Arbella at Ashland

Memorial Drive
Ashland, MA 01721

Issued for:

- Comprehensive Permit (40B)

Issued to:

- Ashland Zoning Board of Appeals

Applicant/Owner:

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A&M PROJECT #2604-01
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TRAFFIC ENGINEER
Not Applicable

The information presented herein is collaborative effort from the various members/personnel of the Project Team.

RECORD OWNER

PARCEL ID 13-154-00-000 (0 Memorial Drive)

Ashland RTD Apartments LLC
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Winchester, MA 01890

Figure - ASHLAND GIS Map

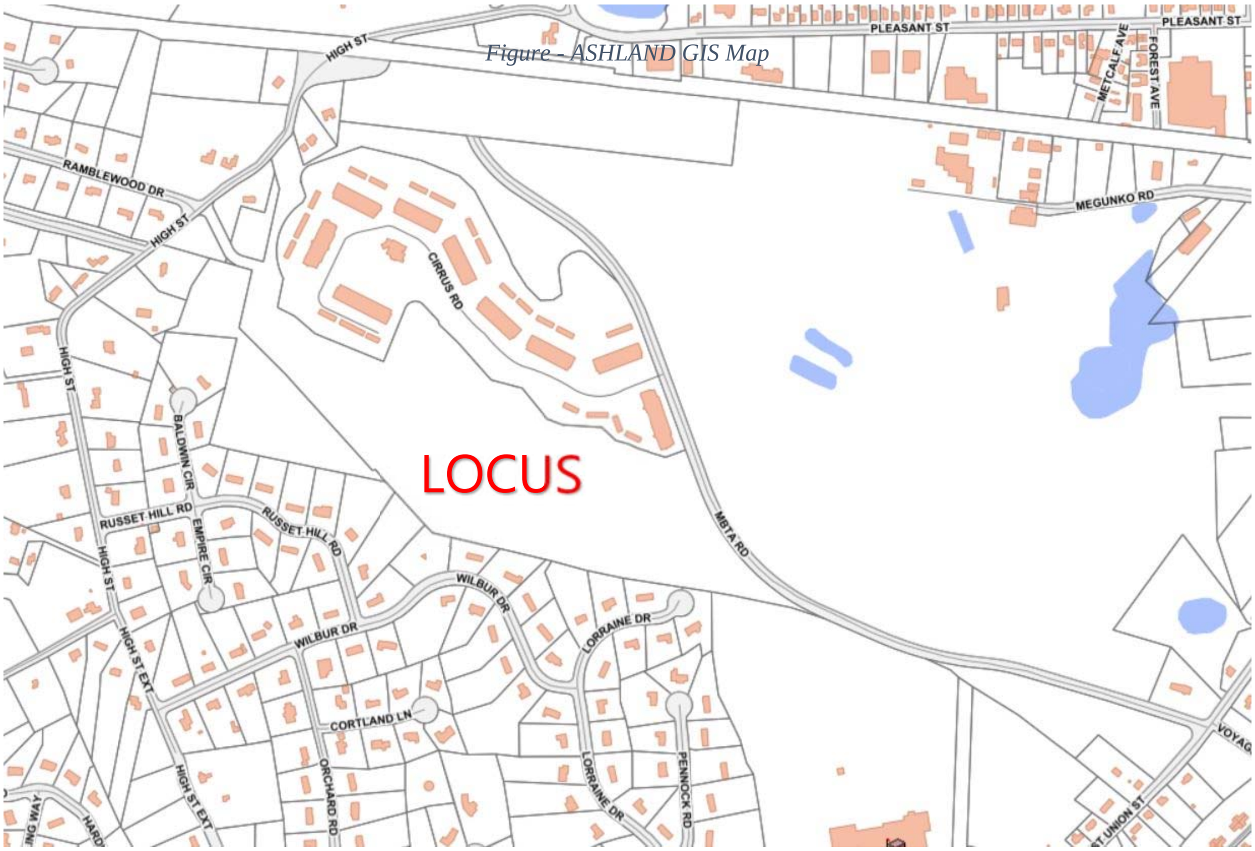

Image 1 - Ashland GIS

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1.0 – EXECUTIVE SUMMARY

The applicant, UA Senior Manager, LLC, is submitting this comprehensive permit (40B) for a senior housing development located off Memorial Drive in the Town of Ashland, Massachusetts consisting of a total of 180 units. The proposed project will include the construction of two (2) 4/5-story apartment style buildings, four (4) townhouse buildings with six (6) units each, a clubhouse, four (4) detached parking garages, an access road, parking areas, amenities and all supporting site features and infrastructure required to support the proposed development.

The purpose of this report is to summarize the project elements for consideration by the Ashland Zoning Board of Appeals for a Comprehensive Permit submitted in accordance with the general requirements of Massachusetts General Laws, Chapter 40. The applicant has engaged the Town of Ashland Select Board on the enactment of a Development Agreement, hereafter "the Agreement" entered into on July 15, 2020 as attached hereto. The Agreement specifies the build characteristics of the development and the outline model for permitting within the Town. Subsequent to the Agreement endorsement, the applicant has applied for, and received, a Project Eligibility Letter, issued by the Department of Housing and Community Development (DHCD) as part of the Local Initiate Program (LIP) process endorsed by the Select Board.

By conditions of the Agreement, the applicant seeks to construct no more than one hundred eighty multi-family one and two-bedroom rental units consisting of twenty-four rental townhouses and 156 garden style rental units. All units shall include a mix of one and two-bedroom units at the discretion of the applicant. As proposed, 98 units will be one-bedroom and 58 units will be two-bedroom. All townhomes shall contain 2 bedrooms.

Applicable summarized additional considerations for The Arbella at Ashland as defined in the Agreement include:

a. 25% of the units will be deemed affordable with a matrix of Four will be affordable at 50% of the average mean family income level (of the Greater Boston US Census tract); Five will be affordable at 60% of the average mean family income level; Thirty-six will be affordable at 80% of the average mean family income level;
b. Affordable units will be dispersed only throughout the garden rental units;
c. The Arbella shall be designated as a senior residential development limited to tenants who are at least 62 years of age;
d. Number and height of the buildings shall be as laid out as shown on the proposed site plans that accompanied the LIP application;
e. Parking ration shall not be less than one parking space per unit;
f. The applicant shall provide up to $20,000 during permitting for peer review services and up to $100,000 for construction oversight;
g. Surety in the amount of $500,000 shall be provided prior to any work within the MBTA Roadway (Memorial Drive); and
h. The final plan as submitted with [this] Comprehensive Permit shall reflect a 150 foot undisturbed buffer along the Southerly boundary adjacent to the "Apple Ridge" residential subdivision, and an additional 50 feet beyond the baseline RTD zoning F boundary.

The subject parcel area is 38± acres as shown on Town of Ashland Assessor Map 13 Lot 154. As a condition of the Agreement, the applicant will create by Approval Not Required process with the Zoning Board of Appeals, a parcel of land approximately 20± acres in size that will be conveyed to the Town of Ashland for use as open space and/or conservation purposes.

The project site is currently vacant, unimproved land located within the Rail Transit District per Section 8.0 of the Ashland Zoning Bylaw. Portions of the site are located within Zones A, E, and F with the entirety of the site located within a photovoltaic overlay zone. No other use on the site is known or has been identified.

