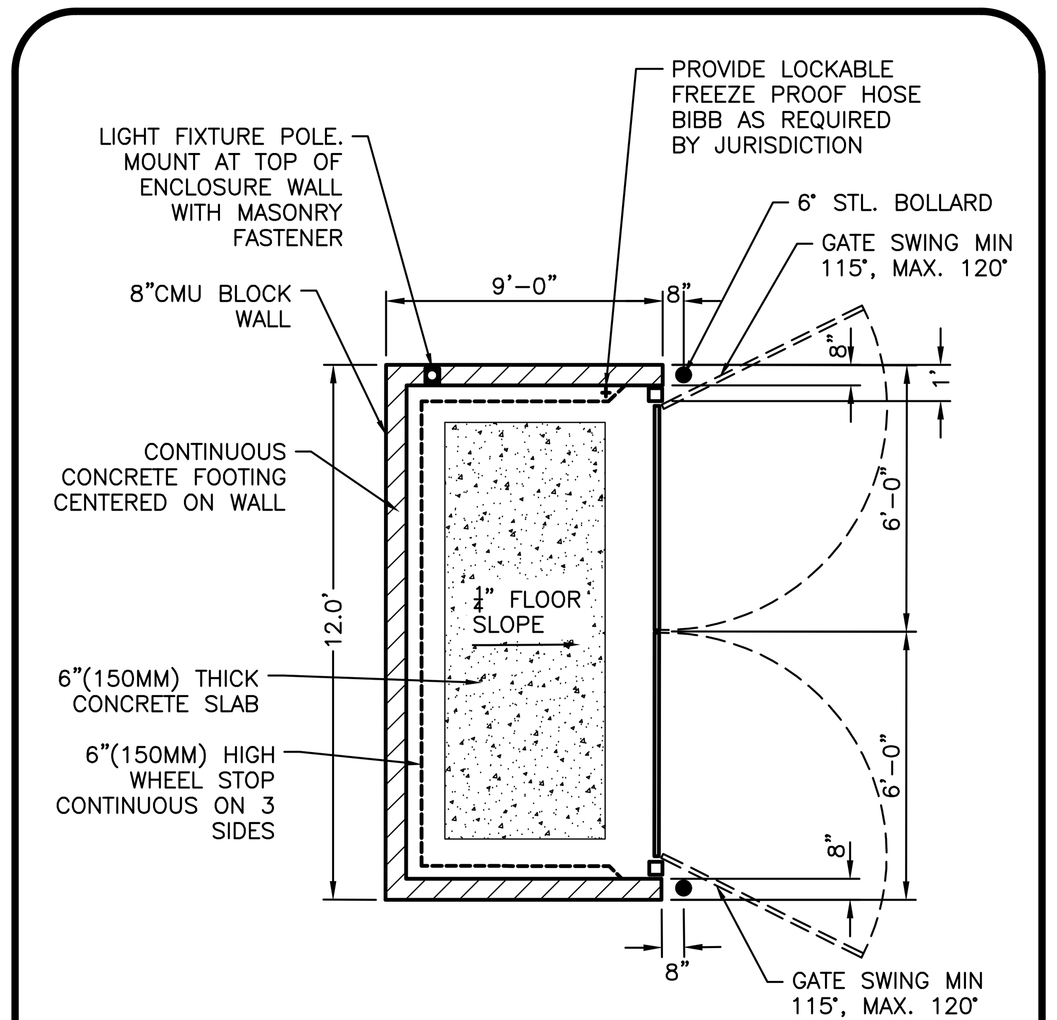
NOTES:
1. CONCRETE SLAB SHALL BE SLOPED 1.5% CROSS PITCH MAX TO PROVIDE COMPLETE SURFACE DRAINAGE. SEE GRADING PLAN & HANDICAP CURB CUT / CURB TRANSISTION DETAIL.
2. SLAB TO HAVE STEEL TROWEL AND FINE BROOM FINISH. DO NOT USE CURING COMPOUNDS. CONTRACTOR TO ADD EXPANSION JOINTS AND PREMOLDED FILLER AT EDGE OF TILES AND ADJACENT MATERIAL.
3. SET TILES FLUSH WITH ADJACENT MATERIALS.
4. SUBMIT SHOP DRAWINGS OF TILES AND SAMPLE FOR APPROVAL OF COLOR TO OWNER / ARCH.
5. INSTALL DETECTABLE WARNING PAVERS PER MANUFACTURER'S RECOMMENDATIONS OR DESIGN ENGINEER.
6. ALL DET. WARN. PAVERS SHALL COMPLY WITH ADA REGULATIONS.

DETECTABLE WARNING PAVERS
NOT TO SCALE
5

NOTE:
TACK COAT – PROVIDE EMULSIFIED ASPHALT WHICH CONFORMS TO THE REQUIREMENTS OF THE STATE SPECIFICATIONS, DILUTED WITH ONE PART WATER TO ONE ONE PART ASPHALT FOLLOWING AASHTO M140/ASTM D997, OR AASHTO M208/ASTM D2397, SS–1H, CSS–1, OR CSS–1H.



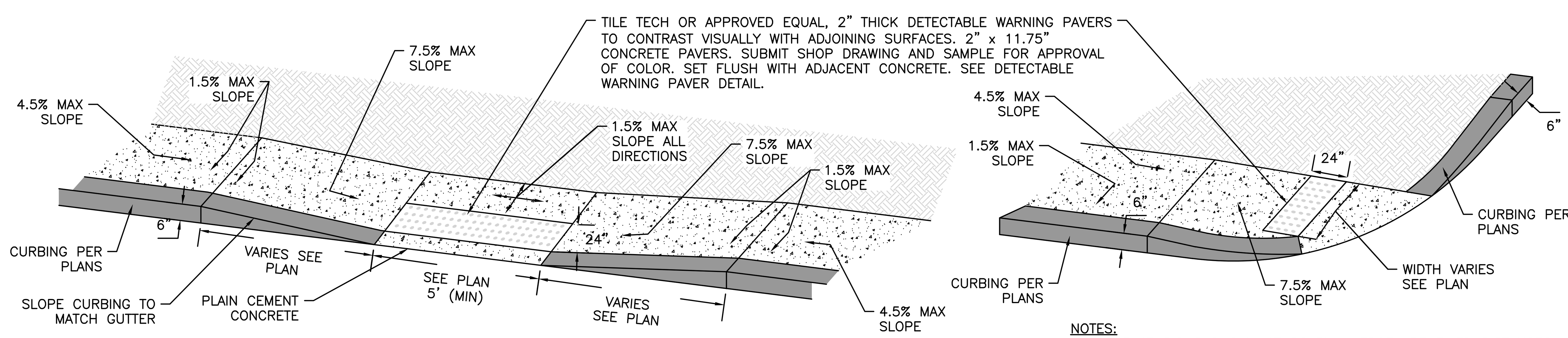
PAVEMENT KEY CUT
NOT TO SCALE
6



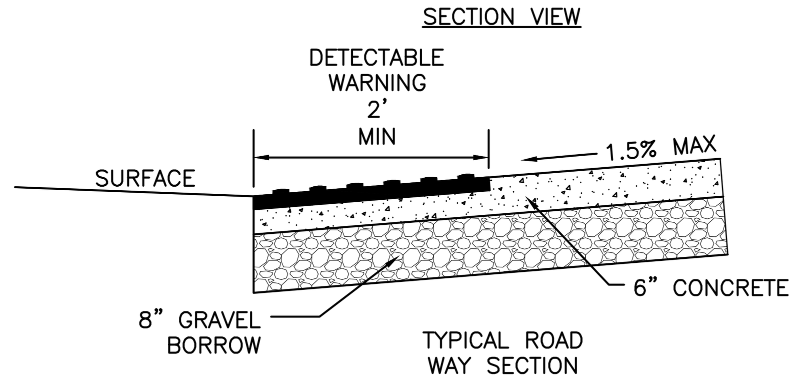
NOTES:

1. NO OPEN CHAIN LINK ENCLOSURES WILL BE ALLOWED FOR THE TRASH AND RECYCLING AREA
2. ENCLOSURE SHALL BE LOCKABLE WITH A PADLOCK FOR SECURITY
3. THE TRASH AND RECYCLING AREA WILL BE LOCATED NO GREATER THAN 500 FEET FROM THE ENTRANCE TO THE PREMISES (THE PATH TO WHICH LOCATION SHALL BE WELL LIT
4. ENCLOSURE SHALL BE OF SUFFICIENT SIZE TO INCLUDE THEREIN, ALL TRASH, RECYCLING, AND COMPOST
5. ENCLOSURE SHALL BE WELL LIT AND LOCATED IN AN AREA THAT WILL NOT INTERRUPT THE FLOW TO DRIVE–THRU LANE (IF APPLICABLE) OR ACCESS TO THE PARKING AREAS OR INGRESS OR EGRESS TO AND FROM THE PREMISES
6. ENCLOSURE SHALL NOT BE AN AREA UNDER OVERHEAD WIRES OR OTHER BARRIERS
7. ENCLOSURE MUST BE POSITIONED SO THAT TENANT'S TRASH REMOVAL VENDOR CAN ACCESS THE CONTAINERS) BY EITHER A FRONT LOAD OR REAR LOAD TRASH REMOVAL VEHICLE WITH A VEHICLE TURNING RADIUS OF
8. 40–45 FEET TO MAKE A 90 DEGREE TURN
9. ALL DESIGNS MUST BE IN ACCORDANCE WITH ALL APPLICABLE LAWS, INCLUDING TRASH AND RECYCLING LAWS AND/OR WITH ESTABLISHED HAULING INFRASTRUCTURE AND SECONDARY MARKETS TO SUPPORT RECOVERY AND MATERIAL REUSE IN FORM OF POST–CONSUMER CONTENT FOR PRODUCTS.

Trash Enclosure Details
NOT TO SCALE
8



SECTION VIEW



TYPICAL ROAD WAY SECTION

NOTES:
1. THE DIMENSIONS SHOWN AT ROADWAY EDGE ARE FIXED DISTANCES.
2. RAMP CROSS SECTION TO BE THE SAME AS ADJACENT SIDEWALK; I.E. DEPTH OF SURFACE AND FOUNDATION.
3. PORTLAND CEMENT CONCRETE RAMPS ARE TO BE TEXTURED BY BROOMING IN A DIRECTION PARALLEL TO THE LENGTH OF THE RAMP.
4. IN NO CASE ARE THE RAMPS TO BE PLACED BEHIND THE STOP LINE.
5. THE DIMENSIONS ARE SUBJECT TO CHANGE IN THE FIELD IF EXISTING APPURTENANCES OR CONDITIONS WILL MAKE THE RAMP LOCATIONS IMPRACTICAL OR UNSAFE. CONSULT CIVIL ENGINEER PRIOR TO MAKING ANY MODIFICATIONS.

ADA ACCESSIBLE CURB CUT AND TRANSITION
NOT TO SCALE
7

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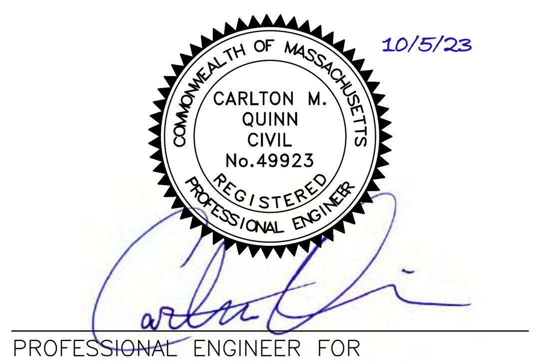

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO. 2398-01A	DATE: 10-05-2023
SCALE: AS SHOWN	DWG. NAME: C-2398-01A
DESIGNED BY: MTB	CHECKED BY: CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
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environmental consulting ◆ landscape architecture
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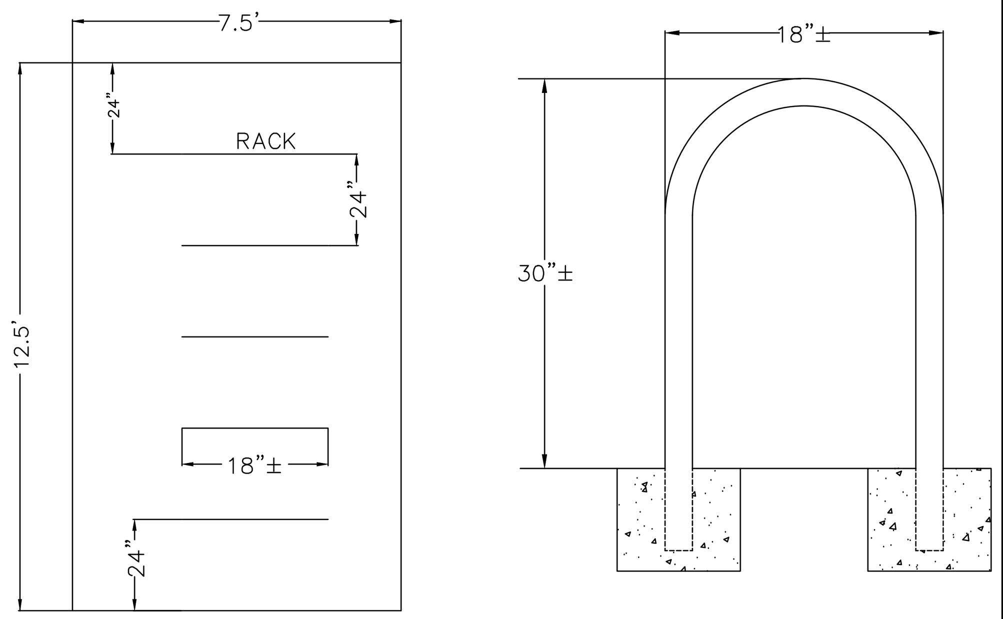
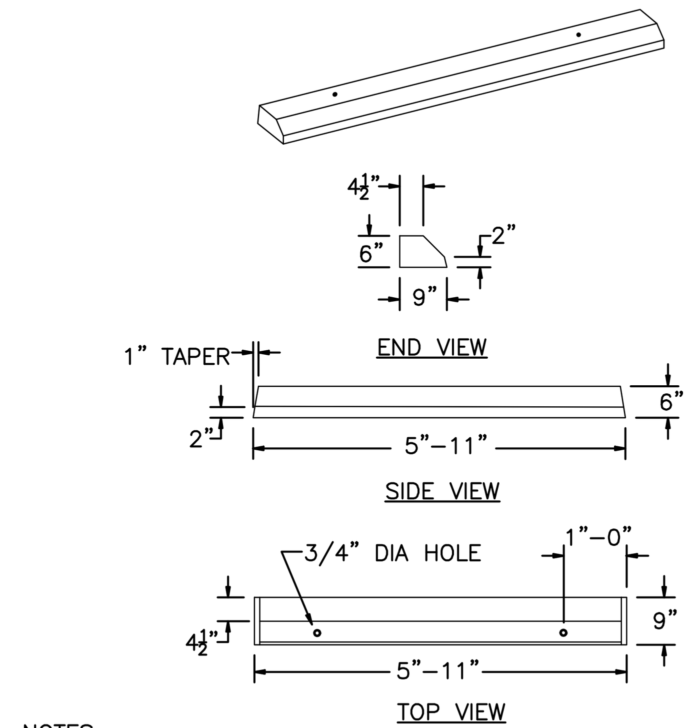
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: DETAILS
SHEET No. C-502

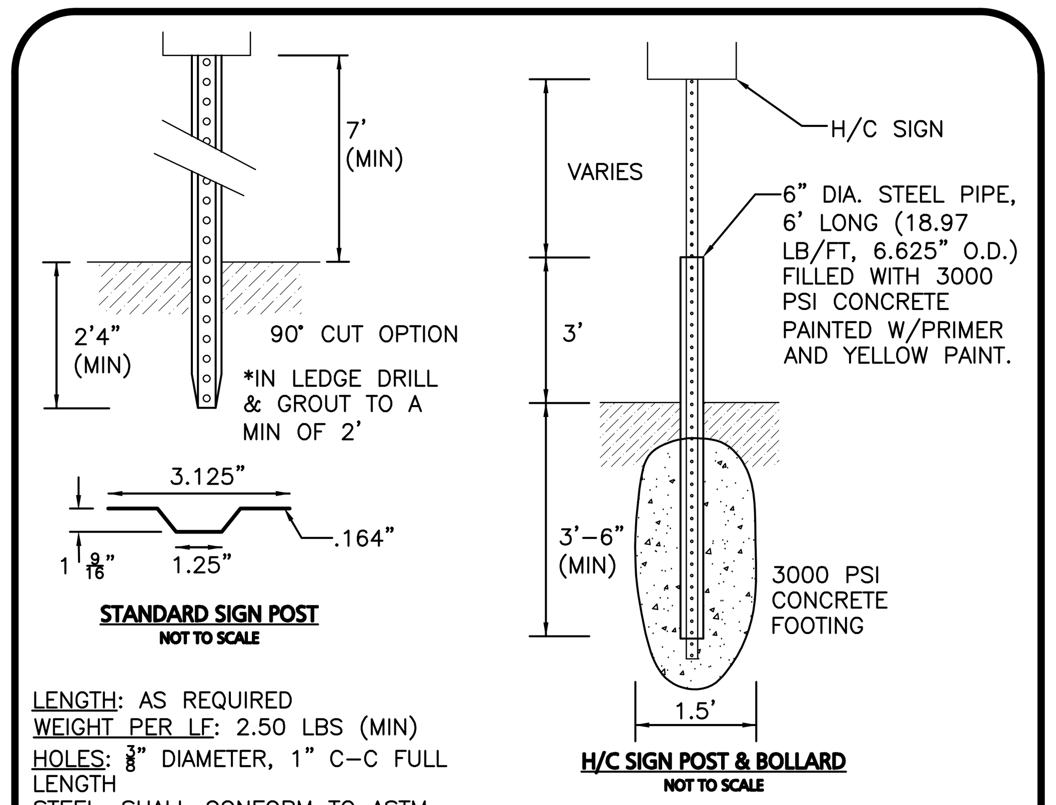


TYPICAL BICYCLE RACK (1)
NOT TO SCALE



NOTES
1. CONCRETE: 4,500 PSI MINIMUM AFTER 28 DAYS.
2. PINS AVAILABLE.
3. APPROXIMATE WEIGHT: 265 LBS.

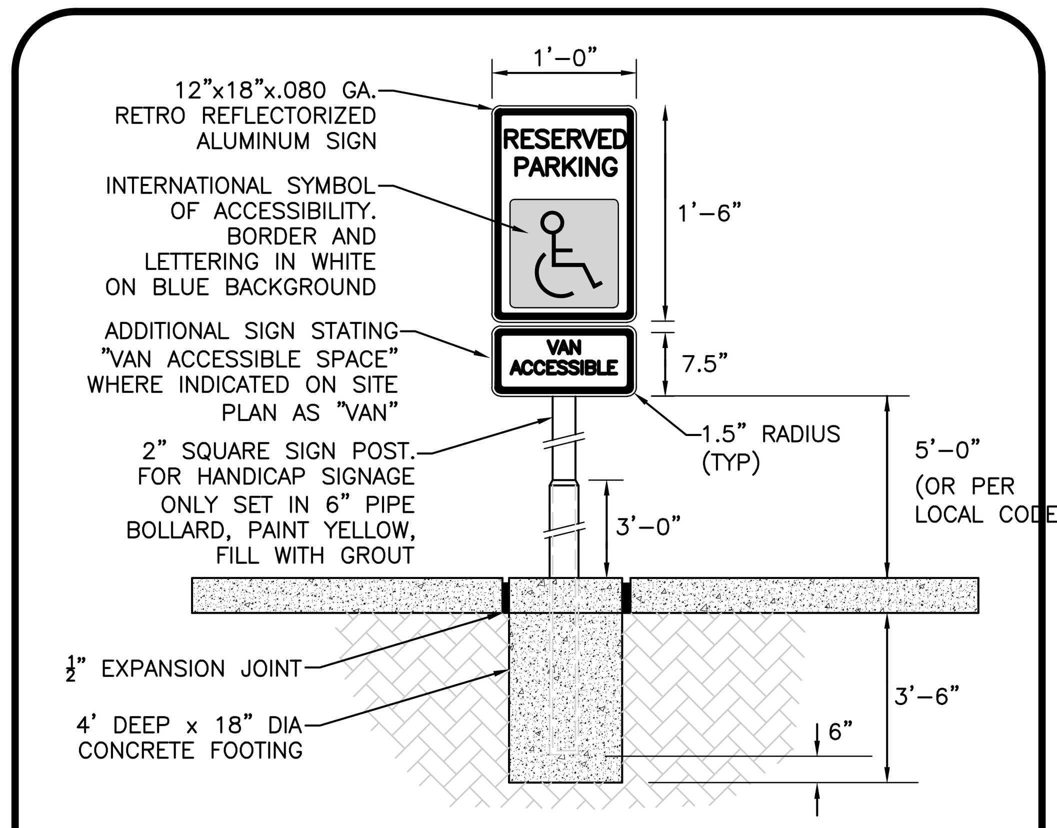
BUMPER CURBING SINGLE FACE (2)
NOT TO SCALE



LENGTH: AS REQUIRED
WEIGHT PER LF: 2.50 LBS (MIN)
HOLES: 3/8" DIAMETER, 1" C-C FULL LENGTH
STEEL: SHALL CONFORM TO ASTM A-499 OR ASTM A-576
FINISH: SHALL BE PAINTED WITH 2 COATS OF AN APPROVED MEDIUM GREEN, BAKED ON OR AIR DRIED, PAINT OF WEATHER RESISTANT QUALITY.

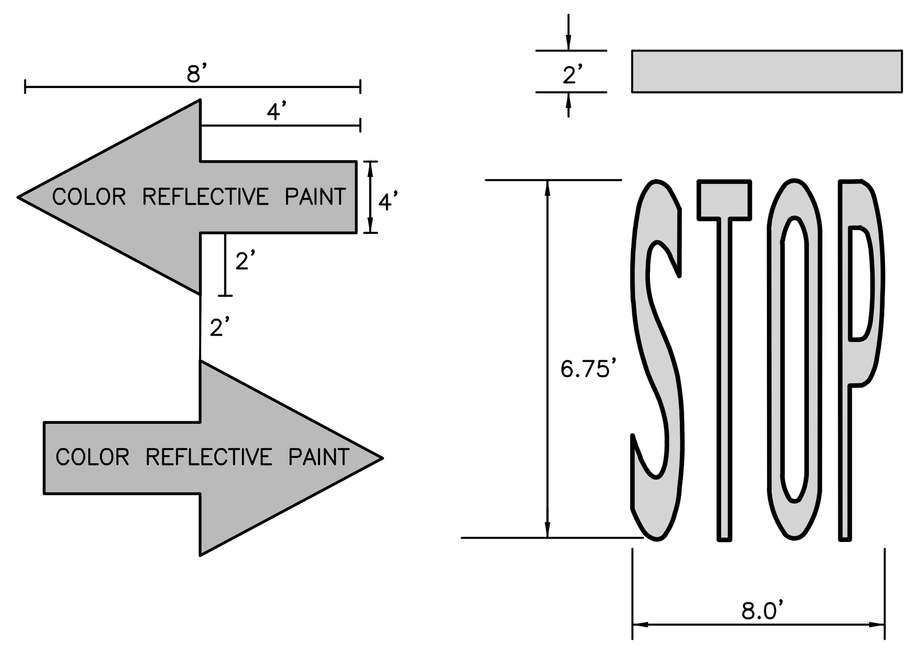
NOTE:
1. STEEL PIPE BOLLARD & CONCRETE FOOTING TO BE USED ON POST MOUNTED SIGNS IN PAVED AREAS.

SIGN POST DETAILS (3)
NOT TO SCALE

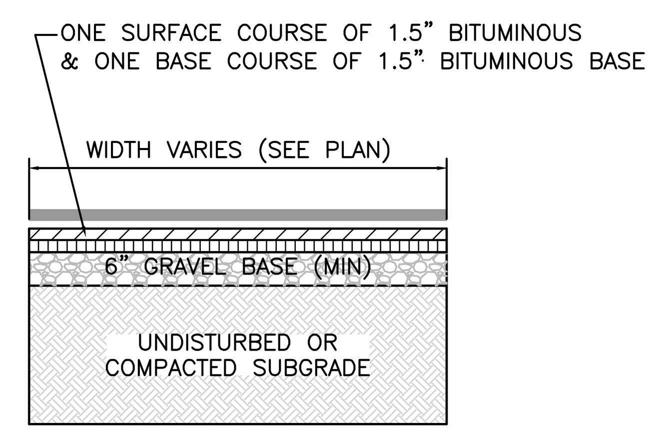


NOTES:
1. SPECIFIC CODE SHALL BE REFERENCED FOR LOCAL AND STATE REQUIREMENTS.
2. PROVIDE (1) SIGN PER HANDICAP SPACE. SEE SITE PLAN FOR EXACT LOCATION.
3. EXPANSION JOINT MATERIAL NOT REQUIRED WITH FLEXIBLE PAVEMENT.

ADA ACCESSIBLE PARKING / TRAFFIC CONTROL SIGNAGE (4)
NOT TO SCALE

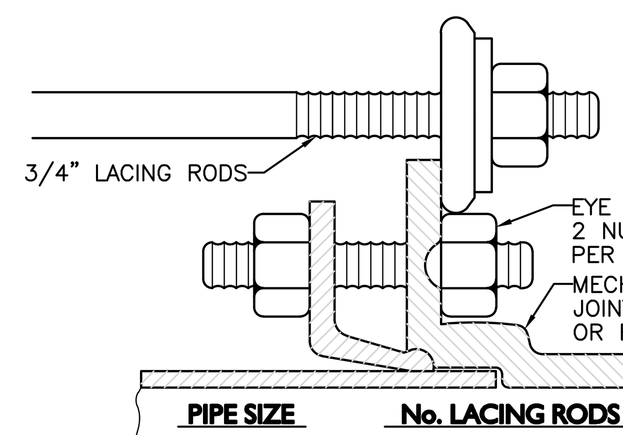


WHITE THERMOPLASTIC LETTERING/ ARROWS (5)
NOT TO SCALE



NOTES
1. SEE PLAN FOR ELEVATIONS.

BITUMINOUS WALKWAY (6)
NOT TO SCALE

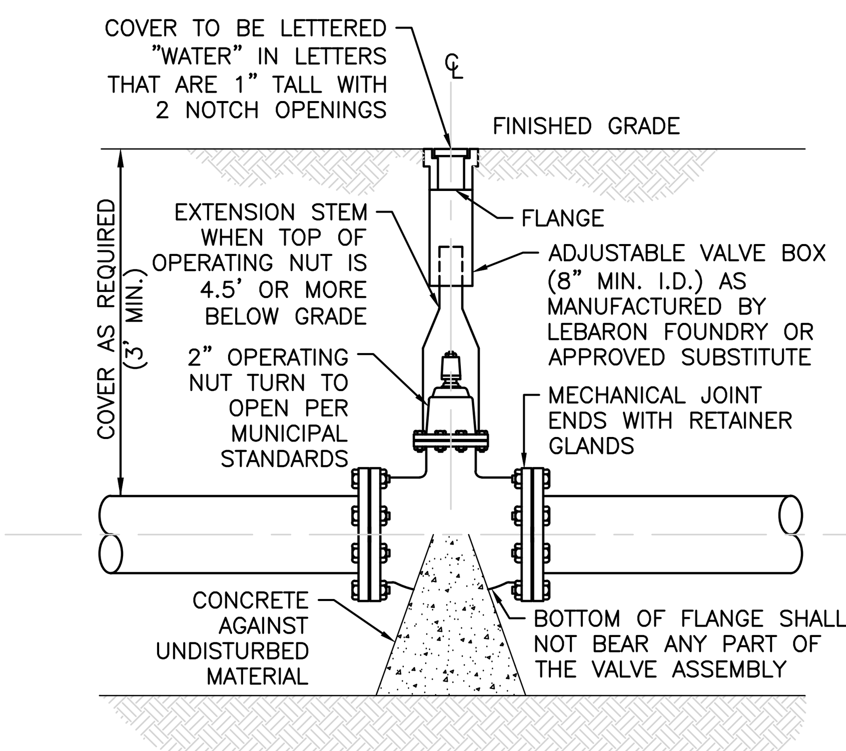


PIPE SIZE	No. LACING RODS
4", 6" & 8"	2 – 3/4" *
10" & 12"	4 – 3/4" *
16"	4 – 3/4" *
20"	6 – 3/4" *

1. NUMBER OF LACING RODS IS BASED ON MAXIMUM PRESSURE OF 125 P.S.I. IN MAIN.
2. EYE-BOLTS AND LACING RODS ARE TO BE FABRICATED FROM A-36 STEEL.
3. STEEL LACING RODS SHALL HAVE A YIELD STRESS OF NOT LESS THAN 36,000 P.S.I.
4. EYE-BOLTS SHALL HAVE A MINIMUM TENSILE STRENGTH OF 7,000 LBS. EACH.

* STANDARD LENGTHS ARE 6' & 10'. COUPLINGS MAY BE USED FOR LONGER LENGTHS.

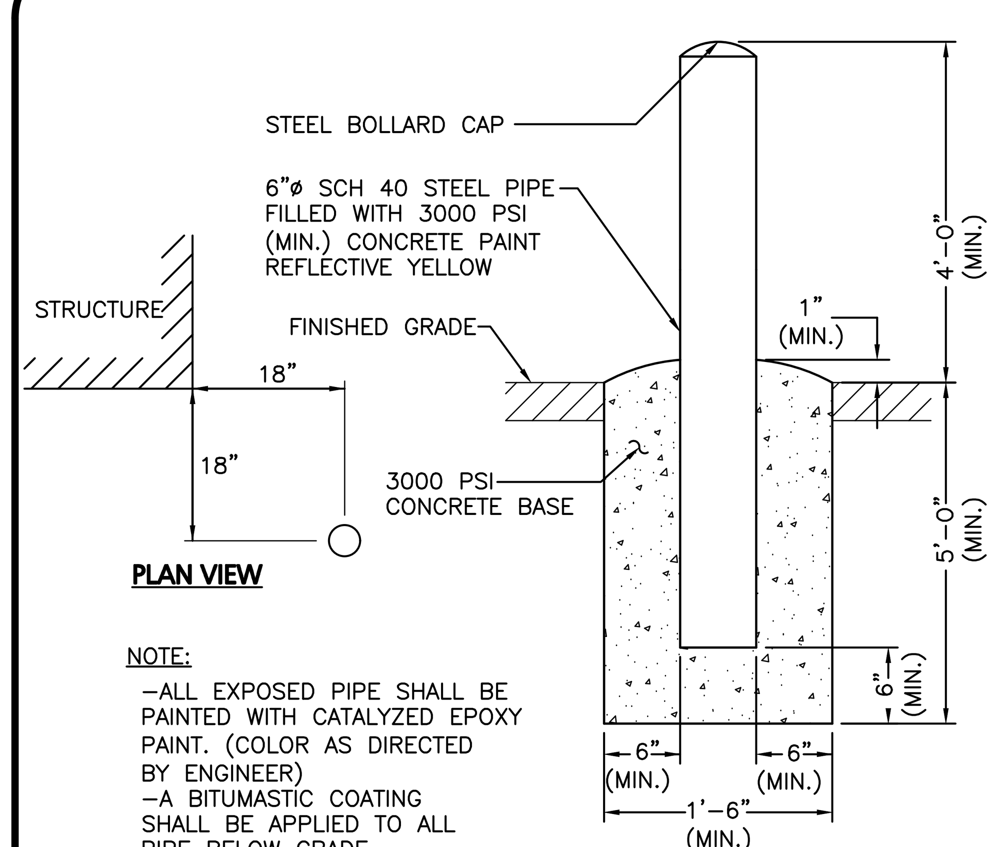
MECHANICAL JOINT LACING DETAIL (7)
NOT TO SCALE



NOTE:
1. CONTRACTOR MAY USE ANCHOR TEES AT HIS OPTION.
2. HYDRANTS AND VALVES TO OPERATE PER MUNICIPAL STANDARDS

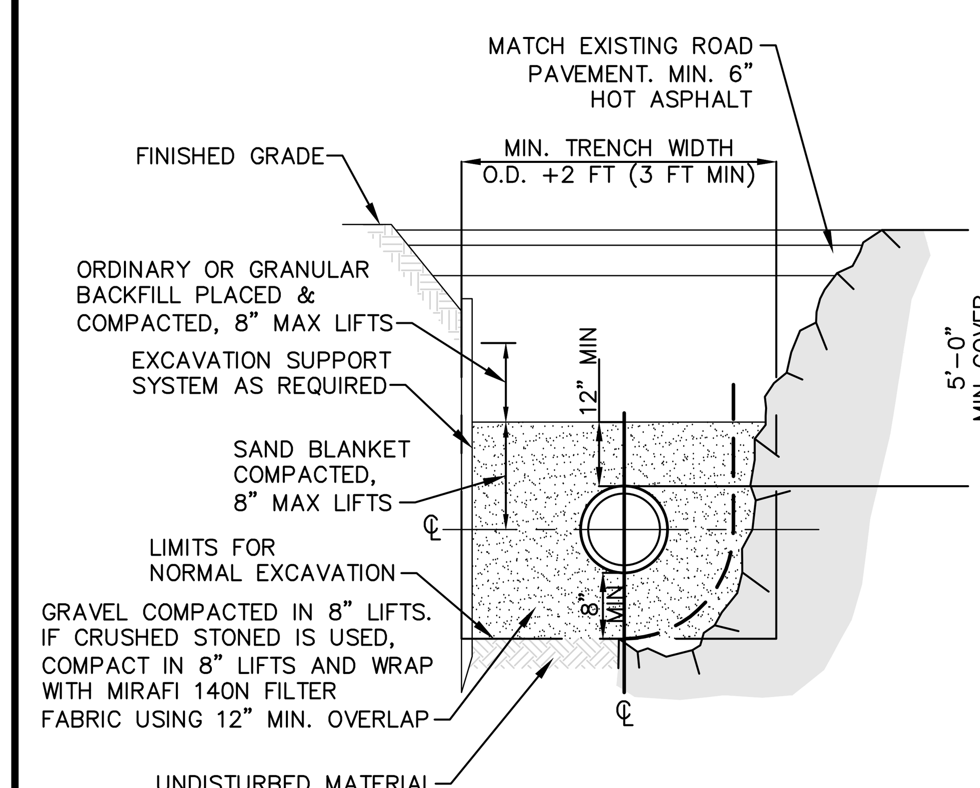
GATE VALVE (8)
NOT TO SCALE

NOT USED (9)
NOT TO SCALE

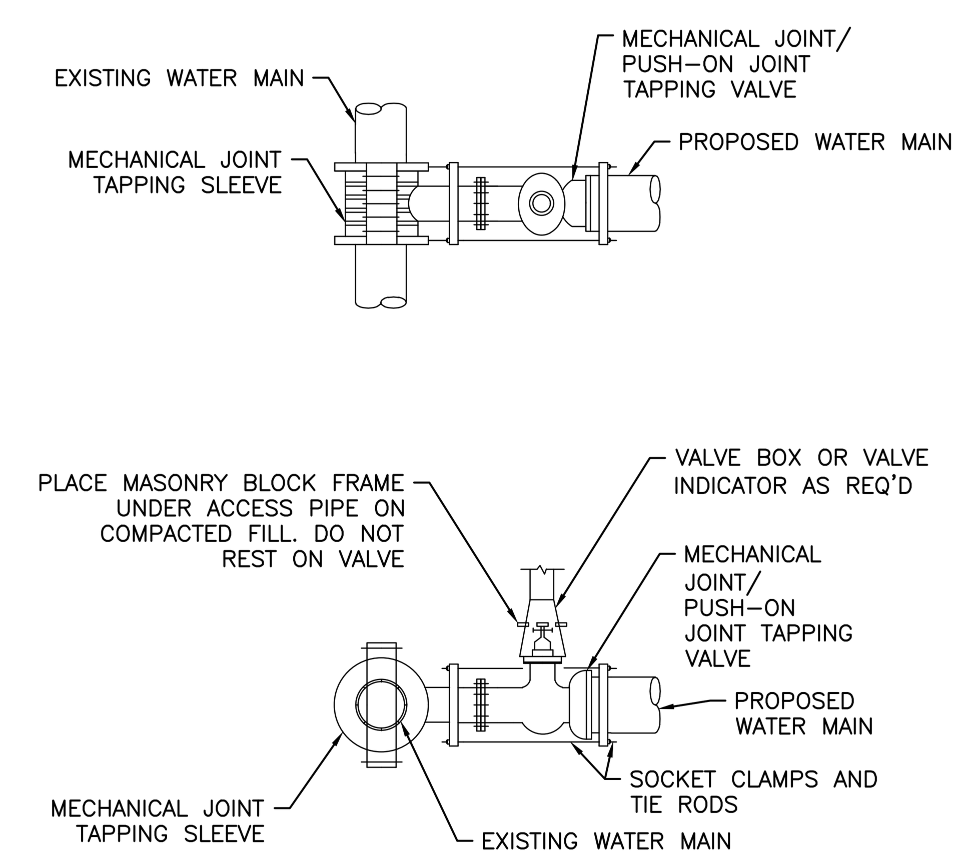


NOTE:
-ALL EXPOSED PIPE SHALL BE PAINTED WITH CATALYZED EPOXY PAINT. (COLOR AS DIRECTED BY ENGINEER)
-A BITUMASTIC COATING SHALL BE APPLIED TO ALL PIPE BELOW GRADE

FIXED BOLLARD (10)
NOT TO SCALE



WATER TRENCH SECTION (11)
NOT TO SCALE



TAPPING VALVE AND SLEEVE (12)
NOT TO SCALE

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COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

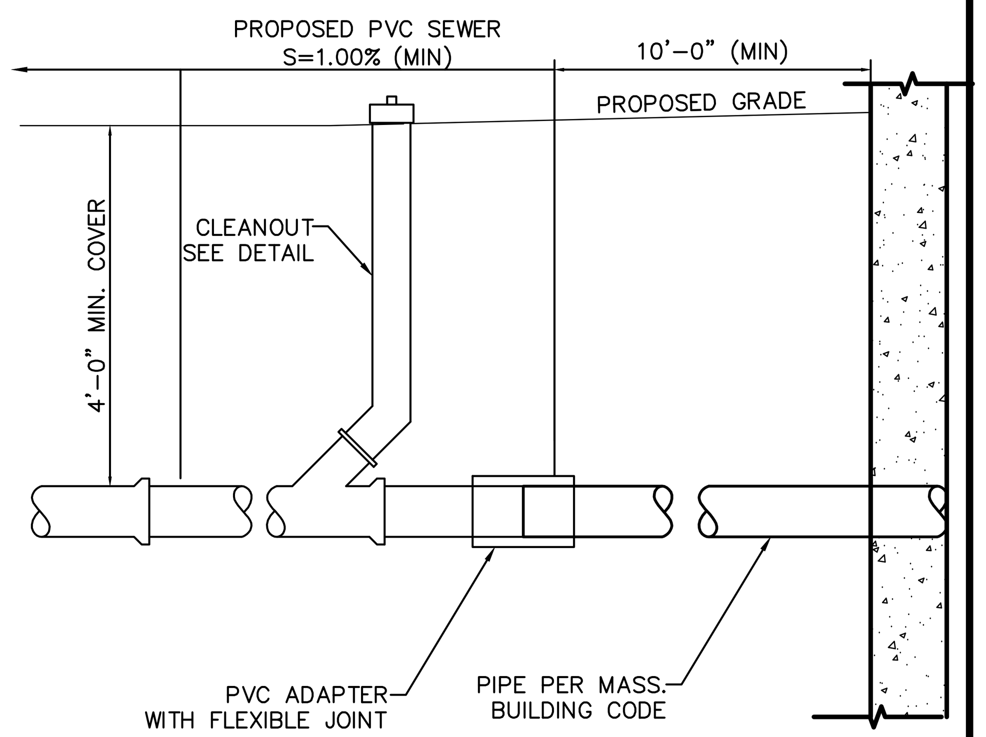
PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

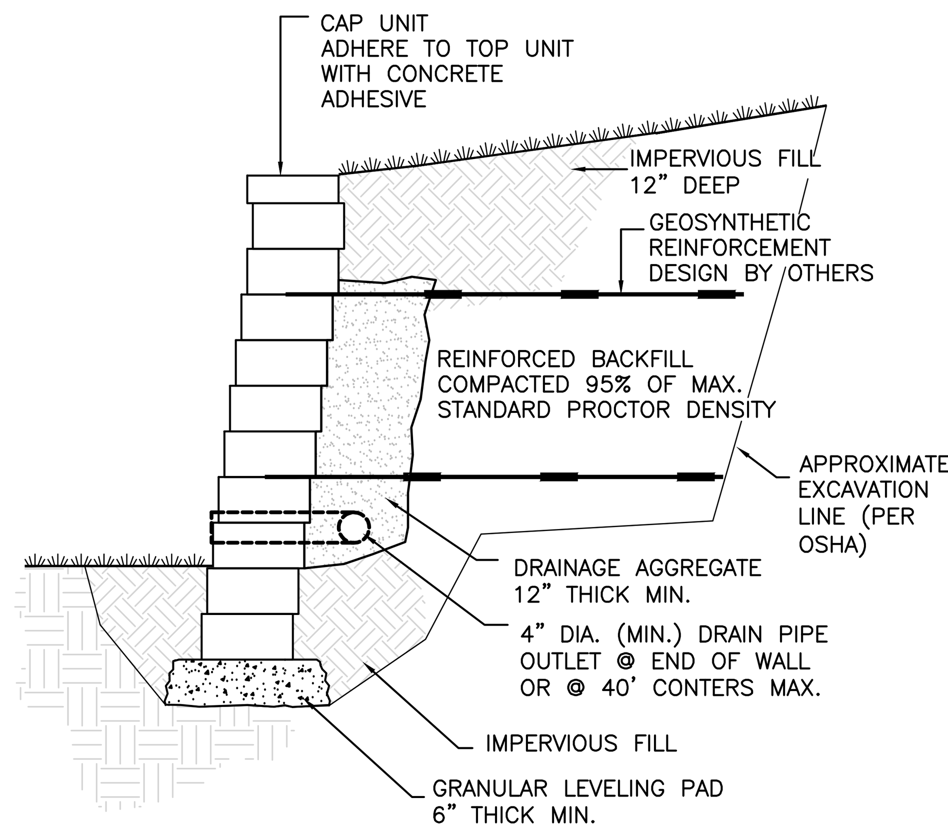
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

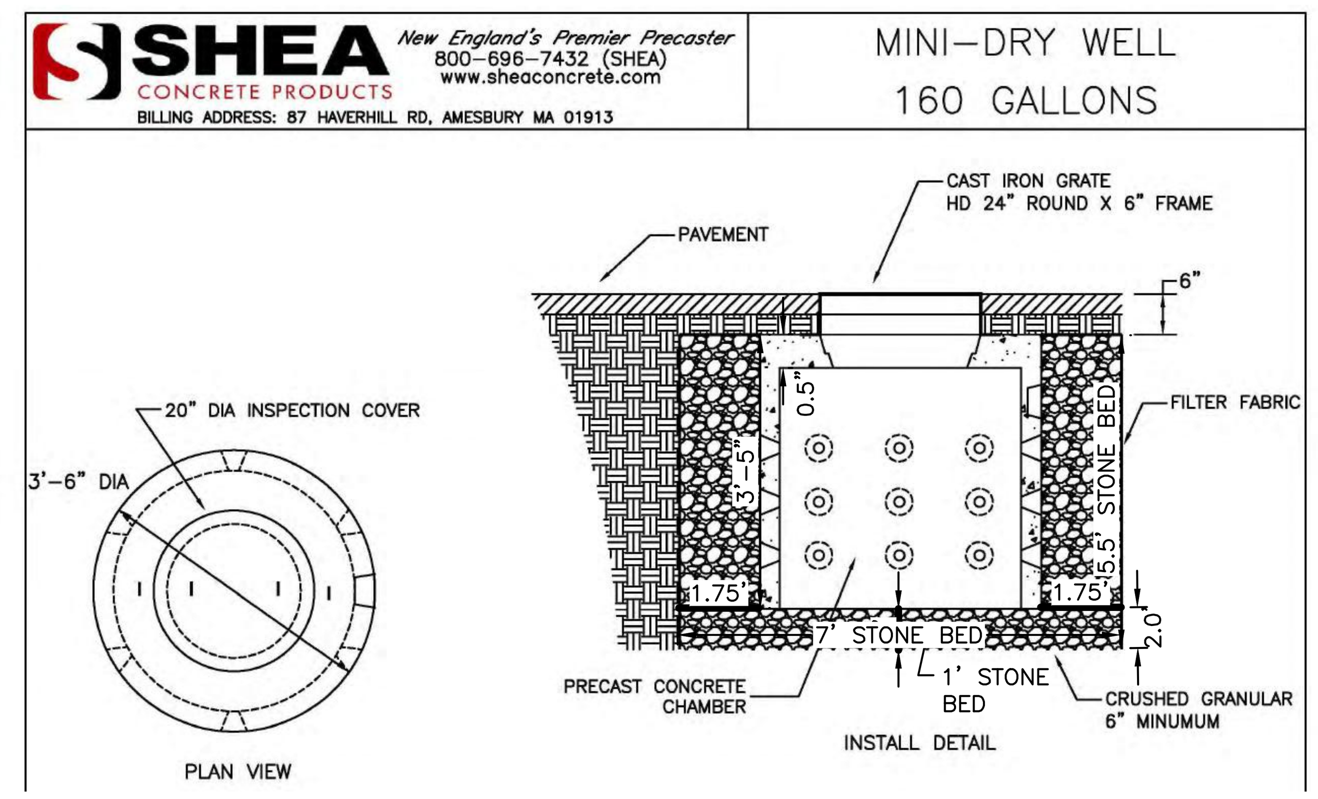
DRAWING TITLE:	SHEET No.
DETAILS	C-503



BUILDING SEWER SERVICE (1)
NOT TO SCALE



TYPICAL SEGMENTAL BLOCK RETAINING WALL (2)
NOT TO SCALE



NOTES:
PRECAST DRYWELL HAS BEEN SIZED TO ACCOMMODATE FOR A 1" STORM WITH A CATCHMENT AREA OF 620 S.F. OF IMPERVIOUS SURFACE. STONE PERIMETER ADDED TO ACCOMMODATE EXTRA STORAGE VOLUME.