The project site is serviced by municipal water and sewer located within Memorial Drive. The reconstruction of Memorial Drive was performed pursuant to a MassWorks grant that was supported by the development goals of the RTD parcel that includes apartment rentals at the Cirrus Apartments and solar panels constructed in other areas of the site. The MassWorks grant improved the water and sewer availability for such growth inclusive of the Arbella. Electrical and gas services are provided by private supplier and were extended during reconstruction. Infrastructure is discussed in greater detail below.

Subsequent sections of this report provide a more detailed project narrative and stormwater analysis of the locus and its potential project impacts and stormwater as it pertains to the existing conditions and proposed development. The report will show by means of narrative, calculations and exhibits that appropriate best management practices have been used to mitigate the impacts from the proposed development. The report will demonstrate that the proposed site development reduces the peak stormwater discharge rates and the overall site runoff volume during all storm events at the existing design points. Further, the report will show that the proposed stormwater management system complies with the ten stormwater standards as presented in the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Regulations and MA MS4 General Permit regulations.

Attached to the appendix of the report are:

- Project Eligibility Letter (DHCD)
- Development Agreement
- Evidence of Site Control
- Title Commitment
- Deed Documents
- Dividend Entity Status
- Development Team Qualifications
- Certified Abutter List
- Site Development Drawings
- Preliminary Architectural Plans

2.0 – EXISTING CONDITIONS

2.1 – SITE LOCATION & DESCRIPTION

The Town of Ashland Assessor's office currently identifies the site on Map 13 as Lot 154 with a total area of approximately 38± acres with access off of Memorial Drive. The property is bounded by said roadway to the east, the Cirrus Apartments development to the north, and residential, single family properties to the south and High Street to the west. The property has a connection to High Street along the rear of the property. The proposed development area will be concentrated in approximately 17.98 acres and will be located between the Cirrus Apartment development and the newly created Approval Not Required (ANR) lot. Approximately 20 acres will be conveyed to the Town.

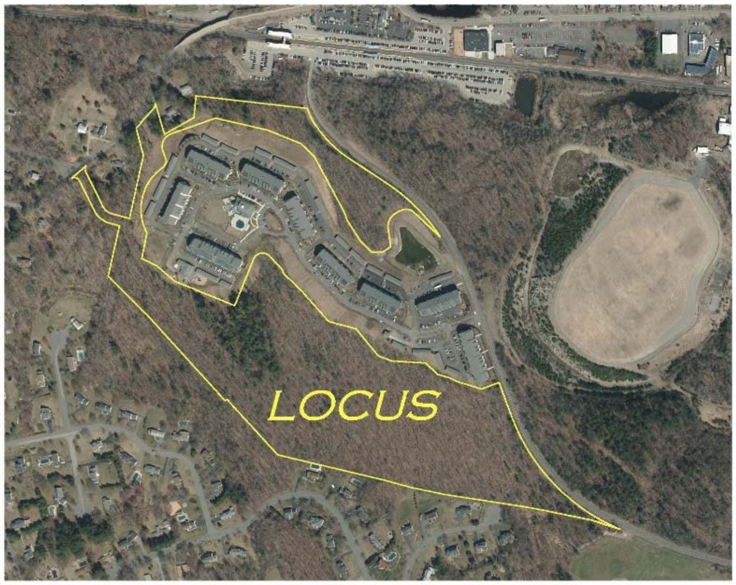

Figure 1 – MassGIS Aerial

An abandoned 50 foot wide Shell Oil easement traverses portions of the northern property. The functional use of the easement has been vacated but has not been extinguished. Development in and around the easement is permissible. The property is located in the Rail Transit District (RTD) as shown on the current Zoning Map. Refer to the site plans for the location of the various sub districts within the RTD.

Memorial Drive provides access to the property with a twenty four (24) foot wide travel way, one (1) foot shoulders, and curbed edges. A fourteen (14) foot wide multi-modal bike path travels along one side of the roadway. The bike path, as well as upgraded roadway lighting, was included as part of a comprehensive rebuild of the roadway as a harbinger to residential development along the corridor. Roadway construction was facilitated through a MassWorks Infrastructure Grant as it achieved a goal of the Commonwealth of Massachusetts to increase the residential population in defined segments of the communities served. In this case, age restricted and rental units that provide reasonable access to transit facilities. Memorial Drive meets at a signalized intersection with West Union Street (MassDOT Route 137) approximately 0.5 mile from the subject site. This intersection provides for dedicated left and right turn movements under signal protected control. Similarly, 0.4 miles northerly along Memorial Drive is the Ashland Commuter rail station. This station provides daily commute access between metro Boston and Worcester station

The property is currently undeveloped and is comprised of New England forest with a variety of tree species onsite. The topography ranges from a low elevation of 255 at the roadway to 391 at the peak of the site. The property is marked by steep slopes and a terraced plateau at approximate crest elevation 391. Some cart paths are spread throughout the property but is largely in its natural state. The infrastructure for this anticipated developed has been installed along Memorial Drive and connection stubs have been provided and stubbed at the right of way/property line.

The underlying soils have been mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) and consist of the following:

- 71B – Ridgebury fine sandy loam, 3-8% slopes — Hydrologic Soil Group "D"
- 307B – Paxton fine sandy loam, 0-8% slopes — Hydrologic Soil Group "C"
- 307D – Paxton fine sandy loam, 15-25% slopes — Hydrologic Soil Group "C"
- 312B – Woodbridge fine sandy loam, 0-8% slopes — Hydrologic Soil Group "C"
- 416B – Narragansett silt loam, 3-8% slopes — Hydrologic Soil Group "A"
- 416C – Narragansett silt loam, 8-15% slopes — Hydrologic Soil Group "A"

Figure 2 - Soil's Map

No new on-site soil investigations were done as part of this filing. Drainage infiltration basins have been located in soils categorized as Hydrologic Soil Group A which are known to have soils that are well draining and suitable for infiltration.

2.2 – Existing Stormwater Patterns

In order to compare the difference between pre and post-development peak flows and run-off volumes, existing and proposed watersheds were developed. The design points for existing watersheds were picked based on the extent of development to ensure proper analysis from pre and post-development conditions. All flow paths represent the longest time of concentration for stormwater runoff. The site topography is well defined and runoff is either directed towards the easterly wetland, to the westerly wetland, to the northerly property line or towards the existing apartment complex. Please note that a very detailed study was conducted in 2007 for the entire RTD district, therefore this report is only concentrating on the alterations associated with this proposed development. A total of four (4) watersheds have been defined for the site and are as follows:

- Watershed 1W is located on the southeast portion of the site and is 6.318 acres in size. Watershed 1W consists mostly of woodlands, with good groundcover and a small portions of grass with good groundcover. Stormwater currently drains by overland flow to the southeast corner of the parcel and eventually drains to the wetlands located on the easterly side of Memorial Drive;

- Watershed 2W is located on the northeast portion of the site and is 5.335 acres in size. Watershed 2W consists mostly of woodlands, with good groundcover and small portions of grass with good groundcover. Stormwater currently drains by overland flow onto Memorial Drive into the existing municipal drainage system and eventually into the wetlands on the easterly side of Memorial Drive;
- Watershed 3W is also located on the northerly portion of the site and is 10.509 acres in size. Watershed 3W consists mostly of woodlands, with good groundcover and grass with good groundcover. Stormwater currently drains by overland flow off-site towards the existing apartment complex;
- Watershed 4W is located on the westerly portion of the site and is 8.873 acres in size. Watershed 4W consists mostly of woodlands, with good groundcover, a small portion of grass with good groundcover and a small portion of the existing parking lot located off-site. Stormwater currently drains by overland flow to the westerly wetlands.