1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR AASHTO HS-20 LOADING, 1 TO 5 FT COVER.
3. CAPACITY INCREASES IN INCREMENTS OF 160 GALLONS FOR EVERY 3' SECTION ADDED.
4. BOTTOM PLATES AVAILABLE.

CALCULATION:

STORAGE REQUIRED: 320SF/1" = 199 GALLONS

STORAGE PROVIDED:

160 GALLON PRECAST CONCRETE DRYWELL = 254 GALLONS

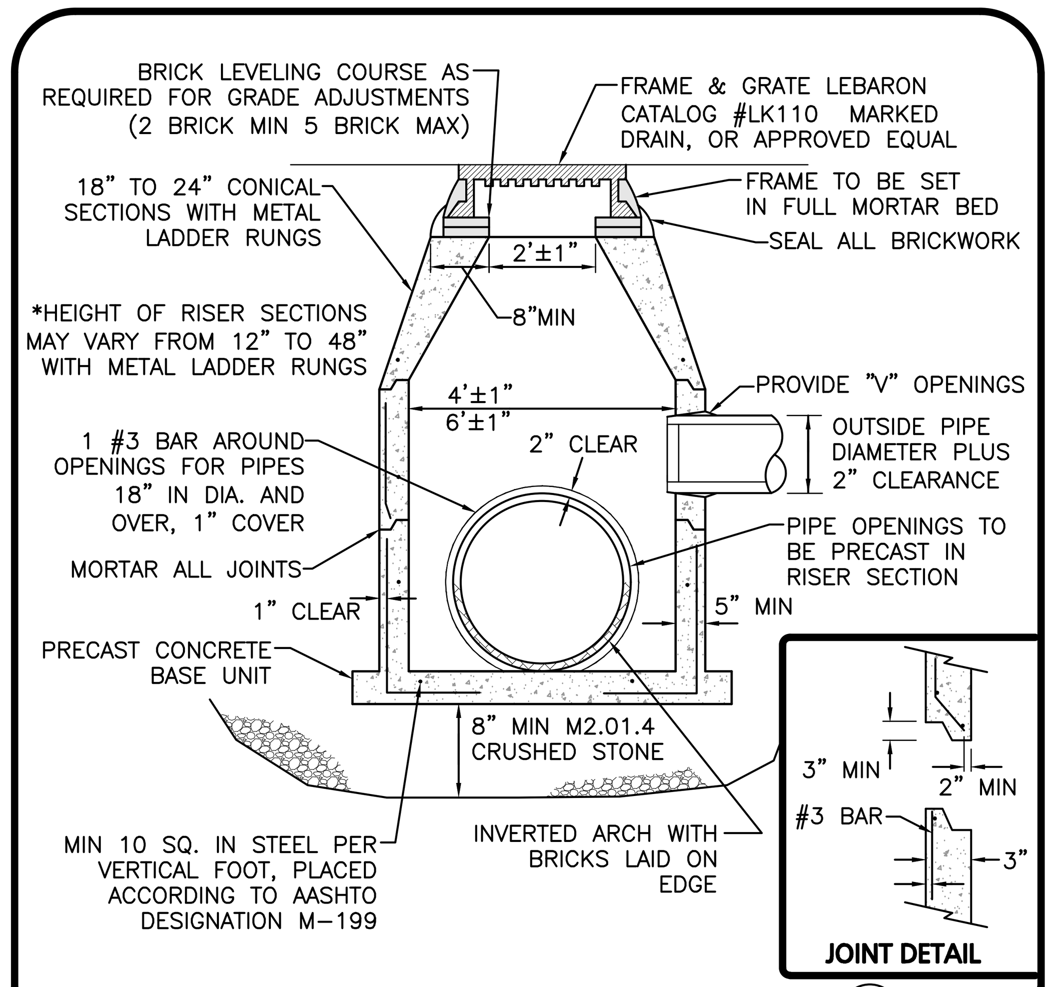
7.00' X 5.50' STONE BED PERIMETER = 531 GALLONS

TOTAL STORAGE PROVIDED = 785 GALLONS

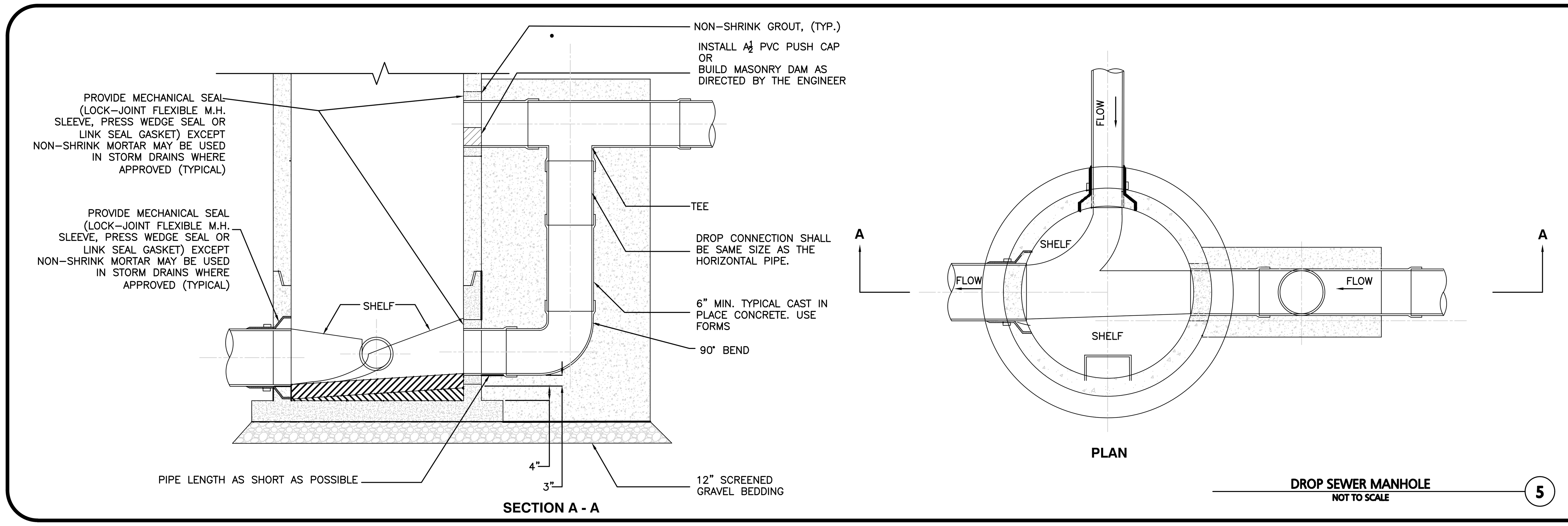
160 GALLON DRY WELL (3)
NOT TO SCALE

10/5/23
COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER

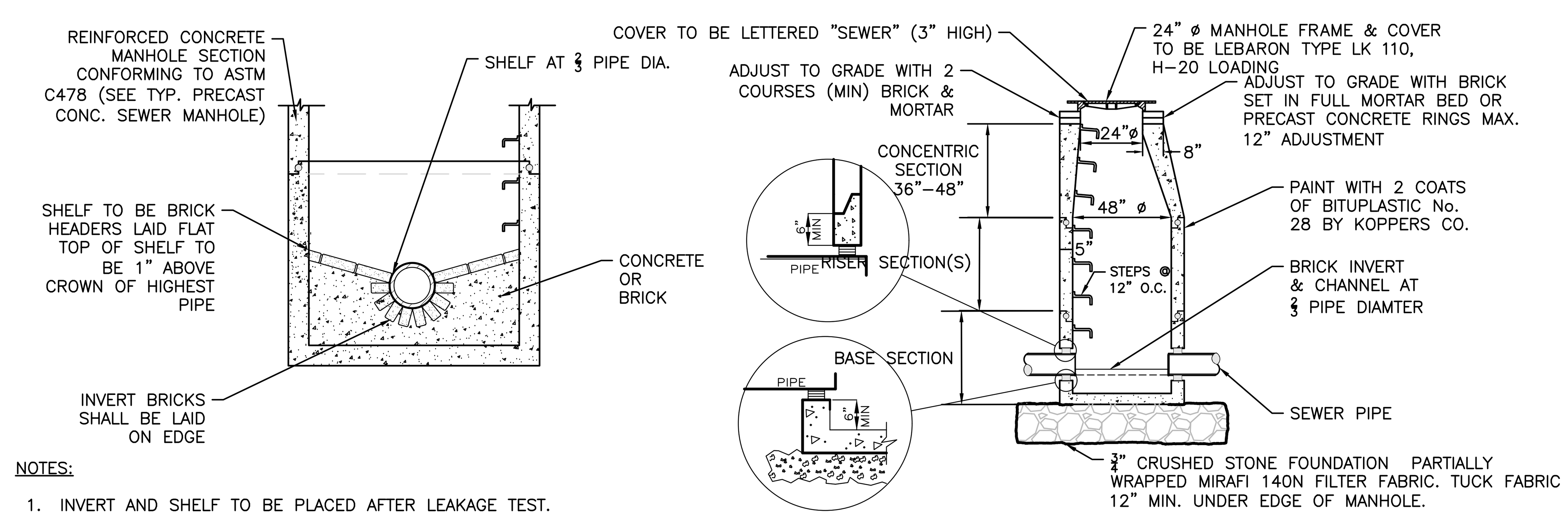
PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.



PRECAST DRAIN MANHOLE (4)
NOT TO SCALE



DROP SEWER MANHOLE (5)
NOT TO SCALE

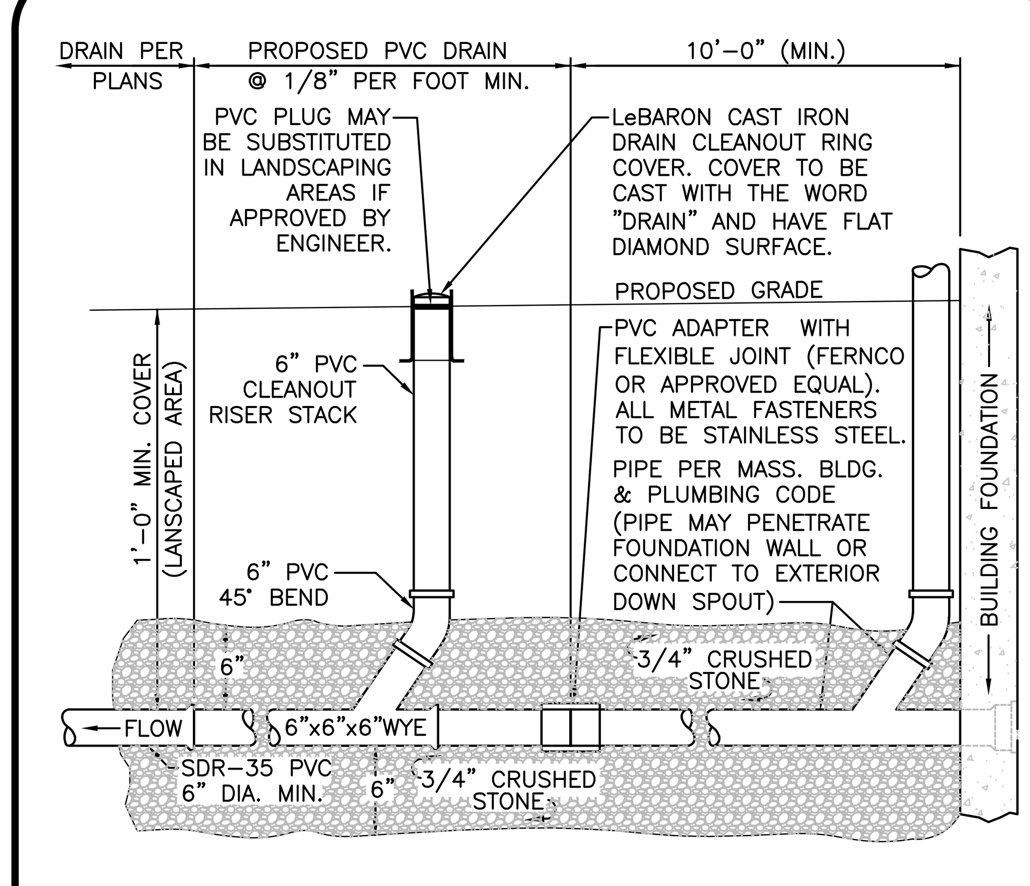


NOTES:

1. INVERT AND SHELF TO BE PLACED AFTER LEAKAGE TEST.
2. MANHOLES SHALL HAVE A BRICK PAVED SHELF AND INVERT, CONSTRUCTED TO CONFORM TO THE SIZE OF PIPE AND FLOW. AT CHANGES IN DIRECTION, THE INVERTS SHALL BE LAID OUT IN CURVES OF THE LONGEST RADIUS POSSIBLE TANGENT TO THE CENTER LINE OF THE HIGHEST PIPE CROWN AND SLOPE TO DRAIN TOWARD THE FLOWING THROUGH CHANNEL. UNDERLAYMENT OF INVERT AND SHELF SHALL CONSIST OF CEMENT CONCRETE OR BRICK IN MORTAR.

NOTE:
THE MANHOLE, INCLUDING ALL COMPONENT PARTS, SHALL HAVE ADEQUATE SPACE, STRENGTH AND LEAK PROOF QUALITIES CONSIDERED NECESSARY FOR THE INTENDED SERVICE SPACE REQUIREMENT AND CONFIGURATIONS SHALL BE AS SHOWN ON THE DRAWING. MANHOLES MAY BE AN ASSEMBLY OR PRECAST SECTIONS, WITH OR WITHOUT STEEL REINFORCEMENT, WITH ADEQUATE JOINTING OR CONCRETE CAST MONOLITHICALLY IN PLACE WITH OR WITHOUT REINFORCEMENT. IN ANY APPROVED MANHOLE, THE COMPLETE STRUCTURE SHALL BE OF SUCH MATERIAL AND QUALITY AS TO WITHSTAND LOADS OF 8 TONS (H-20 LOADING) WITHOUT FAILURE AND PREVENT LEAKAGE IN EXCESS OF ONE GALLON PER DAY PER VERTICAL FOOT OF MANHOLE.

PRECAST CONCRETE SEWER MANHOLE (6)
NOT TO SCALE



ROOF DRAIN (5)
NOT TO SCALE

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REV	DATE	DESCRIPTION

APPLICANT\OWNER:
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c/o SAVERIO FULCINITI
1 SYLVAN STREET
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STRADA
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PROJECT NO.	2398-01A	DATE:	10-05-2023
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DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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DRAWING TITLE:	SHEET No.
DETAILS	C-504

SC-310 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

SC-310 STORMTECH CHAMBER SPECIFICATION 1
NOT TO SCALE

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-310 SYSTEM

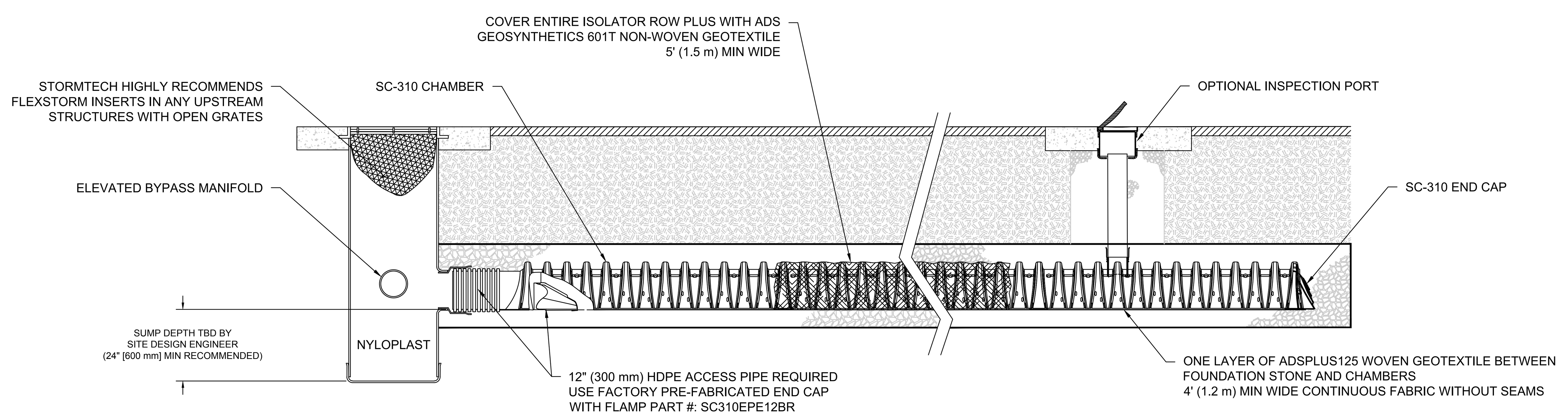
1. STORMTECH SC-310 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

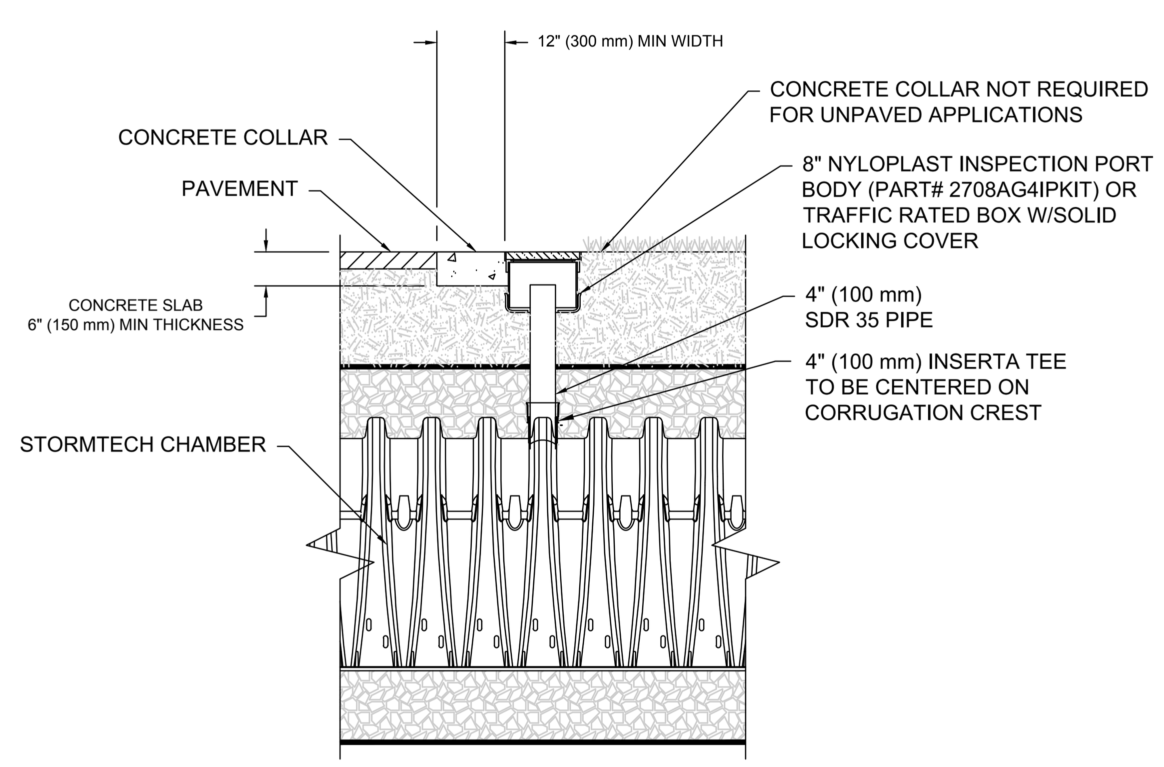
1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.



SC-310 ISOLATOR ROW PLUS DETAIL 2
NOT TO SCALE



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER) 3
NOT TO SCALE

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

ADS™
Advanced Drainage Systems, Inc.

ADS SiteAssist™
FOR STORMTECH INSTALLATION INSTRUCTIONS VISIT OUR APP

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_DETAILS.DWG

COMMONWEALTH OF MASSACHUSETTS
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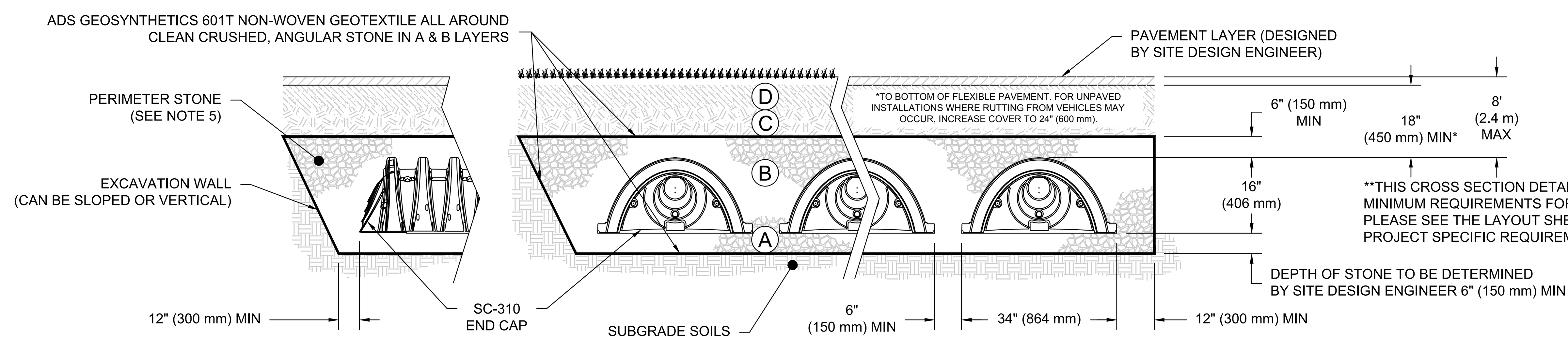
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
DETAILS	C-505

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

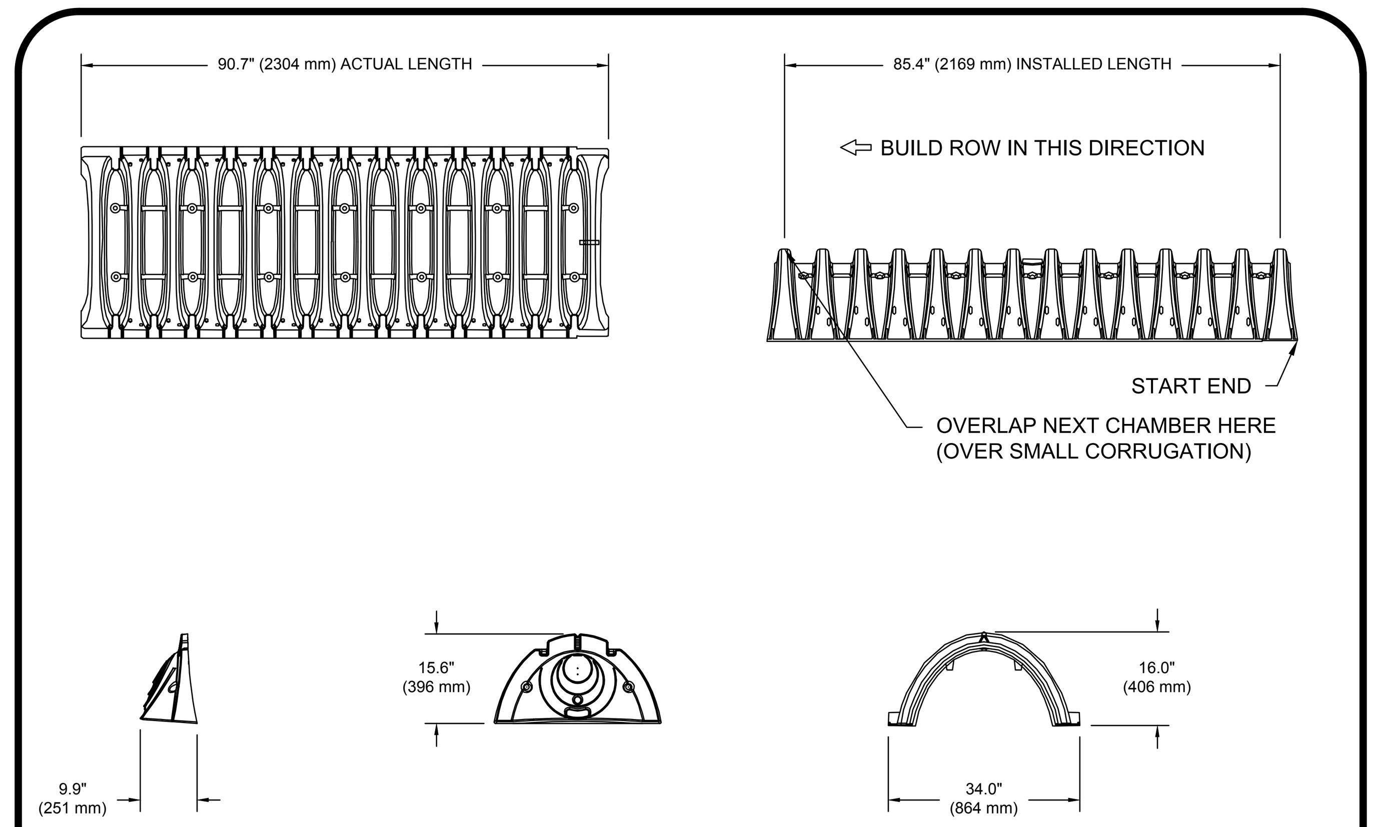
PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

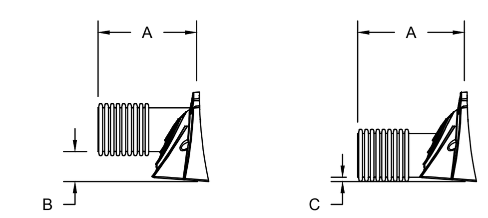
SC-310 CROSS SECTION DETAIL 1
NOT TO SCALE



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE CORED END CAPS END WITH "PC"

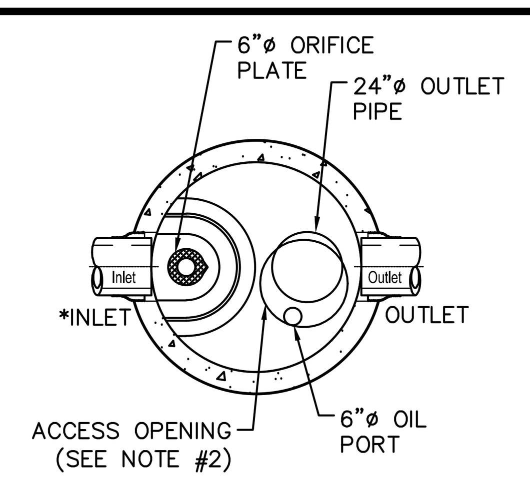
PART #	STUB	A	B	C
SC310EPE06T / SC310EPE06TPC	6" (150 mm)	9.6" (244 mm)	5.8" (147 mm)	---
SC310EPE06B / SC310EPE06BPC			---	0.5" (13 mm)
SC310EPE08T / SC310EPE08TPC	8" (200 mm)	11.9" (302 mm)	3.5" (89 mm)	---
SC310EPE08B / SC310EPE08BPC			---	0.6" (15 mm)
SC310EPE10T / SC310EPE10TPC	10" (250 mm)	12.7" (323 mm)	1.4" (36 mm)	---
SC310EPE10B / SC310EPE10BPC			---	0.7" (18 mm)
SC310EPE12B	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)
SC310EPE12BR	12" (300 mm)	13.5" (343 mm)	---	0.9" (23 mm)

ALL STUBS, EXCEPT FOR THE SC310EPE12B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

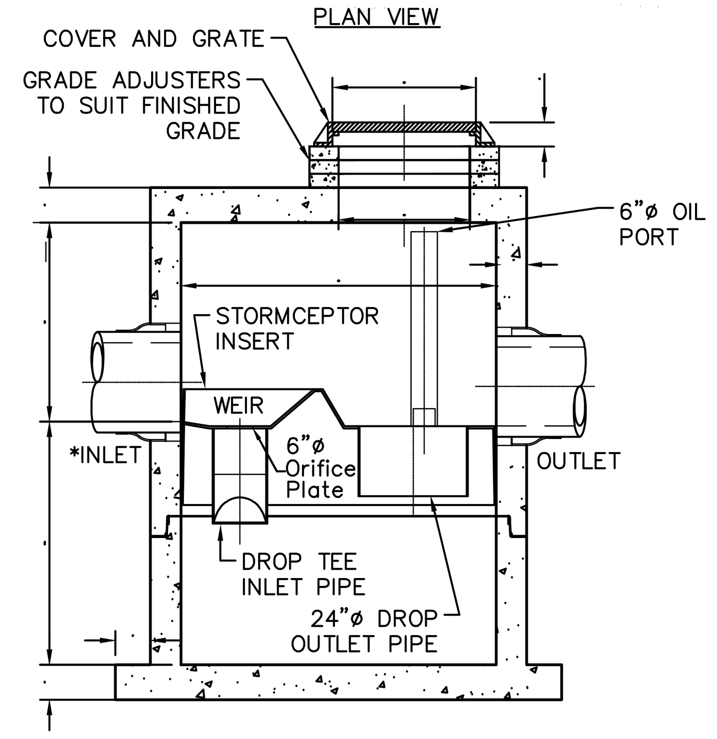
* FOR THE SC310EPE12B THE 12" (300 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 0.25" (6 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

SC-310 TECHNICAL SPECIFICATIONS 2
NOT TO SCALE



PLAN VIEW



SECTION THRU CHAMBER

NOTE :
1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE INLET AND OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 24"ø OUTLET RISER PIPE AND THE 6"ø OIL PORT.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.
4. CONTACT A CONCRETE PIPE DIVISION REPRESENTATIVE FOR FURTHER DETAILS NOT LISTED ON THIS DRAWING.
5. MINIMUM 6" FROM TOP OF WEIR TO MANHOLE.

STC 900 PRECAST CONCRETE STORMCEPTOR (900 US GALLON CAPACITY) 3
NOT TO SCALE

NOT FOR CONSTRUCTION

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_DETAILS.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED
PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
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WOBURN MA 01801
TEL: (781) 935-6889
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WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
DETAILS	C-506

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

SC-740 STORMTECH CHAMBER SPECIFICATION (1)
NOT TO SCALE

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

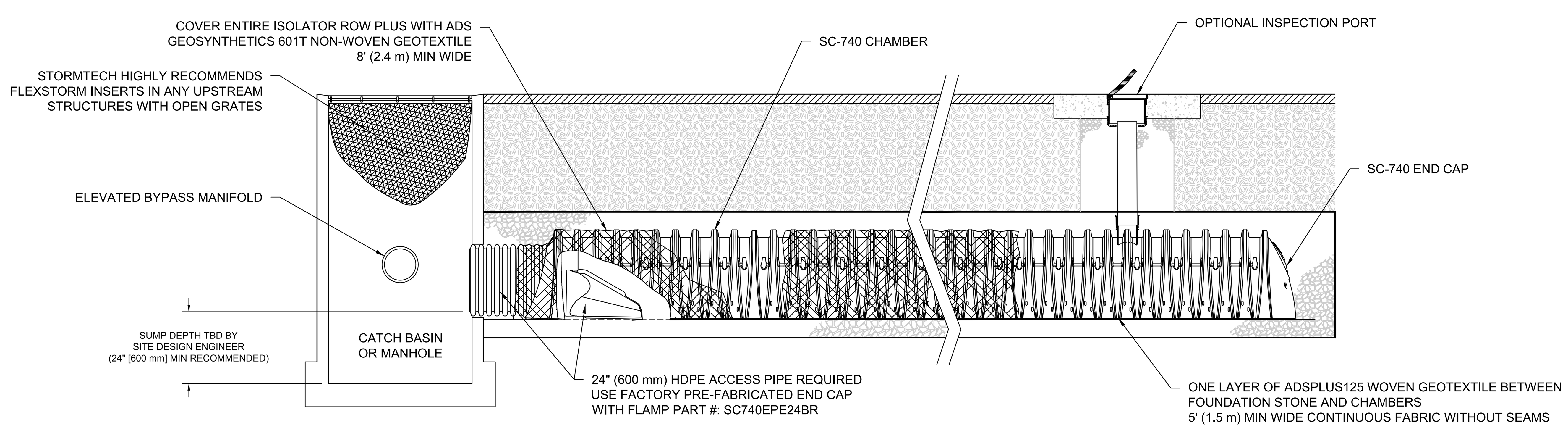
1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

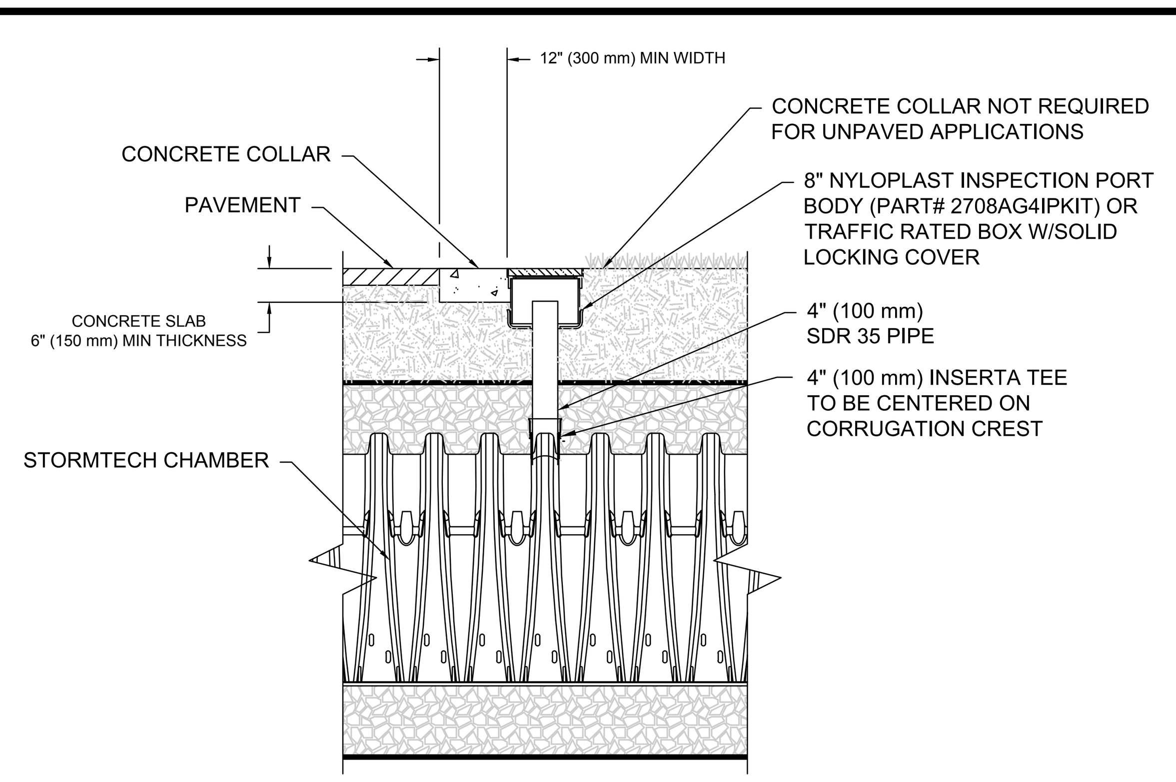
1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.