See the rear of this report for a copy of the Existing Watershed Plan (EWS-1).

2.3 – Site Utilities

Sanitary Sewer

Municipal sewer is currently installed within Memorial Drive. The sewer consist of an eight (8) inch PVC main and flows southerly via gravity to West Union Street. An eight (8) inch sewer service has been provided and is stubbed at the right-of-way at approximately the midpoint of the street frontage.

Stormwater

The site topography indicates the site is moderately sloped with the high point being located in the center of the lot. The ridge runs in a north-south direction, therefore stormwater currently flows in an east to west direction. Stormwater flowing easterly drains towards Memorial Drive and eventually to the existing wetlands. Stormwater flowing westerly drains towards the westerly wetlands.

Stormwater in this portion of Town currently drains to Cold Spring Brook crossing Metropolitan Avenue. The Town's stormwater system is regulated by the EPA under the NPDES permitting program. The Town is currently under the NPDES MS4 General Permit (No. MAR041086). As required by the permit, the Town reports annually to the EPA and the MassDEP regarding the status of implementing the permit requirements. The General Permit is more stringent and requires additional treatment as follows:

1. Stormwater management systems on new development sites shall be designed to:
    a. Retain the volume of runoff equivalent to, or greater than, one (1) inch over the total post-development impervious surface area on the site; AND/OR
    b. Remove 90% of the annual load of Total Suspended Solids (TSS) generated from the post-construction impervious area on the site and 60% average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on site.
2. Stormwater management systems on redevelopment sites shall be designed to:
    a. Retain the volume of runoff equivalent to, or greater than, 0.8 inches over the total post-development impervious surface area on the site; AND/OR

b. Remove 80% of the annual load of Total Suspended Solids (TSS) generated from the post-construction impervious area on the site and 50% average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on site.

WATER

Municipal water is currently installed within Memorial Drive. The water main consists of a twelve (12) inch ductile iron pipe connecting to a twelve (12) inch main in West Union Street. An eight (8) inch water service has been provided and is stubbed at the right-of-way at approximately the midpoint of the street frontage. A hydrant flow test was recently conducted on October 29, 2020 and witnessed by the Town of Ashland's DPW. The first hydrant flow test was performed with the pumps on and Woodridge valve closed and the second test was done with the pumps off and Woodridge valve open. The results showed a slight drop in the static and residual pressures. Hydrant reports are included in the appendix

OTHER UTILITIES

Underground utilities are currently installed within Memorial Drive. Electrical service is provided by Eversource Electric and is located on the easterly side of Memorial Drive.

Natural gas is provided via a four (4) inch main by Eversource Gas and is also located on the easterly side of Memorial Drive.

Telephone and Cable are available to the site through Comcast and/or Verizon. Comcast and/or Verizon provides digital cable television, state-of-the-art telephone services, and high-speed broadband internet services.

2.4 – OTHER CHARACTERISTICS

WETLAND RESOURCE AREAS

Review of the National Wetland Inventory Map (NWI) and the MassDEP Wetland Map demonstrates that the Site does contain areas subject to jurisdiction under the Wetlands Protection Act. The wetland resource areas was evaluated by a professional wetland scientist from Goddard Consulting in 2019. Bordering Vegetated Wetlands were field delineated, located by an on-the-ground survey and are as shown on the attached plan. Within the proposed development area, there are no wetland resource areas present and the entirety of the proposed work area is greater than 100 feet from the resource area that establishes Wetlands Protection Act jurisdiction. The Conservation Commission has reviewed the resource area via a Request for Determination of Applicability (RDA) in September/October 2020 and have concluded that the proposed work area is located outside their jurisdiction.

FLOOD PLAIN

The Flood Insurance Rate Map (FIRM) (Map Number 25017C0513F) for the Town of Ashland dated July 7, 2014, indicates that the parcel lies within the FEMA Zone X. The FEMA Zone X in this area is defined as "areas determined to be outside the 0.2% annual chance floodplain". The entire subject property is outside of the 500-year Floodplain.

WILDLIFE HABITAT
According to MassGIS and the 14th Edition of the Massachusetts Natural Heritage Atlas dated August 1, 2017, there are no Priority Habitats of Rare Species, no Estimated Habitats of Rare Wildlife, no Certified Vernal Pools and no Potential Vernal Pools on the property.

MEPA PERMIT THRESHOLDS
The review thresholds identify categories of Projects or aspects thereof of a nature, size or location that are likely, directly or indirectly, to cause damage to the environment. MEPA review is required when one (1) or more review thresholds are met or exceeded and the subject matter of at least one review threshold is within MEPA jurisdiction. A review threshold that is met or exceeded specifies whether MEPA review shall consist of an Environmental Notification Form (ENF) and a mandatory Environmental Impact Report (EIR) or an ENF and other MEPA review if the Secretary so requires. The subject matter of a review threshold is within MEPA jurisdiction when there is full-scope jurisdiction (i.e., the Project is undertaken by an Agency or involves Financial Assistance) or when the subject matter of the review threshold is conceptually or physically related to the subject matter of one or more required Permits (provided that the review thresholds for Land and Areas of Critical Environmental Concern shall be considered to be related to the subject matter of any required Permit) or the area subject to a Land Transfer. These thresholds are not triggered by this application.

3.0 – PROPOSED CONDITIONS

3.1 – PROPOSED OVERVIEW

The applicant, UA Senior Manager, LLC, is submitting a comprehensive permit (40B) for a senior housing development located off Memorial Drive (aka MBTA Access Road) in the Town of Ashland, Massachusetts consisting of a total of 180 units. The proposed project will include the construction of two (2) 4/5-story apartment style buildings, four (4) townhouse buildings with six (6) unit each, a clubhouse, four (4) detached parking garages, an access road, parking areas, amenities and all supporting site features and infrastructure required to support the proposed development.

The clubhouse will be centrally located on the site and is approximately 11,500 sf. Building 1 will be located northeast of the clubhouse and will have a footprint of approximately 17,865 sf and will provide 76 residential units. Building 2 will be located northerly of the clubhouse and westerly of Building 1, with a footprint of approximately 20,515 sf with 80 residential units. Buildings 1 and 2 are the residential apartments which will consist of various sized 1-bedroom, 2-bedroom and 3-bedroom units mixed throughout the complex. The four (4) townhouse type buildings will be located along the southerly portion of the proposed development and will have a footprint of approximately 9,020 sf each and contain six (6) residential units each for a total of twenty four (24) units. Four (4) residential garages will be located along the northerly portion of the development and will vary in sizes. Three (3) of the garages will have twelve (12) spaces and the one (1) garage will have eight (8) spaces.

The site will be accessed off of Memorial Drive with a thirty two (32) foot wide drive. The drive will split at the top of the development, providing access to all the residential units as well as the clubhouse. Parking spaces will dispersed throughout the site and within reasonable distances to the buildings. A total of 243 parking spaces are being provided of which 67 parking stalls are located within garages. A total of 13 spaces in compliance with the Americans with Disabilities Act (ADA) are provided site wide located at main entry points to each building and/or amenity spaces. All points of the site have been designed in compliance with ADA grading tolerances.

Other site improvements include landscape areas, underground utilities, municipal water and sewer and a new stormwater management systems. Three (3) dedicated trash and recycling centers have been strategically located throughout the site. The proposed stormwater management plan calls for the use of appropriate best management practices, including swales, deep sump hooded catch basins, several CDS hydrodynamic separator, two (2) subsurface infiltration systems and a infiltration basin. The system has been designed with infiltration and an outlet control structure. The outlet control structure has been designed to match pre-development conditions for peak discharge rates and runoff volumes. The combination of these BMP's will remove greater than 80% of Total Suspended Solids, from the anticipated stormwater runoff. The stormwater design seeks to use off road swales to control drainage to prevent high sheet flow velocities developed along steep roadways. This condition allows limits water paths of travel that help minimize icing potential during winter months.

3.2 – Proposed Stormwater Patterns

The drainage patterns under proposed conditions will maintain the same design points and designations under existing conditions. Some of the existing watershed areas have been modified due to grading of the proposed development. The study concluded that the proposed rates of runoff and runoff volumes at the property line is less than the existing conditions analysis. A total of six (6) watersheds have been defined for the site and are as follows:

- Watershed P-1 is associated with a majority of the proposed development and is 11.764 acres in size. The area will consist of impervious surface areas and landscape areas. Stormwater will be directed into several deep sump hooded catch basins, routed through a water quality structure and through the infiltration basin system. The access road has been graded to drain into the grass swales equipped with catch basins, equally spaced along the bottom. The infiltration basin will be located at the intersection of Memorial Drive and the access drive. An outlet pipe will direct treated stormwater towards the existing design point, the southeast corner.
- Watershed P-2 is also associated with the proposed development and is 2.32 acres in size. The area will consist mostly of roof area, a small amount of impervious surface areas from the access road and landscape areas. Clean roof runoff will be piped directly into the subsurface infiltration system. Stormwater from the access road and landscape areas will be directed into a set of deep sump hooded catch basins, routed through a water quality structure and through the subsurface infiltration system. An outlet pipe will direct treated stormwater towards the existing design point, the westerly wetlands.
- Watershed P-3 is located along the southeasterly portion of the site and is 7.626 acres in size. The area will consist of landscape slope area and the existing woodlands. Runoff from this watershed will continue to flow by overland to the southeast corner.
- Watershed P-4 is located along the southwesterly portion of the site and is 6.82 acres in size. The area will consist mostly of landscape slope area and the existing woodlands. Runoff from this watershed will continue to flow by overland to the westerly wetlands.
- Watershed P-5 is located along the northerly portion of the development and is 2.41 acres in size. The area will consist mostly of landscape slope area and the existing woodlands. Runoff from this watershed will continue to flow by overland to the northerly property line.
- Watershed P-6 is located along the southwest portion of the site and is 0.105 acres in size. The area will consist of the southerly half roof area associated with building 7. Clean roof runoff

will be collected via downspouts and piped into the subsurface infiltration system. An outlet pipe will direct treated stormwater towards the existing design point, the westerly wetlands.

See the rear of this report for a copy of the Proposed Watershed Plan (PWS-1).

The following tables show comparison of the existing vs proposed peak flow rate of runoff and runoff volume at the three (3) design points.

Table 3.2.A - Design Point 1 Existing vs Proposed peak rate of runoff at the Southeast Corner

Design Storm	Existing (cfs)	Proposed (cfs)	Difference (cfs)	
2-year	0.68	0.24	**-0.44**	**-64.7%**
10-year	3.14	2.24	**-0.9**	**-28.7%**
25-year	6.42	4.79	**-1.63**	**-25.4%**
100-year	11.85	8.99	**-2.86**	**-24.1%**

Table 3.2.B - Design Point 1 Existing vs Proposed runoff volume at the Southeast Corner

Design Storm	Existing (ac-ft)	Proposed (af-ft)	Difference (ac-ft)	
2-year	0.123	0.08	**-0.043**	**-35.0%**
10-year	0.444	0.329	**-0.115**	**-25.9%**
25-year	0.774	0.593	**-0.181**	**-23.4%**
100-year	1.286	1.408	**0.122**	**9.5%**

Table 3.2.C - Design Point 2 Existing vs Proposed peak rate of runoff at the Northerly Property

Design Storm	Existing (cfs)	Proposed (cfs)	Difference (cfs)	
2-year	6.26	1.21	**-5.05**	**-80.7%**
10-year	14.63	3.25	**-11.38**	**-77.8%**
25-year	21.3	5	**-16.3**	**-76.5%**
100-year	30.29	7.37	**-22.92**	**-75.7%**

Table 3.2.D - Design Point 2 Existing vs Proposed runoff volume at the Northerly Property Line

Design Storm	Existing (ac-ft)	Proposed (af-ft)	Difference (ac-ft)	
2-year	0.61	0.107	**-0.503**	**-82.5%**
10-year	1.305	0.248	**-1.057**	**-81.0%**
25-year	1.869	0.367	**-1.502**	**-80.4%**
100-year	2.641	0.532	**-2.109**	**-79.9%**

Table 3.2.E - Design Point 2 Existing vs Proposed peak rate of runoff at the Westerly Wetlands				
Design Storm	Existing (cfs)	Proposed (cfs)	Difference (cfs)	
2-year	5.97	0.95	**-5.02**	**-84.1%**
10-year	13.05	10.82	**-2.23**	**-17.1%**
25-year	18.62	15.44	**-3.18**	**-17.1%**
100-year	26.06	21.68	**-4.38**	**-16.8%**

Table 3.2.F - Design Point 2 Existing vs Proposed runoff volume at the Westerly Wetlands				
Design Storm	Existing (ac-ft)	Proposed (af-ft)	Difference (ac-ft)	
2-year	0.585	0.45	**-0.135**	**-23.1%**
10-year	1.207	1.025	**-0.182**	**-15.1%**
25-year	1.704	1.564	**-0.14**	**-8.2%**
100-year	2.379	2.296	**-0.083**	**-3.5%**

3.2.1 – Methodology

The peak rate of runoff was 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 10.18. The HydroCAD program was used to generate the runoff hydrographs for the watershed areas, to determine discharge/stage/storage characteristics for the infiltration systems, to perform drainage routing and to combine the results of the runoff hydrographs.

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

4. Rainfall Data for each of the storm events was based on the data from the National Weather Service Technical Paper 40 (TP-40) 24-hour rainfall maps as published in the TR-55 book. The total rainfall for each event is shown in the following table:

Table 3.2.1 – Rainfall (TP-40)

2-year	10-year	25-year	100-year
3.2 inches	4.55 inches	5.50 inches	6.7 inches

3.2.2 – Closed Drainage System Computational Methods

The closed drainage system calculations determine the rate of runoff, the time of concentration and the rainfall intensity for the drainage basin. The calculations were performed for a 25-year storm event. The closed drainage system has also been analyzed for the 100-year event. The following standards were used:

1. The Rational Formula (Q =CIA) was used to determine the flow to each structure.
   Q = Flow cubic feet per second (CFS)
   C = Runoff coefficients
   I = Rainfall Intensity (inches per hour)
   A = Drainage Area (acres)

2. The runoff coefficients used are as follows:
   Impervious (pavement and roofs) = 0.9
   Grassed = 0.30
   Bare Ground and gravel = 0.50
   Landscape = 0.3
   Wooded = 0.2

3. The intensity for each area was determined by the Steel Formula for a 25-year frequency storm. The Steel Formula is:
   I = k/(t+b)
   I = Intensity
   k = 230 (25 yr)
   t = Time of Concentration
   b = 30 (25 yr)

4. The times of concentration were calculated using a nomograph provided in "Design, Volume 1," by Seelye, 1960. A minimum time of concentration of six (6) minutes was utilized.