SC-740ISOLATOR ROW PLUS DETAIL (2)
NOT TO SCALE



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

4" PVC INSPECTION PORT DETAIL (SC SERIES CHAMBER) (3)
NOT TO SCALE

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_DETAILS.DWG

COMMONWEALTH OF MASSACHUSETTS
CARLTON M. QUINN
CIVIL
No.49923
REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:		DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
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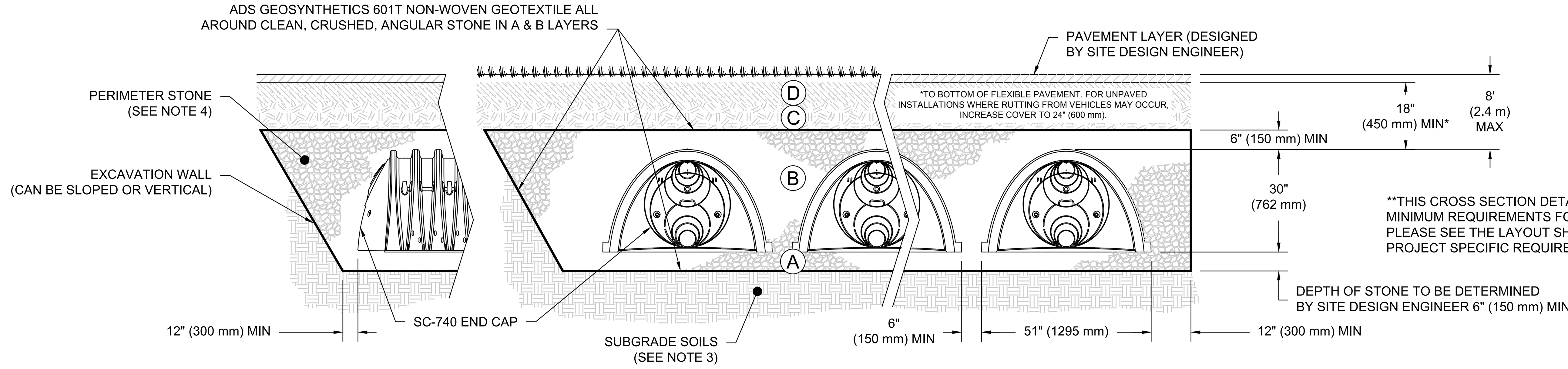
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
DETAILS	C-507

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

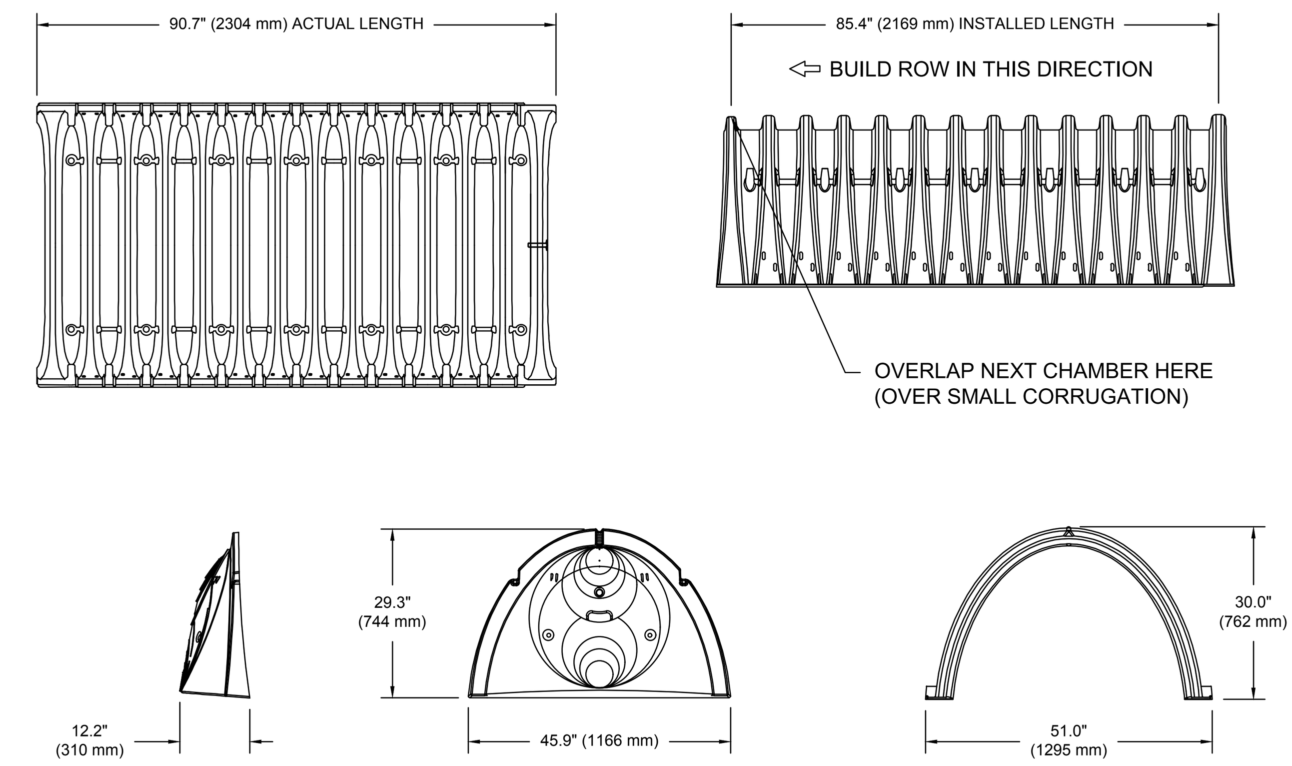
PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

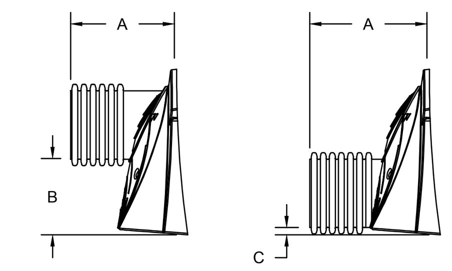
SC-740 CROSS SECTION DETAIL (1)
NOT TO SCALE



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"
PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

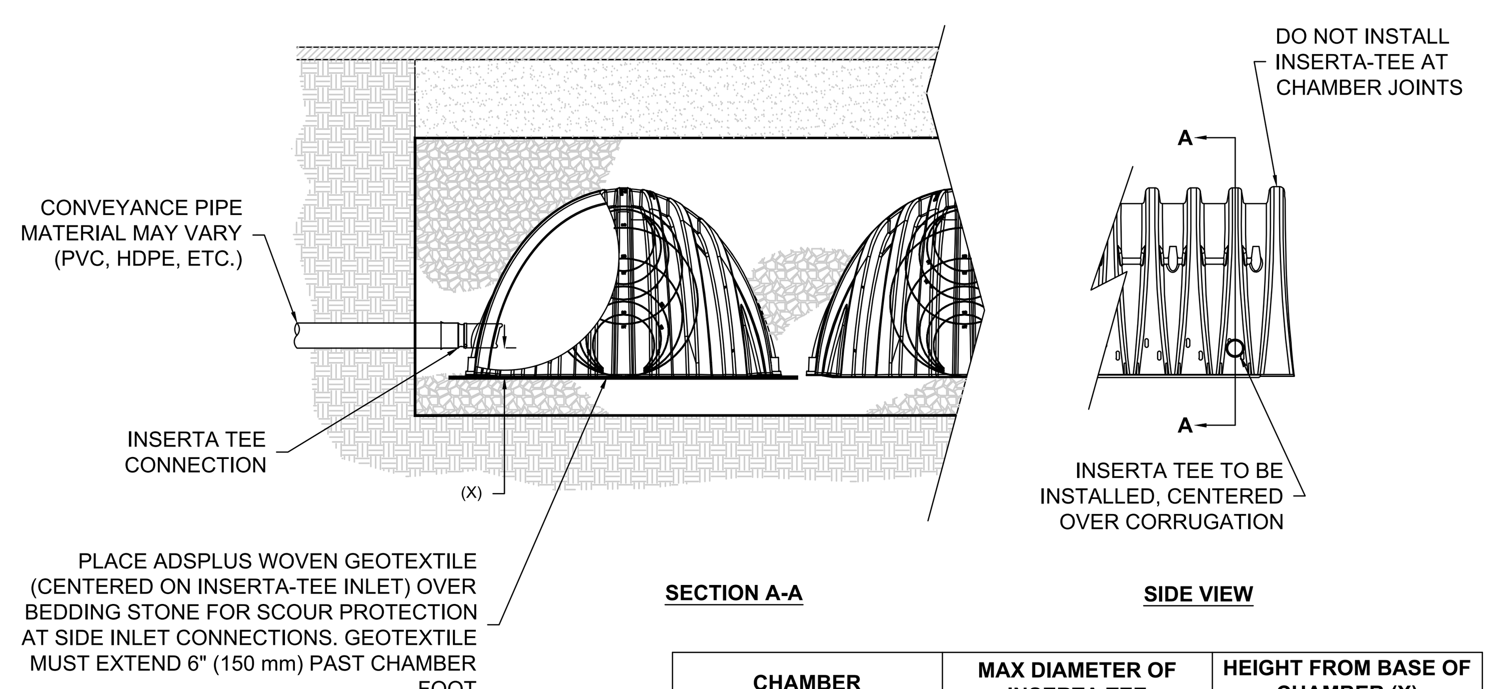
PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T /SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)
SC740EPE24BR*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B/SC740EPE24BR ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B/SC740EPE24BR THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

SC-740 TECHNICAL SPECIFICATIONS (2)
NOT TO SCALE



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTES:
- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

SC-740 INSERTA-TEE SIDE INLET DETAIL (3)
NOT TO SCALE

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\C-2398-01A_DETAILS.DWG

COMMONWEALTH OF MASSACHUSETTS CARLTON M. QUINN CIVIL No.49923 REGISTERED PROFESSIONAL ENGINEER
10/5/23

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

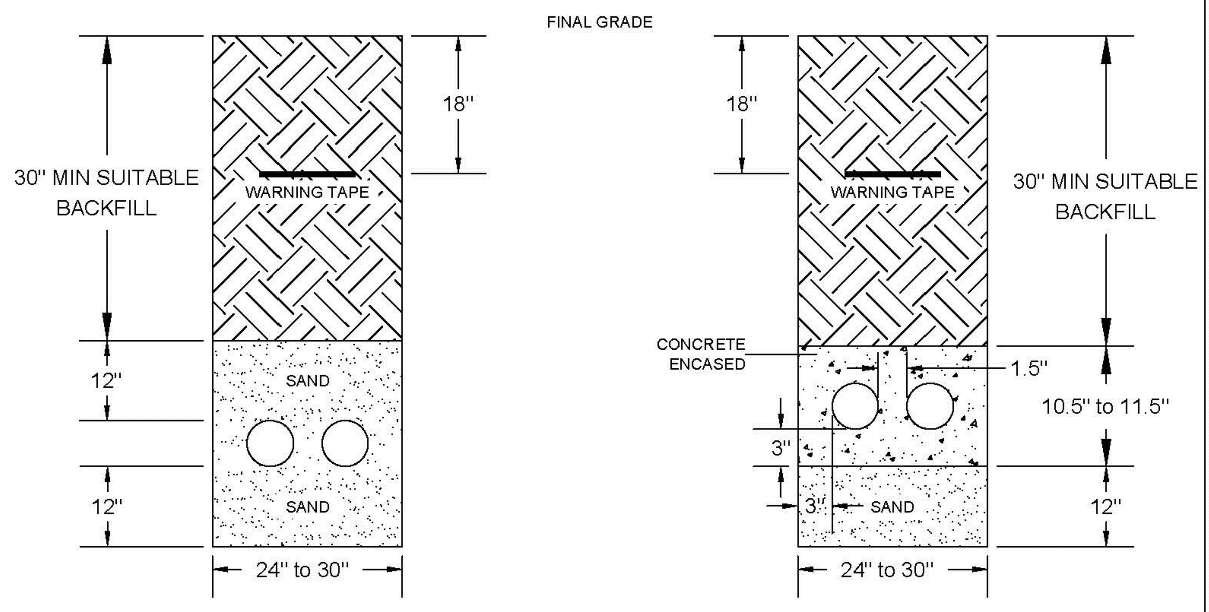
PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: DETAILS
SHEET No. C-508



TYPICAL CROSS SECTION
TRENCH DETAIL FOR CONDUIT

TYPICAL CROSS SECTION
TRENCH DETAIL FOR CONDUIT
CONCRETE ENCASEMENT

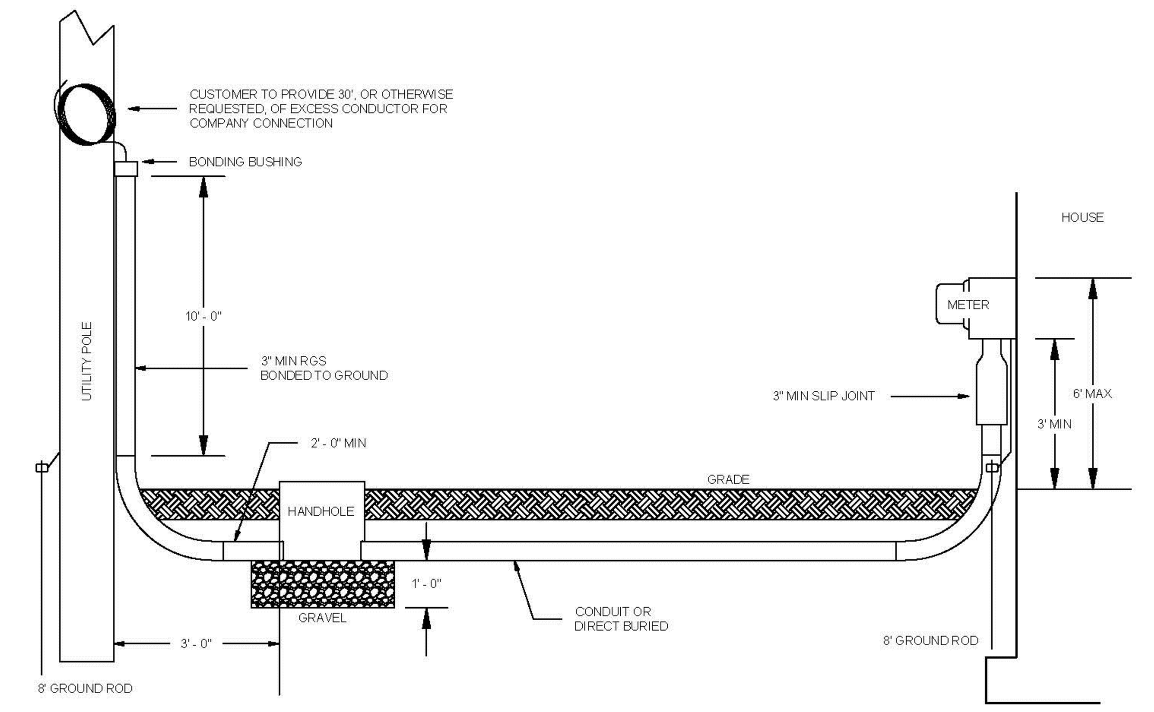
1. SPECIFICATIONS: ALL WORK SHALL BE IN ACCORDANCE WITH THESE STANDARDS. THE NATIONAL ELECTRICAL SAFETY CODE, STATE AND LOCAL CODE REQUIREMENTS. ADDITIONAL SEPCIFICATIONS, WHEN REQUIRED, TO BE FURNISHED BY THE RMLD ENGINEERING DIVISION UPON REQUEST.
2. OWNERSHIP: CONTRACTOR SHALL FURNISH TRENCH, BACKFILL, AND CONDUIT.
3. APPROVAL: CUSTOMER SHALL OBTAIN APPROVAL OF PLANS BY THE RMLD ENGINEERING DIVISION. NO TRENCH SHALL BE BACKFILLED OR POURED WITH CONCRETE UNTIL INSPECTED BY RMLD ENGINEERING DIVISION.
4. CONDUIT: TYPICAL INSTALLATION SHOWN. TYPICAL SIZE OF CONDUITS SHALL BE 4" FOR PRIMARY AND 3" FOR SECONDARY; UNLESS OTHERWISE NOTED BY RMLD ENGINEERING.
5. SAND/FILL: PROVIDE AS SHOWN; ALL FILL BEING THOROUGHLY COMPACTED.

NOTES:
ANY VARIATION IN TRENCH SPECIFICATIONS MUST HAVE PRIOR APPROVAL OF RMLD ENGINEERING DIVISION.

ALL REQUIRED EASEMENTS SHALL BE SECURED BY THE CONTRACTOR/OWNER

"DIG SAFE" NOTIFICATION IS THE RESPONSIBILITY OF THE CONTRACTOR

RMLD Reading Municipal Light Department RELIABLE POWER FOR GENERATIONS	FIGURE 22 TYPICAL TRENCH SPECIFICATIONS
230 Ash St. Reading, MA 01867	SCALE: N.T.S / DATE: 9/24/2020

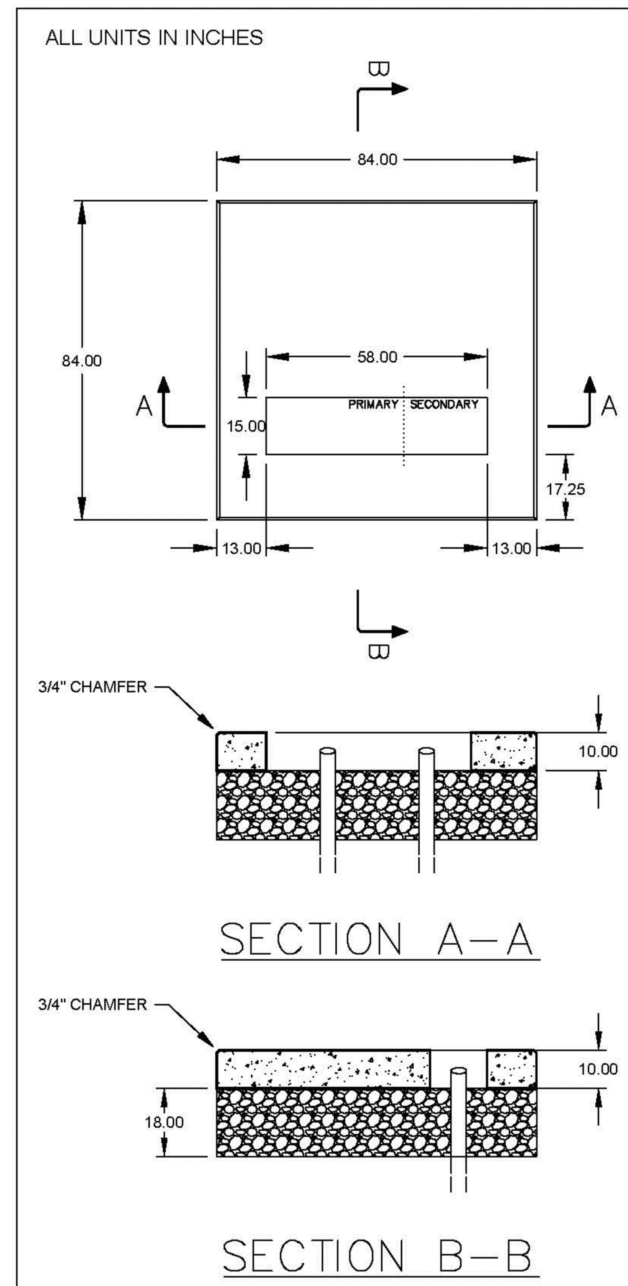


NOTES:

1. ALL EQUIPMENT, EXCEPT WATT-HOUR METER, SHALL BE FURNISHED AND INSTALL BY THE CUSTOMER, UNLESS SPECIFICALLY NOTED
2. CUSTOMER TO INSTALL RISER AT RMLD UTILITY POLE.
   MINIMUM RISER INSTALLATION REQUIREMENTS: 10' RIGID STEEL (RGS) CONDUIT, RGS SWEEP AND 2' MIN RGS CONDUIT GETAWAY FROM UTILITY POLE
3. CUSTOMER TO INSTALL HANDHOLE; PROVIDED BY RMLD OF THE FOLLOWING SIZES: 12"x24" OR 17"x30". SIZE OF HANDHOLE TO BE DETERMINED BY RMLD ENGINEERING
4. CUSTOMER WILL FURNISH AND INSTALL WIRE FOR ENTIRE LENGTH,FROM METER SOCKET TO POLE. CUSTOMER TO INCLUDE ENOUGH WIRE TO REACH RMLD SECONDARY CONDUCTORS. (LENGTH SHORTAGE WILL BE CUSTOMER'S RESPONSIBILITY TO RESOLVE)
5. RMLD TO MAKE ALL SERVICE CONNECTIONS AND DISCONNECTIONS AT UTILITY POLE
6. UTILITY POLE SHALL HAVE NO MORE THAN 4 RISERS ASSOCIATED

RMLD Reading Municipal Light Department RELIABLE POWER FOR GENERATIONS	FIGURE 9 CUSTOMER SECONDARY RISER AND SERVICE LATERAL (600V AND BELOW)
230 Ash St. Reading, MA 01867	SCALE: N.T.S / DATE: 9/24/2020

ALL UNITS IN INCHES



1. SPECIFICATIONS: ALL WORK SHALL BE IN ACCORDANCE WITH THESE STANDARDS. THE NATIONAL ELECTRICAL SAFETY CODE, STATE AND LOCAL CODE REQUIREMENTS. ADDITIONAL SPECIFICATIONS, WHEN REQUIRED, TO BE FURNISHED BY THE RMLD ENGINEERING DIVISION UPON REQUEST.
2. OWNERSHIP: CONTRACTOR SHALL FURNISH AND OWN CONCRETE PAD, GROUND GRID, CONDUITS AND GROUND WIRES
3. APPROVAL: CUSTOMER SHALL OBTAIN APPROVAL OF PLANS BY THE WIRE INSPECTOR AND RMLD . PLANS SHALL SHOW CONCRETE PAD, ALSO CONDUITS, LOCATION, TYPE, SIZE AND NUMBER
4. LOCATION / PROTECTION: PAD LOCATION TO BE APPROVED BY RMLD. THERE SHALL BE NO OBSTRUCTIONS WITHIN 4' OF THE REAR, OF THE SIDES, AND 12' OF THE FRONT. IN AREAS OF VEHICULAR ACTIVITY APPROVED BARRIERS SHALL BE INSTALLED, BY THE CUSTOMER, AROUND THE PAD FOR MECHANICAL PROTECTION OF THE TRANSFORMER.
5. CONDUIT: INSTALL AS SHOWN. CONDUIT TO BE 4" IN DIAMETER FOR PRIMARY AND 3" FOR SECONDARY, USE 36" RADIUS BENDS. TERMINATIONS OF CONDUITS FOR PRIMARY AND SECONDARY SHALL BE INSTALLED IN THEIR RESPECTIVE ZONES; PRIMARY ON LEFT, SECONDARY ON RIGHT (WHEN FACING THE FRONT DOORS OF TRANSFORMER).
6. GROUND GRID: CONTRACTOR TO INSTALL, 1/0 STR (7 STRANDS) BARE COPPER WIRE LOOP 12" BELOW PAD GRADE. LEAVE 36" WIRE ABOVE PAD AT TWO OPPPOSITE POINTS IN THE CONDUIT OPENINGS, FOR GROUNDING OF THE TRANSFORMER. DRIVE FOUR (4) 3/4" BY 8' COPPERWELD GROUND RODS IN EACH CORNER OF PAD AND BOND TO GROUND WIRE
7. BACKFILL: ALL FILL BEING THOROUGHLY COMPACTED
8. CONCRETE PAD: CONCRETE MINIMUM STRENGTH 5,000 PSI AFTER 28 DAYS, ALL REINFORCEMENT PER ASTM A-615, ALL MATERIAL CONFORM TO ACI-318
9. CONDUCTORS: PRIMARY AND SECONDARY CONDUCTORS AND TERMINATIONS TO BE INSTALL BY CUSTOMER. PRIMARY CONNECTION AT RISER POLE TO BE DONE BY RMLD. CABLE TEST REPORT REQUIRED BEFORE CABLE CAN BE ENERGIZED.

RMLD Reading Municipal Light Department RELIABLE POWER FOR GENERATIONS	FIGURE 27 CONCRETE PAD (84x84) UP TO 500KVA
230 Ash St. Reading, MA 01867	SCALE: N.T.S / DATE: 9/24/2020

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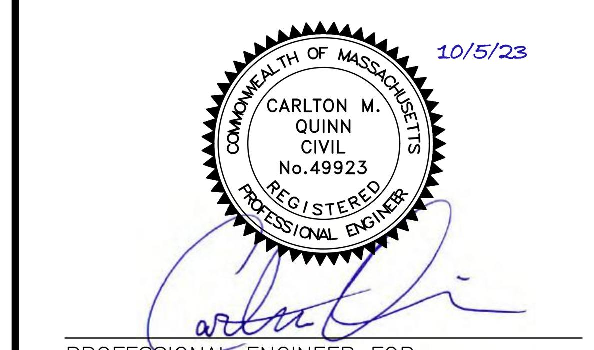

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	C-2398-01A
DESIGNED BY:	MTB	CHECKED BY:	CMQ

PREPARED BY:

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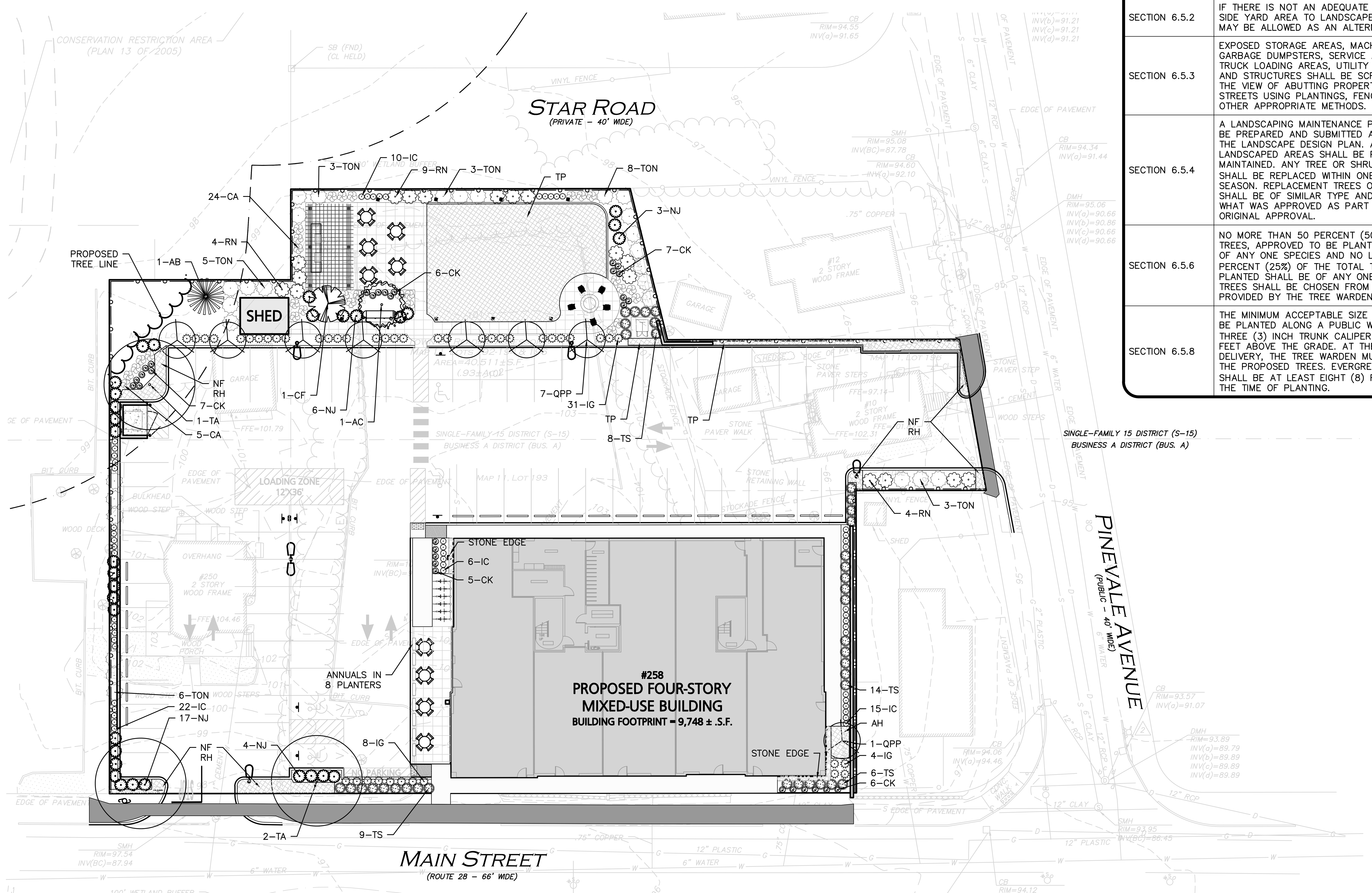
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
DETAILS	C-509



TOWN OF READING ZONING SUMMARY - LANDSCAPE

BUSINESS A AND SINGLE FAMILY 15 DISTRICTS

REGULATION	ITEM	REQUIRED / ALLOWED	PROPOSED
SECTION 6.5.2	IF THERE IS NOT AN ADEQUATE AMOUNT OF SIDE YARD AREA TO LANDSCAPE, A FENCE MAY BE ALLOWED AS AN ALTERNATIVE	SIDE YARD SCREENING	PRIVACY FENCE PROVIDED
SECTION 6.5.3	EXPOSED STORAGE AREAS, MACHINERY, GARBAGE DUMPSTERS, SERVICE AREAS, TRUCK LOADING AREAS, UTILITY BUILDINGS, AND STRUCTURES SHALL BE SCREENED FROM THE VIEW OF ABUTTING PROPERTIES AND STREETS USING PLANTINGS, FENCES, AND OTHER APPROPRIATE METHODS.	UTILITY SCREENING	SCREENING PROVIDED
SECTION 6.5.4	A LANDSCAPING MAINTENANCE PLAN SHALL BE PREPARED AND SUBMITTED AS PART OF THE LANDSCAPE DESIGN PLAN. ALL LANDSCAPED AREAS SHALL BE PROPERLY MAINTAINED. ANY TREE OR SHRUB THAT DIES SHALL BE REPLACED WITHIN ONE (1) GROWING SEASON. REPLACEMENT TREES OR SHRUBS SHALL BE OF SIMILAR TYPE AND SIZE TO WHAT WAS APPROVED AS PART OF THE ORIGINAL APPROVAL.	LANDSCAPE MAINTENANCE PLAN	SEE DETAIL SHEET
SECTION 6.5.6	NO MORE THAN 50 PERCENT (50%) OF THE TREES, APPROVED TO BE PLANTED, SHALL BE OF ANY ONE SPECIES AND NO LESS THAN 25 PERCENT (25%) OF THE TOTAL TREES PLANTED SHALL BE OF ANY ONE SPECIES. TREES SHALL BE CHOSEN FROM A LIST PROVIDED BY THE TREE WARDEN	TREE SPECIES	SEE PLAN
SECTION 6.5.8	THE MINIMUM ACCEPTABLE SIZE OF TREE TO BE PLANTED ALONG A PUBLIC WAY SHALL BE THREE (3) INCH TRUNK CALIPER AT FOUR (4) FEET ABOVE THE GRADE. AT THE TIME OF DELIVERY, THE TREE WARDEN MUST APPROVE THE PROPOSED TREES. EVERGREEN TREES SHALL BE AT LEAST EIGHT (8) FEET TALL AT THE TIME OF PLANTING.	TREE SIZE	3" CALIPER DECIDUOUS TREES AND 8' HT EVERGREEN TREES

LEGEND

- DECIDUOUS TREE
- EVERGREEN TREE
- FLOWERING TREE
- SHRUBS
- MULCH BED
- PERENNIALS/GROUNDCOVER
- WILDFLOWER SEED MIX
- EROSION CONTROL SEED MIX

GENERAL NOTES:

1. THE EXISTING CONDITIONS USED IN THIS DRAWING IS FROM AN EXISTING CONDITIONS PLAN PREPARED BY ALLEN & MAJOR ASSOCIATES, INC., ENTITLED "PROPERTY USE/EXISTING CONDITIONS" FOR 252–260 MAIN STREET DATED APRIL 27, 2023 AND PREPARED FOR ONE SYLVAN LLC.
2. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR IT'S REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
3. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. ITS INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

DIG SAFE

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

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COMMONWEALTH OF MASSACHUSETTS
JACQUELINE B. TRAINOR
REGISTERED LANDSCAPE ARCHITECT
NO. 1526

10.05.2023

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

S

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

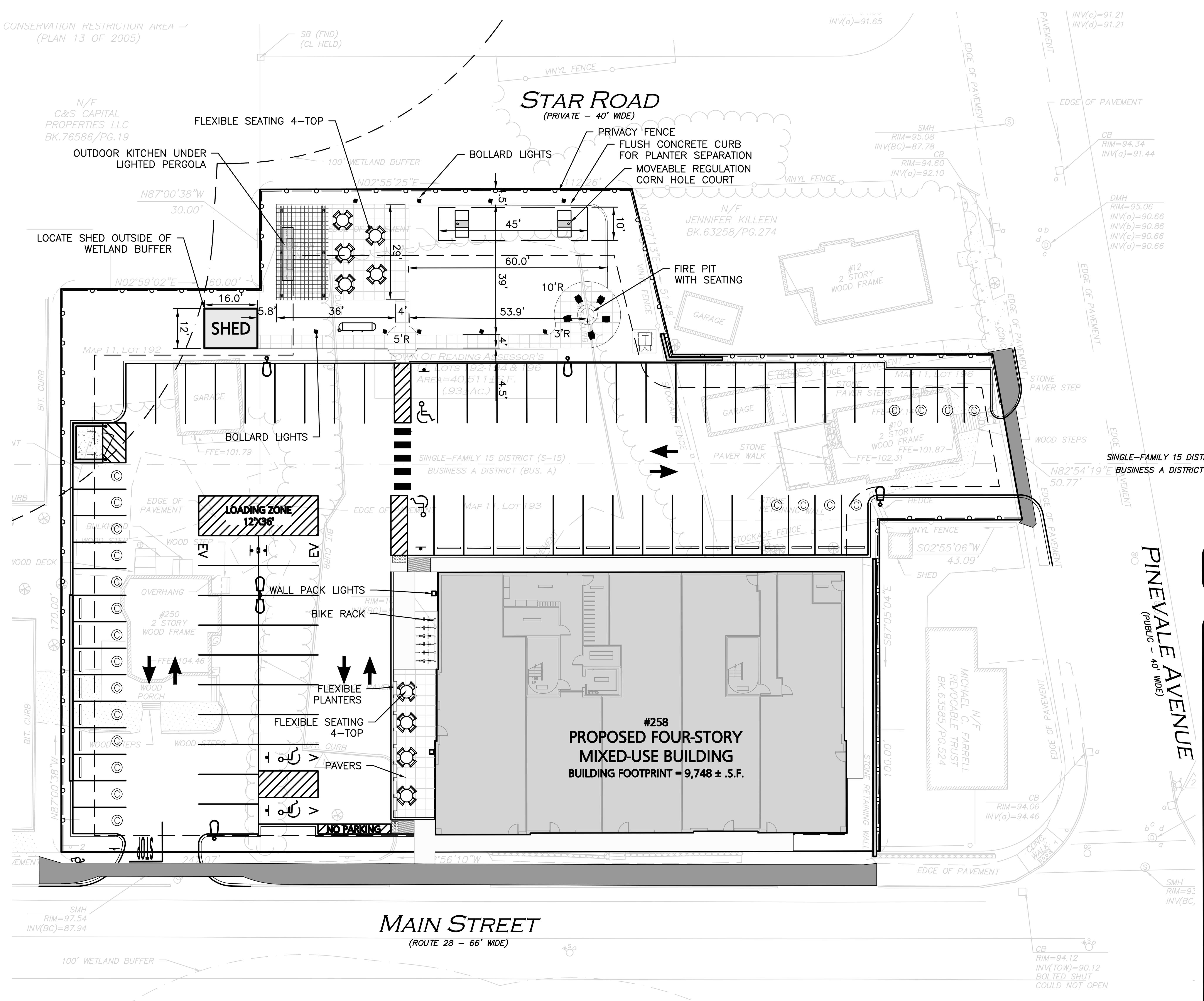
PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:

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

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
LANDSCAPE PLAN	L-101



MATERIALS SCHEDULE

HARDSCAPE & FURNITURE

QTY	ITEM	MODEL NUMBER	COLOR	SIZE	COMPANY
3,000 SF±	PAVERS	ARCANA	FIELD: CORVARA ACCENT: VIVANTO	24"x24" 2" DEEP	UNILOCK.COM ASHLEY ALLARD–LACROIX 508–277–4413
665 LF±	FENCE	BUFFTECH CHESTERFIELD VINYL FENCE	VINYL	6' HEIGHT	AVOFENCEANDSUPPLY.COM
1	FIRE PIT – SOBA MODERN FIREBOWL – NATURAL GAS OR PROPANE	PALOFORM FIRE	CHARCOAL CONCRETE WITH DARK GREY RIVER ROCK	28" ROUND WITH TABLE TOP	EMERGENCY SHUT OFF GAS VALVE, ELECTRIC IGNITION PALOFORM.COM 888 823 8883
5	FIRE PIT FURNITURE	BASK LOUNGE CHAIR	GREY, WHITE, ORANGE, OR SANDSTONE	32"x32"x31"	TUPELOGOODS.COM
2	GRILL WITH ACCESS DOORS BELOW	36" LYNX GRILL, OR AEI S36T PGS T–SERIES – EMERGENCY SHUT OFF GAS VALVE, ELECTRIC IGNITION, ADA KIT FOR HOOD HANDLE	SILVER	36"	LYNXGRILLS.COM AEICORPORATION.COM
1	ROLL OUT TRASH DRAWER SERIES BLAZE NARROW MODEL#: BLZ–TRNW–DRW	BBQ GUYS	STAINLESS STEEL	13"	BBQGUYS.COM AEICORPORATION.COM
8	PLANTERS WILSHIRE COLLECTION	WWR–CS481218 W/ IRRIGATION INSERT CWM–R1614 & CASTERS	TBD	12" x 48"	TOURNESOL.COM
9	FLEXIBLE SEATING 4 TOP	TABLE & CHAIRS PORTABLE LC–R36WCP AND ADA ACCESSIBLE LC–R36WP3	TBD	36" ROUND	EASTCOASTCHAIR.COM
1	PERGOLA	L.A. MODERN OR SILVERADO MODERN	MOSAIC REDWOOD	25'–6" x 12'–9"	FOREVERREDWOOD.COM
6	BIKE RACK	OAHU NO SCRATCH	TBD	36" RADIUS	SPORTWORKS.COM
LIGHTING					
250 LF±	BISTRO STRING LIGHTS & POLES	EGP–HD–0362	BLACK	10' HT	EXCELLO GLOBAL PRODUCTS WAYFAIR.COM

1. ALL COLORS AND FINISHES TO BE FINAL APPROVED/SELECTED BY OWNER/ARCHITECT
2. PLANTERS TO HAVE ANNUALS SEE PLANTING PLAN AND PLANTING DETAILS.
3. SEE SHEET C–105 FOR LIGHT POLES, WALL PACKS, AND BOLLARDS.

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

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

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\L-2398-01A_AMENITIES.DWG

MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT Jacqueline B. Tramer NO. 1526
10.05.2023
PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:
STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	1" = 20'	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:
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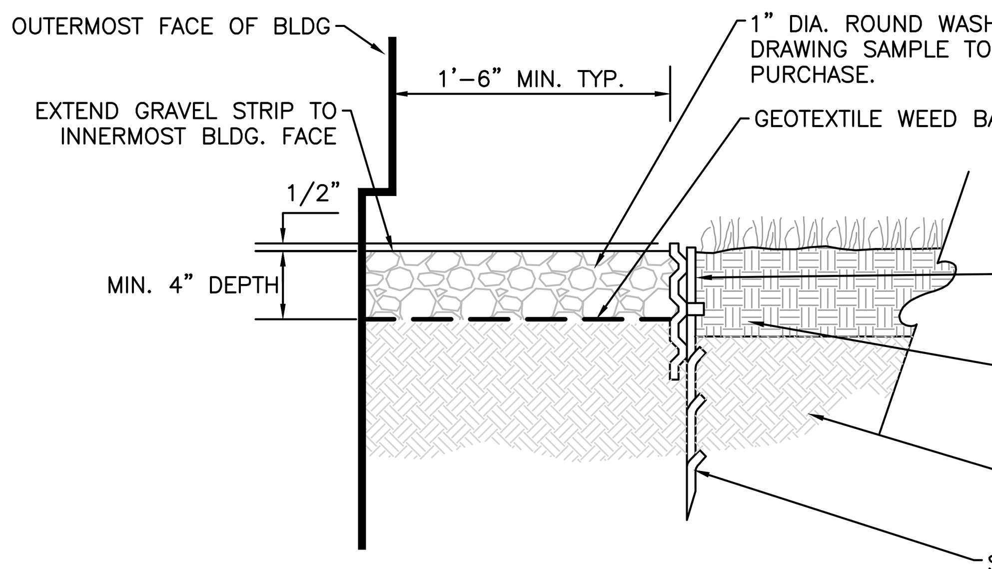
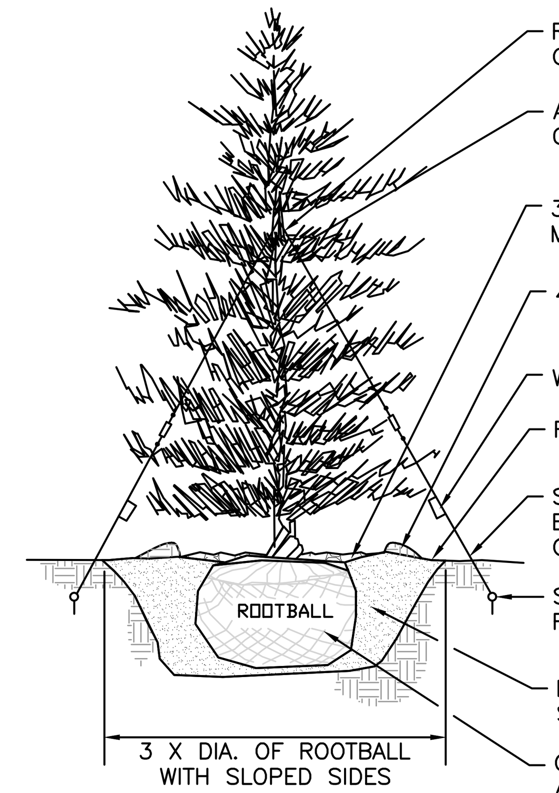
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

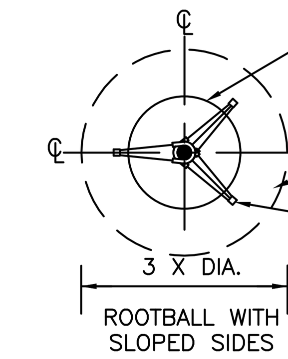
DRAWING TITLE: SITE AMENITIES PLAN
SHEET No. L-102



NOTES:
1. STONE EDGE IS TO BE INSTALLED CONTINUOUS ADJACENT TO THE ENTIRE FACE OF BUILDINGS EXCEPT WHERE OTHER HARD SURFACING MATERIALS ARE SPECIFIED OR IF SHOWN OTHERWISE ON PLAN.
2. STONE EDGE TO BE INSTALLED UNDER ALL BUILDING OVERHANGS.

STONE EDGE (1)
NOT TO SCALE

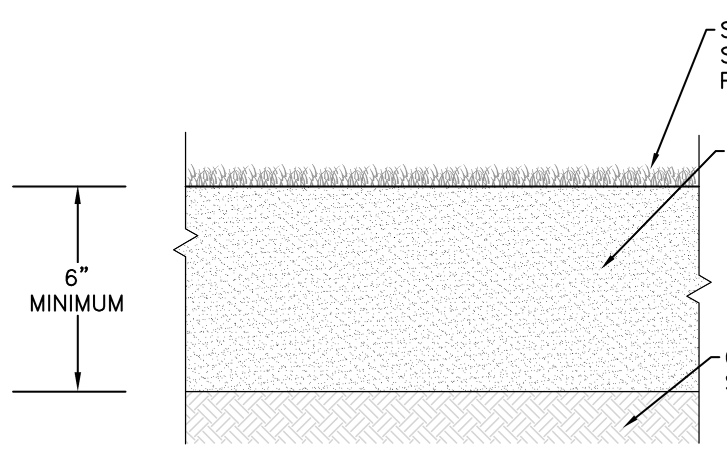




PLAN VIEW

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

EVERGREEN TREE (2)
NOT TO SCALE

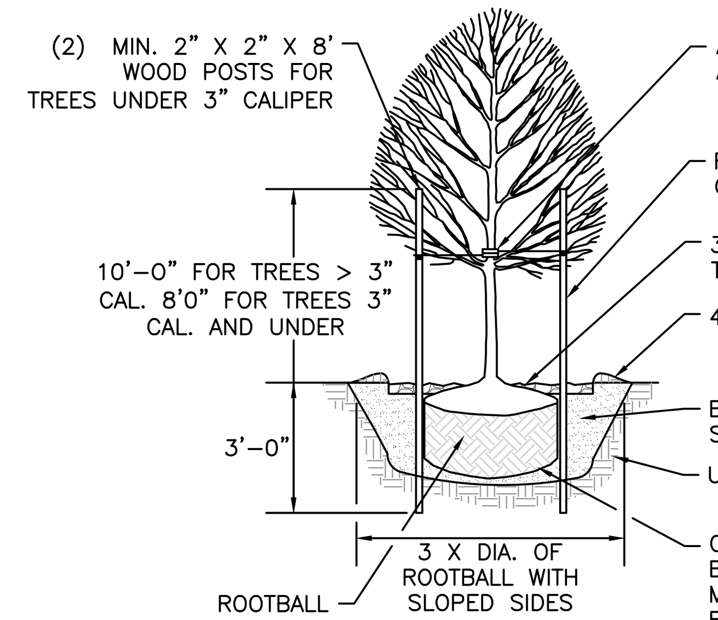


TEXTURE CLASS	% OF TOTAL WEIGHT
SAND	45% – 65%
SILT	15% – 35%
CLAY	5% – 20%

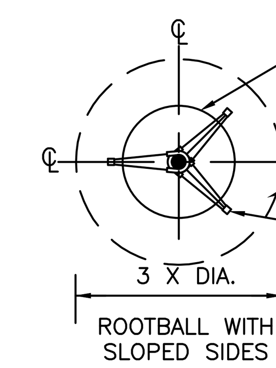
SIEVE	% PASSING
3/8"	100
NO. 4	85–100
NO. 40	60–85
NO. 100	38–60
NO. 200	28–40

NOTES:
1. TOP OF LOAM (TOPSOIL) IS FINISH GRADE.
2. ALL TOPSOIL (BOTH ONSITE AND OFFSITE SOURCES) SHALL BE COMPOSED OF A NATURAL, FERTILE, FRIABLE SOIL TYPICAL OF CULTIVATED TOPSOILS OF THE LOCALITY. SOIL SHALL BE SUITABLE FOR THE GERMINATION OF SEEDS AND SUPPORT OF VEGETATIVE GROWTH, WITH ADDITIVES, IF REQUIRED, TO ACHIEVE PARTICLE DISTRIBUTION AND ORGANIC CONTENT BELOW. TOPSOIL SHALL BE TAKEN FROM A WELL-DRAINED, ARIABLE SITE, FREE OF SUBSOIL, LARGE STONES, EARTH CLODS, STICKS, TRASH, STUMPS, CLAY LUMPS, ROOTS, OTHER OBJECTIONABLE, EXTRANEOUS MATTER OR DEBRIS NOR CONTAIN TOXIC SUBSTANCES.
3. THE CONTRACTOR SHALL PROVIDE THE OWNER / LANDSCAPE ARCHITECT WITH TOPSOIL TEST RESULTS (RECOMMEND UMASS AMHERST SOIL TESTING LAB) FOR APPROVAL PRIOR TO OBTAINING AND PLACING THE SOIL. IF THE PLANTING SOIL (BOTH ONSITE AND OFFSITE SOURCES) DOES NOT FALL WITHIN THE REQUIRED SIEVE ANALYSIS, TEXTURAL CLASS, ORGANIC CONTENT, OR PH RANGE, IT SHALL BE ADJUSTED TO MEET THE SPECIFICATIONS THROUGH THE ADDITION OF SAND, COMPOST, LIMESTONE, OR ALUMINUM SULFATE TO BRING IT WITHIN THE SPECIFIED LIMITS.
4. TOPSOIL SHALL HAVE A PH VALUE BETWEEN 5.5 AND 6.5. TOPSOIL SHALL CONTAIN BETWEEN 4% AND 8% ORGANIC MATTER OF TOTAL DRY WEIGHT AND SHALL CONFORM TO THE FOLLOWING GRADATION AND TEXTURE CLASS ABOVE.

TOPSOIL FOR TREES, SHRUBS, & PERENNIALS (4)
NOT TO SCALE



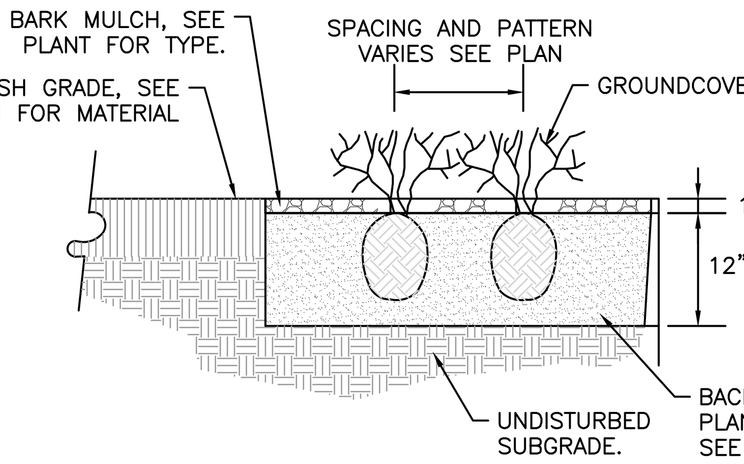
SECTION VIEW



PLAN VIEW

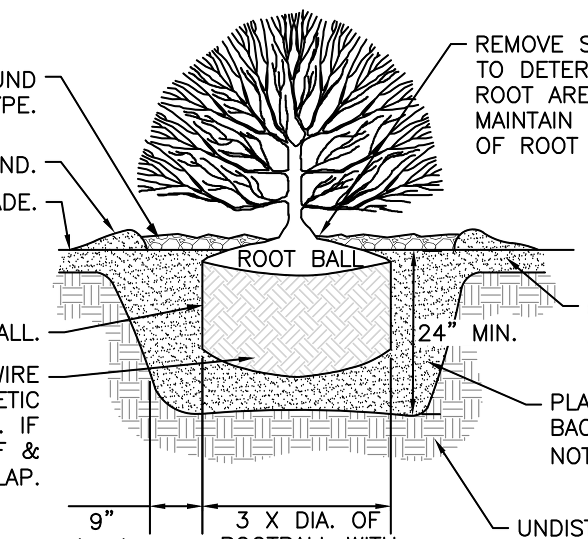
NOTES:
1. ALL TREES SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING. ROOT FLARE SHALL BE 2" ABOVE FINISH GRADE. REMOVE SOIL FROM TRUNK FLARE OF TREE TO DETERMINE ACTUAL ROOTBALL AREA.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% BLENDED AND GROUND COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH OR TOXIC MATERIALS) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED AND WATER THOROUGHLY AT COMPLETION.

DECIDUOUS TREE (3)
NOT TO SCALE



NOTES:
1. ALL GROUNDCOVER/PERENNIALS SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING. ROOT FLARE SHALL BE 2" ABOVE FINISH GRADE. REMOVE SOIL FROM STEM OF GROUND COVER/ PERENNIAL TO DETERMINE ACTUAL ROOTBALL AREA.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% BLENDED AND GROUND COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH OR TOXIC MATERIALS) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED AND WATER THOROUGHLY AT COMPLETION.

GROUNDCOVER/PERENNIAL PLANTING (5)
NOT TO SCALE



NOTES:
1. ALL SHRUBS ROOT FLARE SHALL HAVE THE SAME RELATIONSHIP TO FINISH GRADE AFTER PLANTING AS THEY HAD AT THE ORIGINAL NURSERY SETTING.
2. BACKFILL WITH PLANTING MIX. PLANT MIX TO BE: 50% NATIVE TOPSOIL, 20% COMPOST (LEAVES & ORGANIC MATERIAL, NO ASH) 20% PEAT MOSS, 10% SAND.
3. ADD MYCORRHIZA SOIL ADDITIVES AND SLOW RELEASE FERTILIZER WHEN PLANT HOLES ARE 50% FILLED. WATER THOROUGHLY AT COMPLETION.
4. SHRUB BEDS TO HAVE 24" MIN. OF CONTINUOUS PLANTING SOIL.

SHRUB (6)
NOT TO SCALE

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\L-2398-01A_LANDSCAPE.DWG

MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT Jacqueline B. Franer NO. 1526

10.05.2023

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:

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DRAWING TITLE: LANDSCAPE NOTES & DETAILS
SHEET No. L-501

LANDSCAPE MANAGEMENT NOTES:

LANDSCAPE MANAGEMENT PLAN

IT SHOULD BE RECOGNIZED THAT THIS IS A GENERAL GUIDELINE TOWARDS ACHIEVING HIGH QUALITY AND WELL GROOMED LANDSCAPED AREAS. THE GROUNDS STAFF / LANDSCAPE CONTRACTOR MUST RECOGNIZE THE SHORTCOMINGS OF A GENERAL MAINTENANCE PROGRAM SUCH AS THIS, AND MODIFY AND/OR AUGMENT IT BASED ON WEEKLY, MONTHLY, AND YEARLY OBSERVATIONS. IN ORDER TO ASSURE THE HIGHEST QUALITY CONDITIONS, THE STAFF MUST ALSO RECOGNIZE AND APPRECIATE THE NEED TO BE AWARE OF THE CONSTANTLY CHANGING CONDITIONS OF THE LANDSCAPING AND BE ABLE TO RESPOND TO THEM ON A PROACTIVE BASIS.

FERTILIZER

- MAINTENANCE PRACTICES SHOULD BE AIMED AT REDUCING ENVIRONMENTAL, MECHANICAL AND PEST STRESSES TO PROMOTE HEALTHY AND VIGOROUS GROWTH. WHEN NECESSARY, PEST OUTBREAKS SHOULD BE TREATED WITH THE MOST SENSITIVE CONTROL MEASURE AVAILABLE. SYNTHETIC CHEMICAL CONTROLS SHOULD BE USED ONLY AS A LAST RESORT TO ORGANIC AND BIOLOGICAL CONTROL METHODS. FERTILIZER, SYNTHETIC CHEMICAL CONTROLS AND PEST MANAGEMENT APPLICATIONS (WHEN NECESSARY) SHOULD BE PERFORMED ONLY BY LICENSED APPLICATORS IN ACCORDANCE WITH THE MANUFACTURER'S LABEL INSTRUCTIONS WHEN ENVIRONMENTAL CONDITIONS ARE CONDUCIVE TO CONTROLLED PRODUCT APPLICATION.

- ONLY SLOW-RELEASE ORGANIC FERTILIZERS SHOULD BE USED IN THE LANDSCAPED AREAS TO LIMIT THE AMOUNT OF NUTRIENTS THAT COULD ENTER DOWNSTREAM RESOURCE AREAS. FERTILIZATION OF DEVELOPED AREAS ON SITE WILL BE PERFORMED WITHIN MANUFACTURERS LABELING INSTRUCTIONS AND SHALL NOT EXCEED AN NPK RATIO OF 1:1:1 (I.E. TRIPLE 10 FERTILIZER MIX), CONSIDERED A LOW NITROGEN MIXTURE. ADDITIONALLY, THE FERTILIZER WILL INCLUDE A SLOW RELEASE ELEMENT.

LANDSCAPE MAINTENANCE PROGRAM PRACTICES:

SHRUBS

- MULCH NOT MORE THAN 3" DEPTH WITH SHREDDED PINE OR FIR BARK.
- HAND PRUNE ANNUALLY, IMMEDIATELY AFTER BLOOMING, TO REMOVE 1/3 OF THE ABOVE-GROUND BIOMASS (OLDER STEMS). STEM REMOVALS TO OCCUR WITHIN 6" OF THE GROUND TO OPEN UP SHRUB AND MAINTAIN TWO-YEAR WOOD (THE BLOOMING WOOD).
- FERTILIZE WITH 1/2 LB. SLOW-RELEASE FERTILIZER (SEE ABOVE SECTION ON FERTILIZER) EVERY SECOND YEAR.
- HAND PRUNE EVERGREEN SHRUBS ONLY AS NEEDED TO REMOVE DEAD AND DAMAGED WOOD AND TO MAINTAIN THE NATURALISTIC FORM OF THE SHRUB. NEVER MECHANICALLY SHEAR EVERGREEN SHRUBS.

TREES

- PROVIDE AFTERCARE FOR NEW TREE PLANTINGS FOR THE FIRST THREE YEARS.
- DO NOT FERTILIZE TREES, IT ARTIFICIALLY STIMULATES THEM (UNLESS TREE HEALTH WARRANTS).
- WATER ONCE A WEEK FOR THE FIRST YEAR; TWICE A MONTH THE SECOND, ONCE A MONTH THE THIRD YEAR.
- PRUNE TREES ON A FOUR-YEAR CYCLE.

ORNAMENTAL GRASSES/PERENNIALS

- APPLY LOW- NITROGEN 10-10-10 FERTILIZER AS GROWTH RESUMES IN THE SPRING.
- WATER THOROUGHLY.
- GRASSES/PERENNIALS DO NOT NEED TO BE CUT DOWN BEFORE WINTER. IN FACT, THEY ARE ATTRACTIVE WHEN LEFT STANDING AND THE FOLIAGE HELPS TO INSULATE THE CROWN OF THE PLANT.
- CUT BACK THE FOLIAGE TO ABOUT 4-6 INCHES IN THE SPRING BEFORE GROWTH RESUMES. WHEN FOLIAGE IS REMOVED, SPRING GROWTH WILL BEGIN EARLIER. OLD FOLIAGE LEFT ON THE PLANT CAN DELAY THE CROWN'S WARMING AND SUBSEQUENT GROWTH BY AS MUCH AS 3 WEEKS.

WATERING

- WATERING TREES, SHRUBS AND PERENNIALS SHOULD BE DONE WEEKLY UPON ESTABLISHMENT FOR 6 MONTHS.

LANDSCAPE NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TOWN OF READING.
2. PLANTING PLAN IS DIAGRAMMATIC IN NATURE. FINAL PLACEMENT OF PLANTS TO BE APPROVED BY THE LANDSCAPE ARCHITECT IN THE FIELD.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES, ANY PERMITTING AGENCIES, AND "DIG-SAFE" (1-888-344-7233) AT LEAST 72 HOURS IN ADVANCE OF ANY WORK THAT WILL REQUIRE EXCAVATION. CONTRACTOR SHALL NOTIFY THE OWNERS REPRESENTATIVE OF NAY CONFLICTS IN WRITING.
4. NO PLANT MATERIAL SHALL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
5. ANY TREES NOTED AS "SEAL OR SELECTED SPECIMEN" SHALL BE TAGGED AND SEALED BY THE LANDSCAPE ARCHITECT.
6. ALL TREES SHALL BE BALLED AND BURLAPPED (B&B) UNLESS OTHERWISE NOTED OR APPROVED BY THE OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
7. CONTRACTOR SHALL VERIFY QUANTITIES SHOWN ON PLANT LIST. QUANTITIES SHOWN ON PLANS SHALL GOVERN OVER PLANT LIST.
8. ANY PROPOSED PLANT SUBSTITUTIONS MUST BE APPROVED IN WRITING BY OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT.
9. ALL PLANT MATERIALS INSTALLED SHALL MEET THE GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY AMERICANHORT (LATEST EDITION).
10. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF ACCEPTANCE. ANY PLANT MATERIALS WHICH DIE WITHIN THE ONE YEAR PLANT GUARANTEE PERIOD WILL BE REPLACED BY THE LANDSCAPE CONTRACTOR. OWNERS TO COORDINATE DIRECTLY WITH THE LANDSCAPE CONTRACTOR FOR REPLACEMENT PLANTINGS.
11. ANY FALL TRANSPLANTING HAZARD PLANTS SHALL BE DUG IN THE SPRING AND STORED FOR FALL PLANTING.
12. TREES SHALL HAVE A MINIMUM CALIPER AS INDICATED ON THE PLANTING SCHEDULE TAKEN ONE FOOT ABOVE THE ROOT CROWN.
13. ALL PLANT BEDS AND TREE SAUCERS TO RECEIVE 3" OF PINE BARK MULCH. GROUNDCOVER AREAS SHALL RECEIVE 1" OF PINE BARK MULCH.
14. ALL DECIDUOUS TREES ADJACENT TO WALKWAYS AND ROADWAYS SHALL HAVE A BRANCHING PATTERN TO ALLOW FOR A MINIMUM OF 7' OF CLEARANCE BETWEEN THE GROUND AND THE LOWEST BRANCH.
15. ALL TREE STAKES SHALL BE STAINED DARK BROWN.
16. CONTRACTOR RESPONSIBLE FOR WATERING UNTIL A UNIFORM STAND OF VEGETATION IS ESTABLISHED AND ACCEPTED.
17. ALL PARKING ISLANDS PLANTED WITH SHRUBS SHALL HAVE 24" OF TOP SOIL. FINISH GRADE SHALL BE SLOPED TO SIX INCHES (6") ABOVE THE TOP OF CURB.
18. SOIL SAMPLES, TESTS, AND SHOP DRAWINGS SHALL BE PROVIDED TO THE LANDSCAPE ARCHITECT OR THE OWNER FOR APPROVAL PRIOR TO CONSTRUCTION.
19. NO MULCH IS ALLOWED WITHIN 18" OF ALL BUILDINGS PER THE LATEST EXECUTIVE OFFICE OF PUBLIC SAFETY AND SECURITY DEPARTMENT OF FIRE SERVICES REGULATION (527 CMR 17.00).
20. ALL LANDSCAPED AREAS WITH SHRUBS, TREES, AND PERENNIALS TO HAVE 2 FEET MINIMUM DEPTH OF TOPSOIL. TWO FEET OF TOPSOIL AROUND TREES AND SHRUBS DOES NOT INCLUDE AMENDED PLANTING SOIL WITHIN TREE / SHRUB PIT FOR FULL DEPTH OF ROOTBALLS. SEE PLANTING DETAILS FOR PLANTING DEPTH AT SHRUBS AND TREES. TOPSOIL TO BE TESTED BY CONTRACTOR, AND APPROVED BY A&M PRIOR TO PURCHASE AND OR PLACEMENT. GENERAL, DEMOLITION, AND LANDSCAPE CONTRACTORS TO COORDINATE PROPER DEPTH OF EXISTING MATERIAL REMOVAL ACROSS SITE SO THAT 2 FEET MINIMUM DEPTHS OF PROPOSED TOPSOIL NOTED ABOVE ARE MET. SEE TOPSOIL DETAIL.
21. PRIOR TO LAYING TOPSOIL, ALL SUBSOIL (BELOW PROPOSED TOPSOIL) TO BE TILLED TO A DEPTH OF AT LEAST 18" TO REMOVE CONSTRUCTION COMPACTION AND ALLOW FOR PROPER DRAINAGE OF TOPSOILS.
22. IF THERE IS NO PROPOSED IRRIGATION SYSTEM AFTER PLANTINGS AREAS HAVE BEEN INSTALLED, LANDSCAPE CONTRACTOR RESPONSIBLE TO TEMPORARILY WATER ALL INSTALLED PLANTINGS, AREAS MIN. 4 TIMES A WEEK DURING INITIAL ESTABLISHMENT PERIOD OF 6 MONTHS AFTER ALL LANDSCAPING IS INSTALLED.
23. ALL PROPOSED LANDSCAPE AREAS INCLUDING TREES, SHRUB BEDS, AND PERENNIALS SHALL BE PROVIDED WITH WATER EFFICIENT UNDERGROUND IRRIGATION. DESIGN AND INSTALLATION OF IRRIGATION SYSTEM TO BE PERFORMED BY AN APPROVED IRRIGATION DESIGN BUILD CONTRACTOR OR BY AN APPROVED EQUAL TO BE DETERMINED BY THE OWNERS REPRESENTATIVE AND LANDSCAPE ARCHITECT. IRRIGATION SYSTEM IS TO BE DESIGNED FOR EFFICIENT WATER USAGE INCLUDING: USE OF DRIP IRRIGATION FOR SHRUBS AND PERENNIALS, IRRIGATION SYSTEM WITH HEAD-TO-HEAD COVERAGE, A CENTRAL SHUT-OFF VALVE, SEPARATE ZONES FOR EACH TYPE OF BEDDING AREA BASED ON WATERING NEEDS, AND A RAIN SENSOR TO SHUT OFF IRRIGATION DURING RAIN EVENTS.

PLANTING SCHEDULE -TREES, SHRUBS, GROUNDCOVERS & PERENNIALS

	KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	SPACING	COMMENTS
DECIDUOUS SHADE AND FLOWERING TREES							
*	QPP	8	QUERCUS PALUSTRIS 'GREEN PILLAR'	GREEN PILLAR OAK	3" CAL.	AS SHOWN	B&B
*	TA	3	TILIA AMERICANA 'REDMOND'	REDMOND AMERICAN LINDEN	3" CAL.	AS SHOWN	B&B
ORNAMENTAL TREES							
*	AC	1	AMELANCHIER CANADENSIS	SHADBLOW SERVICEBERRY	6-7' HT.	AS SHOWN	B&B
*	CF	1	CORNUS FLORIDA	FLOWERING DOGWOOD	3" CAL.	AS SHOWN	B&B
EVERGREEN TREES							
*	AB	1	ABIES BALSAMEA	BALSAM FIR	#10	15' O.C.	POT
*	TON	28	THUJA OCCIDENTALIS 'NIGRA'	AMERICAN ARBORVITAE	7-8' HT.	5' O.C.	B&B
SHRUBS							
*	NJ	30	CEANOTHUS AMERICANUS	NEW JERSEY TEA	2.5'-3' HT.	AS SHOWN	B&B
*	CA	29	CLETHRA ALNIFOLIA	SUMMERSWEET	#5	48" O.C.	POT
	IC	53	ILEX CRENATA 'SKY PENCIL'	SKY PENCIL HOLLY	#15	24" O.C.	POT
*	IG	43	ILEX GLABRA 'SHAMROCK'	SHAMROCK INKBERRY	#7	36" O.C.	POT
*	RN	17	RHODODENDRON 'NOVA ZEMBLA'	NOVA ZEMBLA RHODODENDRON	#5	6' O.C.	POT
*	TS	37	THUJA OCCICENTALIS 'SMARAGD'	SMARAGD ARBORVITAE	6-7' HT.	AS SHOWN	B&B
PERENNIALS/GRASSES							
*	AH	TBD	AMSONIA HUBRICHTII	BLUE STAR	#1	36" O.C.	STAGGERED
*	AN	TBD	ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER	#1	36" O.C.	STAGGERED
*	BA	TBD	BAPTISIA AUSTRALIS	BLUE FALSE INDIGO	#1	48" O.C.	STAGGERED
	CK	TBD	CALAMAGROSTIS 'KARL FOERSTER'	KARL FOERSTER FEATHER REED GRASS	#2	24" O.C	STAGGERED
	MS	TBD	MISCANTHUS SINESIS 'MORNING LIGHT'	SILVER VARIEGATED MAIDEN GRASS	#2	48" O.C.	STAGGERED
	NF	TBD	NEPETA X FAASSENII 'WALKER'S LOW'	WALKER'S LOW CATMINT	#2	36" O.C.	STAGGERED
	PA	TBD	PEROVSKIA ATRIPLICIFOLIA	RUSSIAN SAGE	#1	48" O.C.	STAGGERED
*	RH	TBD	RUDBECKIA FULGIDA	BLACK EYED SUSAN	#1	30" O.C.	STAGGERED
	TP	TBD	THYMUS PRAECOX 'ALBIFLORUS'	STEPABLES CREEPING THYME	QUART	8" O.C.	STAGGERED
*	VL	TBD	VERNONIA LETTERMANNII	IRON BUTTERFLY	#1	36" O.C.	STAGGERED
ANNUALS							
		TBD	"PROVEN WINNERS" BREATHTAKING MIX		FLATS	AS NEEDED	STAGGERED
*	DENOTES NATIVE SPECIES OR NATIVE CULTIVAR						

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MASSACHUSETTS
NO. 1526
REGISTERED LANDSCAPE ARCHITECT

10.05.2023

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:
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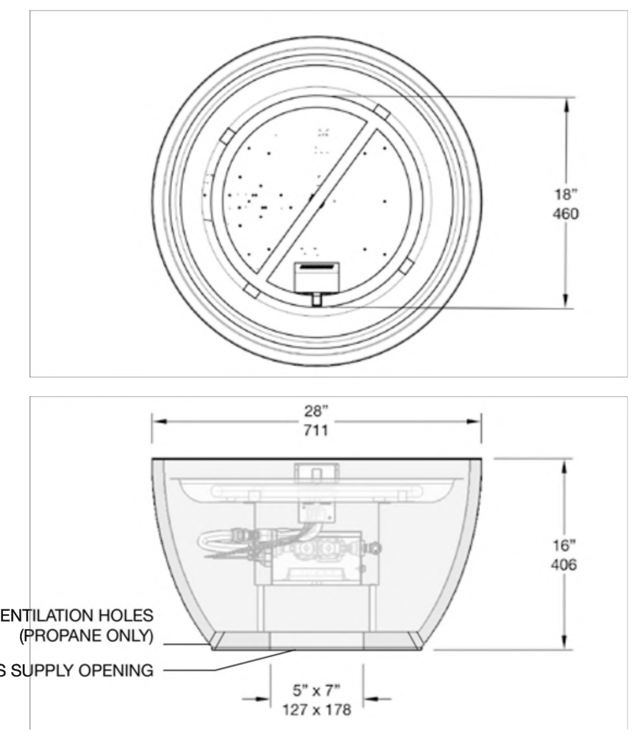
DRAWING TITLE: LANDSCAPE NOTES & DETAILS

SHEET No. L-502

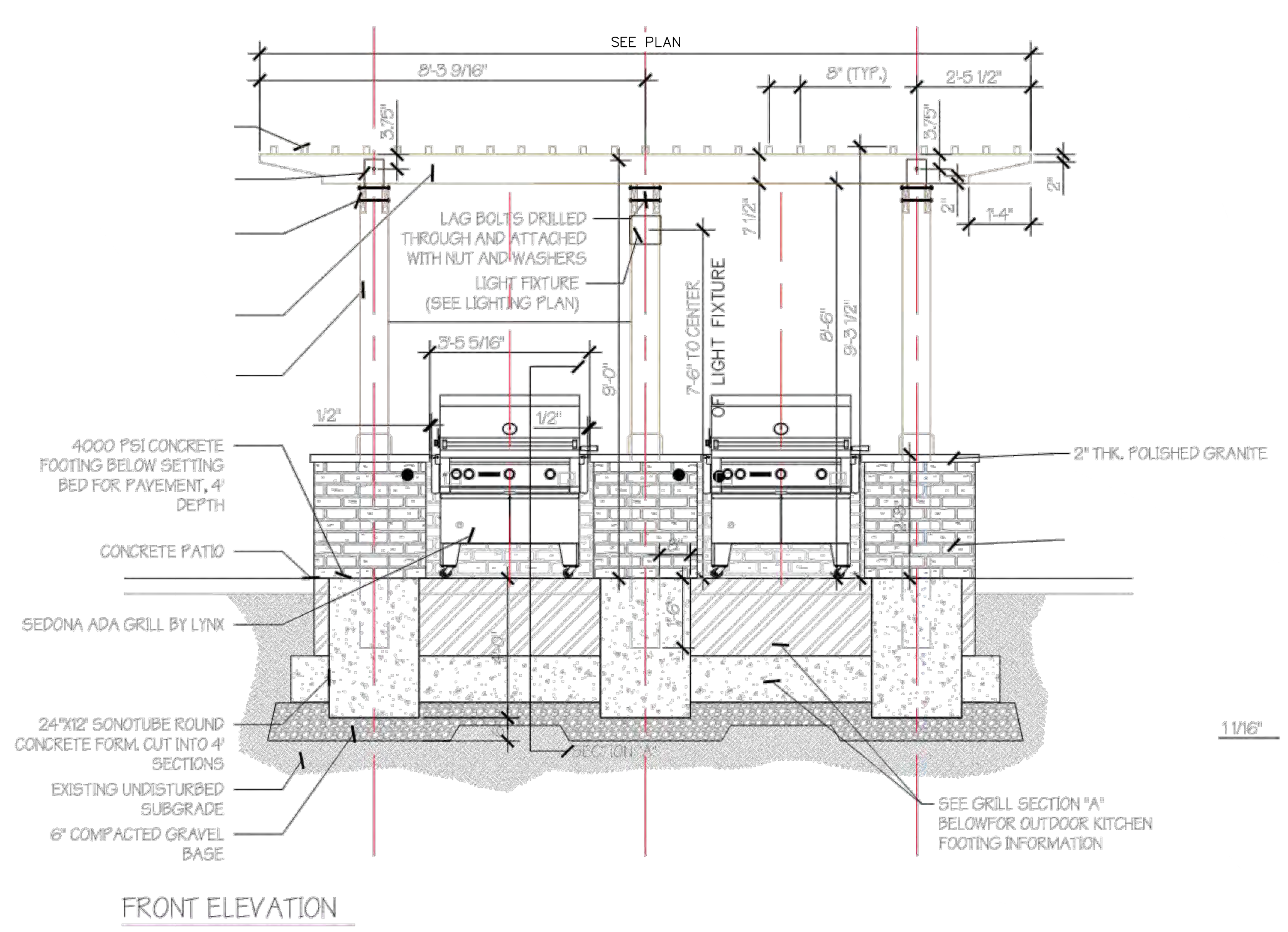
	NATURAL GAS	PROPANE
Burner Model #	CIR-E-18	CIR-E-18P
Max Heat Input	69,000 BTU/h	60,000 BTU/h
Inlet Pressure - Min.	4.5" W.C	11.0" W.C.
Inlet Pressure - Max.	10.5" W.C.	13.0" W.C.
Orifice Size	18	37
Burner Ports	68	68
Port Size	1/8"	1/8"
Electrical	120V 15A Outdoor Receptacle - Dedicated Circuit with Wall Switch. Burner connects via an AC adapter. Must be installed and grounded in accordance with local codes.	

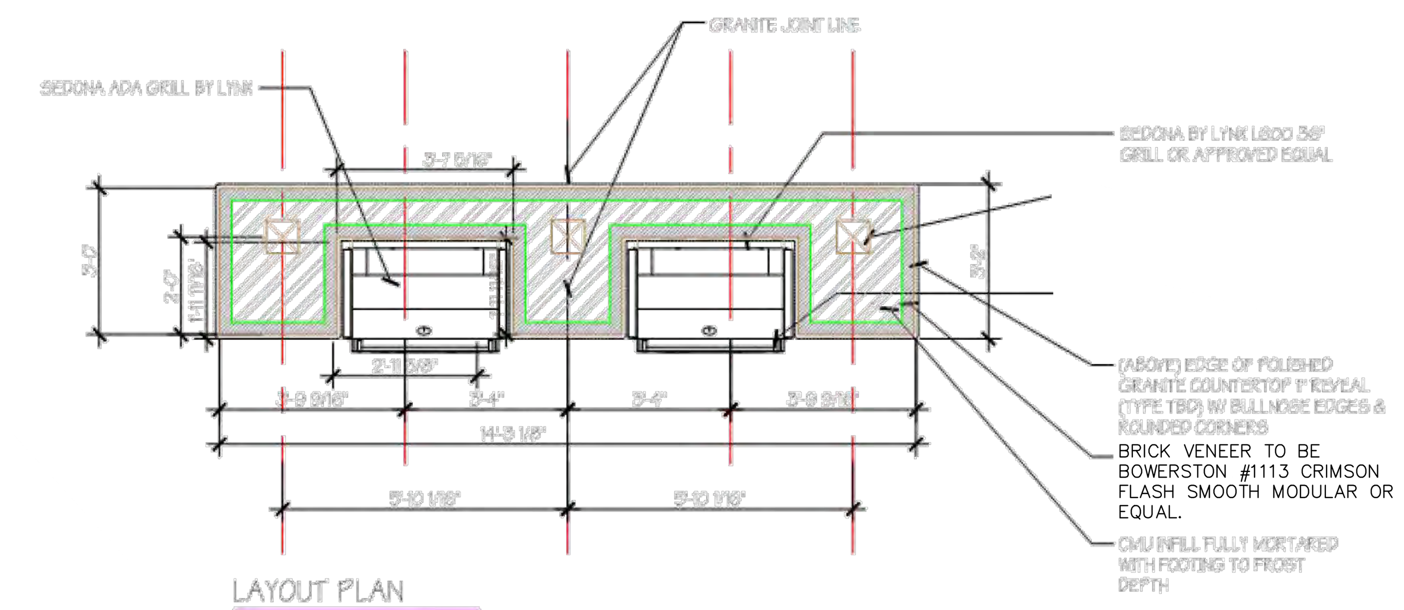


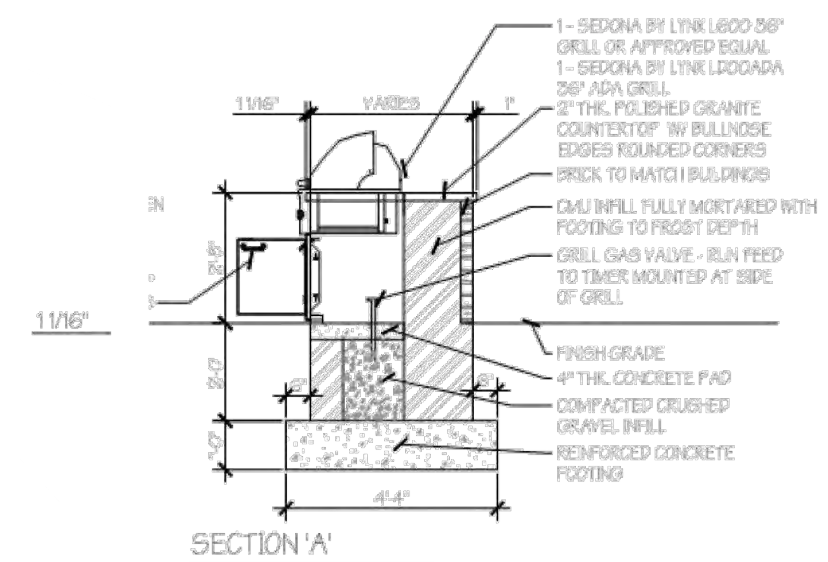
NOTES:

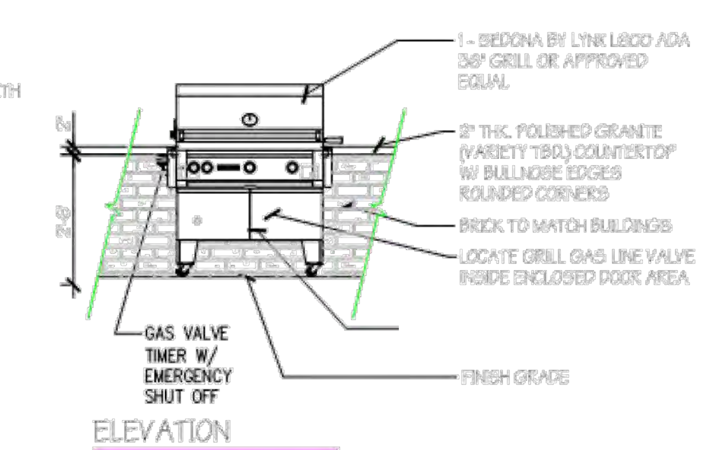
1. PROVIDE FIRE PIT AS LISTED ON AMENITIES PLAN. CONTRACTOR TO ALSO INSTALL A GAS TIMER AND A RED MUSHROOM EMERGENCY SHUTOFF SWITCH FOR PROPANE FIRE TABLE. LOCATION OF ALL ABOVE TO BE AWAY FROM THE FIRE TABLE.
2. COLOR IS TO BE CARBON BUT WILL BE FINALIZED BY OWNER AND A&M DURING THE SHOP DRAWING PROCESS.
3. PROVIDE SHOP DRAWINGS FOR APPROVAL TO A&M, & OWNER FOR APPROVAL PRIOR TO ORDERING.
4. INSTALL PER MANUFACTURERS RECOMMENDATIONS, & MA STATE FIRE CODE. CONTRACTOR TO REVIEW COMPLIANCE WITH MA STATE FIRE CODE AND RECEIVE ANY NECESSARY PERMITS & APPROVALS FROM LOCAL AND STATE FIRE OFFICIALS.
5. CONTROLS MUST BE IN ACCESSIBLE LOCATION, MOUNTED MIN. 15" AFF TO WITHIN 48" AFF, AND NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF WRIST TO OPERATE.
6. FIRE TABLE TO BE PLACED ON TOP OF PAVERS.

FIRE PIT TABLE 1
NOT TO SCALE









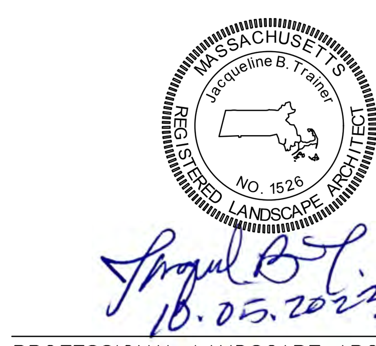
NOTES:

1. 34" MAX TO TOP OF GRILL SURFACE, CONTROLS, COUNTER TOP, AND ANY AND ALL WORK SURFACES. KITCHEN AREA TO COMPLY WITH BOTH MA AAB & FEDERAL FHA CODES PRIOR TO FABRICATION OF COUNTER & INSERT FOR GRILL, CONTRACTOR TO VERIFY INSTALLATION SPECIFICATIONS WITH GRILL, LIGHT & DOOR MANUFACTURERS.
2. APPROVED GAS LINE SERVICE FROM PROPANE TANK, GAS TIMER, GAS SHUT OFF VALVE FOR GRILL PER PLUMBER PLANS. VERIFY WITH GRILL REQUIREMENTS PRIOR TO CONSTRUCTION.
3. GRILL FACE BRICK VENEER TO BE FROST RESISTANT & RATED FOR EXTERIOR USE SUCH AS BRICK OR STONE VENEER. BRICK TO BE: BRICK BOWERSTON #1113 CRIMSON FLASH SMOOTH MODULAR OR EQUAL. VENEER BRICK AND DARK GRAY GROUT TO MATCH BUILDING AND BE APPROVED BY OWNER.
4. GRILL COUNTER TO BE MEDIUM GRAY MIST GRANITE WITH LARGE VEINING. POLISHED GRANITE OR EQUAL. SEAL WITH STONE SEALER IF RECOMMENDED BY MANUFACTURER OR EQUAL. ALL SPECIFICATIONS TO BE APPROVED BY OWNER BEFORE CONSTRUCTION. GRILL COUNTER SHOP DRAWING AND MOCK UP FOR APPROVAL PRIOR TO CONSTRUCTION.
5. COORDINATE ALL UTILITIES WITH RESPECTIVE TRADES. (ELECTRICAL OUTLET TO FRONT FACE OF THE COUNTERTOP, PLUMBING FOR GAS, SEWER & WATER SERVICE.)
6. GRILL AREA FLOOR SURFACE SHALL BE SEALED WITH RAIN GUARD-CR-0356 MICRO-SEAL 1 GAL CLEAR PENETRATING SEALER OR EQUAL. THIS WILL PROTECT THE CONCRETE FROM GREASE STAINS.

POLISHED GRANITE COUNTERTOP LOOK TO BE APPROVED BY OWNER.

OUTDOOR KITCHEN, PERGOLA FOOTING AND LIGHTS 2
NOT TO SCALE

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\L-2398-01A_AMENITIES.DWG



PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

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STRADA
MIXED USE BUILDING
258 MAIN STREET
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PROJECT NO.	2398-01A	DATE:	10-05-2023
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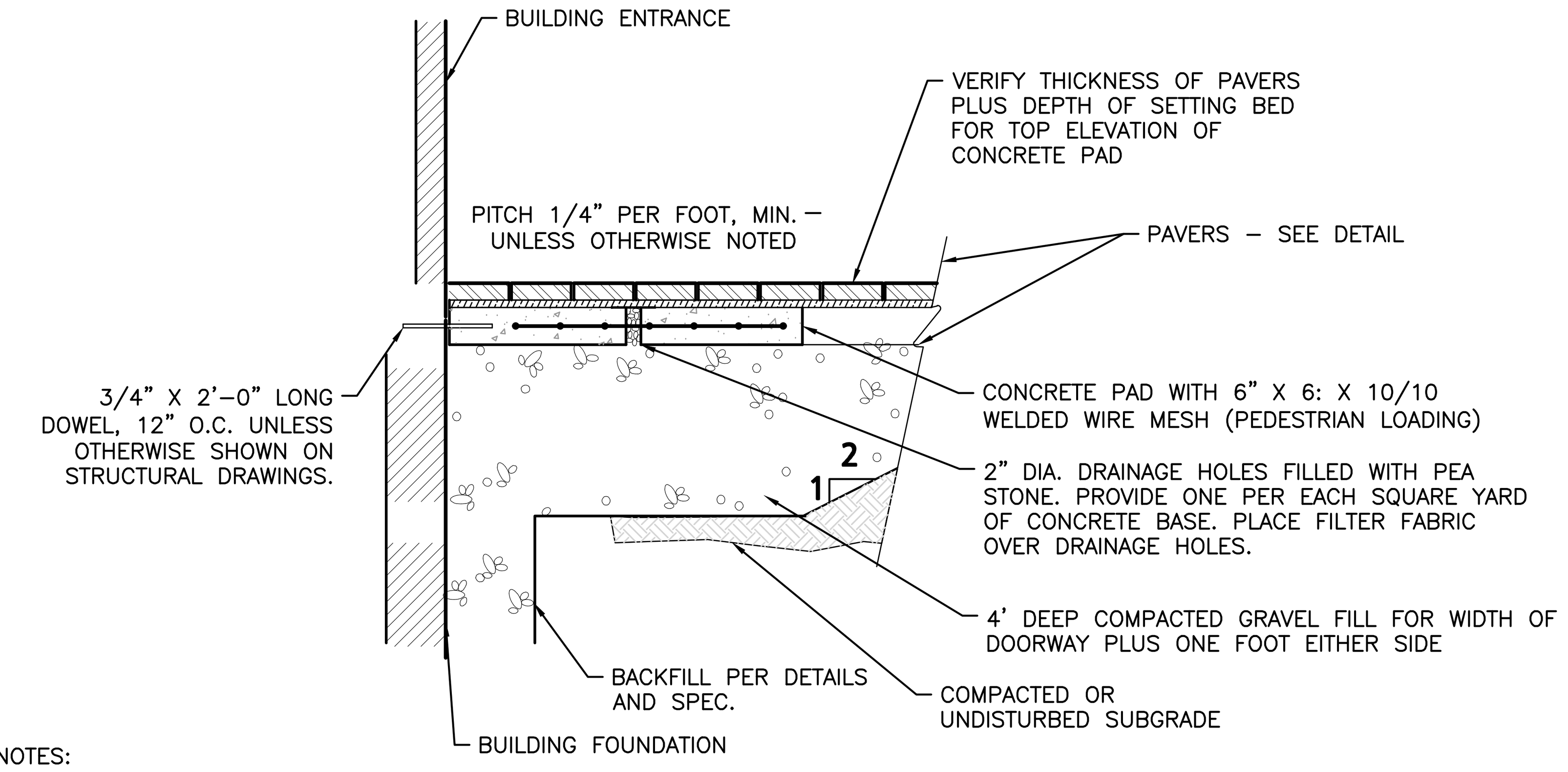
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

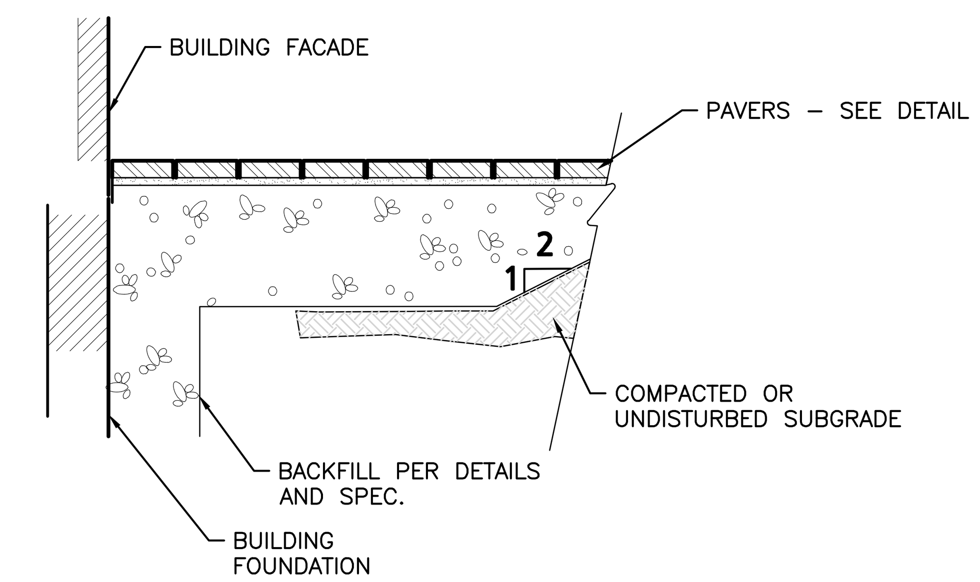
DRAWING TITLE:	SHEET No.
SITE AMENITIES DETAILS	L-503



NOTES:

1. COORDINATE WITH STRUCTURAL DRAWINGS FOR CONNECTION OF CONCRETE PAD TO BUILDING FOUNDATION.
2. LAYOUT OF PAVEMENT AT DOORWAYS SHALL MEET ADA REQUIREMENTS.
3. SEE PLAN FOR PAVER PATTERN.
4. SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO ORDERING.