5. The Manning's formula was utilized to calculate the capacity of the individual pipes in the closed drainage system. The Manning's formula is:
   $Q = (Ap)\ (1.486/n)\ (s^{1/2})\ (h^{2/3})$
   Q = Flow in CFS
   Ap = Cross-sectional area of the pipe (square feet)
   n = Roughness coefficient
   s = slope of the pipe (ft/ft)
   h = hydraulic radius

The closed drainage system, as designed, is capable of handling the design flow as calculated, as well as maintaining a design velocity of between 2.0 feet per second (fps) (cleansing velocity at pipe half full conditions) and 12.0 fps.

3.2.3 – Erosion and Sediment Control

The site will be enclosed with a straw wattle and/or fiber roll barrier to prevent incidental conveyance of sediment from disturbed areas off-site or into the existing drainage system. Intermediate erosion control devices will be installed on exposed slopes to minimize erosion. All existing drainage inlets adjacent to the site that are to remain shall have silt sacks installed prior to any construction activities. Stabilized construction entrances shall be installed as part of the construction and will be maintained until site tracking potential has been eliminated. The erosion control measures will remain in place until all construction activities are complete and all disturbed areas have been stabilized. The contractor will be required to inspect all controls regularly to ensure that they are working properly and to see if they need to be cleaned and/or replaced on an as-needed basis. The proposed project will disturb greater than one (1) acre of land, therefore the project will require the filing of a National Pollutant Discharge Elimination System (NPDES) Stormwater Construction General Permit. A stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to any construction activity. The SWPPP will prescribe in detail the performance standards to which the contractor for the project will be responsible for. The SWPPP will be maintained at the construction trailer on-site throughout the duration of the project. The SWPPP shall outline acceptable temporary stabilization measures to prevent incidental transport of sediment to off-site areas.

3.3 – Site Utilities

Sanitary Sewer

The proposed project is proposing a new eight (8) inch sewer service and will be connected to the existing sewer manhole, located opposite the new site driveway. The existing sewer stub is located down gradient and will be abandoned in-place. The proposed development is anticipated to have 98 one-bedroom units and 164 two-bedroom units; totaling 262 total bedrooms. The proposed sewer flows are estimated to be 29,728 gallons per day (0.05 cfs) based on 314 CMR 7.00 and 310 CMR 15.00. The sewage flows were calculated as follows.

Table 3.3.1 - Proposed Sewage Flows per the State Environmental Code, Title V

Type of Establishment	Min. Flow		Size		Calculated Flow		Design Flow	
Residential	110	gpd/bedroom	262	bedrooms	**28820**	gpd	**28820**	gpd
Office	75	gpd/1000 sf (200 gpd min)	12098	sf	**907.35**	gpd	**908**	gpd
						Total	**29728**	gpd
							0.05	cfs

Sewer analysis has been completed through the Department of Public Works through peer review consultant Haley and Ward. Haley and Ward has provided coordination based comments but have noted that capacity exists within the system for the development as part of the RTD master planning.

Stormwater

The stormwater management design incorporates Best Management Practices (BMP's) to protect down gradient points and measures to reduce peak rates and runoff volumes from the site between existing and proposed conditions. The stormwater design incorporates deep sump hooded catch basins, several CDS hydrodynamic separators, grass swales, an infiltration basin and two (2) subsurface infiltration systems consisting of Stormtech SC-740 chambers. An outlet control structure is being proposed to control the release of stormwater to less than predevelopment conditions. The proposed layout, grading and the drainage system will reduce the total site runoff rate, volume and total suspended solids discharging off-site. The developed site will meet and exceed the criteria set forth in the MassDEP Stormwater Technical handbook as well as the MA MS4 General Permit. Proposed BMP's include grass channels, deep sump hooded catch basin, CDS unit, infiltration basin and subsurface infiltration chambers. The combination of these BMP's will remove greater than 80% of TSS from the anticipated stormwater runoff.

WATER

The proposed project is proposing a new eight (8) inch water service connection to the existing twelve (12) inch main in Memorial Drive. The existing eight (8) inch stub is located further southerly, therefore will be abandoned in-place. The proposed eight (8) inch water main will connect to a new booster pump located in one of the garages. The water main servicing the buildings will be pressurized and looped throughout the development. Fire hydrants will be strategically located around the site at locations coordinated at a pre-submission meeting held with the Town of Ashland Fire Chief and Fire Prevention Captain. Each building will have a separate domestic service and a fire protection service off the pressurized eight (8) inch main. In lieu of a peak water demand calculation based on a plumbing fixture unit count, the daily water usage for the project is estimated at 32,700 gpd (22.7 gpm) which is 110% of the anticipated sewer flows. Assuming a peak factor of three (3) the adjusted water usage is 98,100 gpd (68.1 gpm). A more accurate estimate of domestic water demand will be provided by the owner as the building design progresses. The applicant will coordinate with the DPW – Water Division on the opportunity for irrigation water usage.

In order to meet NFPA, the proposed system will be required/capable of moving 750 GPM at 85 psi. This is the worst case scenario for sprinkler flow. At the same time, domestic flow requires 78 psi discharge pressure. A hydrant flow test was conducted on the source line at the entry point to the site. At the lowest operating pressure, the Town can deliver 960 gpm with a flow psi of 33 off of a 12 inch main at a rough grade elevation of 251. The booster pump will be located roughly at elevation 363. The booster system will be installed and maintained as part of the private development. Specifications will be developed as part of the construction document phase of the project and shall be provided to DPW for review prior to fabrication and installation.

Water analysis has been completed through the Department of Public Works through peer review consultant Haley and Ward. Haley and Ward has provided coordination based comments but have noted that capacity exists within the water system for the development as part of the RTD master planning so long as adequate provisions for pressure are provided.

OTHER UTILITIES

The premises will be serviced by new underground utilities and will be coordinated with the various utility providers in the area. Transformer pads will be located throughout the site meeting Eversource design standards for location and vehicular protection. Final locations will be determined and coordinated with Eversource Electric.

A new gas connection will be provided off the existing four (4) main on Memorial Drive. The gas main will feed the gas meter banks located along the buildings. Final location to be determined and coordinated with Eversource Gas.

3.4 – Other Characteristics

Wetland Resource Areas

In October 2020, the Town of Ashland Conservation Commission issued a negative determination (WPA Form 2 – Determination of Applicability) that the proposed project will not have any impact to the wetland resource areas adjacent to the site.

Flood Plain

The project site is located in a Zone X. Therefore, no impacts to flood plains are anticipated.

Wildlife Habitat

No impacts on wildlife habitat, since there are no Priority Habitats of Rare Species, Estimated Habitats of Rare Wildlife, Certified Vernal Pools nor Potential Vernal Pools are located on the project site. Therefore, no impacts to flood plains are anticipated.

MEPA Permit Thresholds

The proposed project will not meet or exceed any of the thresholds established, and is therefore not applicable.

4.0 – Transportation

In order to estimate the number of vehicle trips associated with the proposed development, A&M relied upon the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 10th Edition*. The ITE is a national research organization of transportation professions and the *Trip Generation Manual, 10th Edition* provides traffic generation information for various land uses compiled from studies conducted by members nationwide for similar facilities. Vehicle trip estimates for the proposed project were determined using ITE Land Use Code (LUC) 252 – Senior Adult Housing – Attached.