PAVERS AT DOORWAYS (5)
NOT TO SCALE



NOTES:

1. SEE PLAN FOR PAVER PATTERN.
2. SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO ORDERING.

PAVERS AT BUILDING EDGE (2)
NOT TO SCALE

Oahu No Scratch® Bicycle Rack

Capacity: 2 Warranty: 1 Year

» No Scratch® bumper protects bike frames
» Superior functionality and aesthetics
» High security
» Extremely difficult to cut
» Works with a variety of lock types

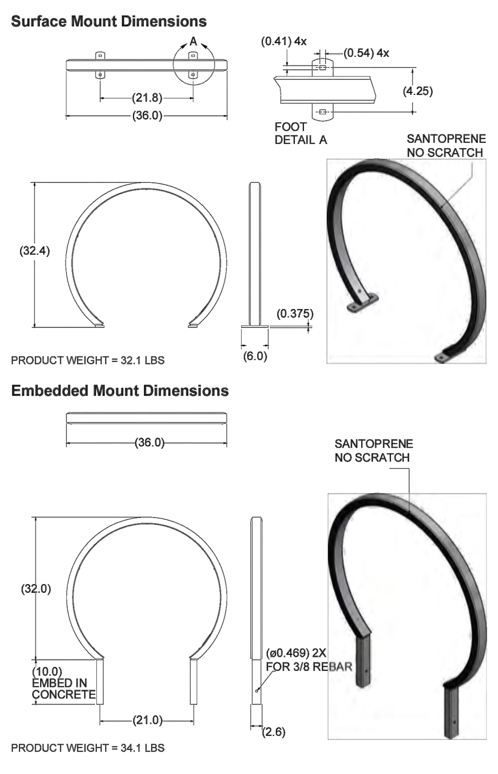
Product Specifications

Materials:
» Stainless Steel or Mild Steal
  » Outer Tube: 2" x 1" x 0.120" rectangular tubing
  » Inner Bar: 0.25" x 2" flat bar
» Santoprene® Rubber Bumper

Finishing Options:
☐ Stainless Steel Bead Blast Satin (recommended)
☐ Stainless Steel Powder Coat
☐ Stainless Steel Thermoplastic (Plascoat)
☐ Mild Steel Hot Dipped Galvanized (Surface Mount Only)
☐ Mild Steel Powder Coat
☐ Mild Steel Thermoplastic (Plascoat)

Mounting Options:
☐ Surface Mount: 0.375" x 2" x 6" flat bar foot
☐ Embedded In-Ground Mount into concrete footing

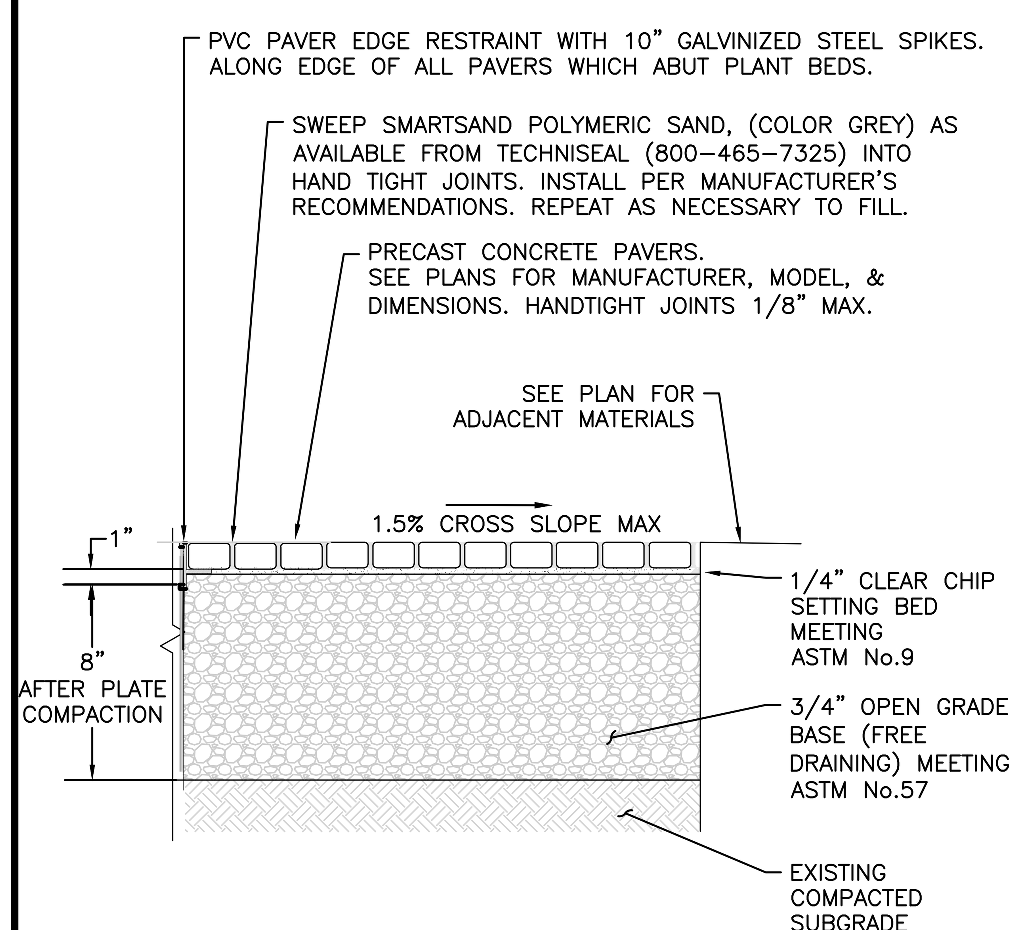
Hardware Options:
☐ Concrete Wedge Anchors (standard)
  ☐ + Tamper Resistant Nuts (recommended)
  For other hardware options contact our sales and support staff.



Revised: 11/09/2020

www.sportworks.com

BIKE RACK (4)
NOT TO SCALE



NOTES:

1. PAVERS TO BE UNILOCK ECO–PROMENADE AND ARCANA. SEE DETAIL THIS SHEET.
2. SUBMIT SAMPLES & SHOP DRAWING OF PAVERS AND COLOR CHART FOR APPROVAL PRIOR TO ORDERING.
3. SUBMIT SHOP DRAWING FOR APPROVAL OF SETTING BED AND FREE DRAINING BASE SIEVE ANALYSIS PRIOR TO ORDERING.

PRECAST CONCRETE PAVERS (4)
NOT TO SCALE

FIELD PAVERS

ARCANA

Manufactured with EasyClean, an integral sealer that is a property of the paver allowing for easier clean-ups when a spill happens before a stain can develop.

TO BE USED FOR FIREPIT PATIO AREA. PERMEABLE PAVER SPACERS WILL BE REQUIRED IN THIS APPLICATION TO MAKE ARCANA PERMEABLE.

ARCANA | CORVARA COLOR

NOTES:

1. SUBMIT SAMPLES & SHOP DRAWING OF PAVERS AND COLOR CHART FOR APPROVAL PRIOR TO ORDERING.
2. FIELD PAVERS TO BE 24" x 24" x 2" DEEP ARCANA IN CORVARA COLOR.
3. ACCENT BAND PAVERS TO BE 24" x 24" x 2" DEEP ARCANA IN VIVANTO COLOR.
4. SPACERS TO BE USED FOR FIRE PIT PATIO AREA. PERMEABLE PAVER SPACERS WILL BE REQUIRED IN THIS APPLICATION TO MAKE ARCANA PERMEABLE.

FIRE PIT PAVERS (7)
NOT TO SCALE

ACCENT PAVERS

ARCANA

Manufactured with EasyClean, an integral sealer that is a property of the paver allowing for easier clean-ups when a spill happens before a stain can develop.

TO BE USED FOR FIREPIT PATIO AREA. PERMEABLE PAVER SPACERS WILL BE REQUIRED IN THIS APPLICATION TOMAKE ARCANA PERMEABLE.

ARCANA| VIVANTO

NOTES:

1. SUBMIT SAMPLES & SHOP DRAWING OF PAVERS AND COLOR CHART FOR APPROVAL PRIOR TO ORDERING.
2. FIELD PAVERS TO BE 4" x 16" AND 3" x 12" (BOTH 4" DEEP) ECO–PROMENADE IN FRENCH GREY COLOR WITH UMBRIANO FINISH.
3. ACCENT BAND PAVERS TO BE 4" x 16" x 4" DEEP ECO–PROMENADE IN BLACK GRANITE COLOR WITH SERIES FINISH.

COURTYARD PAVERS (9)
NOT TO SCALE

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MASSACHUSETTS REGISTERED LANDSCAPE ARCHITECT NO. 1526

10.05.2023

PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:

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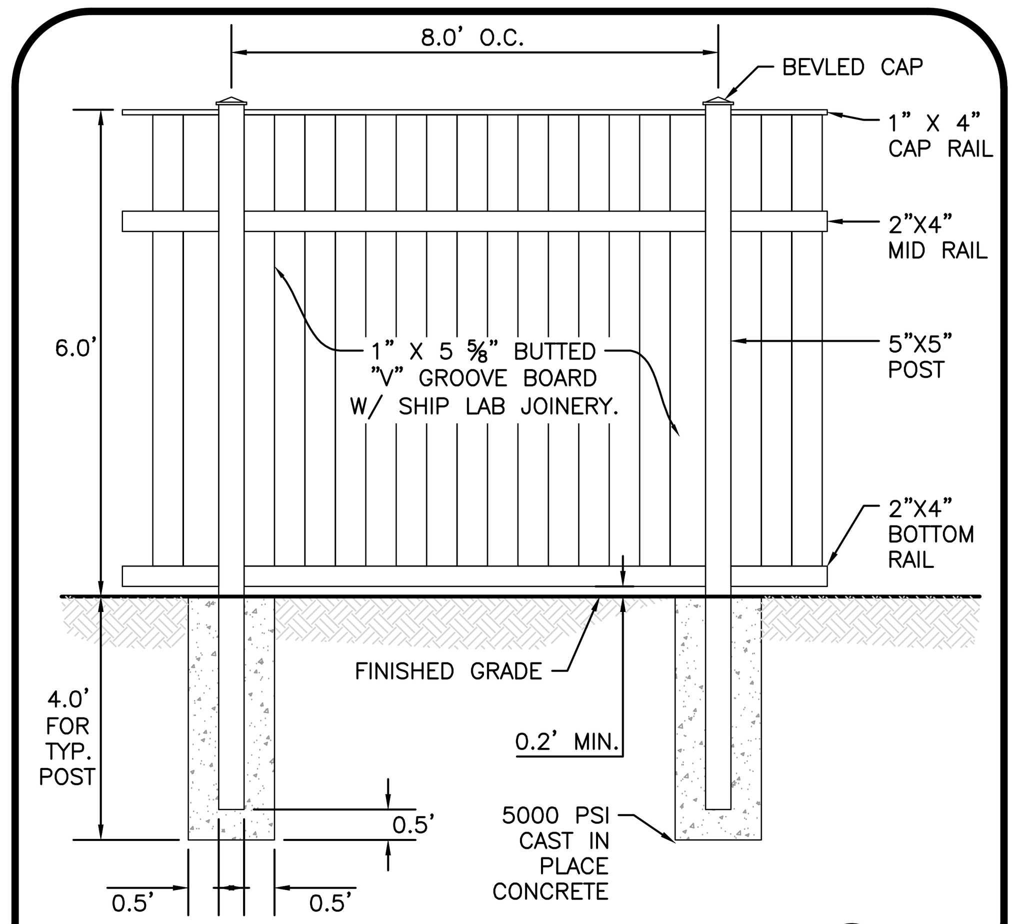
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
SITE AMENITIES DETAILS	L-504



6' HIGH SCREEN FENCE DETAIL (1)
NOT TO SCALE

NOTES:
1. THIS DETAIL IS PROTOTYPICAL IN NATURE AND IS NOT TO BE USED TO BUILD FROM FOR CONSTRUCTION. CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO ORDER & PURCHASE.
2. PERGOLA DESIGNED & BUILT BY FOREVER REDWOOD OR EQUAL. ALL PERGOLA WOOD TO BE MOSAIC REDWOOD, 12 YEAR WARRANTY.
3. FLUSH CUTTING RAFTER AND SUPPORTS END CUT DETAIL.
4. 4 POST ANCHOR KIT FOR WOOD WITH LAG BOLTS.
5. 4 FT. DEPTH MIN. CONC. FOOTINGS FOP ALL POSTS. WOOD TO BE STAINED OR LEFT NATURAL. TRANSPARENT SEALANT INCLUDED. FOR PRICING PURPOSES ONLY STAINED WITH 2 COATS. PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO ORDERING.
6. PERGOLA STRUCTURE INCLUDING FASTENERS, WOOD SIZING, AND 4 FT. DEPTH CONCRETE FOOTINGS FOR ALL POSTS TO BE REVIEWED AND APPROVED BY STRUCTURAL ENGINEER LICENSED IN THE STATE OF MA & AT CONTRACTOR'S COST PRIOR TO PURCHASE & INSTALLATION. PERGOLA CONTRACTOR TO COORD. PERGOLA INSTALLATION WITH ADJACENT LIGHTING, SURFACE MATERIALS, AND FOOTING CONTRACTORS.

FOREVER REDWOOD
33732 ANNAPOLIS RD.
ANNAPOLIS, CA 95412
CUSTOMER SERVICE / ORDER INFO
ALEJANDRO OR SOPHIA
(866) 332-2403
HELP@FOREVERREDWOOD.COM

PERGOLA TO BE:
"THE L.A. MODERN PERGOLA" OR "THE SILVERADO MODERN PERGOLA"
25'-6" X 12'-9", POST HEIGHT: 10 FT. NO WALL PRIVACY PANELS

8" x 8" POSTS ON 4 FT. DEPTH BELOW GRADE CONCRETE FOOTINGS (4,500 PSI) AT 28 DAY STRENGTH.

PERGOLA ROOF STYLE: OPEN ROOF WITH SLATS AT 12" AND RAFTERS AT 18"

POST DECORATIVE TRIM: VERTICAL POST DECORATIVE TRIM (ALL POSTS)

MINIMUM POST ANCHORING: POST ANCHOR KIT ON 4 FT. DEPTH BELOW GRADE CONC. FOOTINGS (4,500 PSI) FOR HURRICANE-WIND. A MASSACHUSETTS LICENSED STRUCTURAL ENGINEER (AT CONTRACTOR COST) TO PROVIDE REVIEW & APPROVAL FOR STATE CODES, & WIND & SNOW LOAD. CONTRACTOR TO MAKE CHANGES AS APPROPRIATE FOR THIS SITE & AS NOTED BY THE STRUCTURAL ENGINEER.

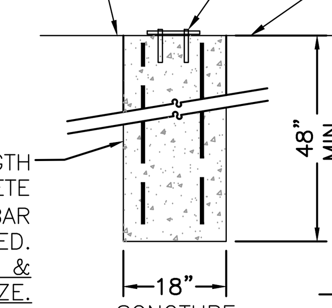
L A MODERN PERGOLA

SILVERADO MODERN PERGOLA

FINISH GRADE & MATERIALS PER PLANS. IF WITHIN PAVER PATIO THEN COVER OVER CONC. FOOTING WITH PAVERS AT SURFACE.

ATTACH BASE PLATE, U-BRACKET, ANCHORS AND BOLTS TO CONCRETE PER MANUFACTURERS DETAILS ABOVE. FOOTING CONTRACTOR TO COORDINATE WITH PERGOLA MANUFACTURER FOR CONNECTION OF POSTS TO FOOTING PRIOR TO POURING. STRUCTURAL ENGINEER TO REVIEW & SPECIFY BASE PLATE, U-BRACKET, ANCHORS & BOLTS.

FINISH GRADE



4,500 PSI AT 28 DAY STRENGTH POURED IN PLACE CONCRETE FOOTING WITH (4) #4 REBAR VERTICAL &, EQUALLY SPACED. STRUCTURAL ENGINEER TO REVIEW & APPROVE REBAR & FOOTING SIZE.

SONOTUBE

WOODEN PERGOLA DETAIL (2)
SCALE: N.T.S.

NOTES:
1. 6' HEIGHT PRIVACY FENCE. SEE SHEET L-102 FOR MODEL NUMBER.
2. PREPARE SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION.
3. COLOR TO BE: TBD, COLORS TO BE APPROVED BY OWNER.
4. SEE PLAN FOR LOCATIONS.

FENCE (3)
NOT TO SCALE

NOTES:
1. TOURNESOL PLANTER, RECTANGLE WITH MATCHING IRRIGATION AND CASTERS OR EQUAL. SEE SHEET L-102 FOR MODEL NUMBER.
2. PREPARE SHOP DRAWINGS FOR APPROVAL PRIOR TO CONSTRUCTION.
3. COLOR TO BE: TBD, COLORS TO BE APPROVED BY OWNER.
4. SEE PLAN FOR LOCATIONS.

MOVABLE PLANTERS (4)
NOT TO SCALE

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\L-2398-01A_AMENITIES.DWG

COMMONWEALTH OF MASSACHUSETTS — JACQUELINE B. TRAYNOR — NO. 1526 — REGISTERED LANDSCAPE ARCHITECT
10.05.2023
PROFESSIONAL LANDSCAPE ARCHITECT FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	AS SHOWN	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:

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environmental consulting ♦ landscape architecture
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FAX: (781) 935-2896
WOBURN, MA ♦ LAKEVILLE, MA ♦ MANCHESTER, NH

DRAWING TITLE: SITE AMENITIES DETAILS

SHEET No. L-505

AMENITIES IMAGE
NOT TO SCALE
1

AMENITIES IMAGE
NOT TO SCALE
2

NOTES:

1. THE IMAGES SHOWN HERE WERE PREPARED BY OKANEMARKETING.COM, 1 PARK AVENUE, UNIT G1, HAMPTON, NH 03842.
2. ALLEN & MAJOR ASSOCIATES, INC. MAKES NO WARRANTIES, GUARANTEES AND/OR REPRESENTATIONS OF ANY NATURE WHATSOEVER REGARDING THE CORRECTNESS, ACCURACY AND/OR COMPLETENESS OF ANY INFORMATION DEPICTED IN THIS PLAN.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BLVD READING, LLC
c/o SAVERIO FULCINITI
1 SYLVAN STREET
PEABODY, MA 01960

PROJECT:

STRADA
MIXED USE BUILDING
258 MAIN STREET
READING, MA

PROJECT NO.	2398-01A	DATE:	10-05-2023
SCALE:	NOT TO SCALE	DWG. NAME:	L-2398-01A
DESIGNED BY:	JBT	CHECKED BY:	CMQ

PREPARED BY:

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WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: AMENITIES RENDERINGS

SHEET No. L-600

N:\PROJECTS\2398-01A\CIVIL\DRAWINGS\CURRENT\L-2398-01A_AMENITIES RENDERINGS.DWG

Transportation Impact Assessment

Proposed Mixed-Use Development
252, 258, & 262 Main Street & 10 Pinevale Avenue
Reading, Massachusetts

Prepared for:

BLVD Reading, LLC
Peabody, Massachusetts

October 2023

Prepared by:

Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

DESCRIPTION OF PROJECT

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to identify traffic impacts associated with a proposed mixed-use development to be located at 252, 258, & 262 Main Street and 10 Pinevale Avenue in Reading, Massachusetts (the "Project"). The purpose of this TIA is to review existing and future traffic conditions in the vicinity of the site, determine the traffic impact of the proposed Project at key intersections expected to experience increased traffic levels from the Project, and review the need for improvements to mitigate the Project's traffic impact.

PROPOSED PROJECT

The site is bounded by Pinevale Avenue and residential properties to the north, a commercial property to the south, Main Street to the east, and residential properties to the west. Currently, the site contains one residential and two commercial buildings and has four curb cuts; three onto Main Street and one onto Pinevale Avenue. The Project entails razing the existing buildings and constructing a mixed-use building consisting of 6,150 square feet (sf) of commercial space, a 2,000 sf sit-down restaurant on the bottom floor, and 40 multifamily units. The site will contain 78 parking spaces. Site access will be provided via two curb cuts; one onto Main Street and one onto Pinevale Avenue.

EXISTING CONDITIONS

An extensive inventory was conducted to collect traffic volumes, operating characteristics, speed limits, and sight distances, as well as land use information. Traffic volumes were collected in May 2023 at the intersections expected to receive the traffic impact from the Project. These are listed below:

- Main Street (Route 28) at Pinevale Avenue and the 269 Main Street driveway
- Route 28 at Knollwood Road

FUTURE CONDITIONS

Traffic volumes within the study area were projected to 2030, which reflects a seven-year planning horizon consistent with State traffic study guidelines. These conditions incorporate traffic growth due to general background traffic increases as well as development projects currently being proposed/permitted or under construction and expected to generate traffic in the future. This condition is referred to as the No-Build condition.

PROJECT-GENERATED TRAFFIC

The Project is expected to generate 592 new vehicle trips (approximately 296 vehicles entering and exiting) on an average weekday (two-way, 24-hour volume), with 35 new vehicle trips (15 entering and 20 exiting) expected during the weekday morning peak hour and 54 new vehicle trips (32 entering and 22 exiting) expected during the weekday evening peak hour.

Project-related traffic-volume increases external to the study area relative to 2030 No-Build conditions are anticipated to range from 2 to 40 vehicles or 0.6 to 3.0 percent during the peak periods.

TRAFFIC OPERATIONS ANALYSIS

In future conditions, operations are generally preserved with minor increases in delays and vehicle queue lengths on the various approaches.

RECOMMENDATIONS

Project Access

Access to the Project site will be provided via two curb cuts; one onto Main Street and one onto Pinevale Avenue. As the site currently has four curb cuts, the Project will decrease the number of curb cuts onto Main Street by two, reducing conflicts with pedestrians and bicyclists. The following recommendations are offered with respect to the design and operation of the Project site driveway:

- The driveways should be placed under STOP-sign (*Manual on Uniform Traffic Control Devices* (MUTCD)[1] R1-1) control, with a painted STOP-bar included.
- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current MUTCD.
- Signs and landscaping adjacent to the Project site driveways should be designed and maintained so as not to restrict lines of sight.
- Snow windrows within sight triangle areas of the Project site driveways should be promptly removed where such accumulations would impede sightlines.

[1]*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, D.C.; 2009.

Transportation Demand Management (TDM) Plan

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented as a part of the Project:

- Information regarding the proximity of the Reading Depot station, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents and employees;
- A “welcome packet” should be provided to residents and employees detailing available public transportation services, bicycle, micro-mobility devices, walking alternatives, and available commuter options;
- Two Electric Vehicle (EV) charging stations will be provided on-site;
- Bicycle racks will be provided on-site.

CONCLUSIONS

As documented in this study, Project-related traffic increases result in minor delay increases at area intersections; however, there is no change in vehicle queuing so it is unlikely that Project-related traffic increases will be noticeable. Further, Project-related traffic increases will not result in significant increases on overall traffic volumes or traffic delays within the study area. The site driveways will provide efficient access to and from the development. In general, Project-related traffic can be adequately accommodated within the existing infrastructure with minimal impact on the traffic operations within the study area.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to identify the traffic impacts associated with the proposed mixed-use development to be located at 252, 258, & 262 Main Street and 10 Pinevale Avenue in Reading, Massachusetts. This report identifies and analyzes existing and future traffic conditions both with and without the Project and reviews access requirements, potential offsite improvements, and safety considerations.

STUDY METHODOLOGY

This study was prepared in accordance with the State guidelines for TIAs and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometry, observations of traffic flow, and collection of peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for these analyses consistent with State guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any are necessary, based on the results from stage two of the study.

EXISTING CONDITIONS

An extensive inventory of existing conditions within the study area was conducted in May 2023. The field investigation consisted of an inventory of existing traffic volumes, operating characteristics, posted speed limits, sight distances, and land use information within the study area. The study area for the Project contains the roadways which provide access to the Project, as well as the intersections which are expected to accommodate the majority of Project-related traffic. The study area is listed below and graphically depicted on Figure 1.

- Main Street (Route 28) at Pinevale Avenue and the 269 Main Street driveway
- Route 28 at Knollwood Road

The following describes the study area roadways.

GEOMETRY

Roadways

Route 28

Route 28 is classified as a principal arterial roadway under Massachusetts Department of Transportation (MassDOT) jurisdiction. Route 28 runs in a general north-to-south alignment throughout the study area. Route 28 provides one general-purpose travel lane in each direction with a center two-way left-turn lane. Land uses along Route 28 throughout the study area generally consist of commercial and residential uses.

Pinevale Avenue

Pinevale Avenue is classified as a local roadway under Town jurisdiction. Pinevale Avenue runs in a general east-to-west alignment throughout the study area. Pinevale Avenue provides one general-purpose travel lane in each direction separated by a double-yellow centerline. Land use along Pinevale Avenue throughout the study area generally consists of residential uses.

Figure 1

Site Location and Study Area Map

Vanasse & Associates inc

Intersections

Figure 2 summarizes existing lane use, travel lane widths, and sidewalk and crosswalk locations at the study area intersections.

EXISTING TRAFFIC VOLUMES

In order to establish base traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) were completed in May 2023. The TMCs were conducted during the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods. Bicycles and pedestrians were also counted.

Traffic-Volume Adjustments

In order to develop 2023 Existing traffic-volume conditions, MassDOT weekday seasonal factors for Urban Groups 3 (other principal arterials) were reviewed.[2] Based on a review of this data, it was determined that traffic volumes for the month of May are 7 percent *above* average-month conditions. As such, the traffic volumes were not adjusted in order to be representative of average-month conditions.

MassDOT no longer requires pandemic-related adjustment of traffic counts performed after March 2022 except in locations where the predominant land use consists of offices or similar uses.[3] Given that the predominant land use within the study area is residential, no further adjustment (beyond the seasonal adjustment) is necessary.

As can be seen in Table 1, Route 28 is estimated to carry approximately 14,100 vehicles per day (vpd) during an average weekday with 1,307 vehicles per hour (vph) observed during the weekday morning peak hour and 1,269 vph observed during the weekday evening peak hour. During the weekday morning peak hour, 55 percent of the traffic is traveling southbound and during the weekday evening peak hour, 54 percent of the traffic is traveling northbound. The existing weekday morning and evening peak-hour traffic volumes for the study area intersections are graphically depicted on Figure 3.

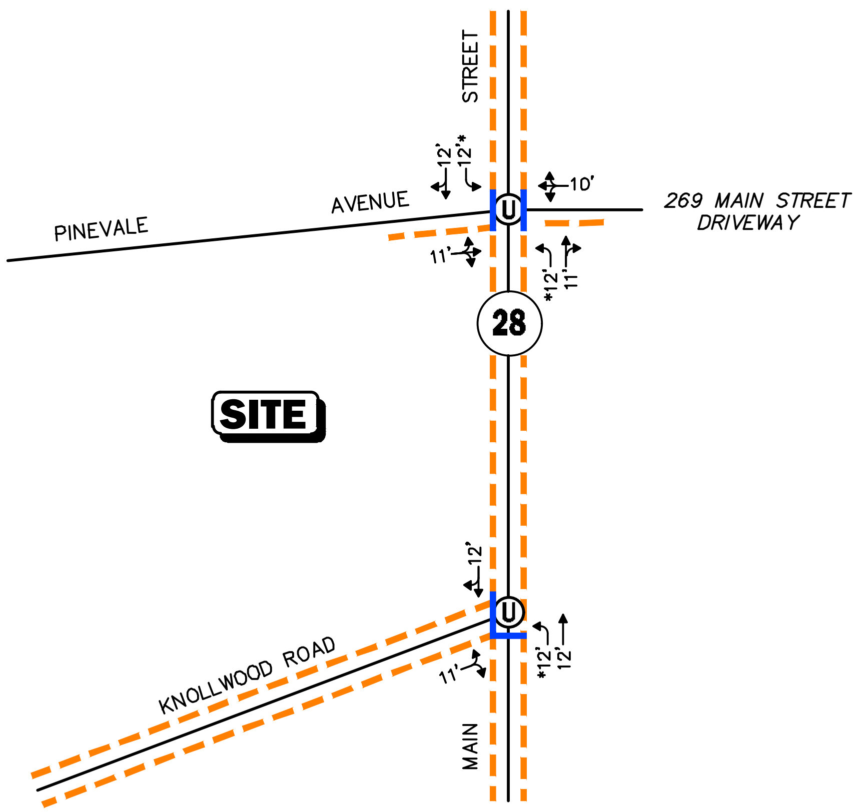
---

[2] MassDOT statewide Traffic Data Collection; 2019 Weekday Seasonal Factors, Groups U3.

[3] *25% Design Submission Guidelines*; MassDOT Highway Division, Traffic and Safety Engineering; Revised May 31, 2022.

Legend:

- (U) Unsignalized Intersection
- Sidewalk
- Crosswalk
- XX' Lane Use and Travel Lane Width



*Two-way left-turn lane.

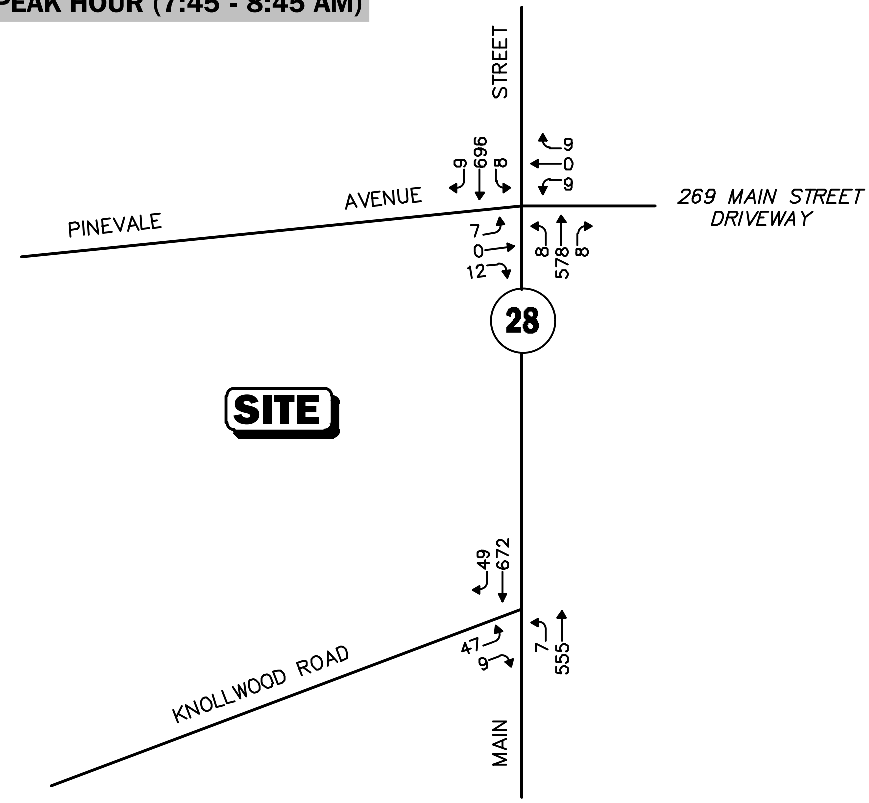
Not To Scale

Figure 2

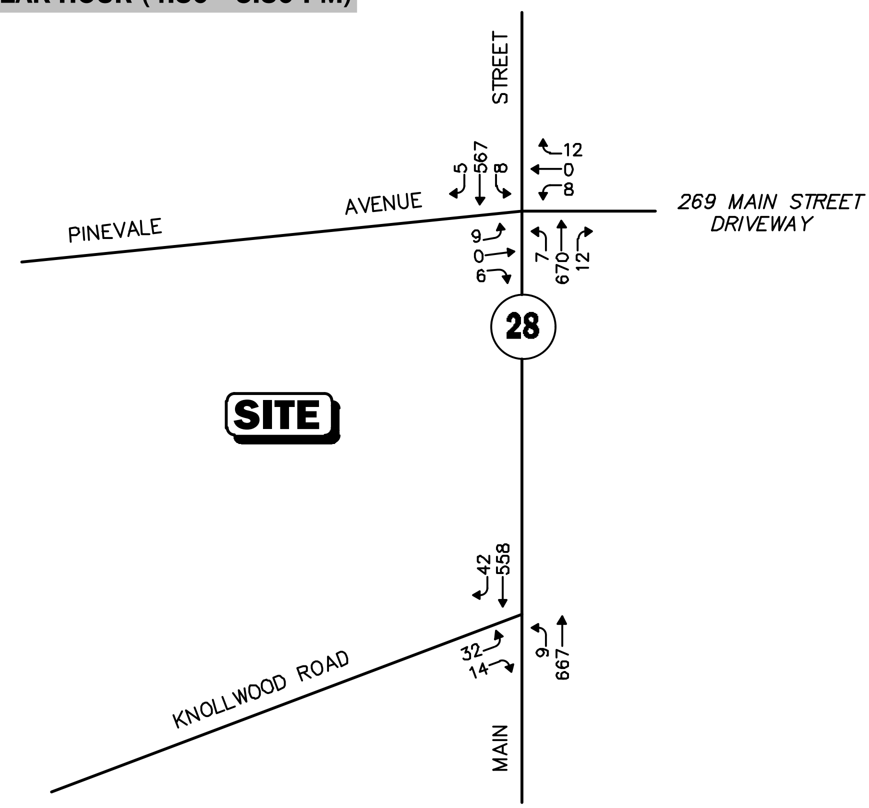
Vanasse & Associates inc

Existing Intersection Lane Use, Travel Lane Width, and Pedestrian Faclities

WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale

Figure 3

Vanasse & Associates inc

2023 Existing Peak-Hour Traffic Volumes

Table 1
2023 EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY

	Weekday	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Location	Daily Volume (vpd)[a]	Volume (vph)[b]	Percent of Daily Traffic[c]	Predominant Flow	Volume (vph)	Percent of Daily Traffic	Predominant Flow
Main Street, south of Pinevale Avenue	14,100	1,307	9.3	54.6% SB	1,269	9.0	54.3% NB

[a]Two-way daily traffic expressed in vehicles per day, estimated.
[b]Two-way peak-hour volume expressed in vehicles per hour.
[c]The percent of daily traffic that occurs during the peak hour.
NB = northbound, SB = southbound.

PEDESTRIAN AND BICYCLE FACILITIES

An extensive inventory of pedestrian and bicycle facilities within the study area was undertaken in May 2023. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study area roadways and at the study area intersections, as well as the location of bicycle facilities. Sidewalks are provided along both sides of Route 28, Knollwood Road, the south side of Pinevale Avenue for about 200 feet west of the intersection of Route 28 at Pinevale Avenue and the 269 Main Street driveway, and the south side of the 269 Main Street driveway for about 50 feet east of the intersection of Route 28 at Pinevale Avenue and the 269 Main Street driveway. Crosswalks are provided across the Pinevale Avenue and 269 Main Street driveway legs of the intersection of Route 28 at Pinevale Avenue and the 269 Main Street driveway intersection and the Knollwood Road and southern Route 28 legs of the intersection of Route 28 at Knollwood Road.

PUBLIC TRANSPORTATION

Public transportation services are provided within the study area by the Massachusetts Bay Transportation Authority (MBTA). The MBTA provides fixed-route bus service between the Reading Commuter Rail Station and the Malden Center Subway Station on the No. 137 route by way of the Reading Depot bus stop, which is located at 35 Lincoln Street, approximately 0.6 miles (a 12-minute walk) to the north of the Project site. In addition, the MBTA provides commuter rail service to North Station in Boston on the Haverhill Line by way of Reading Station.

Table 2 summarizes the characteristics of these services. The public transportation schedules and fare information are provided in the Appendix.

Table 2
PUBLIC TRANSPORTATION SERVICES

Transit	Stop Closest to Site	Distance from Site	Weekday Hours of Operation	Weekday Headway (minutes)
Route No. 137: Reading Depot - Malden Center Station	Lincoln Street at Reading Depot	~0.6 miles north	5:25 AM – 10:30 PM	20-45
Commuter Rail: Haverhill Line	Reading	~0.6 miles north	5:18 AM – 11:28 PM	45-90

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2016 through 2020) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized in Table 3 by intersection, type, weather condition, lighting condition, pavement condition, and severity.

As can be seen in Table 3, the intersection of Route 28 at Pinevale Avenue and the 269 Main Street driveway experienced 8 accidents over the five-year review period, averaging 1.6 accidents per year. The majority of the accidents were collisions with a fixed-object, occurred on dry pavement, during the daylight, in clear weather, and caused property damage only. The intersection of Route 28 at Knollwood Road experienced 9 accidents over the five-year review period, averaging 1.8 accidents per year. The majority of the accidents were angled collisions, occurred on dry pavement, during the daylight, in clear weather, and caused property damage only. The crash rates for the intersections were observed to be lower than the MassDOT District 4 crash rates for unsignalized intersections.

Table 3
MOTOR VEHICLE CRASH DATA SUMMARY[a]

	Main Street/ Pinevale Avenue/ 269 Main Street Driveway	Main Street/ Knollwood Road
Year:		
2016	1	2
2017	0	1
2018	1	1
2019	4	2
2020	2	3
Total	8	9
Average[a]	1.6	1.8
Crash Rate[b]	0.30	0.33
Significant[c]	No	No
Type:		
Angle	1	9
Rear-End	1	0
Head-On	0	0
Sideswipe	2	0
Fixed Object	4	0
Pedestrian/Bicycle	0	0
Unknown/Other	0	0
Total	8	9
Conditions:		
Clear	7	7
Cloudy	0	1
Rain	1	1
Fog/Smog/Smoke	0	0
Snow/Ice	0	0
Total	8	9
Lighting:		
Daylight	8	8
Dawn/Dusk	0	1
Dark (Road Lit)	0	0
Dark (Road Unlit)	0	0
Total	8	9
Pavement Conditions :		
Dry	7	7
Wet	1	2
Snow/Ice	0	0
Unknown/Other	0	0
Total	8	9
Severity:		
Property Damage Only	7	9
Personal Injury	1	0
Fatality	0	0
Unknown	0	0
Total	8	9

[a]Average number of crashes over a five-year period.
[b]Crash rate per million entering vehicles (mev).
[c]Significant if crash rate > 0.57 for unsignalized intersections (MassDOT District 4 rates).
Source: MassDOT Crash Data, 2016 through 2020.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, existing traffic volumes in the study area were projected to the year 2030. Traffic volumes on the roadway network at that time, in the absence of the Project (that is, the No-Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2030. Inclusion of these factors resulted in the development of 2030 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop the 2030 Build traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development impacting the study area. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all existing traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

In addition, we identified the location and type of planned development affecting the study area, estimated the traffic to be generated by that development, and assigned it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used in this TIA.

General Background Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data, it was determined that the traffic volumes are increasing in the area by approximately 0.81 percent per year on average. Therefore, a 1.0 percent per year compounded annual background traffic growth rate was used to account for future traffic growth including presently unforeseen development within the study area.

Specific Development by Others

The Town of Reading was contacted in order to determine if there are any planned or approved development projects that are expected to influence future traffic volumes within the study area. Based on these discussions, no developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

Planned Roadway Improvements

The Town of Reading and MassDOT were contacted in order to determine if there are any planned roadway improvement projects expected to be completed within the study area in the seven-year planning horizon. Based on these discussions, no roadway improvement projects are planned within the study area beyond general maintenance.

No-Build Traffic Volumes

The 2030 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2023 Existing peak-hour traffic volumes. The resulting 2030 No-Build weekday morning and evening peak-hour traffic-volume networks are shown on Figure 4.

PROJECT-GENERATED TRAFFIC

The Project entails the elimination of two commercial buildings on Main Street and one residential building on Pinevale Avenue. In their place, a multi-use building, which will collectively have 6,150 square feet (sf) of commercial space, a 2,000 sf sit-down restaurant on the bottom floor, and 40 multifamily units will be constructed. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)[4] for Land Use Code (LUC) 822, *Strip Retail Plaza (<40K), LUC* 932, *High-Turnover (Sit-Down) Restaurant*, and LUC 220, *Multifamily Housing (Low-Rise)* were used.

Pass-By Trips

Deductions in the base trip-generation calculations can be made to account for pass-by trips. Pass-by trips are from drivers already traveling along adjacent roadways for other purposes that decide to patronize the existing site or the proposed Project in conjunction with their trip and then continue to their original destination. LUC 822, *Strip Retail Plaza (<40K),* reports that 40 percent of total vehicle trips to the site should be considered as existing vehicle trips or vehicles that were already passing by the site. LUC 932, *High-Turnover (Sit-Down) Restaurant*, reports that 43 percent of total vehicle trips to the site should be considered as existing vehicle trips or vehicles that were already passing by the site. These pass-by vehicle trips are not considered to be generated by the site, so they are removed. This is shown in Table 4.

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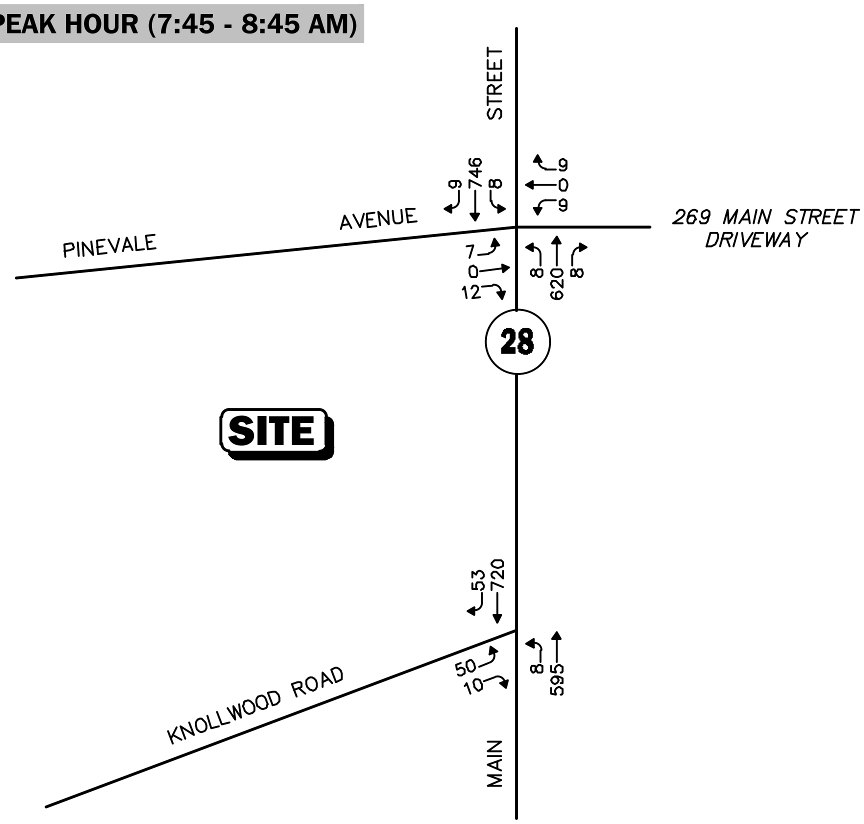
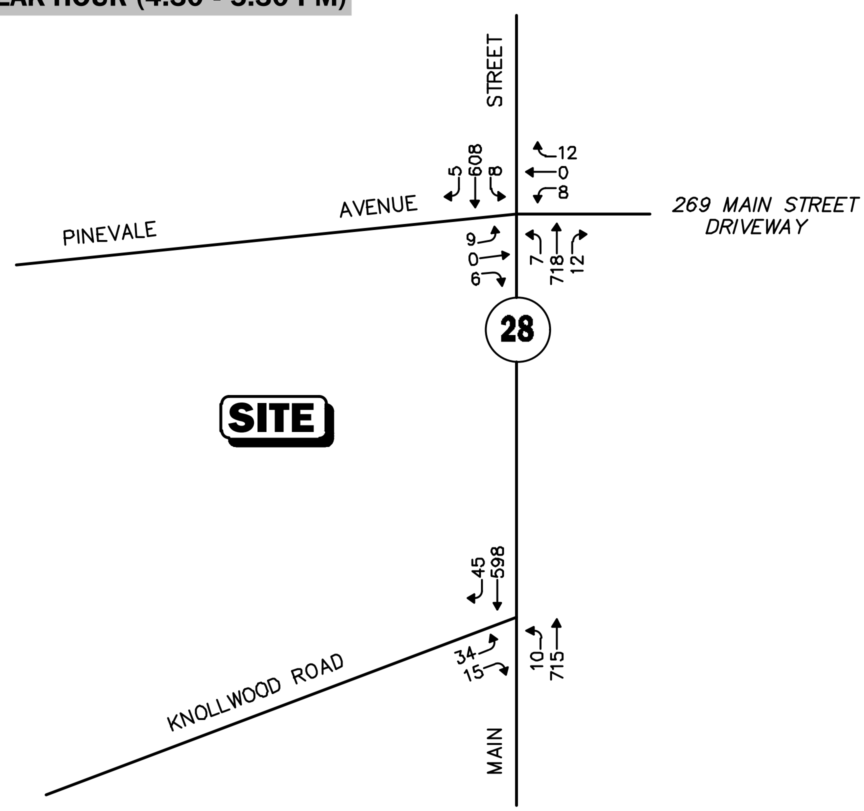
[4] *Trip Generation,* 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale

Figure 4

2030 No-Build
Peak-Hour Traffic Volumes

Vanasse & Associates inc

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Table 4
PROPOSED SITE TRIP-GENERATION SUMMARY

Time Period/ Directional Distribution	Retail Trips[a]	Pass-By Trips[b]	Restaurant Trips[c]	Pass-By Trips[d]	Residential Trips[e]	Net New Trips
Weekday Daily	334	-134	216	-94	270	592
Weekday Morning Peak Hour:						
Entering	8	-3	10	-4	4	15
Exiting	6	-3	9	-4	12	20
Total	14	-6	19	-8	16	35
Weekday Evening Peak Hour:						
Entering	20	-8	11	-4	13	32
Exiting	20	-8	7	-4	7	22
Total	40	-16	18	-8	20	54

[a]Based on ITE LUC 822, *Strip Retail Plaza (<40K);* 6,134 sf.
[b]Based on 40% pass-by rate applied to retail trips only.
[c]Based on ITE LUC 932, *High-Turnover (Sit-Down) Restaurant;* 2,016 sf.
[d]Based on 43% pass-by rate applied to restaurant trips only.
[e]Based on ITE LUC 220, *Multifamily Housing (Low-Rise),* 40 units.

As can be seen in Table 4, the Project is expected to generate 592 new vehicle trips (approximately 296 vehicles entering and exiting) on an average weekday (two-way, 24-hour volume), with 35 new vehicle trips (15 entering and 20 exiting) expected during the weekday morning peak hour and 54 new vehicle trips (32 entering and 22 exiting) expected during the weekday evening peak hour.

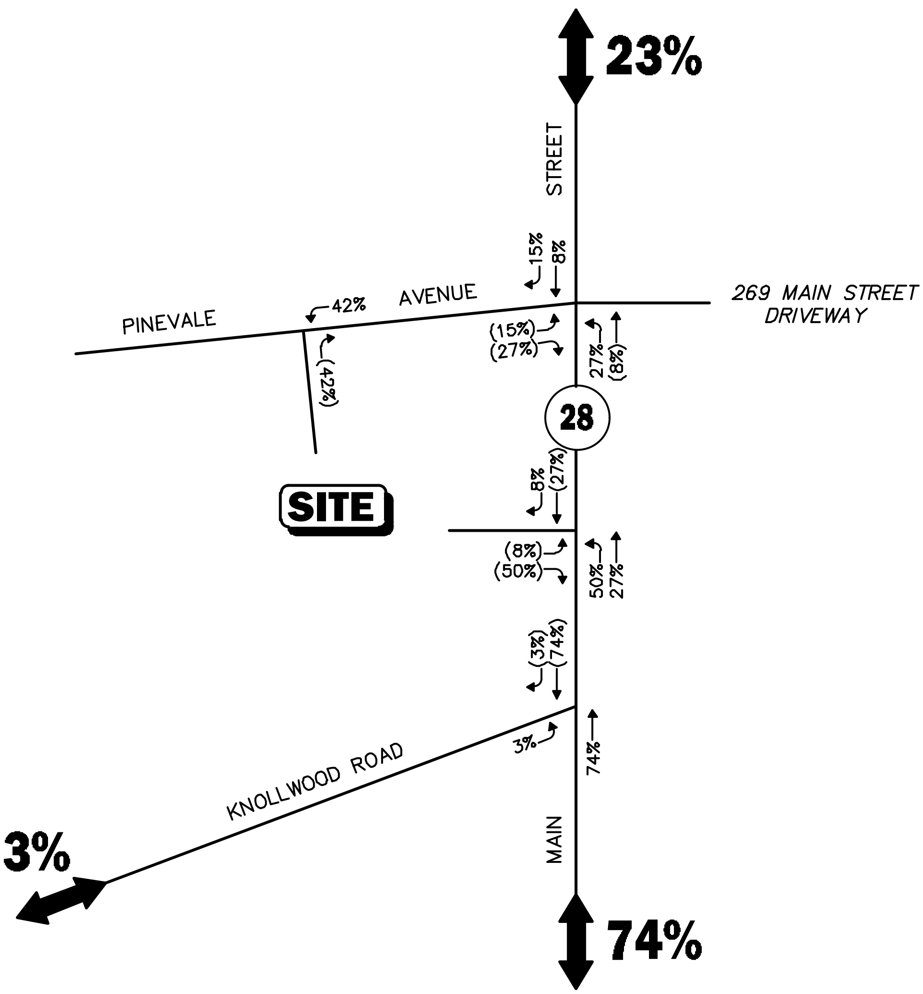
TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated trips to and from the Project was determined based on a combination of a review of existing travel patterns at the study area intersections and census data. The trip distribution for the Project is summarized in Table 5 and graphically depicted on Figure 5. The weekday morning and evening peak-hour traffic volumes expected to be generated by the Project were assigned on the study area roadway network as shown on Figure 6.

Table 5
TRIP-DISTRIBUTION SUMMARY

Roadway	Direction (To/From)	Percent (To/From)
Main Street	North	23
Main Street	South	74
Knollwood Road	West	3
TOTAL		100

Legend:
XX Entering Trips
(XX) Exiting Trips



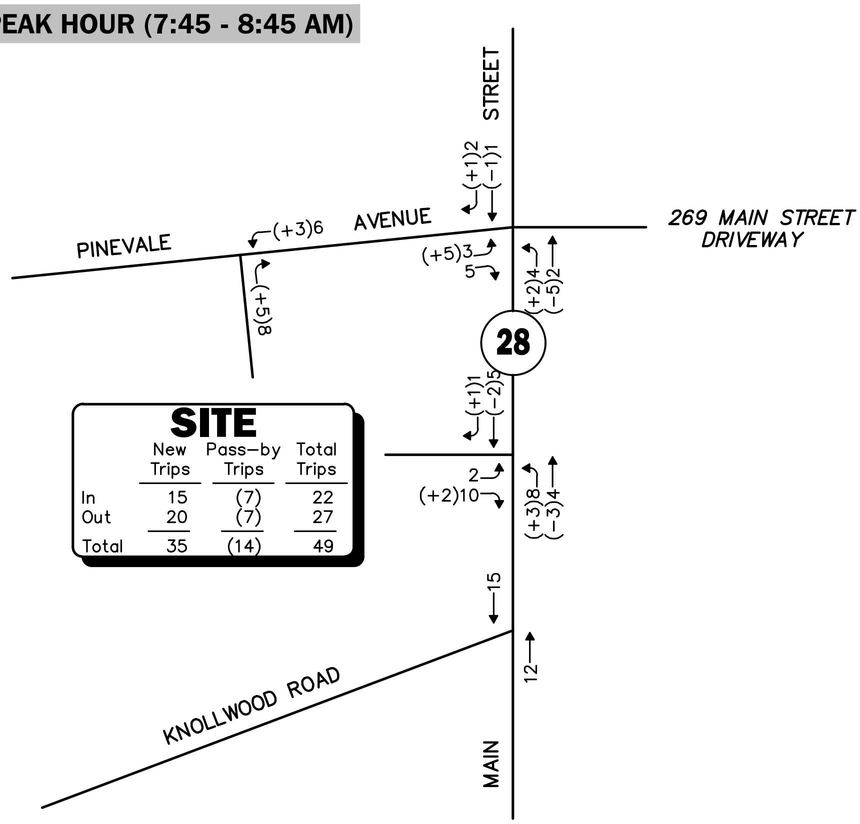
N
Not To Scale

Figure 5

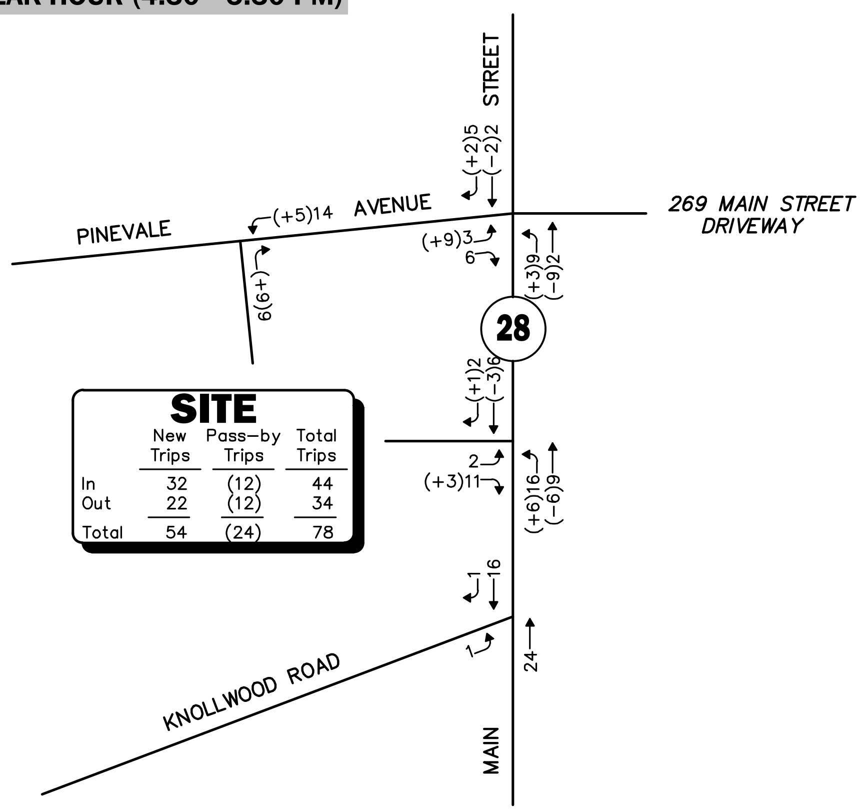
Trip Distribution Map

Vanasse & Associates inc

WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale

Figure 6

Site-Generated Peak-Hour Traffic Volumes

Vanasse & Associates inc

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2030 Build condition networks consist of the 2030 No-Build traffic volumes with the anticipated Project-generated traffic added to them. The 2030 Build weekday morning and evening peak-hour traffic-volume networks are graphically depicted on Figure 7.

A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 6. These volumes are based on the expected increases from the Project.

As shown in Table 6, Project-related traffic-volume increases external to the study area relative to 2030 No-Build conditions are anticipated to range from 2 to 40 vehicles or 0.6 to 3.0 percent during the peak periods.

Table 6
PEAK-HOUR TRAFFIC-VOLUME INCREASES

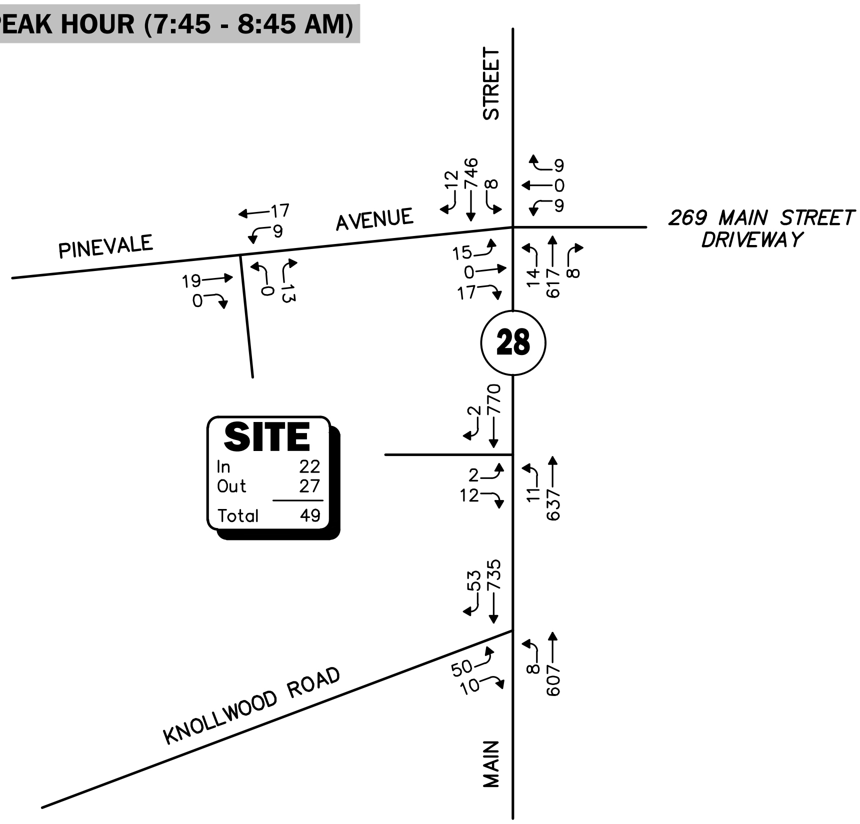
Location/Peak Hour	2030 No-Build	2030 Build	Traffic-Volume Increase Over No-Build	Percent Increase Over No-Build
Main Street, north of Pinevale Avenue:				
Weekday Morning	1,399	1,407	8	0.6
Weekday Evening	1,360	1,372	12	0.9
Main Street, south of Knollwood Road:				
Weekday Morning	1,333	1,360	27	2.0
Weekday Evening	1,338	1,378	40	3.0
Knollwood Road, west of Main Street:				
Weekday Morning	121	121	0	0.0
Weekday Evening	104	106	2	1.9

PARKING GENERATION

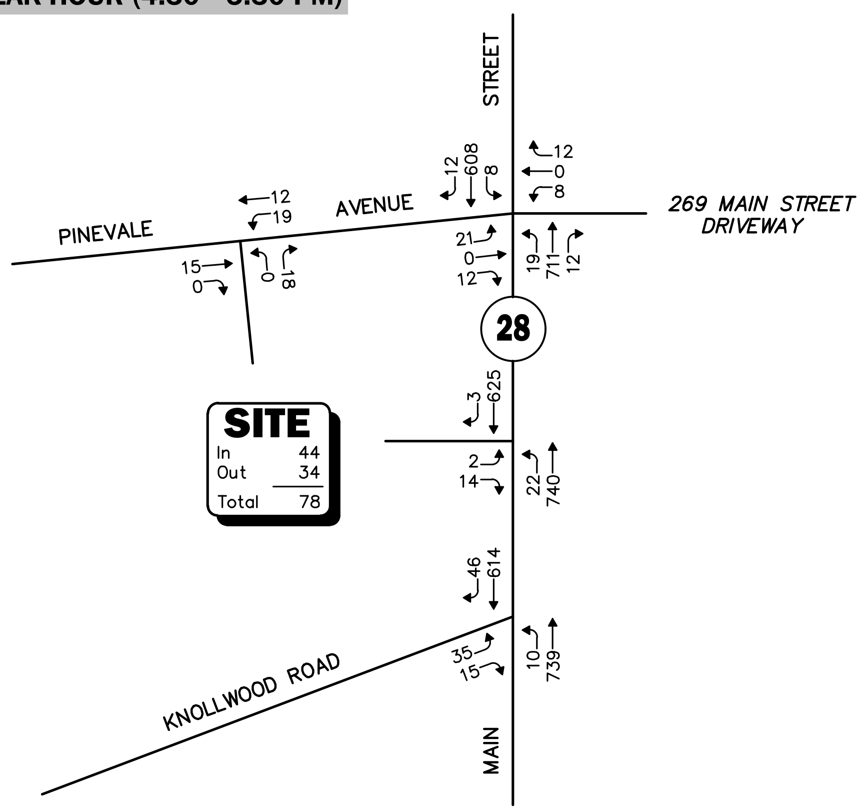
A review of potential parking demand for the Project was conducted using industry sources. The following analysis was conducted to provide an estimate of parking demand for this Project. Parking demand was determined by using the ITE *Parking Generation* publication[5] using LUC 822, *Strip Retail Plaza (<40K), LUC* 932, *High-Turnover (Sit-Down) Restaurant*, and LUC 220, *Multifamily Housing (Low-Rise).* Estimates of parking demand for the Project were calculated and are summarized in Table 7.

[5] *Parking Generation,* 5th Edition; Institution of Transportation Engineers; Washington, DC; 2020.

WEEKDAY MORNING PEAK HOUR (7:45 - 8:45 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



Not To Scale

Figure 7

2030 Build
Peak-Hour Traffic Volumes

Vanasse & Associates inc

Table 7
PROJECT PARKING DEMAND[a]

LUC	Average Parking Rates	Parking Demand (spaces)
Retail[a]	1.95 spaces/1,000 sf	12
Restaurant[b]	9.44 spaces/1,000 sf	19
Housing[c]	1.21 spaces/unit	48

[a]Based on ITE LUC 820, *Shopping Center;* 6,134 sf.
[b]Based on ITE LUC 932, *High-Turnover (Sit-Down) Restaurant;* 2,016 sf.
[c]Based on ITE LUC 220, *Multifamily Housing (Low-Rise),* 40 units.

As can be seen in Table 7, the average ITE parking rates indicate that the site would require 79 spaces to satisfy the expected demand. Depending on the hours of operation for the respective uses, there may be some opportunities for shared parking to occur as the retail activity may peak during the day while the restaurant may have a later peak. The Project is proposing 78 parking spaces; therefore, the parking supply for the project will be constrained and will encourage the use of alternative transportation such as transit and non-motorized forms.

SIGHT DISTANCE EVALUATION

Sight distance measurements were performed at the Project site driveway intersections with Route 28 and Pinevale Avenue in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)[6] recommendations. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance recommended to be provided by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD is the sight distance recommended to be provided by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. ***In accordance with AASHTO standards, if the measured ISD is at least equal to the recommended SSD value for the appropriate design speed, the intersection can operate in a safe manner.*** Table 8 presents the measured SSD and ISD at the subject intersection.

[6] *A Policy on Geometric Design of Highway and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.

Table 8
SIGHT DISTANCE MEASUREMENTS[a]

Intersection/Sight Distance Measurement	Recommended Distances (Feet): Posted Speed Limit 40 mph on Main Street	Recommended Distances (Feet): Speed Limit 30 mph on Pinevale Avenue[b]	Field Measured Distances (Feet)
Main Street at Project Site East Driveway			
Stopping Sight Distance:			
Main Street approaching from the north	305	--	600+
Main Street approaching from the south	305	--	600+
Intersection Sight Distance:[c]			
Left turn from Site Driveway (looking east)	445	--	600+
Left turn from Site Driveway (looking west)	445	--	600+
Pinevale Avenue at Project Site North Driveway			
Stopping Sight Distance:			
Pinevale Avenue approaching from the east	--	50[d]	150[e]
Pinevale Avenue approaching from the west	--	200	285
Intersection Sight Distance:			
Left turn from Site Driveway (looking east)	--	110[d]	150[e]
Left turn from Site Driveway (looking west)	--	355	371

[a]Recommended values obtained from *A Policy on Geometric Design of Highways and Streets,* 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018.
[b]According to the Town of Reading Bylaws Article 6.24
[c]Values shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed.
[d]Based on a speed of 10 mph due to vehicles turning from Route 28 to Pinevale Avenue.
[e]Distance from the site driveway to the existing intersection with Route 28.

As can be seen in Table 8, the sight distance at the intersection of the Project site east driveway with Route 28 was found to exceed the recommended values for both SSD and ISD based on a speed of 40 mph. The sight distance at the intersection of the Project site north driveway with Pinevale Avenue was found to exceed the recommended values for SSD and ISD assuming a reduced speed for westbound vehicles after having executed the turn from Route 28 to Pinevale Avenue. The distance between the north site driveway and Route 28 is approximately 150 feet.

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantify traffic flow within the study area. To assess quality of flow, roadway capacity, and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.[7] The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best-operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

[7] The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition;* Transportation Research Board; Washington, DC; 2016.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 6th Edition.* Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 6th Edition*. Table 9 summarizes the relationship between level of service and average control delay for two-way STOP-controlled and all-way STOP-controlled intersections.

Table 9
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS[a]

Level-of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
v/c ≤ 1.0	v/c > 1.0	
A	F	≤10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	>50.0

[a]Source: *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016; page 20-6.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2023 Existing, 2030 No-Build, and 2030 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Table 10.

Unsignalized Intersection

Route 28 at Pinevale Avenue and the 269 Main Street Driveway

Under 2023 Existing conditions, the critical movements at this intersection operate at LOS D during the weekday morning peak hour and operate at LOS D and LOS C during the weekday evening peak hour. Under 2030 No-Build conditions, the critical movements at this intersection operate at LOS D during the weekday morning and evening peak hours. The only change in level of service under 2030 Building conditions due to the addition of the Project volumes is at the Pinevale Avenue driveway approach during the weekday morning peak hour where the LOS degrades from D to E. The queue length stays the same under 2030 Build conditions compared to 2030 No-Build conditions.

Route 28 at Knollwood Road

Under 2023 Existing and 2030 No-Build conditions, the critical movement at this intersection operates at LOS C during the weekday morning and evening peak hours. No changes to the critical movement level of service occur as a result of the addition of Project volumes under 2030 Build conditions. Critical movement delay increases by 1 second or less and the queue length stays the same under 2030 Build conditions compared to 2030 No-Build conditions.

Pinevale Avenue at the Project Site North Driveway

Under 2030 Build conditions, the critical movement at this intersection operates at LOS A during the weekday morning and evening peak hours. There is no vehicle queue during the weekday morning, however, the average queue length is about 1 vehicle in the weekday evening.

Route 28 at the Project Site East Driveway

Under 2030 Build conditions, the critical movement at this intersection operates at LOS C during the weekday morning peak hour and operates at LOS B during the weekday evening peak hour. The average queue length is about 1 vehicle during both peak hours.

Table 10
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/	2023 Existing				2030 No-Build				2030 Build			
Critical Movement/Peak Hour	Demand[a]	Delay[b]	LOS[c]	Queue[d]	Demand	Delay	LOS	Queue	Demand	Delay	LOS	Queue
Main Street at Pinevale Avenue and the 269 Main Street Driveway												
Weekday Morning:												
Pinevale Avenue EB LT/TH/RT	19	26.8	D	1	19	29.1	D	1	32	36.4	E	1
269 Main Street Driveway WB LT/TH/RT	18	29.6	D	1	18	32.0	D	1	18	33.0	D	1
Weekday Evening:												
Pinevale Avenue EB LT/TH/RT	15	29.6	D	1	15	32.1	D	1	33	40.0	E	1
269 Main Street Driveway WB LT/TH/RT	20	24.6	C	1	20	26.6	D	1	20	27.7	D	1
Main Street at Knollwood Road												
Weekday Morning:												
Knollwood Road EB LT/TH/RT	56	22.3	C	1	60	22.3	C	1	60	21.4	C	1
Weekday Evening:												
Knollwood Road EB LT/TH/RT	46	17.6	C	1	49	18.0	C	1	50	18.7	C	1
Pinevale Avenue at the Project Site North Driveway												
Weekday Morning:												
Project Site North Driveway NB LT/TH/RT	--	--	--	--	--	--	--	--	13	8.4	A	0
Weekday Evening:												
Project Site North Driveway NB LT/TH/RT	--	--	--	--	--	--	--	--	18	8.4	A	1
Main Street at the Project Site East Driveway												
Weekday Morning:												
Project Site East Driveway EB LT/TH/RT	--	--	--	--	--	--	--	--	14	15.7	C	1
Weekday Evening:												
Project Site East Driveway EB LT/TH/RT	--	--	--	--	--	--	--	--	16	14.0	B	1

[a]Demand in vehicles per hour.
[b]Delay in seconds per vehicle.
[c]Level of service.
[d]95th percentile queue length (veh).
EB = eastbound; WB = westbound; NB = northbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

RECOMMENDATIONS AND CONCLUSIONS

VAI has prepared this TIA in order to evaluate potential traffic impacts associated with the proposed mixed-use development to be located at 252, 258, & 262 Main Street and 10 Pinevale Avenue in Reading, Massachusetts. This study was prepared in accordance with MassDOT Guidelines for *Transportation Impact Assessments (TIAs);* and was conducted pursuant to the standards of the traffic engineering and transportation planning professions for the preparation of such reports. Based on the results of this study, the following can be concluded:

- The study area intersection crash rates were observed to be lower than the MassDOT District 4 crash rates for unsignalized and signalized intersections.

- Sight distances for the driveway on Route 28 exceed recommended values based on posted speeds while sight distances for the driveway on Pinevale Avenue exceed recommended values based on assumed speeds and posted speeds on the roadway.

- The Project is expected to generate 592 new vehicle trips (approximately 296 vehicles entering and exiting) on an average weekday (two-way, 24-hour volume), with 35 new vehicle trips (15 entering and 20 exiting) expected during the weekday morning peak hour and 54 new vehicle trips (32 entering and 22 exiting) expected during the weekday evening peak hour.

- The analysis has indicated that the Project will generally result in minimal impact on motorist delays and vehicle queue lengths at the study intersection.

RECOMMENDATIONS

The following improvements have been recommended as a part of this evaluation:

Project Access

Access to the Project site will be provided via two curb cuts; one onto Main Street and one onto Pinevale Avenue. As the site currently has four curb cuts; three onto Main Street and one onto Pinevale Avenue, the Project will decrease the number of curb cuts onto Main Street by two. The following recommendations are offered with respect to the design and operation of the Project site driveway:

- The driveways should be placed under STOP-sign (*Manual on Uniform Traffic Control Devices* (MUTCD R1-1) control, with a painted STOP-bar included.

- All signs and other pavement markings to be installed within the Project site shall conform to the applicable standards of the current MUTCD.

- Signs and landscaping adjacent to the Project site driveways should be designed and maintained so as not to restrict lines of sight.

- Snow windrows within sight triangle areas of the Project site driveways should be promptly removed where such accumulations would impede sightlines.

Transportation Demand Management (TDM) Plan

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented as a part of the Project:

- Information regarding the proximity of the Reading Depot station, maps, schedules and fare information should be posted in a central location and/or otherwise made available to residents and employees;

- A “welcome packet” should be provided to residents and employees detailing available public transportation services, bicycle, micro-mobility devices, walking alternatives, and available commuter options;

- Two EV charging stations will be provided on-site;

- Bicycle racks will be provided on-site.

CONCLUSIONS

As documented in this study, Project-related traffic increases result in minor delay increases at area intersections; however, there is no change in vehicle queuing so it is unlikely that Project-related traffic increases will be noticeable. Further, Project-related traffic increases will not result in significant increases on overall traffic volumes or traffic delays within the study area. The site driveways will provide efficient access to and from the development. In general, Project-related traffic can be adequately accommodated within the existing infrastructure with minimal impact on the traffic operations within the study area.

APPENDIX

TRAFFIC COUNT DATA
SEASONAL ADJUSTMENT DATA
PUBLIC TRANSPORTATION SCHEDULES
MASSDOT CRASH RATE WORKSHEETS
GROWTH RATE DATA
TRIP GENERATION DATA
JOURNEY TO WORK
CAPACITY ANALYSIS

TRAFFIC COUNT DATA

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 1

Groups Printed- Cars - Trucks

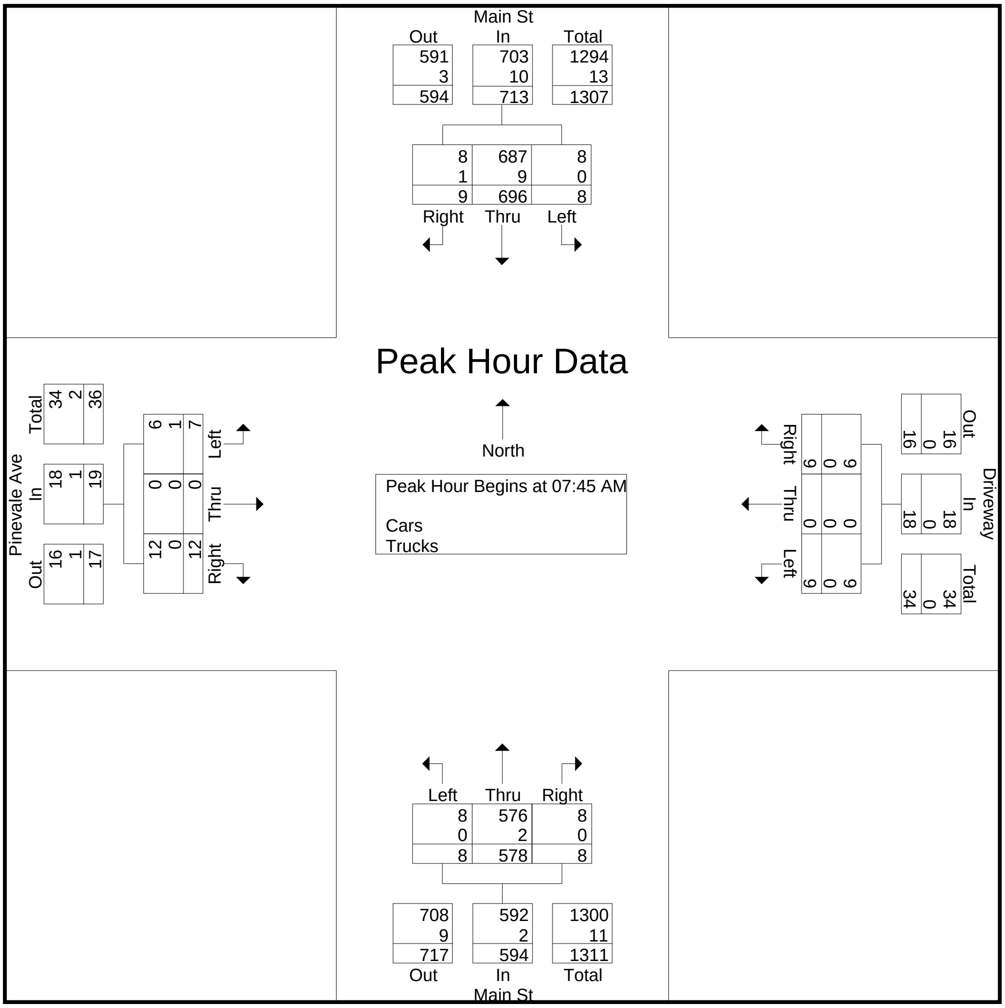
	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	148	0	0	0	1	1	81	0	1	0	3	235
07:15 AM	5	168	1	3	0	1	0	106	1	4	0	0	289
07:30 AM	4	163	1	4	0	4	0	99	2	3	0	3	283
07:45 AM	2	188	2	4	0	3	4	133	3	0	0	3	342
Total	11	667	4	11	0	9	5	419	6	8	0	9	1149
08:00 AM	1	177	3	2	0	3	0	156	3	3	0	4	352
08:15 AM	2	182	3	2	0	3	2	145	1	4	0	2	346
08:30 AM	3	149	1	1	0	0	2	144	1	0	0	3	304
08:45 AM	3	179	2	3	0	2	1	133	2	2	0	1	328
Total	9	687	9	8	0	8	5	578	7	9	0	10	1330
Grand Total	20	1354	13	19	0	17	10	997	13	17	0	19	2479
Apprch %	1.4	97.6	0.9	52.8	0	47.2	1	97.7	1.3	47.2	0	52.8	
Total %	0.8	54.6	0.5	0.8	0	0.7	0.4	40.2	0.5	0.7	0	0.8	
Cars	20	1339	12	19	0	17	10	986	13	16	0	19	2451
% Cars	100	98.9	92.3	100	0	100	100	98.9	100	94.1	0	100	98.9
Trucks	0	15	1	0	0	0	0	11	0	1	0	0	28
% Trucks	0	1.1	7.7	0	0	0	0	1.1	0	5.9	0	0	1.1

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	2	**188**	2	**192**	**4**	0	**3**	**7**	**4**	133	**3**	140	0	0	3	3	342
08:00 AM	1	177	**3**	181	2	0	3	5	0	**156**	3	**159**	3	0	**4**	**7**	**352**
08:15 AM	2	182	3	187	2	0	3	5	2	145	1	148	**4**	0	2	6	346
08:30 AM	**3**	149	1	153	1	0	0	1	2	144	1	147	0	0	3	3	304
Total Volume	8	696	9	713	9	0	9	18	8	578	8	594	7	0	12	19	1344
% App. Total	1.1	97.6	1.3		50	0	50		1.3	97.3	1.3		36.8	0	63.2		
PHF	.667	.926	.750	.928	.563	.000	.750	.643	.500	.926	.667	.934	.438	.000	.750	.679	.955
Cars	8	687	8	703	9	0	9	18	8	576	8	592	6	0	12	18	1331
% Cars	100	98.7	88.9	98.6	100	0	100	100	100	99.7	100	99.7	85.7	0	100	94.7	99.0
Trucks	0	9	1	10	0	0	0	0	0	2	0	2	1	0	0	1	13
% Trucks	0	1.3	11.1	1.4	0	0	0	0	0	0.3	0	0.3	14.3	0	0	5.3	1.0

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 2



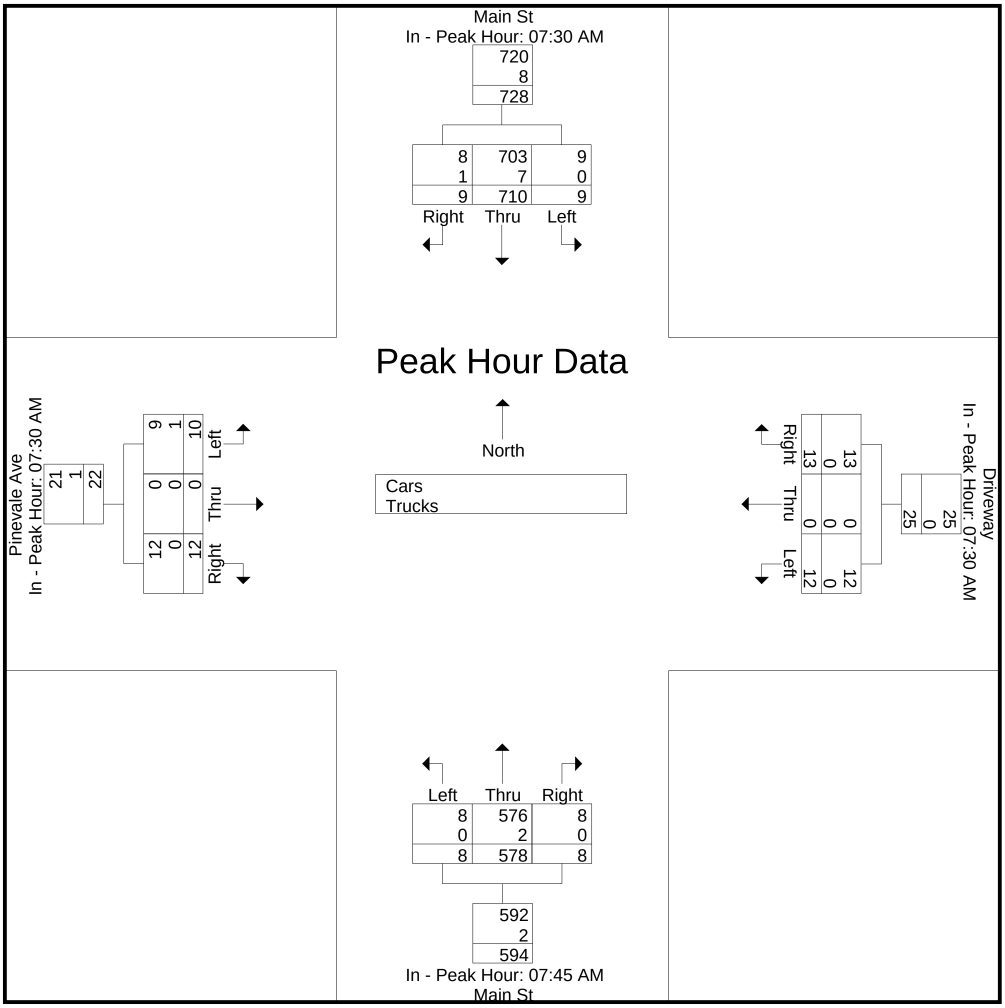
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:30 AM			
+0 mins.	**4**	163	1	168	**4**	0	**4**	**8**	**4**	133	**3**	140	3	0	3	6
+15 mins.	2	**188**	2	**192**	4	0	3	7	0	**156**	3	**159**	0	0	3	3
+30 mins.	1	177	**3**	181	2	0	3	5	2	145	1	148	3	0	**4**	**7**
+45 mins.	2	182	3	187	2	0	3	5	2	144	1	147	**4**	0	2	6
Total Volume	9	710	9	728	12	0	13	25	8	578	8	594	10	0	12	22
% App. Total	1.2	97.5	1.2		48	0	52		1.3	97.3	1.3		45.5	0	54.5	
PHF	.563	.944	.750	.948	.750	.000	.813	.781	.500	.926	.667	.934	.625	.000	.750	.786
Cars	9	703	8	720	12	0	13	25	8	576	8	592	9	0	12	21
% Cars	100	99	88.9	98.9	100	0	100	100	100	99.7	100	99.7	90	0	100	95.5
Trucks	0	7	1	8	0	0	0	0	0	2	0	2	1	0	0	1
% Trucks	0	1	11.1	1.1	0	0	0	0	0	0.3	0	0.3	10	0	0	4.5

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 4

Groups Printed- Cars

	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	146	0	0	0	1	1	79	0	1	0	3	231
07:15 AM	5	167	1	3	0	1	0	101	1	4	0	0	283
07:30 AM	4	162	1	4	0	4	0	97	2	3	0	3	280
07:45 AM	2	185	2	4	0	3	4	133	3	0	0	3	339
Total	11	660	4	11	0	9	5	410	6	8	0	9	1133
08:00 AM	1	175	2	2	0	3	0	156	3	2	0	4	348
08:15 AM	2	181	3	2	0	3	2	143	1	4	0	2	343
08:30 AM	3	146	1	1	0	0	2	144	1	0	0	3	301
08:45 AM	3	177	2	3	0	2	1	133	2	2	0	1	326
Total	9	679	8	8	0	8	5	576	7	8	0	10	1318
Grand Total	20	1339	12	19	0	17	10	986	13	16	0	19	2451
Apprch %	1.5	97.7	0.9	52.8	0	47.2	1	97.7	1.3	45.7	0	54.3	
Total %	0.8	54.6	0.5	0.8	0	0.7	0.4	40.2	0.5	0.7	0	0.8	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	2	**185**	2	**189**	**4**	0	**3**	**7**	**4**	133	**3**	140	0	0	3	3	339
08:00 AM	1	175	2	178	2	0	3	5	0	**156**	3	**159**	2	0	**4**	**6**	**348**
08:15 AM	2	181	**3**	186	2	0	3	5	2	143	1	146	**4**	0	2	6	343
08:30 AM	**3**	146	1	150	1	0	0	1	2	144	1	147	0	0	3	3	301
Total Volume	8	687	8	703	9	0	9	18	8	576	8	592	6	0	12	18	1331
% App. Total	1.1	97.7	1.1		50	0	50		1.4	97.3	1.4		33.3	0	66.7		
PHF	.667	.928	.667	.930	.563	.000	.750	.643	.500	.923	.667	.931	.375	.000	.750	.750	.956

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 7

Groups Printed- Trucks

	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	2	0	0	0	0	0	2	0	0	0	0	4
07:15 AM	0	1	0	0	0	0	0	5	0	0	0	0	6
07:30 AM	0	1	0	0	0	0	0	2	0	0	0	0	3
07:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	7	0	0	0	0	0	9	0	0	0	0	16
08:00 AM	0	2	1	0	0	0	0	0	0	1	0	0	4
08:15 AM	0	1	0	0	0	0	0	2	0	0	0	0	3
08:30 AM	0	3	0	0	0	0	0	0	0	0	0	0	3
08:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	8	1	0	0	0	0	2	0	1	0	0	12
Grand Total	0	15	1	0	0	0	0	11	0	1	0	0	28
Apprch %	0	93.8	6.2	0	0	0	0	100	0	100	0	0	
Total %	0	53.6	3.6	0	0	0	0	39.3	0	3.6	0	0	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	2	0	2	0	0	0	0	0	2	0	2	0	0	0	0	4
07:15 AM	0	1	0	1	0	0	0	0	0	**5**	0	**5**	0	0	0	0	**6**
07:30 AM	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0	3
07:45 AM	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	0	7	0	7	0	0	0	0	0	9	0	9	0	0	0	0	16
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.583	.000	.583	.000	.000	.000	.000	.000	.450	.000	.450	.000	.000	.000	.000	.667

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 10

Groups Printed- Bikes Peds

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	2	3
07:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0	2
07:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	0	3
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	2
Total	0	1	0	0	0	0	0	2	0	1	0	0	0	0	0	6	8	2	10
08:00 AM	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	1	2	3
08:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
08:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0	2
08:45 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	0	3
Total	0	0	0	0	0	0	0	3	0	2	0	1	0	0	0	3	7	2	9
Grand Total	0	1	0	0	0	0	0	5	0	3	0	1	0	0	0	9	15	4	19
Apprch %	0	100	0		0	0	0		0	100	0		0	0	0				
Total %	0	25	0		0	0	0		0	75	0		0	0	0		78.9	21.1	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	**1**	0	**1**	0	0	0	0	0	**1**	0	**1**	0	0	0	0	**2**
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.250