LUC 252, Senior Adult housing consists of attached independent living developments, including retirement communities, age-restricted housing, and active adult communities. These developments may include limited social or recreational services. The ITE classification lacks centralized dining and onsite medical facilities. Residents in these communities live independently, are typically active (requiring little to no medical supervision) and may or may not be retired. This analysis approach is an over-conservative estimation based on the anticipated population of the Arbella at Ashland. The United Group's residential basis is often based on limited mobility residents that will seek to engage in communal based activities supported by the facility operator. These activities include coordinated shuttle bus services to nearby locations inclusive of medical appointments, basic service needs, and the like. The Arbella at Ashland will also maintain an onsite clubhouse that will provide recreational opportunities that may otherwise be sought off property.

A continuing care retirement community (CCRC) is a land use that provides multiple elements of senior adult living. CCRCs combine aspects of independent living with increased care, as lifestyle needs change with time. Housing options may include various combinations of senior adult (detached), senior adult (attached), congregate care, assisted living, and skilled nursing care—aimed at allowing the residents to live in one community as their medical needs change. The communities may also contain special services such as medical, dining, recreational, and some limited, supporting retail facilities. CCRCs are usually self-contained villages.

Arbella at Ashland Vehicular Trip Generation

Weekday, AM Peak hour	180 units	56 – 59 vehicle trips per day
Weekday, PM Peak hour	180 units	56 – 60 vehicle trips per day.

Under the analysis method, approximately 1/3 of the occupied units would make a round trip in any given day during the peak hours of analysis.

For comparative value, on June 11, 2019, preliminary traffic data was recorded using automatic data recorders to determine the flow of traffic at the intersection of West Union Street and the MBTA Driveway. At the time of study, the Ashland Commuter Rail station was in full operation and the 288 residential units at Cirrus Apartments were occupied.

During the 7:00 – 9:00 am reporting period, approximately 402 vehicle trips were recorded as vehicles traveling along the MBTA Roadway. Approximately 2,902 vehicles were recorded traveling east/west along West Union Street. The 60 (rounded) Arbella at Ashland trips per day would represent approximately 29% trips during a one hour period along the MBTA roadway, and 4% of the West Union Street volume.

Similarly during the 4:00 – 6:00 pm reporting period, approximately 420 vehicle trips were reported along the MBTA Roadway and 2,879 along West Union Street, or 29% and 4% respectively.

During the 7:00 – 9:00 am reporting period, on a normal weekday operating calendar, the Framingham/Worcester has three inbound stops (7:27, 7:54, and 8:34) that are traffic attractors and three outbound stops (7:01, 7:59, and 8:21) that contribute departing traffic to the MBTA roadway. During the 4:00 – 6:00 pm reporting period, three inbound stops (4:20, 5:50, and 6:35) and three outbound stops (4:29, 5:09, and 5:48) are noted.

The data presented above is preliminary and is subject to final review, modification, and evaluation based on growth projections, timing and gap models, and seasonal variations.

5.0 – Stormwater Management

Standard 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 project is proposing an infiltration basin and two (2) subsurface infiltration systems with an outlet control structure. All discharges from the roadway and parking areas will be treated and directed into one of the proposed infiltration systems prior to discharging.

Standard 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.

Calculations have been provided to show that the proposed development will not cause an increase in peak discharge rates. Refer to the HydroCAD calculations provided within Appendix A and Appendix B of this report for detailed breakdowns.

STANDARD 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 USDA Soil Survey of Middlesex County was used to determine soil types on site.

The required recharge rates for each soil classification are as follows:

Table 5.1 – Recharge Volume per Hydrologic Soil Group (HSG)

	HSG A	HSG B	HSG C	HSG D
Required Recharge	0.60 inches	0.35 inches	0.25 inches	0.10 inches

Table 5.2 – Proposed Impervious Surface

Site	Total Area	HSG A	HSG B	HSG C	HSG D
Building Roof	99,970 sf	-	-	99,970 sf	-
Pavement/sidewalk	183,388 sf	28,314 sf	-	155,074 sf	-
Total Impervious Area	283,358 sf	28,314 sf	-	255,044 sf	-

The project is considered a new development project under proposed conditions, the project will have 283,358 sf of impervious surface area. Per the Massachusetts Stormwater Handbook, the project is required to recharge the increase in impervious surface. All runoff that flows from impervious areas will be collected by the proposed closed drainage system and directed into an underground infiltration system. The required recharge volume is given by the following equation

R_v = F x IA (Equation 1 Stormwater Handbook Volume 3)

where R_v = Required Recharge Volume, ft^3
F = Target Depth factor
IA = Impervious drainage area
R_v = F x IA
= (0.6 inches)(1foot/12 inches)(28,314 sf) + (0.25 inches)(1foot/12 inches)(255,044 sf)
=6,729 cubic feet

The volume within the infiltration basin and the subsurface infiltration system, below the lowest orifice in the outlet control structure is approximately 65,981 cubic feet which exceeds the required volume of 6,729 cubic feet.

MA MS4 General Permit requires the project to retain and infiltrate the volume of one (1) inch over the post-developed impervious surface, therefore the required V= (1")(1'/12")(255,044 sf) = 21,254 cf.

The volume within the subsurface infiltration system, below the lowest orifice in the outlet control structure is approximately 65,981 cubic feet which exceeds the required volume of 21,254 cubic feet.

The basin drawdown time is defined as:

$Time_{drawdown} = R_v$ / (K)(bottom area)

where R_v = Required Recharge Volume, ft3

K = Saturated Hydraulic Conductivity (Rawls Table)

Bottom area = Bottom area of recharge structure

Table 5.3 – Drawdown Calculation

System	R_v	K	Bottom Area	$Time_{drawdown}$
Infiltration Basin	49,080 cf	8.27 in/hr	10,661 sf	6.7 hrs
Subsurface SC-740	15,464 cf	0.27 in/hr	13,112 sf	52.4 hrs
Subsurface SC-310	1,437 cf	0.27 in/hr	1,437 sf	44.4 hrs

STANDARD 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:

a. *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*
b. *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook and*
c. *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook*

All runoff that flows through or along any impervious area will be treated in a manner such that 80% (min.) of the total suspended solids are removed with 44% removal achieved prior to infiltration. Parking lot sweeping shall be performed in accordance with the table below in order to remove at least 5% of TSS. Sweeping shall comply with Table 7 for a minimum of 5% removal. Also the site will employ a proprietary treatment device (CDS), deep sump hooded catch basins and a subsurface infiltration system to achieve and exceed the required 80% TSS removal. Removal rates for the proprietary water quality unit are based on the recommendations of the former Technology Acceptance and Reciprocity Partnership (TARP) and the Massachusetts Strategic Envirotechnology Partnership (STEP) and not wholly on manufacturer's claims. Refer to the TSS Removal Calculation Worksheet included in Appendix C of this report.

Table 7 – TSS Removal Credits for Street Sweeping (Massachusetts Stormwater Handbook Volume 2 Chapter 1)

TSS Removal Rate	High Efficiency Vacuum Sweeper – Frequency of Sweeping	Regenerative Air Sweeper – Frequency of Sweeping	Mechanical Sweeper (Rotary Broom)
5%	Quarterly Average, with sweeping scheduled primarily in spring and fall.	Quarterly Average, with sweeping scheduled primarily in spring and fall.	Monthly Average, with sweeping scheduled primarily in spring and fall.