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 1

Groups Printed- Cars - Trucks

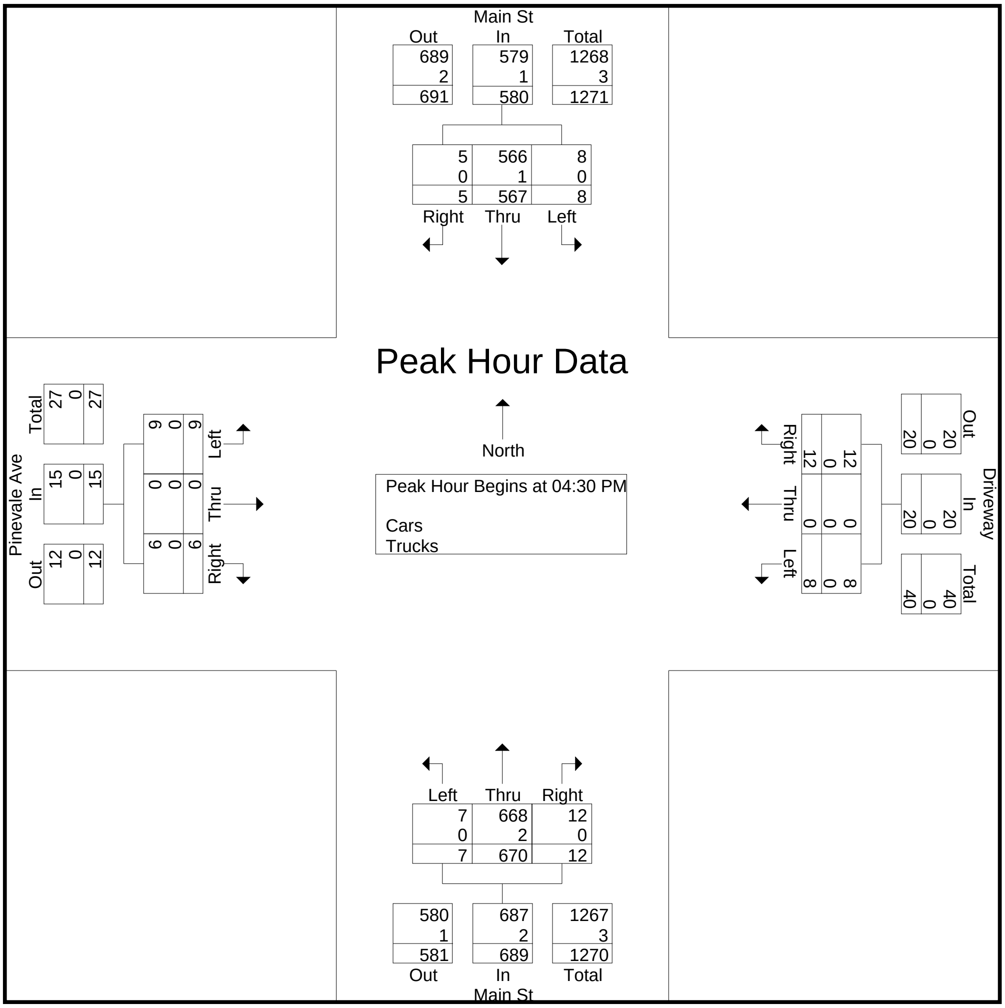
	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	2	143	1	3	0	3	1	177	3	1	0	0	334
04:15 PM	1	111	2	0	0	3	1	145	1	0	0	1	265
04:30 PM	1	135	0	1	0	1	3	180	2	3	0	3	329
04:45 PM	1	141	3	3	0	4	1	146	5	4	0	1	309
Total	5	530	6	7	0	11	6	648	11	8	0	5	1237
05:00 PM	3	147	2	2	0	3	2	167	2	1	0	0	329
05:15 PM	3	144	0	2	0	4	1	177	3	1	0	2	337
05:30 PM	1	141	1	2	0	1	3	150	0	3	0	0	302
05:45 PM	1	155	1	2	0	0	0	171	2	2	0	0	334
Total	8	587	4	8	0	8	6	665	7	7	0	2	1302
Grand Total	13	1117	10	15	0	19	12	1313	18	15	0	7	2539
Apprch %	1.1	98	0.9	44.1	0	55.9	0.9	97.8	1.3	68.2	0	31.8	
Total %	0.5	44	0.4	0.6	0	0.7	0.5	51.7	0.7	0.6	0	0.3	
Cars	13	1114	10	15	0	19	12	1307	18	15	0	7	2530
% Cars	100	99.7	100	100	0	100	100	99.5	100	100	0	100	99.6
Trucks	0	3	0	0	0	0	0	6	0	0	0	0	9
% Trucks	0	0.3	0	0	0	0	0	0.5	0	0	0	0	0.4

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	1	135	0	136	1	0	1	2	**3**	**180**	2	**185**	3	0	**3**	**6**	329
04:45 PM	1	141	**3**	145	**3**	0	**4**	**7**	1	146	**5**	152	**4**	0	1	5	309
05:00 PM	**3**	**147**	2	**152**	2	0	3	5	2	167	2	171	1	0	0	1	329
05:15 PM	3	144	0	147	2	0	4	6	1	177	3	181	1	0	2	3	**337**
Total Volume	8	567	5	580	8	0	12	20	7	670	12	689	9	0	6	15	1304
% App. Total	1.4	97.8	0.9		40	0	60		1	97.2	1.7		60	0	40		
PHF	.667	.964	.417	.954	.667	.000	.750	.714	.583	.931	.600	.931	.563	.000	.500	.625	.967
Cars	8	566	5	579	8	0	12	20	7	668	12	687	9	0	6	15	1301
% Cars	100	99.8	100	99.8	100	0	100	100	100	99.7	100	99.7	100	0	100	100	99.8
Trucks	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0	3
% Trucks	0	0.2	0	0.2	0	0	0	0	0	0.3	0	0.3	0	0	0	0	0.2

Accurate Counts

978-664-2565

N/S Street : Main Street	File Name : 96160001
E/W Street : Driveway / Pinevale Ave	Site Code : 96160001
City/State : Reading, MA	Start Date : 5/25/2023
Weather : Clear	Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

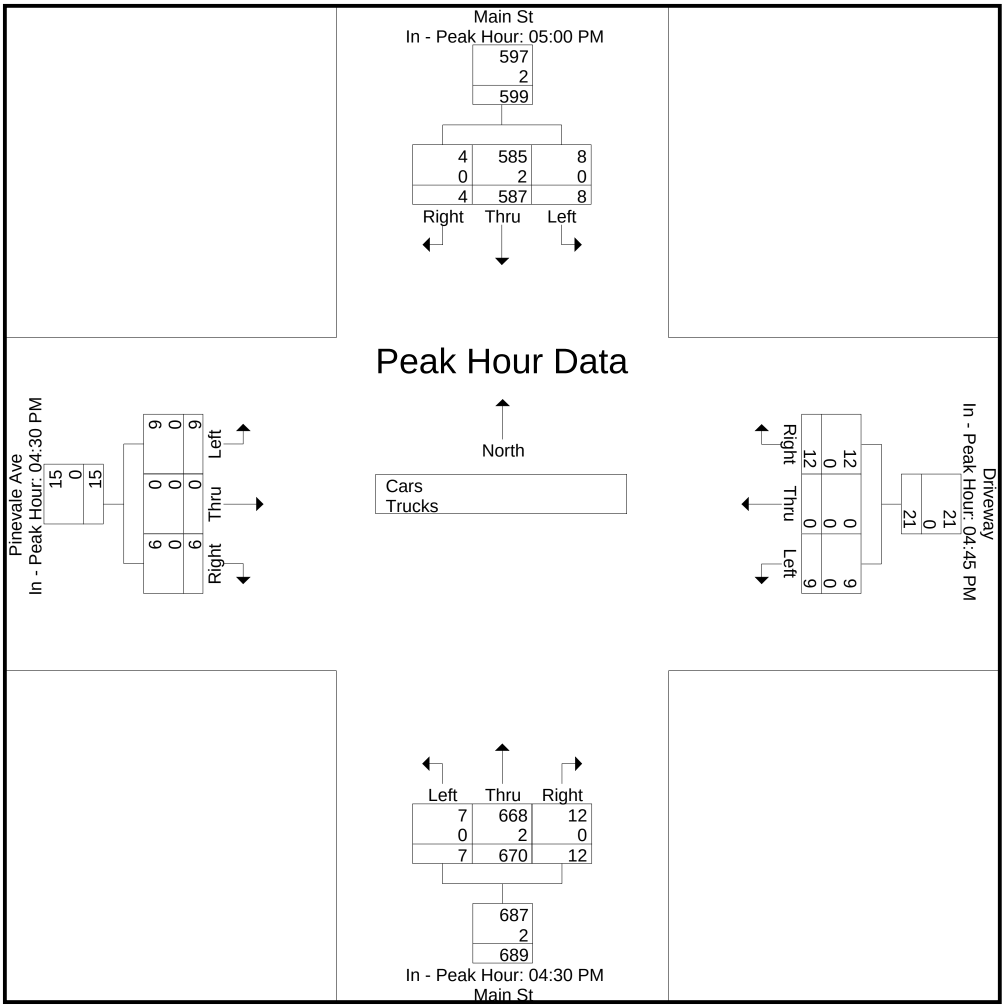
Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				04:30 PM				04:30 PM			
+0 mins.	**3**	147	**2**	152	**3**	0	**4**	**7**	**3**	**180**	2	**185**	3	0	**3**	**6**
+15 mins.	3	144	0	147	2	0	3	5	1	146	**5**	152	**4**	0	1	5
+30 mins.	1	141	1	143	2	0	4	6	2	167	2	171	1	0	0	1
+45 mins.	1	**155**	1	**157**	2	0	1	3	1	177	3	181	1	0	2	3
Total Volume	8	587	4	599	9	0	12	21	7	670	12	689	9	0	6	15
% App. Total	1.3	98	0.7		42.9	0	57.1		1	97.2	1.7		60	0	40	
PHF	.667	.947	.500	.954	.750	.000	.750	.750	.583	.931	.600	.931	.563	.000	.500	.625
Cars	8	585	4	597	9	0	12	21	7	668	12	687	9	0	6	15
% Cars	100	99.7	100	99.7	100	0	100	100	100	99.7	100	99.7	100	0	100	100
Trucks	0	2	0	2	0	0	0	0	0	2	0	2	0	0	0	0
% Trucks	0	0.3	0	0.3	0	0	0	0	0	0.3	0	0.3	0	0	0	0

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 4

Groups Printed- Cars

	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	2	142	1	3	0	3	1	176	3	1	0	0	332
04:15 PM	1	111	2	0	0	3	1	144	1	0	0	1	264
04:30 PM	1	135	0	1	0	1	3	180	2	3	0	3	329
04:45 PM	1	141	3	3	0	4	1	146	5	4	0	1	309
Total	5	529	6	7	0	11	6	646	11	8	0	5	1234
05:00 PM	3	146	2	2	0	3	2	166	2	1	0	0	327
05:15 PM	3	144	0	2	0	4	1	176	3	1	0	2	336
05:30 PM	1	140	1	2	0	1	3	149	0	3	0	0	300
05:45 PM	1	155	1	2	0	0	0	170	2	2	0	0	333
Total	8	585	4	8	0	8	6	661	7	7	0	2	1296
Grand Total	13	1114	10	15	0	19	12	1307	18	15	0	7	2530
Apprch %	1.1	98	0.9	44.1	0	55.9	0.9	97.8	1.3	68.2	0	31.8	
Total %	0.5	44	0.4	0.6	0	0.8	0.5	51.7	0.7	0.6	0	0.3	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	1	135	0	136	1	0	1	2	**3**	**180**	2	**185**	3	0	**3**	**6**	329
04:45 PM	1	141	**3**	145	**3**	0	**4**	**7**	1	146	**5**	152	**4**	0	1	5	309
05:00 PM	**3**	**146**	2	**151**	2	0	3	5	2	166	2	170	1	0	0	1	327
05:15 PM	3	144	0	147	2	0	4	6	1	176	3	180	1	0	2	3	**336**
Total Volume	8	566	5	579	8	0	12	20	7	668	12	687	9	0	6	15	1301
% App. Total	1.4	97.8	0.9		40	0	60		1	97.2	1.7		60	0	40		
PHF	.667	.969	.417	.959	.667	.000	.750	.714	.583	.928	.600	.928	.563	.000	.500	.625	.968

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 7

Groups Printed- Trucks

	Main St From North			Driveway From East			Main St From South			Pinevale Ave From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	2	0	0	0	0	3
05:00 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
05:30 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	2	0	0	0	0	0	4	0	0	0	0	6
Grand Total	0	3	0	0	0	0	0	6	0	0	0	0	9
Apprch %	0	100	0	0	0	0	0	100	0	0	0	0	
Total %	0	33.3	0	0	0	0	0	66.7	0	0	0	0	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	**1**	0	**1**	0	0	0	0	0	**1**	0	**1**	0	0	0	0	**2**
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
05:30 PM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	2	0	2	0	0	0	0	0	4	0	4	0	0	0	0	6
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	1.00	.000	1.00	.000	.000	.000	.000	.750

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Driveway / Pinevale Ave
City/State : Reading, MA
Weather : Clear

File Name : 96160001
Site Code : 96160001
Start Date : 5/25/2023
Page No : 10

Groups Printed- Bikes Peds

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West						
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	0	2
04:15 PM	0	0	0	1	0	0	0	0	0	1	0	3	0	0	0	0	4	1	5
04:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2
04:45 PM	0	1	0	0	0	0	0	2	0	1	0	0	0	0	0	5	7	2	9
Total	0	2	0	2	0	0	0	3	0	2	0	3	0	0	0	6	14	4	18
05:00 PM	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	2	1	3
05:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	4	0	4
05:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	0	2
Total	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	5	9	1	10
Grand Total	0	2	0	2	0	0	0	7	0	3	0	3	0	0	0	11	23	5	28
Apprch %	0	100	0		0	0	0		0	100	0		0	0	0				
Total %	0	40	0		0	0	0		0	60	0		0	0	0		82.1	17.9	

	Main St From North				Driveway From East				Main St From South				Pinevale Ave From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	0	0	0	0	**1**	0	**1**	0	0	0	0	1
04:30 PM	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	**2**
05:00 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	2	0	2	0	0	0	0	0	3	0	3	0	0	0	0	5
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.750	.000	.750	.000	.000	.000	.000	.625

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 1

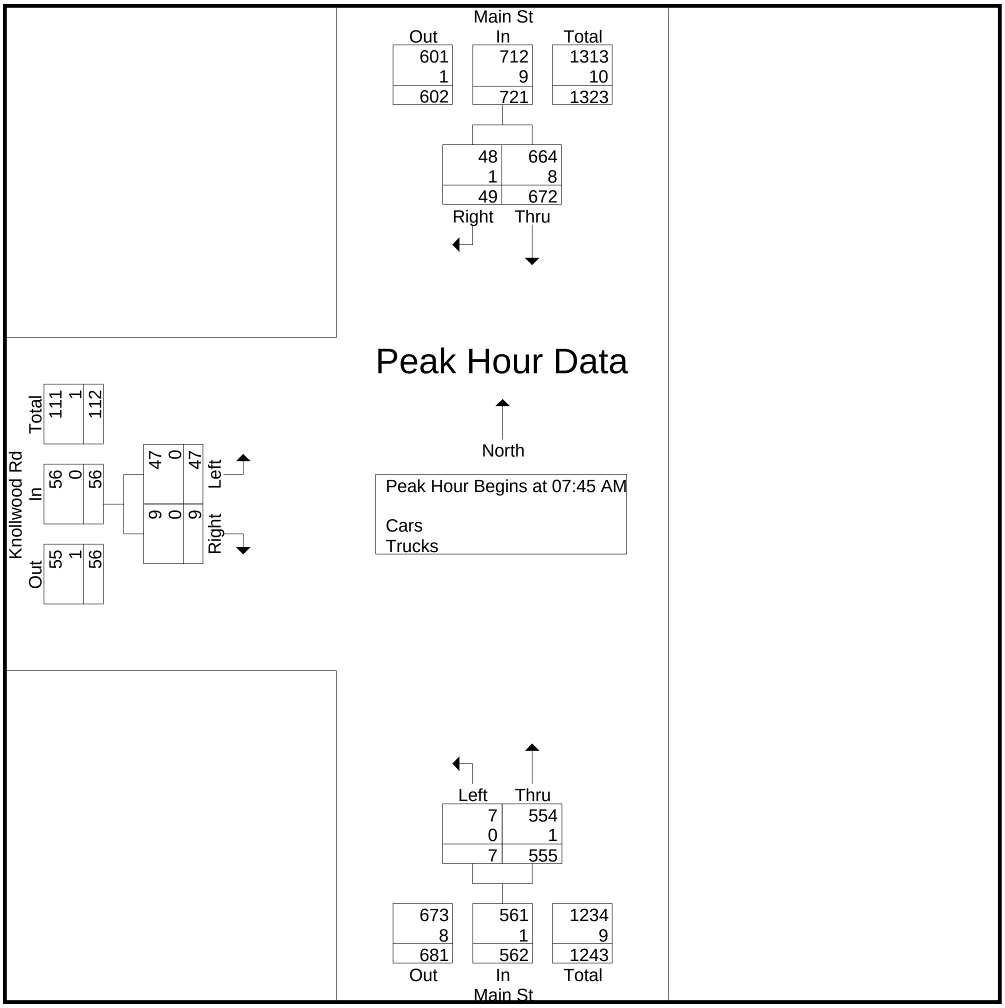
Groups Printed- Cars - Trucks

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	148	5	0	79	7	1	240
07:15 AM	165	10	3	99	6	0	283
07:30 AM	157	14	6	93	8	2	280
07:45 AM	185	11	1	134	6	4	341
Total	655	40	10	405	27	7	1144
08:00 AM	166	18	4	153	12	2	355
08:15 AM	174	12	2	124	23	3	338
08:30 AM	147	8	0	144	6	0	305
08:45 AM	167	14	0	123	10	2	316
Total	654	52	6	544	51	7	1314
Grand Total	1309	92	16	949	78	14	2458
Apprch %	93.4	6.6	1.7	98.3	84.8	15.2	
Total %	53.3	3.7	0.7	38.6	3.2	0.6	
Cars	1296	91	16	940	77	14	2434
% Cars	99	98.9	100	99.1	98.7	100	99
Trucks	13	1	0	9	1	0	24
% Trucks	1	1.1	0	0.9	1.3	0	1

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**185**	11	**196**	1	134	135	6	**4**	10	341
08:00 AM	166	**18**	184	**4**	**153**	**157**	12	2	14	**355**
08:15 AM	174	12	186	2	124	126	**23**	3	**26**	338
08:30 AM	147	8	155	0	144	144	6	0	6	305
Total Volume	672	49	721	7	555	562	47	9	56	1339
% App. Total	93.2	6.8		1.2	98.8		83.9	16.1		
PHF	.908	.681	.920	.438	.907	.895	.511	.563	.538	.943
Cars	664	48	712	7	554	561	47	9	56	1329
% Cars	98.8	98.0	98.8	100	99.8	99.8	100	100	100	99.3
Trucks	8	1	9	0	1	1	0	0	0	10
% Trucks	1.2	2.0	1.2	0	0.2	0.2	0	0	0	0.7

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

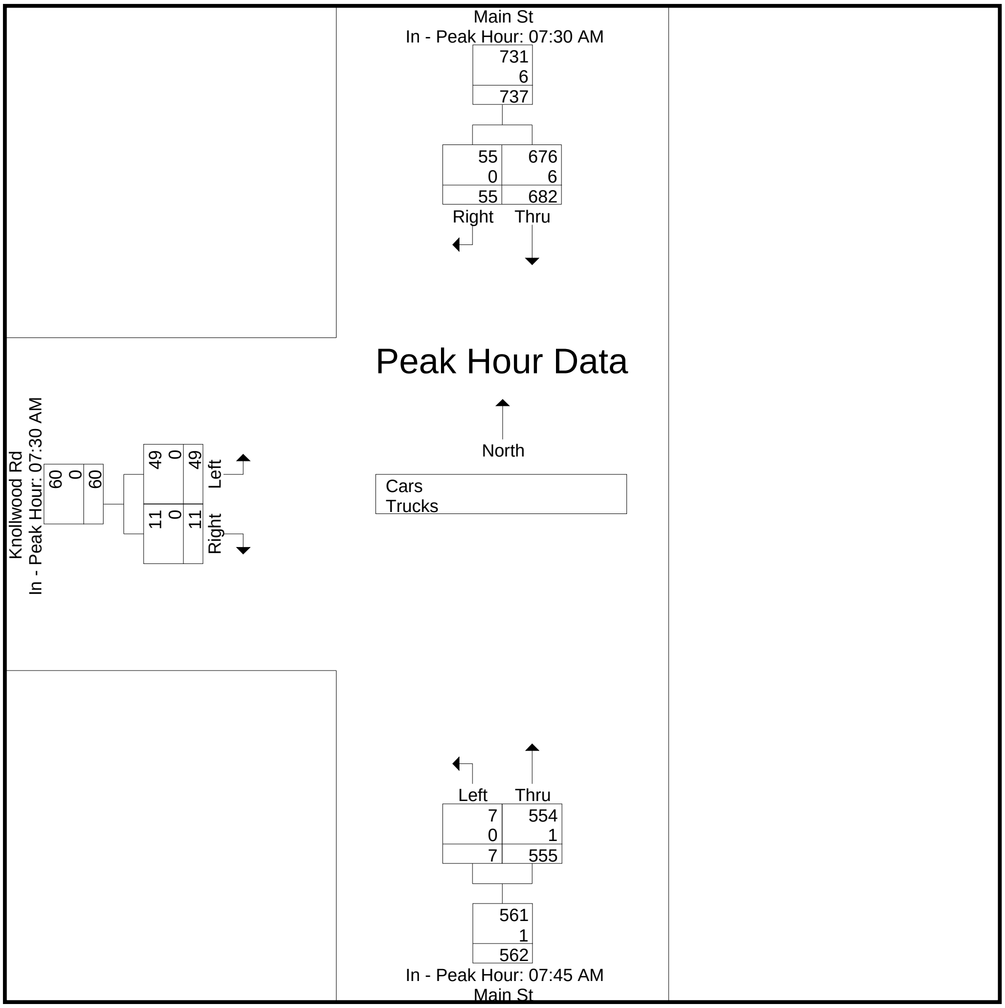
	07:30 AM			07:45 AM			07:30 AM		
+0 mins.	157	14	171	1	134	135	8	2	10
+15 mins.	**185**	11	**196**	**4**	**153**	**157**	6	**4**	10
+30 mins.	166	**18**	184	2	124	126	12	2	14
+45 mins.	174	12	186	0	144	144	**23**	3	**26**
Total Volume	682	55	737	7	555	562	49	11	60
% App. Total	92.5	7.5		1.2	98.8		81.7	18.3	
PHF	.922	.764	.940	.438	.907	.895	.533	.688	.577
Cars	676	55	731	7	554	561	49	11	60
% Cars	99.1	100	99.2	100	99.8	99.8	100	100	100
Trucks	6	0	6	0	1	1	0	0	0
% Trucks	0.9	0	0.8	0	0.2	0.2	0	0	0

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 3



Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 4

Groups Printed- Cars

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	146	5	0	77	7	1	236
07:15 AM	164	10	3	95	5	0	277
07:30 AM	157	14	6	91	8	2	278
07:45 AM	182	11	1	134	6	4	338
Total	649	40	10	397	26	7	1129
08:00 AM	164	18	4	153	12	2	353
08:15 AM	173	12	2	123	23	3	336
08:30 AM	145	7	0	144	6	0	302
08:45 AM	165	14	0	123	10	2	314
Total	647	51	6	543	51	7	1305
Grand Total	1296	91	16	940	77	14	2434
Apprch %	93.4	6.6	1.7	98.3	84.6	15.4	
Total %	53.2	3.7	0.7	38.6	3.2	0.6	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:45 AM										
07:45 AM	**182**	11	**193**	1	134	135	6	**4**	10	338
08:00 AM	164	**18**	182	**4**	**153**	**157**	12	2	14	**353**
08:15 AM	173	12	185	2	123	125	**23**	3	**26**	336
08:30 AM	145	7	152	0	144	144	6	0	6	302
Total Volume	664	48	712	7	554	561	47	9	56	1329
% App. Total	93.3	6.7		1.2	98.8		83.9	16.1		
PHF	.912	.667	.922	.438	.905	.893	.511	.563	.538	.941

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 7

Groups Printed- Trucks

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
07:00 AM	2	0	0	2	0	0	4
07:15 AM	1	0	0	4	1	0	6
07:30 AM	0	0	0	2	0	0	2
07:45 AM	3	0	0	0	0	0	3
Total	6	0	0	8	1	0	15
08:00 AM	2	0	0	0	0	0	2
08:15 AM	1	0	0	1	0	0	2
08:30 AM	2	1	0	0	0	0	3
08:45 AM	2	0	0	0	0	0	2
Total	7	1	0	1	0	0	9
Grand Total	13	1	0	9	1	0	24
Apprch %	92.9	7.1	0	100	100	0	
Total %	54.2	4.2	0	37.5	4.2	0	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	2	0	2	0	2	2	0	0	0	4
07:15 AM	1	0	1	0	**4**	**4**	**1**	0	**1**	**6**
07:30 AM	0	0	0	0	2	2	0	0	0	2
07:45 AM	**3**	0	**3**	0	0	0	0	0	0	3
Total Volume	6	0	6	0	8	8	1	0	1	15
% App. Total	100	0		0	100		100	0		
PHF	.500	.000	.500	.000	.500	.500	.250	.000	.250	.625

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 10

Groups Printed- Bikes Peds

	Main St From North			Main St From South			Knollwood Rd From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	1	0	0	0	1	1	1	2
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	1
Total	0	0	0	0	1	0	0	0	3	3	1	4
08:00 AM	0	0	0	0	2	0	0	0	0	0	2	2
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	1	1	0	1
08:45 AM	0	0	0	0	0	0	0	0	1	1	0	1
Total	0	0	0	0	2	0	0	0	2	2	2	4
Grand Total	0	0	0	0	3	0	0	0	5	5	3	8
Apprch %	0	0		0	100		0	0				
Total %	0	0		0	100		0	0		62.5	37.5	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	**2**	**2**	0	0	0	**2**
Total Volume	0	0	0	0	2	2	0	0	0	2
% App. Total	0	0		0	100		0	0		
PHF	.000	.000	.000	.000	.250	.250	.000	.000	.000	.250

Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023

Groups Printed- Cars - Trucks

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
04:00 PM	135	11	2	178	8	1	335
04:15 PM	108	5	1	140	4	2	260
04:30 PM	134	12	0	175	10	7	338
04:45 PM	144	6	4	148	6	3	311
Total	521	34	7	641	28	13	1244
05:00 PM	141	10	3	164	10	1	329
05:15 PM	139	14	2	180	6	3	344
05:30 PM	134	5	5	147	8	1	300
05:45 PM	152	6	3	166	8	9	344
Total	566	35	13	657	32	14	1317
Grand Total	1087	69	20	1298	60	27	2561
Apprch %	94	6	1.5	98.5	69	31	
Total %	42.4	2.7	0.8	50.7	2.3	1.1	
Cars	1085	69	20	1292	60	27	2553
% Cars	99.8	100	100	99.5	100	100	99.7
Trucks	2	0	0	6	0	0	8
% Trucks	0.2	0	0	0.5	0	0	0.3

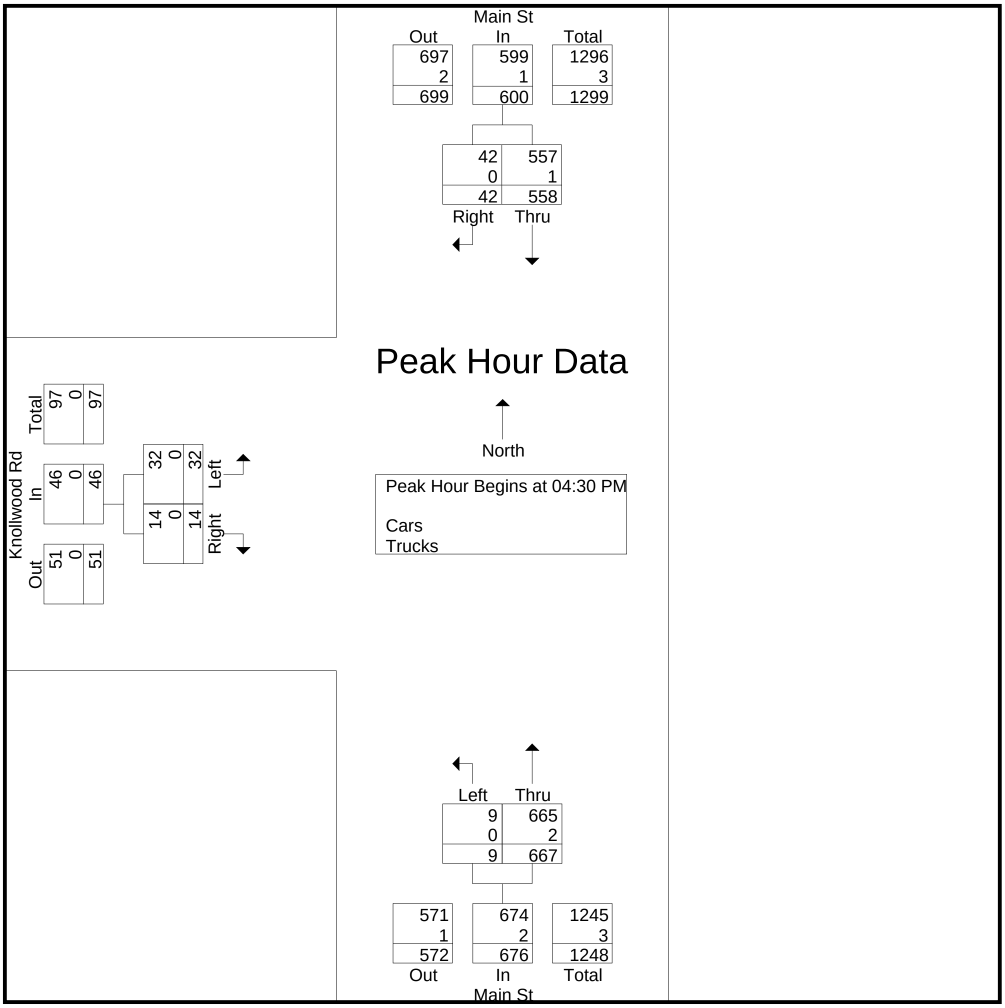
	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	134	12	146	0	175	175	**10**	**7**	**17**	338
04:45 PM	**144**	6	150	**4**	148	152	6	3	9	311
05:00 PM	141	10	151	3	164	167	10	1	11	329
05:15 PM	139	**14**	**153**	2	**180**	**182**	6	3	9	**344**
Total Volume	558	42	600	9	667	676	32	14	46	1322
% App. Total	93	7		1.3	98.7		69.6	30.4		
PHF	.969	.750	.980	.563	.926	.929	.800	.500	.676	.961
Cars	557	42	599	9	665	674	32	14	46	1319
% Cars	99.8	100	99.8	100	99.7	99.7	100	100	100	99.8
Trucks	1	0	1	0	2	2	0	0	0	3
% Trucks	0.2	0	0.2	0	0.3	0.3	0	0	0	0.2

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

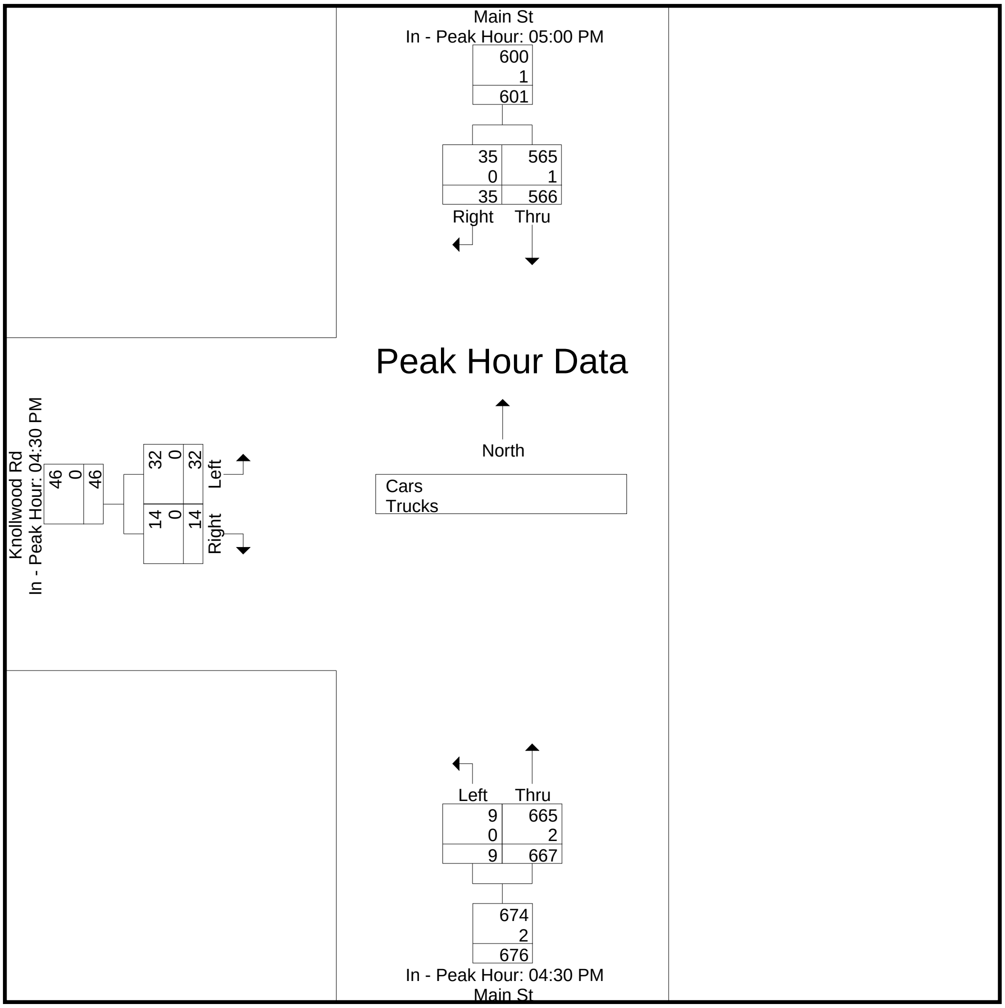
	05:00 PM			04:30 PM			04:30 PM		
+0 mins.	141	10	151	0	175	175	**10**	**7**	**17**
+15 mins.	139	**14**	153	**4**	148	152	6	3	9
+30 mins.	134	5	139	3	164	167	10	1	11
+45 mins.	**152**	6	**158**	2	**180**	**182**	6	3	9
Total Volume	566	35	601	9	667	676	32	14	46
% App. Total	94.2	5.8		1.3	98.7		69.6	30.4	
PHF	.931	.625	.951	.563	.926	.929	.800	.500	.676
Cars	565	35	600	9	665	674	32	14	46
% Cars	99.8	100	99.8	100	99.7	99.7	100	100	100
Trucks	1	0	1	0	2	2	0	0	0
% Trucks	0.2	0	0.2	0	0.3	0.3	0	0	0

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 3



Accurate Counts
978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023

Groups Printed- Cars

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
04:00 PM	134	11	2	177	8	1	333
04:15 PM	108	5	1	139	4	2	259
04:30 PM	134	12	0	175	10	7	338
04:45 PM	144	6	4	148	6	3	311
Total	520	34	7	639	28	13	1241
05:00 PM	140	10	3	163	10	1	327
05:15 PM	139	14	2	179	6	3	343
05:30 PM	134	5	5	146	8	1	299
05:45 PM	152	6	3	165	8	9	343
Total	565	35	13	653	32	14	1312
Grand Total	1085	69	20	1292	60	27	2553
Apprch %	94	6	1.5	98.5	69	31	
Total %	42.5	2.7	0.8	50.6	2.4	1.1	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	134	12	146	0	175	175	**10**	**7**	**17**	338
04:45 PM	**144**	6	150	**4**	148	152	6	3	9	311
05:00 PM	140	10	150	3	163	166	10	1	11	327
05:15 PM	139	**14**	**153**	2	**179**	**181**	6	3	9	**343**
Total Volume	557	42	599	9	665	674	32	14	46	1319
% App. Total	93	7		1.3	98.7		69.6	30.4		
PHF	.967	.750	.979	.563	.929	.931	.800	.500	.676	.961

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023

Groups Printed- Trucks

	Main St From North		Main St From South		Knollwood Rd From West		
Start Time	Thru	Right	Left	Thru	Left	Right	Int. Total
04:00 PM	1	0	0	1	0	0	2
04:15 PM	0	0	0	1	0	0	1
04:30 PM	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0
Total	1	0	0	2	0	0	3
05:00 PM	1	0	0	1	0	0	2
05:15 PM	0	0	0	1	0	0	1
05:30 PM	0	0	0	1	0	0	1
05:45 PM	0	0	0	1	0	0	1
Total	1	0	0	4	0	0	5
Grand Total	2	0	0	6	0	0	8
Apprch %	100	0	0	100	0	0	
Total %	25	0	0	75	0	0	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**1**	0	**1**	0	**1**	**1**	0	0	0	**2**
05:15 PM	0	0	0	0	1	1	0	0	0	1
05:30 PM	0	0	0	0	1	1	0	0	0	1
05:45 PM	0	0	0	0	1	1	0	0	0	1
Total Volume	1	0	1	0	4	4	0	0	0	5
% App. Total	100	0		0	100		0	0		
PHF	.250	.000	.250	.000	1.00	1.00	.000	.000	.000	.625

Accurate Counts

978-664-2565

N/S Street : Main Street
E/W Street : Knollwood Road
City/State : Reading, MA
Weather : Clear

File Name : 96160002
Site Code : 96160002
Start Date : 5/25/2023
Page No : 10

Groups Printed- Bikes Peds

	Main St From North			Main St From South			Knollwood Rd From West					
Start Time	Thru	Right	Peds	Left	Thru	Peds	Left	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	2	2	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	1	0	0	0	0	0	0	0	0	0	1	1
04:45 PM	1	0	0	0	0	0	0	0	2	2	1	3
Total	2	0	0	0	0	0	0	0	4	4	2	6
05:00 PM	0	0	0	0	1	0	0	0	1	1	1	2
05:15 PM	0	0	0	0	0	2	0	0	4	6	0	6
05:30 PM	0	0	0	0	0	2	0	0	0	2	0	2
05:45 PM	0	0	0	0	0	0	0	0	1	1	0	1
Total	0	0	0	0	1	4	0	0	6	10	1	11
Grand Total	2	0	0	0	1	4	0	0	10	14	3	17
Apprch %	100	0		0	100		0	0				
Total %	66.7	0		0	33.3		0	0		82.4	17.6	

	Main St From North			Main St From South			Knollwood Rd From West			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	**1**	0	**1**	0	0	0	0	0	0	**1**
04:45 PM	1	0	1	0	0	0	0	0	0	1
05:00 PM	0	0	0	0	**1**	**1**	0	0	0	1
Total Volume	2	0	2	0	1	1	0	0	0	3
% App. Total	100	0		0	100		0	0		
PHF	.500	.000	.500	.000	.250	.250	.000	.000	.000	.750

SEASONAL ADJUSTMENT DATA

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.

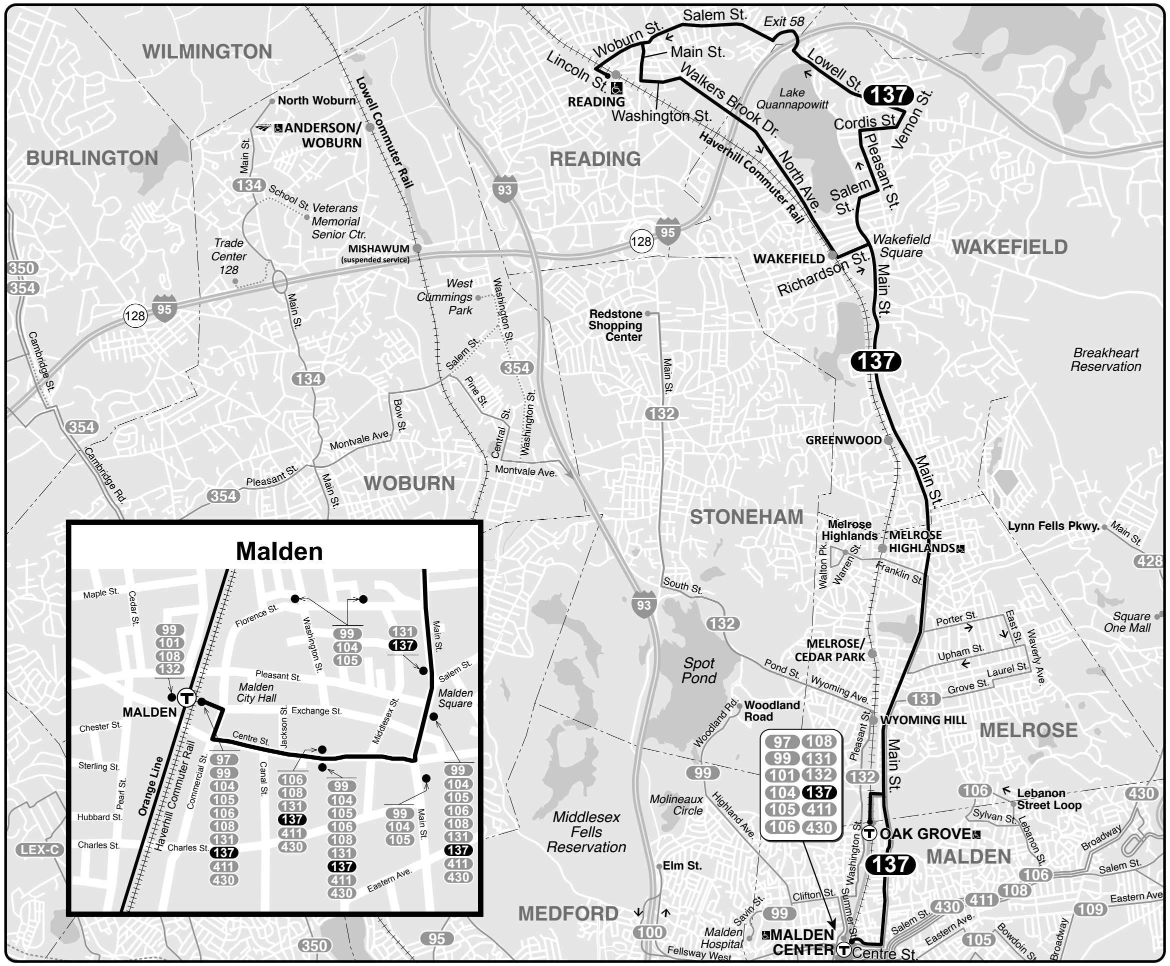
Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113,1114,1116,2196,2197 and 2198.

PUBLIC TRANSPORTATION SCHEDULES

Effective **July 2, 2023** Replaces March 2023

137 Reading Depot – Malden Ctr Sta

Schedule Change – Weekday



	CharlieCard	Cash on board	Reduced fare
Bus	**$1.70**	**$1.70**	**$0.85**
Bus + Subway	**$2.40**	**$4.10**	**$1.10**

- Transfer to bus/subway available on CharlieCard—good for 2 hours, pay fare difference.
- Children 11 & under ride free with a paying customer.
- All MBTA buses are accessible to people with disabilities.