0%	Less than above	Less than above	Less than above

STANDARD 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 proposed project is not a Land Use with Higher Potential Pollutant Loads and therefore Standard 5 does not apply.

STANDARD 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 to or near a critical area therefore Standard 6 does not apply.

STANDARD 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.

This project is considered a new development, therefore not applicable.

STANDARD 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.

An Erosion Control plan has been incorporated with the design plans. Also, the project requires a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will be prepared and submitted prior to construction. The SWPPP shall also be kept on file as required under the NPDES Construction General Permit program.

STANDARD 9

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

An operations and maintenance (O&M) plan has been included in this report that outlines the general maintenance for the stormwater systems during and after construction.

STANDARD 10

All illicit discharges to the stormwater management system are prohibited.

No illicit discharges exist on site. The storm water management system proposed shall not be connected to the wastewater management system and shall not be contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease per Massachusetts DEP Storm Water Standard 10. A signed statement shall be provided by the owner in concurrence with issuance of the final site plan.

6.0 – STORMWATER MANAGEMENT SYSTEM MAINTENANCE

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. (A&M) has prepared the following Operation and Maintenance plan for the proposed stormwater management system for the proposed project.

This plan focuses on post construction maintenance of the on-site drainage system. Operation and Maintenance (O&M) practices discussed below are recommendations made by the Design Engineer based on available reference material on Best Management Practices (BMP's) and experience. The property owner is responsible for implementation of the plan, and is encouraged to revise / supplement this plan accordingly based on actual site conditions.

This plan is broken into two (2) major sections. The first section describes construction-related erosion and sedimentation controls. The second section is devoted to a post-development operation and maintenance plan.

Basic Information

Proponent:	UA Senior Manager, LLC
Property Address:	Off Memorial Drive Ashland, MA
Owner Address:	Rensselaer Technology Park 300 Jordon Road
City:	Troy, NY 12180

Section 1 Construction Activities

1. Schedule a meeting with the various Town Departments, Design Engineer and Owner at least three (3) days prior to start of construction.
2. Install the wattles, silt fence, construction fencing and silt sacks in the catch basins as shown on the Erosion and Sediment Control Plan.
3. All erosion and sedimentation controls shall be in accordance with MassDEP's Erosion and Sedimentation Control guidelines revised through May 2003 and the USDA SCS Erosion and Sedimentation Control in site development dated September 1983.
4. Site access shall be achieved only from the designated construction entrance.
5. All erosion control measures shall be inspected weekly and after any rainfall event greater than 0.5-inches, and shall be maintained, repaired or replaced as required or at the direction of the owner's engineer, or the Town's Engineer.
6. Sediment accumulation up-gradient of the wattles and silt fence greater than 6-inches in depth shall be removed and disposed of in accordance with all applicable regulations.
7. If it appears that sediment is exiting the site, additional silt sacks shall be installed in all catch basins adjacent to the site as directed by the Engineer. Sediment accumulation on all adjacent catch basin inlets shall be removed and the silt sack replaced if torn or damaged.
8. The contractor shall comply with the General and Erosion Notes as shown on the Site Development Plans & National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP).
9. All disturbed areas shall be stabilized with mulch or seed immediately upon completion of the construction activity that disturbed the soil or at 6 months whichever is less.

10. All slopes greater than 3:1 shall be stabilized with an erosion control blanket.
11. The contractor shall keep on site additional silt fence and wattle to mitigate any emergency condition.
12. All proposed drainage structures (catch basins, manholes, etc.) should be cleaned at the end of construction and any time the sediment within the structures equals 12" deep.
13. All newly installed inlets shall be protected during construction by installing silt sacks.
14. The contractor shall be responsible for preventing any silt or sediment from entering the infiltration systems.
15. No overuse, over-compaction, or storage of materials shall occur within any areas defined as stormwater infiltration to prevent the incidental compaction of soils. The areas are to be constructed as soon as possible and protected from construction traffic. NO CONSTRUCTION WATERS are to be emptied into an infiltration system. An allowance may be accommodated for a temporary excavation of soils within the infiltration basin for collection and handling of construction water, but the entirety of the debris is to be removed in order to achieve the grades as shown on the construction drawings.
16. The entire drainage system, including but not limited to catch basin, manholes, piping, water quality structures and infiltration system should be cleaned prior to turnover to the Owner.

<u>Section 2 Post-Development Activities</u>

1. The entire project area shall be stabilized with vegetation upon completion of construction and prior to removal of the erosion control devices.
2. Salt for de-icing on the paved areas during the winter months shall be limited to the minimum amount practicable. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.
3. The closed drainage system shall be inspected every six (6) months. If more than 18 inches of sediment is found within the drainage structures, manholes or catch basins the structures shall be cleaned and the sediment removed and disposed of.
4. Deep Sump Hooded Catch Basins shall be inspected two (2) times per year (specifically after foliage and snow season) to ensure that the catch basins are working in their intended fashion and that they are free of debris. Structures will be skimmed of floatable materials (i.e. Snout), check to ensure watertight seal is working. Units shall be cleaned two (2) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert.
5. Drainage channels should be inspected for the first few months after construction in order to ensure proper function and twice a year thereafter. Inspection is recommended to include ensuring slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion, ponding, and sediment accumulation are not affecting the efficiency of the channel. For the highest efficiency, grass heights, within drainage channels, should be around three to six inches which is optimal so mowing should be done as necessary and removal of sediment is recommended to be completed once per year. Due to use of road salt and other deicers during the winter months, the need to reseed drainage channels is recommended to be evaluated yearly during the spring months. Other regular maintenance of drainage channels include fertilizing, liming, watering, pruning, weeding, and pest control. Each condition is evaluated on a case by case basis for applicability. Temporary ponding within drainage channels is normal and can develop over time. Each area should be reviewed on a semi-regular

basis and duration of ponding should be noted. Cleaning of drainage channels are subject to site specific review and may not require cleaning in accordance with recommendations if conditions do not permit.

6. It is recommended that check dams be inspected twice per year and after all major storm events. Repair damage to check dams as needed. All accumulated sediment, trash, and debris is to be removed.
7. CDS specific maintenance shall be as follows:
   A. Inspections shall be performed twice per year (e.g. spring and fall).
   B. A visual inspection should ascertain that the system components are in working order and there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument.
   C. Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen.
   D. Cleaning is required once the sediment depth reaches 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated.
   E. Cleaning should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.
   F. The system should be cleaned out immediately in the event of an oil or gasoline spill.
   G. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oil layer.
   H. Trash and debris can be netted out to separate it from other pollutants. The screen should be power washed to ensure it is free of trash and debris.
8. Infiltration basins are recommended to be inspected twice per year as well as during and following major storms for the first three (3) months of operation. Inspection is also prompted when there are discharges through the high outlet orifice. Examination of outlet structures for evidence of clogging and velocities of outflow runoff that exceed design should also be conducted twice per year. According to the Massachusetts Stormwater Handbook, potential problems include settlement, erosion, cracking or tree growth on the embankment, sediment accumulation around the outlet, inadequacy of the inlet/outlet channel erosion control measures, the health of the turf, and erosion within the basin and banks. Mowing of the upper-stage, side slopes, embankment, and emergency spillway should be conducted twice per year or as necessary. Removal of sediment, trash, and debris is recommended to be conducted once per year.