Complete fare/pass rules and free/reduced fare eligibility: **mbta.com/fares** or call **617-222-3200**

Connections

ORANGE LINE

HAVERHILL LINE

Information **617-222-3200**
Lost and Found **617-222-2229**
TTY **617-222-5146**

Realtime arrival information, maps, and more

mbta.com

A126-3-22.1

Weekday 137

Inbound

Reading Depot	Wakefield Square	Oak Grove Station	Malden Center Station
5:25	5:33	5:49	5:57
6:10	6:22	6:42	6:56
6:55	7:07	7:27	-
7:15	7:27	7:47	-
7:35	7:47	8:07	-
7:55	8:07	8:26	-
8:15	8:27	8:46	-
8:35	8:47	9:06	-
8:55	9:07	9:26	9:38
9:30	9:42	10:01	10:13
10:02	10:14	10:33	10:45
10:35	10:47	11:06	11:19
11:10	11:23	11:44	11:57
11:45	11:58	**12:19**	**12:32**
12:19	**12:32**	**12:53**	**1:05**
12:56	**1:07**	**1:24**	**1:36**
1:32	**1:43**	**2:00**	**2:15**
2:05	**2:17**	**2:43**	**2:58**
2:37	**2:49**	**3:10**	**3:24**
3:18	**3:30**	**3:48**	**4:02**
3:58	**4:10**	**4:28**	**-**
4:33	**4:45**	**5:03**	**-**
5:03	**5:15**	**5:33**	**-**
5:28	**5:40**	**5:58**	**-**
5:53	**6:05**	**6:22**	**-**
6:20	**6:31**	**6:48**	**-**
6:45	**6:56**	**7:13**	**-**
7:10	**7:21**	**7:38**	**-**
7:33	**7:44**	**8:01**	**-**
7:56	**8:07**	**8:24**	**-**
8:23	**8:34**	**8:51**	**9:04**
8:59	**9:08**	**9:26**	**9:39**
9:57	**10:06**	**10:20**	**10:30**
10:33	**10:42**	**10:56**	**11:06**

Outbound

Malden Center Station	Oak Grove Station	Wakefield Square	Reading Depot
4:45	4:52	5:07	5:22
5:29	5:36	5:51	6:06
6:27	6:36	6:56	7:12
7:07	7:16	7:36	7:52
-	7:36	7:56	8:12
-	7:56	8:16	8:32
-	8:16	8:36	8:52
-	8:30	8:50	9:06
-	8:51	9:11	9:27
-	9:23	9:43	9:59
9:45	9:54	10:13	10:32
10:20	10:30	10:48	11:07
10:55	11:04	11:23	11:42
11:30	11:38	11:57	**12:16**
12:05	**12:14**	**12:34**	**12:53**
12:40	**12:49**	**1:10**	**1:29**
1:13	**1:23**	**1:43**	**2:02**
1:45	**1:55**	**2:15**	**2:34**
2:25	**2:35**	**2:56**	**3:15**
3:05	**3:15**	**3:36**	**3:55**
3:40	**3:50**	**4:11**	**4:30**
-	**4:20**	**4:41**	**5:00**
-	**4:45**	**5:06**	**5:25**
-	**5:10**	**5:31**	**5:50**
-	**5:37**	**5:58**	**6:17**
-	**6:02**	**6:23**	**6:42**
-	**6:27**	**6:48**	**7:07**
-	**6:52**	**7:11**	**7:30**
-	**7:17**	**7:34**	**7:53**
7:35	**7:44**	**8:01**	**8:20**
8:10	**8:19**	**8:37**	**8:56**
9:10	**9:19**	**9:35**	**9:54**
9:50	**9:59**	**10:15**	**10:30**

Saturday 137

Inbound

Reading Depot	Wakefield Square	Oak Grove Station	Malden Center Station
6:00	6:10	6:25	6:36
6:41	6:51	7:06	7:17
7:21	7:31	7:46	7:57
8:06	8:16	8:31	8:42
8:49	8:59	9:16	9:27
9:36	9:48	10:07	10:18
10:21	10:34	10:55	11:07
11:17	11:31	11:50	**12:02**
12:09	**12:23**	**12:42**	**12:54**
12:59	**1:13**	**1:32**	**1:44**
1:49	**2:03**	**2:23**	**2:34**
2:39	**2:53**	**3:11**	**3:22**
3:29	**3:42**	**4:00**	**4:11**
4:18	**4:30**	**4:47**	**4:58**
5:08	**5:20**	**5:37**	**5:48**
5:52	**6:04**	**6:21**	**6:32**
6:42	**6:54**	**7:11**	**7:22**
7:32	**7:44**	**8:01**	**8:12**
-	**9:05**	**9:20**	**9:31**

Outbound

Malden Center Station	Oak Grove Station	Wakefield Square	Reading Depot
6:00	6:08	6:23	6:38
6:40	6:48	7:03	7:18
7:25	7:33	7:48	8:03
8:05	8:13	8:31	8:46
8:50	8:58	9:18	9:33
9:35	9:43	10:03	10:18
10:30	10:38	10:58	11:14
11:15	11:24	11:50	**12:06**
12:10	**12:19**	**12:41**	**12:56**
1:00	**1:09**	**1:31**	**1:46**
1:50	**1:59**	**2:21**	**2:36**
2:40	**2:49**	**3:11**	**3:26**
3:30	**3:39**	**4:00**	**4:15**
4:20	**4:29**	**4:50**	**5:05**
5:05	**5:15**	**5:34**	**5:49**
5:55	**6:05**	**6:24**	**6:39**
6:45	**6:55**	**7:14**	**7:29**
8:30	**8:40**	**8:58**	**-**

Sunday 137

Inbound

Reading Depot	Wakefield Square	Oak Grove Station	Malden Center Station
8:00	8:11	8:25	8:36
9:22	9:34	9:50	10:01
10:53	11:05	11:21	11:34
12:24	**12:36**	**12:54**	**1:06**
2:04	**2:16**	**2:32**	**2:44**
3:40	**3:51**	**4:06**	**4:17**
5:09	**5:20**	**5:35**	**5:46**

Outbound

Malden Center Station	Oak Grove Station	Wakefield Square	Reading Depot
8:40	8:49	9:05	9:19
10:10	10:19	10:36	10:50
11:40	11:50	**12:07**	**12:21**
1:20	**1:29**	**1:47**	**2:01**
2:55	**3:05**	**3:23**	**3:37**
4:25	**4:34**	**4:52**	**5:06**

PM times are **bold**

Information in this timetable is subject to change without notice. Traffic and weather may affect running times.

Always check bus destination signs before boarding. Some buses may only serve a part, or skip portions of this route.

2023 Holidays

- SAT Patriots' Day
- SUN Memorial Day
- SUN Independence Day
- SUN Labor Day
- SAT Indigenous People's Day
- SUN Thanksgiving
- SUN Christmas Day
- SUN New Year's Eve
- SUN New Year's Day

HAVERHILL LINE

SPRING/SUMMER SCHEDULE
Effective May 22, 2023

Monday to Friday — Inbound to Boston

			AM											PM											
ZONE	STATION	TRAIN #	280	200	202	282	204	284	206	286	208	288	210	290	212	292	214	294	216	218	296	298	220	222	224
	Bikes Allowed		🚲							🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲
7	Haverhill	♿	-	5:27	6:12	-	7:25	-	8:27	-	9:57	-	11:27	-	12:57	-	2:27	-	3:57	5:20	-	-	6:57	8:17	9:32
7	Bradford	♿	-	5:29	6:14	-	7:27	-	8:29	-	f 9:59	-	f 11:29	-	f 12:59	-	f 2:29	-	f 3:59	f 5:22	-	-	f 6:59	f 8:19	9:34
6	Lawrence	♿	-	5:36	6:21	-	7:34	-	8:36	-	10:06	-	11:36	-	1:06	-	2:36	-	4:06	5:29	-	-	7:06	8:26	9:41
5	Andover	♿	-	5:43	6:28	-	7:41	-	8:43	-	f 10:13	-	f 11:43	-	f 1:13	-	f 2:43	-	f 4:13	f 5:36	-	-	f 7:13	f 8:33	9:48
4	Ballardvale	♿	-	5:48	6:33	-	7:46	-	8:48	-	f 10:18	-	f 11:48	-	f 1:18	-	f 2:48	-	f 4:18	f 5:41	-	-	f 7:18	f 8:38	9:53
3	North Wilmington		-	5:56	6:41	-	-	-	8:56	-	f 10:26	-	f 11:56	-	f 1:26	-	f 2:56	-	f 4:26	-	-	-	f 7:26	f 8:46	10:00
2	Reading	♿	5:18	6:03	6:48	7:33	-	8:18	9:03	9:48	10:33	11:18	12:03	12:48	1:33	2:18	3:03	3:48	4:33	-	6:03	6:48	7:33	8:53	10:07
2	Wakefield		5:24	6:09	6:54	7:39	-	8:24	9:09	9:54	10:39	11:24	12:09	12:54	1:39	2:24	3:09	3:54	4:39	-	f 6:09	f 6:54	f 7:39	f 8:59	10:13
2	Greenwood		5:27	6:12	6:57	7:42	-	8:27	9:12	f 9:57	f 10:42	f 11:27	f 12:12	f 12:57	f 1:42	f 2:27	f 3:12	f 3:57	f 4:42	-	f 6:12	f 6:57	f 7:42	f 9:02	10:16
1	Melrose Highlands	♿	5:29	6:14	6:59	7:44	-	8:29	9:14	9:59	10:44	11:29	12:14	12:59	1:44	2:29	3:14	3:59	4:44	-	f 6:14	f 6:59	f 7:44	f 9:04	10:18
1	Melrose/Cedar Park		5:31	6:16	7:01	7:46	-	8:31	9:16	f 10:01	f 10:46	f 11:31	f 12:16	f 1:01	f 1:46	f 2:31	f 3:16	f 4:01	f 4:46	-	f 6:16	f 7:01	f 7:46	f 9:06	10:20
1	Wyoming Hill		5:33	6:18	7:03	7:48	-	8:33	9:18	f 10:03	f 10:48	f 11:33	f 12:18	f 1:03	f 1:48	f 2:33	f 3:18	f 4:03	f 4:48	-	f 6:18	f 7:03	f 7:48	f 9:08	10:22
1A	Oak Grove	♿	5:35	6:20	7:05	7:50	-	8:35	9:20	f 10:05	f 10:50	f 11:35	f 12:20	f 1:05	f 1:50	f 2:35	f 3:20	f 4:05	f 4:50	-	f 6:20	f 7:05	f 7:50	f 9:10	10:24
1A	Malden Center	♿	L 5:38	L 6:23	L 7:08	L 7:53	-	L 8:38	L 9:23	L 10:08	L 10:53	L 11:38	L 12:23	L 1:08	L 1:53	L 2:38	L 3:23	L 4:08	L 4:53	-	L 6:23	L 7:08	L 7:53	L 9:13	L 10:27
1A	North Station	♿	5:54	6:41	7:26	8:10	8:25	8:55	9:40	10:24	11:09	11:54	12:39	1:24	2:09	2:54	3:39	4:24	5:09	6:21	6:39	7:24	8:09	9:29	10:43

Monday to Friday — Outbound from Boston

			AM									PM												
ZONE	STATION	TRAIN #	201	281	283	203	285	205	287	207	289	209	291	211	293	213	215	295	217	297	219	221	223	225
	Bikes Allowed		🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲							🚲	🚲	🚲
1A	North Station	♿	5:55	6:40	7:25	8:10	8:55	9:40	10:25	11:10	11:55	12:40	1:25	2:10	2:55	3:40	4:25	5:10	5:40	5:55	6:40	8:00	9:40	10:55
1A	Malden Center	♿	f 6:06	f 6:51	f 7:36	f 8:21	f 9:06	f 9:51	f 10:36	f 11:21	f 12:06	f 12:51	f 1:36	f 2:21	f 3:06	3:51	4:36	5:21	-	6:06	6:51	f 8:11	f 9:51	11:06
1A	Oak Grove	♿	f 6:08	f 6:53	f 7:38	f 8:23	f 9:08	f 9:53	f 10:38	f 11:23	f 12:08	f 12:53	f 1:38	f 2:23	f 3:08	3:53	4:38	5:23	-	6:08	6:53	f 8:13	f 9:53	11:08
1	Wyoming Hill		f 6:10	f 6:55	f 7:40	f 8:25	f 9:10	f 9:55	f 10:40	f 11:25	f 12:10	f 12:55	f 1:40	f 2:25	f 3:10	3:55	4:40	5:25	-	6:10	6:55	f 8:15	f 9:55	11:10
1	Melrose/Cedar Park		f 6:12	f 6:57	f 7:42	f 8:27	f 9:12	f 9:57	f 10:42	f 11:27	f 12:12	f 12:57	f 1:42	f 2:27	f 3:12	3:57	4:42	5:27	-	6:12	6:57	f 8:17	f 9:57	11:12
1	Melrose Highlands	♿	f 6:15	f 7:00	f 7:45	f 8:30	f 9:15	10:00	10:45	11:30	12:15	1:00	1:45	2:30	3:15	4:00	4:45	5:30	-	6:15	7:00	8:20	f 10:00	11:15
2	Greenwood		f 6:18	f 7:03	f 7:48	f 8:33	f 9:18	f 10:03	f 10:48	f 11:33	f 12:18	f 1:03	f 1:48	f 2:33	f 3:18	4:03	4:48	5:33	-	6:18	7:03	f 8:23	f 10:03	11:18
2	Wakefield		f 6:22	f 7:07	f 7:52	f 8:37	f 9:22	10:07	10:52	11:37	12:22	1:07	1:52	2:37	3:22	4:07	4:52	5:37	-	6:22	7:07	8:27	f 10:07	11:22
2	Reading	♿	6:28	7:16	8:01	8:43	9:31	10:13	11:01	11:43	12:31	1:13	2:01	2:43	3:31	4:13	4:58	5:46	-	6:31	7:13	8:33	10:13	11:28
3	North Wilmington		f 6:34	-	-	f 8:49	-	f 10:19	-	f 11:49	-	f 1:19	-	f 2:49	-	4:19	5:05	-	-	-	7:19	f 8:39	f 10:19	11:34
4	Ballardvale	♿	f 6:42	-	-	f 8:57	-	f 10:27	-	f 11:57	-	f 1:27	-	f 2:57	-	4:27	5:13	-	6:12	-	7:27	8:47	f 10:26	11:41
5	Andover	♿	f 6:47	-	-	f 9:02	-	f 10:32	-	f 12:02	-	f 1:32	-	f 3:02	-	4:32	5:18	-	6:17	-	7:32	8:52	f 10:31	11:46
6	Lawrence	♿	6:54	-	-	9:09	-	10:39	-	12:09	-	1:39	-	3:09	-	4:39	5:25	-	6:24	-	7:39	8:59	10:38	11:53
7	Bradford	♿	f 7:02	-	-	f 9:17	-	f 10:47	-	f 12:17	-	L 1:49	-	L 3:19	-	L 4:50	L 5:37	-	L 6:36	-	L 7:50	L 9:09	f 10:46	12:01
7	Haverhill	♿	7:09	-	-	9:24	-	10:54	-	12:24	-	1:54	-	3:24	-	4:56	5:43	-	6:41	-	7:56	9:14	10:53	12:08

Weekend — Inbound to Boston

			AM			PM				
ZONE	STATION	SATURDAY TRAIN #	1200	1202	1204	1206	1208	1210	1212	1214
		SUNDAY TRAIN #	2200	2202	2204	2206	2208	2210	2212	2214
	Bikes Allowed		🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲
7	Haverhill	♿	5:35	8:35	10:35	12:35	2:35	4:35	6:35	9:35
7	Bradford	♿	5:37	8:37	10:37	12:37	2:37	4:37	6:37	9:37
6	Lawrence	♿	5:44	8:44	10:44	12:44	2:44	4:44	6:44	9:44
5	Andover	♿	f 5:51	f 8:51	f 10:51	f 12:51	f 2:51	f 4:51	f 6:51	9:51
4	Ballardvale	♿	f 5:56	f 8:56	f 10:56	f 12:56	f 2:56	f 4:56	f 6:56	9:56
3	North Wilmington		f 6:03	f 9:03	f 11:03	f 1:03	f 3:03	f 5:03	f 7:03	10:03
2	Reading	♿	6:10	9:10	11:10	1:10	3:10	5:10	7:10	10:10
2	Wakefield		6:16	9:16	11:16	1:16	3:16	5:16	7:16	10:16
2	Greenwood		f 6:19	f 9:19	f 11:19	f 1:19	f 3:19	f 5:19	f 7:19	10:19
1	Melrose Highlands	♿	6:21	9:21	11:21	1:21	3:21	5:21	7:21	10:21
1	Melrose/Cedar Park		f 6:23	f 9:23	f 11:23	f 1:23	f 3:23	f 5:23	f 7:23	10:23
1	Wyoming Hill		f 6:25	f 9:25	f 11:25	f 1:25	f 3:25	f 5:25	f 7:25	10:25
1A	Oak Grove	♿	f 6:27	f 9:27	f 11:27	f 1:27	f 3:27	f 5:27	f 7:27	10:27
1A	Malden Center	♿	L 6:30	L 9:30	L 11:30	L 1:30	L 3:30	L 5:30	L 7:30	L 10:30
1A	North Station	♿	6:45	9:45	11:45	1:45	3:45	5:45	7:45	10:45

Weekend — Outbound from Boston

			AM			PM				
ZONE	STATION	SATURDAY TRAIN #	1201	1203	1205	1207	1209	1211	1213	1215
		SUNDAY TRAIN #	2201	2203	2205	2207	2209	2211	2213	2215
	Bikes Allowed		🚲	🚲	🚲	🚲	🚲	🚲	🚲	🚲
1A	North Station	♿	7:00	9:00	11:00	1:00	3:00	5:00	8:00	10:55
1A	Malden Center	♿	f 7:11	f 9:11	f 11:11	f 1:11	f 3:11	f 5:11	f 8:11	11:06
1A	Oak Grove	♿	f 7:13	f 9:13	f 11:13	f 1:13	f 3:13	f 5:13	f 8:13	11:08
1	Wyoming Hill		f 7:15	f 9:15	f 11:15	f 1:15	f 3:15	f 5:15	f 8:15	11:10
1	Melrose/Cedar Park		f 7:17	f 9:17	f 11:17	f 1:17	f 3:17	f 5:17	f 8:17	11:12
1	Melrose Highlands	♿	7:20	9:20	11:20	1:20	3:20	5:20	8:20	11:15
2	Greenwood		f 7:23	f 9:23	f 11:23	f 1:23	f 3:23	f 5:23	f 8:23	11:18
2	Wakefield		7:27	9:27	11:27	1:27	3:27	5:27	8:27	11:22
2	Reading	♿	7:33	9:33	11:33	1:33	3:33	5:33	8:33	11:28
3	North Wilmington		f 7:39	f 9:39	f 11:39	f 1:39	f 3:39	f 5:39	f 8:39	11:34
4	Ballardvale	♿	f 7:46	f 9:46	f 11:46	f 1:46	f 3:46	f 5:46	f 8:46	11:41
5	Andover	♿	f 7:51	f 9:51	f 11:51	f 1:51	f 3:51	f 5:51	f 8:51	11:46
6	Lawrence	♿	7:58	9:58	11:58	1:58	3:58	5:58	8:58	11:53
7	Bradford	♿	f 8:06	f 10:06	f 12:06	f 2:06	f 4:06	f 6:06	f 9:06	12:01
7	Haverhill	♿	8:13	10:13	12:13	2:13	4:13	6:13	9:13	12:08

Keep in Mind:

This schedule will be effective from May 22, 2023 and will replace the schedule of October 17, 2022.

Holiday Service
On Monday, May 29th (Memorial Day), Tuesday, July 4th (Independence Day) and Monday, September 4th (Labor Day), all lines will operate on a weekend schedule.

On Monday, June 19th (Juneteenth), Monday, July 3rd (Day before Independence Day), and Monday, October 9th (Columbus Day), all lines will operate on a regular weekday schedule.

For all holiday schedules, please check MBTA.com/holidays or call 617-222-3200.

Times in purple with "f" indicate a flag stop: Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.

Times in blue with "L" indicate an early departure: The train may leave ahead of schedule at these stops.

Bikes: Bicycles are allowed on trains with the bicycle symbol shown below the train number.

High level platform and bridge plate available. Visit **mbta.com/accessibility** for more information.

Massachusetts Bay Transportation Authority

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Visit **MBTA.com** — Customer Service **617-222-3200** — Follow **@MBTA_CR** — Download the **mTicket App**

MASSDOT CRASH RATE WORKSHEETS

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading | COUNT DATE : May-23

DISTRICT : 4 | UNSIGNALIZED : X | SIGNALIZED :

~ INTERSECTION DATA ~

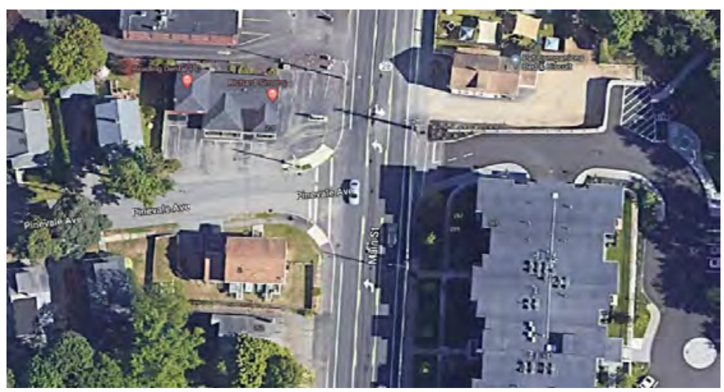
MAJOR STREET : Route 28

MINOR STREET(S) : Pinevale Avenue

269 Main Street Driveway

INTERSECTION DIAGRAM
(Label Approaches)

↑ *North*



PEAK HOUR VOLUMES

APPROACH :	**1**	**2**	**3**	**4**	**5**	**Total Peak Hourly Approach Volume**
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	15	20	689	580		**1,304**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **14,489**

TOTAL # OF CRASHES : 8

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **1.60**

CRASH RATE CALCULATION : **0.30**

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments : Below Statewide and District Crash Rates

Project Title & Date: Proposed Mixed-Use Development

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading

COUNT DATE : May-23

DISTRICT : 4

UNSIGNALIZED : X

SIGNALIZED :

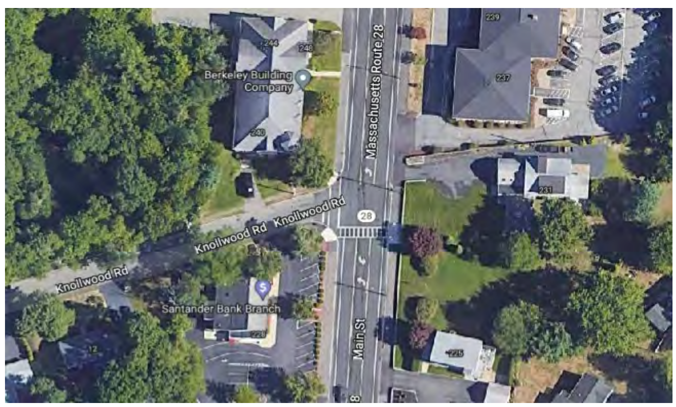
~ INTERSECTION DATA ~

MAJOR STREET : Route 28

MINOR STREET(S) : Knollwood Road

INTERSECTION DIAGRAM
(Label Approaches)

North



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	46		706	600		**1,352**

" K " FACTOR : **0.090**

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **15,022**

TOTAL # OF CRASHES : 9

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : **1.80**

CRASH RATE CALCULATION : **0.33**

$$RATE = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : Below Statewide and District Crash Rates

Project Title & Date: Proposed Mixed-Use Development

GROWTH RATE DATA

General Background Traffic Growth - Daily Traffic Volumes

CITY/TOWN	ROUTE/STREET	LOCATION	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Annual Growth
Wakefield	Yankee Division Highway	North of Route 28		141,000					137,541	148,269	147,824	146,684	144,478	**0.77%**
Reading	Yankee Division Highway	North of I-93		150,000					154,054	155,608	157,422	157,652	156,392	**0.48%**
Reading	Route 28	North of Minot Street	12,600	12,628		14,788	15,034	15,861	13,378	13,552	13,701	15,214	15,275	**1.17%**
														0.81%

TRIP GENERATION DATA

Institute of Transportation Engineers (ITE)
***Trip Generation, 11* th Edition**
Land Use Code (LUC) 822 - Strip Retail Plaza (<40K)

Average Vehicle Trips Ends vs: 1,000 Square Feet Gross Leasable Area
Independent Variable (X): 6.134

2.125

AVERAGE WEEKDAY DAILY

T = 54.45 * X
T = 54.45 * 6.134
T = 334.00
T = 334 vehicle trips
with 50% (167 vpd) entering and 50% (167 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 2.36 * (X)
T = 2.36 * 6.134
T = 14.48
T = 14 vehicle trips
with 60% (8 vph) entering and 40% (6 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 6.59 * X
T = 6.59 * 6.134
T = 40.42
T = 40 vehicle trips
with 50% (20 vph) entering and 50% (20 vph) exiting.

Institute of Transportation Engineers (ITE)
***Trip Generation*, 11th Edition**
Land Use Code (LUC) 932 - High-Turnover (Sit-Down) Restaurant

Average Vehicle Trips Ends vs: 1000 Square Feet Gross Floor Area
Independent Variable (X): 2.016

AVERAGE WEEKDAY DAILY

T = 107.20 * (X)
T = 107.20 * 2.016
T = 216.12
T = 216 vehicle trips
with 50% (108 vpd) entering and 50% (108 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 9.57 * (X)
T = 9.57 * 2.016
T = 19.29
T = 19 vehicle trips
with 55% (10 vph) entering and 45% (9 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 9.05 * (X)
T = 9.05 * 2.016
T = 18.24
T = 18 vehicle trips
with 61% (11 vph) entering and 39% (7 vph) exiting.

Institute of Transportation Engineers (ITE)
Trip Generation, 11 **th Edition**
Land Use Code (LUC) 220 - Multifamily Housing (Low-Rise) Not Close to Rail Trans

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 40

AVERAGE WEEKDAY DAILY

T = 6.74
T = 6.74 * 40
T = 269.60
T = 270 vehicle trips
with 50% (135 vpd) entering and 50% (135 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.40 * (X)
T = 0.40 * 40
T = 16.00
T = 16.00
T = 16 vehicle trips
with 24% (4 vph) entering and 76% (12 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

T = 0.51 * (X)
T = 0.51 * 40
T = 20.40
T = 20.40
T = 20 vehicle trips
with 63% (13 vph) entering and 37% (7 vph) exiting.

JOURNEY TO WORK

Proposed Mixed-Use Development
Reading, Massachusetts

Residence	Workplace	Number	Route 28 (North)		Route 28 (South)		Knollwood Road (West)	
Reading town	Boston city	2,202		0	100%	2202		0
Reading town	Reading town	2,127	69%	1468	27%	574	4%	85
Reading town	Woburn city	734		0	100%	734		0
Reading town	Burlington town	614		0	50%	307	50%	307
Reading town	Cambridge city	511		0	100%	511		0
Reading town	Stoneham town	350		0	100%	350		0
Reading town	Wilmington town	340	50%	170	50%	170		0
Reading town	Wakefield town	285		0	100%	285		0
Reading town	Winchester town	281		0	100%	281		0
Reading town	Lexington town	279		0	100%	279		0
Reading town	Malden city	273		0	100%	273		0
Reading town	Medford city	270		0	100%	270		0
Reading town	Waltham city	253		0	100%	253		0
Reading town	Andover town	223	45%	100	55%	123		0
Reading town	Peabody city	223		0	100%	223		0
Reading town	Billerica town	210		0	100%	210		0
Reading town	Lowell city	201		0	100%	201		0
Reading town	Somerville city	186		0	100%	186		0
Reading town	Everett city	182		0	100%	182		0
Reading town	Bedford town	178		0	100%	178		0
Reading town	North Reading town	155	100%	155		0		0
Reading town	Beverly city	148		0	100%	148		0
Reading town	Danvers town	148		0	100%	148		0
Reading town	Newton city	147		0	100%	147		0
Reading town	Marlborough city	146		0	100%	146		0
Reading town	Chelmsford town	115		0	100%	115		0
Reading town	Framingham town	109		0	100%	109		0
Reading town	Chelsea city	107		0	100%	107		0
Reading town	Lawrence city	96		0	100%	96		0
Reading town	Belmont town	94		0	100%	94		0
Reading town	Arlington town	83		0	100%	83		0
Reading town	Natick town	82		0	100%	82		0
Reading town	Lynn city	73		0	100%	73		0
Reading town	Clinton town	68		0	100%	68		0
Reading town	Salem city	65		0	100%	65		0
Reading town	North Andover town	63	40%	25	60%	38		0
Reading town	Hudson town	60		0	100%	60		0
				0		0		0
				0		0		0
				0		0		0
				0		0		0
				0		0		0
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				0		0		0
				0		0		0
				0		0		0
		11,681		1,918		9,371		392
				16.4%		80.2%		3.4%
		SAY		**23%**		**74%**		**3%**

CAPACITY ANALYSIS

2023 Existing Weekday Morning Peak Hour
2023 Existing Weekday Evening Peak Hour
2030 No-Build Weekday Morning Peak Hour
2030 No-Build Weekday Evening Peak Hour
2030 Build Weekday Morning Peak Hour
2030 Build Weekday Evening Peak Hour

2023 Existing Weekday Morning Peak Hour

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	0	12	9	0	9	8	578	8	8	696	9
Future Vol, veh/h	7	0	12	9	0	9	8	578	8	8	696	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	68	68	68	64	64	64	93	93	93	93	93	93
Heavy Vehicles, %	14	0	0	0	0	0	0	1	0	0	1	11
Mvmt Flow	10	0	18	14	0	14	9	622	9	9	748	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1423	1420	753	1425	1421	627	758	0	0	631	0	0
Stage 1	771	771	-	645	645	-	-	-	-	-	-	-
Stage 2	652	649	-	780	776	-	-	-	-	-	-	-
Critical Hdwy	7.24	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.24	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.24	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.626	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	107	138	413	114	138	487	862	-	-	961	-	-
Stage 1	375	413	-	464	471	-	-	-	-	-	-	-
Stage 2	437	469	-	391	410	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	101	134	413	106	134	487	862	-	-	961	-	-
Mov Cap-2 Maneuver	101	134	-	106	134	-	-	-	-	-	-	-
Stage 1	369	406	-	457	463	-	-	-	-	-	-	-
Stage 2	418	461	-	368	403	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.8	29.6	0.1	0.1
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	862	-	-	193	174	961	-	-
HCM Lane V/C Ratio	0.01	-	-	0.145	0.162	0.009	-	-
HCM Control Delay (s)	9.2	-	-	26.8	29.6	8.8	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.6	0	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	47	9	7	555	672	49
Future Vol, veh/h	47	9	7	555	672	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	54	54	90	90	92	92
Heavy Vehicles, %	0	0	0	1	1	2
Mvmt Flow	87	17	8	617	730	53

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1390	757	783	0	-	0
Stage 1	757	-	-	-	-	-
Stage 2	633	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	158	411	844	-	-	-
Stage 1	467	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	156	411	844	-	-	-
Mov Cap-2 Maneuver	296	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	533	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	22.3	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	844	-	310	-	-
HCM Lane V/C Ratio	0.009	-	0.335	-	-
HCM Control Delay (s)	9.3	-	22.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	1.4	-	-

2023 Existing Weekday Evening Peak Hour

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	0	6	8	0	12	7	670	12	8	567	5
Future Vol, veh/h	9	0	6	8	0	12	7	670	12	8	567	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	63	63	63	71	71	71	93	93	93	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	14	0	10	11	0	17	8	720	13	8	597	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1367	1365	600	1364	1361	727	602	0	0	733	0	0
Stage 1	616	616	-	743	743	-	-	-	-	-	-	-
Stage 2	751	749	-	621	618	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	125	149	505	126	150	427	985	-	-	881	-	-
Stage 1	481	485	-	410	425	-	-	-	-	-	-	-
Stage 2	406	422	-	478	484	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	118	145	505	121	146	427	985	-	-	881	-	-
Mov Cap-2 Maneuver	118	145	-	121	146	-	-	-	-	-	-	-
Stage 1	474	478	-	404	419	-	-	-	-	-	-	-
Stage 2	384	416	-	462	477	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.6	24.6	0.1	0.1
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	985	-	-	170	212	881	-	-
HCM Lane V/C Ratio	0.008	-	-	0.14	0.133	0.01	-	-
HCM Control Delay (s)	8.7	-	-	29.6	24.6	9.1	-	-
HCM Lane LOS	A	-	-	D	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.5	0	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	14	9	667	558	42
Future Vol, veh/h	32	14	9	667	558	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	93	93	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	47	21	10	717	569	43

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1328	591	612	0	-	0
Stage 1	591	-	-	-	-	-
Stage 2	737	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	173	511	977	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	477	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	170	511	977	-	-	-
Mov Cap-2 Maneuver	310	-	-	-	-	-
Stage 1	548	-	-	-	-	-
Stage 2	477	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.6	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	977	-	352	-	-
HCM Lane V/C Ratio	0.01	-	0.192	-	-
HCM Control Delay (s)	8.7	-	17.6	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

2030 No-Build Weekday Morning Peak Hour

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	0	12	9	0	9	8	620	8	8	746	9
Future Vol, veh/h	7	0	12	9	0	9	8	620	8	8	746	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	93	93	93
Heavy Vehicles, %	14	0	0	0	0	0	0	1	0	0	1	11
Mvmt Flow	8	0	13	10	0	10	9	667	9	9	802	10

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1520	1519	807	1522	1520	672	812	0	0	676	0	0
Stage 1	825	825	-	690	690	-	-	-	-	-	-	-
Stage 2	695	694	-	832	830	-	-	-	-	-	-	-
Critical Hdwy	7.24	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.24	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.24	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.626	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	91	120	385	98	120	459	823	-	-	925	-	-
Stage 1	350	390	-	439	449	-	-	-	-	-	-	-
Stage 2	414	447	-	366	388	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	87	116	385	92	116	459	823	-	-	925	-	-
Mov Cap-2 Maneuver	87	116	-	92	116	-	-	-	-	-	-	-
Stage 1	344	383	-	431	441	-	-	-	-	-	-	-
Stage 2	398	439	-	347	381	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.1	32	0.1	0.1
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	823	-	-	170	153	925	-	-
HCM Lane V/C Ratio	0.01	-	-	0.121	0.128	0.009	-	-
HCM Control Delay (s)	9.4	-	-	29.1	32	8.9	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.4	0	-	-

Intersection						
Int Delay, s/veh	0.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	10	8	595	720	53
Future Vol, veh/h	50	10	8	595	720	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	1	2
Mvmt Flow	54	11	9	647	783	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1477	812	841	0	-	0
Stage 1	812	-	-	-	-	-
Stage 2	665	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	140	382	803	-	-	-
Stage 1	440	-	-	-	-	-
Stage 2	515	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	138	382	803	-	-	-
Mov Cap-2 Maneuver	277	-	-	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	515	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	803	-	290	-	-
HCM Lane V/C Ratio	0.011	-	0.225	-	-
HCM Control Delay (s)	9.5	-	21	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

2030 No-Build Weekday Evening Peak Hour

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	0	6	8	0	12	7	718	12	8	608	5
Future Vol, veh/h	9	0	6	8	0	12	7	718	12	8	608	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	10	0	7	9	0	13	8	772	13	8	640	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1460	1460	643	1457	1456	779	645	0	0	785	0	0
Stage 1	659	659	-	795	795	-	-	-	-	-	-	-
Stage 2	801	801	-	662	661	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	108	130	477	109	131	399	950	-	-	843	-	-
Stage 1	456	464	-	384	402	-	-	-	-	-	-	-
Stage 2	381	400	-	454	463	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	102	126	477	105	127	399	950	-	-	843	-	-
Mov Cap-2 Maneuver	102	126	-	105	127	-	-	-	-	-	-	-
Stage 1	449	457	-	378	396	-	-	-	-	-	-	-
Stage 2	363	394	-	441	456	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	32.1	26.6	0.1	0.1
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	950	-	-	149	188	843	-	-
HCM Lane V/C Ratio	0.008	-	-	0.109	0.116	0.01	-	-
HCM Control Delay (s)	8.8	-	-	32.1	26.6	9.3	-	-
HCM Lane LOS	A	-	-	D	D	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	34	15	10	715	598	45
Future Vol, veh/h	34	15	10	715	598	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	37	16	11	769	610	46

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1424	633	656	0	-	0
Stage 1	633	-	-	-	-	-
Stage 2	791	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	151	483	941	-	-	-
Stage 1	533	-	-	-	-	-
Stage 2	450	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	148	483	941	-	-	-
Mov Cap-2 Maneuver	288	-	-	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	450	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	941	-	329	-	-
HCM Lane V/C Ratio	0.011	-	0.162	-	-
HCM Control Delay (s)	8.9	-	18	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

2030 Build Weekday Morning Peak Hour

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	0	17	9	0	9	14	617	8	8	746	12
Future Vol, veh/h	15	0	17	9	0	9	14	617	8	8	746	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	93	93	93
Heavy Vehicles, %	7	0	0	0	0	0	0	1	0	0	1	6
Mvmt Flow	16	0	18	10	0	10	15	663	9	9	802	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1530	1529	809	1534	1531	668	815	0	0	672	0	0
Stage 1	827	827	-	698	698	-	-	-	-	-	-	-
Stage 2	703	702	-	836	833	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	93	118	384	96	118	462	821	-	-	928	-	-
Stage 1	359	389	-	434	445	-	-	-	-	-	-	-
Stage 2	420	443	-	364	386	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	88	113	384	88	113	462	821	-	-	928	-	-
Mov Cap-2 Maneuver	88	113	-	88	113	-	-	-	-	-	-	-
Stage 1	349	382	-	421	432	-	-	-	-	-	-	-
Stage 2	399	430	-	340	379	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	36.4	33	0.2	0.1
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	821	-	-	149	148	928	-	-
HCM Lane V/C Ratio	0.018	-	-	0.233	0.132	0.009	-	-
HCM Control Delay (s)	9.5	-	-	36.4	33	8.9	-	-
HCM Lane LOS	A	-	-	E	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.9	0.4	0	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	10	8	607	735	53
Future Vol, veh/h	50	10	8	607	735	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	1	2
Mvmt Flow	54	11	9	660	799	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1506	828	857	0	-	0
Stage 1	828	-	-	-	-	-
Stage 2	678	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	135	374	792	-	-	-
Stage 1	432	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	374	792	-	-	-
Mov Cap-2 Maneuver	271	-	-	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	508	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.4	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	792	-	284	-	-
HCM Lane V/C Ratio	0.011	-	0.23	-	-
HCM Control Delay (s)	9.6	-	21.4	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	19	0	9	17	0	13
Future Vol, veh/h	19	0	9	17	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	0	0	6	0	0
Mvmt Flow	21	0	10	18	0	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	21	0	59	21
Stage 1	-	-	-	-	21	-
Stage 2	-	-	-	-	38	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1608	-	953	1062
Stage 1	-	-	-	-	1007	-
Stage 2	-	-	-	-	990	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1608	-	947	1062
Mov Cap-2 Maneuver	-	-	-	-	947	-
Stage 1	-	-	-	-	1007	-
Stage 2	-	-	-	-	984	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	8.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1062	-	-	1608	-
HCM Lane V/C Ratio	0.013	-	-	0.006	-
HCM Control Delay (s)	8.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection						
Int Delay, s/veh	0.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	12	11	637	770	2
Future Vol, veh/h	2	12	11	637	770	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	93	93
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	2	13	12	685	828	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1538	829	830	0	-	0
Stage 1	829	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	129	374	811	-	-	-
Stage 1	432	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	126	374	811	-	-	-
Mov Cap-2 Maneuver	264	-	-	-	-	-
Stage 1	422	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.7	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	811	-	353	-	-
HCM Lane V/C Ratio	0.015	-	0.043	-	-
HCM Control Delay (s)	9.5	-	15.7	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

2030 Build Weekday Evening Peak Hour

Intersection												
Int Delay, s/veh	1.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	0	12	8	0	12	19	711	12	8	608	12
Future Vol, veh/h	21	0	12	8	0	12	19	711	12	8	608	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	93	93	93	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	1	0	0	1	0
Mvmt Flow	23	0	13	9	0	13	20	765	13	8	640	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1481	1481	647	1481	1481	772	653	0	0	778	0	0
Stage 1	663	663	-	812	812	-	-	-	-	-	-	-
Stage 2	818	818	-	669	669	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	105	127	475	105	127	403	943	-	-	848	-	-
Stage 1	454	462	-	376	395	-	-	-	-	-	-	-
Stage 2	373	393	-	450	459	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	98	121	475	98	121	403	943	-	-	848	-	-
Mov Cap-2 Maneuver	98	121	-	98	121	-	-	-	-	-	-	-
Stage 1	437	455	-	362	380	-	-	-	-	-	-	-
Stage 2	348	378	-	431	452	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	40	27.7	0.2	0.1
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	943	-	-	138	180	848	-	-
HCM Lane V/C Ratio	0.022	-	-	0.26	0.121	0.01	-	-
HCM Control Delay (s)	8.9	-	-	40	27.7	9.3	-	-
HCM Lane LOS	A	-	-	E	D	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1	0.4	0	-	-

Intersection						
Int Delay, s/veh	0.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	35	15	10	739	614	46
Future Vol, veh/h	35	15	10	739	614	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	93	93	98	98
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	38	16	11	795	627	47

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1468	651	674	0	-	0
Stage 1	651	-	-	-	-	-
Stage 2	817	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	142	472	927	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	139	472	927	-	-	-
Mov Cap-2 Maneuver	278	-	-	-	-	-
Stage 1	512	-	-	-	-	-
Stage 2	438	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	18.7	0.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	927	-	317	-	-
HCM Lane V/C Ratio	0.012	-	0.171	-	-
HCM Control Delay (s)	8.9	-	18.7	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection						
Int Delay, s/veh	4.5					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	15	0	19	12	0	18
Future Vol, veh/h	15	0	19	12	0	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	16	0	21	13	0	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	16	0	71	16
Stage 1	-	-	-	-	16	-
Stage 2	-	-	-	-	55	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1615	-	938	1069
Stage 1	-	-	-	-	1012	-
Stage 2	-	-	-	-	973	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1615	-	926	1069
Mov Cap-2 Maneuver	-	-	-	-	926	-
Stage 1	-	-	-	-	1012	-
Stage 2	-	-	-	-	960	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.4	8.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1069	-	-	1615	-
HCM Lane V/C Ratio	0.018	-	-	0.013	-
HCM Control Delay (s)	8.4	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection						
Int Delay, s/veh	0.3					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	14	22	740	625	3
Future Vol, veh/h	2	14	22	740	625	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	2	15	24	804	679	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1533	681	682	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	852	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	130	454	920	-	-	-
Stage 1	506	-	-	-	-	-
Stage 2	421	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	124	454	920	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	482	-	-	-	-	-
Stage 2	421	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	920	-	416	-	-
HCM Lane V/C Ratio	0.026	-	0.042	-	-
HCM Control Delay (s)	9	-	14	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-