9. Due to the location of subsurface structures, inspection and maintenance can be difficult. Inlets of subsurface structures are recommended to be inspected twice per year and any debris present which might cause the structure to clog should be removed. Subsurface Infiltration Structures (Stormtech SC-740 with an isolator row) should be inspected within the first three (3) months after construction and within 72 hours of a half-inch storm event to ensure it is draining properly. Thereafter, the system should be inspected for sediment, trash and debris at least twice per year. Trash, debris, and visible sediment should be removed. The system should also be inspected annually within 72 hours of a half-inch storm event to ensure it is draining properly. Inspection can be accomplished by using the observation well, inspection port, and/or access structure for underground chamber systems. Adjust the inspection interval based on previous observation of sediment accumulation and high water elevations. Conduct jetting and vactoring annually or when inspection shows that maintenance is necessary.
10. It is recommended that outlet structures be inspected for sediment buildup as well as any signs of clogging twice per year. Removal of sediment, trash, and debris should be completed as necessary to ensure proper efficiency of the outlet structures. Outlet control structures should be inspected and maintained to assure proper routing of stormwater. Pipe joints in connection with the outlet structure, trash racks, and covers should also be checked for damage and repaired as necessary. Cleaning of outlet structures are subject to site specific review and may not require cleaning in accordance with recommendations if conditions do not permit.
11. It is recommended that the stone placed at the end of pipes be inspected twice per year and after all major storm events. Inlets and outlets of pipes should also be inspected at the same time to ensure there is no clogging or buildup of sediment impeding flow. All accumulated sediment, trash, and debris from the stone as well as the pipe is to be removed.
12. Mosquito Control Plan – 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. Reference: Massachusetts Stormwater Handbook Volume 2, Chapter 5 (Copy attached herewith). Mosquito control shall be performed if visual evidence supports need. Treatment shall include use of accepted pesticides outlined in the Stormwater policy.
13. Work within any drainage structures shall performed in accordance with the latest OSHA regulations, and only by individuals with appropriate OSHA certification.
14. Maintenance Responsibilities **-** All post-construction maintenance activities shall be documented and kept on file and made available upon request.

Referenced from the Massachusetts Stormwater Handbook "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 three (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.

The proposed site plan does not incorporate any permanent stormwater pooling areas except deep sump catch basins. Any temporary ponding areas are located subsurface. Two temporary stormwater basins are proposed in offsite areas. These areas are anticipated to drain within 72 hours in compliance with the Stormwater Handbook and are discussed further below. Please refer to post-construction prevention below. Recommended oversight includes the application of larvicides to affected areas. The Steen operations team only provides mosquito control if an increased population occurs over baseline conditions.

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 actions below. The available options are provided directly from the MassDEP handbook to allow for all contingencies during the construction period.

- **Minimize Land Disturbance:** The existing site is denuded and no further clearing is anticipated. Earthwork activity has the potential to create temporary ponding areas onsite. Stilling basins and temporary forebays will be minimized to the extent feasible. The onsite soils recharge water at an accelerated rate.
- **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 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.

Post-Construction Stormwater Treatment Practices

- 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:** Not site applicable.
    - **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:** Not site applicable.
    - **Wet Basins:** Not site applicable.

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. The open air temporary basins shall be seeded upon completion and allowed to grow naturally. Given the location within the site, rapid growth of vegetation is not anticipated and routine cutting shall be performed on a schedule as determined based on field conditions. Mosquito dunks are an effective treatment device if standing water is encountered.
- **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. Site development drawings utilize subsurface handling of stormwater. An emergency overflow basin is proposed that, by design, is not anticipated to receive any stormwater flow up to and including the 100 year event.
- **Energy Dissipators and Flow Spreaders:** Not site applicable.
- **Rain Barrels and Cisterns:** Not site applicable.
- **Subsurface Structures, Deep Sump Catch Basins, Oil Grit Separators, and Leaching Catch Basins:** All manhole covers shall be inspected to ensure they are closed and reduce the likelihood of mosquitoes laying eggs in standing water. Upon routine inspection, if these systems increase the mosquito breeding potential, the covers can be seal and mosquito netting installed over the outlets.

- **Check dams:** Not site applicable.
- **Cisterns:** Not site applicable.
- **Water quality swales:** Not site applicable.
- **Larvicide Treatment: See LTTP for larvicides treatment.**

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7.0 – Long-Term Pollution Prevention

As required under stormwater Standard 4, the project requires the "development and implementation of suitable practices for source control and pollution prevention. These measures must be identified in a long term pollution prevention plan. The plan shall include the proper procedures for the following:

- good housekeeping;
- storing materials and waste products inside or under cover;
- vehicle washing;
- routine inspections and maintenance of stormwater BMPs;
- spill prevention and response;
- maintenance of lawns, gardens, and other landscaped areas;
- storage and use of fertilizers, herbicides, and pesticides;
- pet waste management;
- operation and management of septic systems (where applicable); and
- proper management of deicing chemicals and snow.

The proposed project consists of a residential development and associated infrastructure to support the development. Upon completion of the projects the maintenance and pollution prevention activities will be the responsibility of the property owner. The Pollution prevention items noted herein shall be followed post construction. Additional constraints shall be followed per the Stormwater Pollution Prevention Plan prepared at the time of construction.

Operator Information

Proponent:	UA Senior Manager, LLC
Property Address:	Off Memorial Drive Ashland, MA
Owner Address:	Rensselaer Technology Park 300 Jordon Road
City:	Troy, NY 12180

Good Housekeeping
The following good housekeeping practices will be followed onsite during the construction project: • An effort will be made to store only the amount of material required to do the job. • All materials stored onsite will be stored in a near, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure. • Products will be kept in their original containers with the original manufacturer's label. • Substances will not be mixed with one another unless recommended by the manufacturer. • Whenever possible, all of a product will be used up before disposing of the container. • Manufacturer's recommendations for proper use and disposal will be followed. • The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.
Hazardous Products
These practices are used to reduce the risks associated with hazardous materials: • Products will be kept in the original containers unless they are not re-sealable. • Original labels and material safety data will be retained; they contain important product information. • If surplus product must be disposed of, manufacturers or local and State recommended methods for proper disposal will be followed.
Product Specific Practices
The following product specific practices will be followed onsite:

Petroleum Products
All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.
Fertilizers
Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to stormwater. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
Paints
All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to the manufacturer's instructions or State and local regulations.
Concrete Trucks
Concrete Trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.
Spill Control Practices
In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean-up: • Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies. • Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose. • All spills will be cleaned up immediately upon discovery. • The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance. • Spills of toxic or hazardous substances will be reported to the appropriate State or local government agency, regardless of the size. • The spill prevention plan will be adjusted to include measure to prevent this type of spill from reoccurring and how to clean up the spill if there should be another. A description of the spill, what caused it, and the cleanup measure will also be included. • The Site Superintendent responsible for the day-to-day site operation will be the spill prevention and cleanup coordinator.
Waste Disposal
All trash and construction debris from the site will be deposited in the dumpster. The dumpster will meet all local and State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and the individual who manages day-to-day site operations, will be responsible for seeing that these practices are followed.
Hazardous Waste
All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual whom manages day-to-day site operations, will be responsible for seeing that these practices are followed.
Sanitary Waste
All sanitary waste will be collected from the portable units a minimum of once per week by a licensed sanitary waste management contractor, as required by the local or State regulation.
Pet Waste
The Owner shall implement a cleanup program where pet owners must put the pet waste into bags and dispose of the waste in the trash.
Sanitary Waste (septic)
There is no septic component to this project that will require long term maintenance.
Landscaping
1) **<u>Mulching and Netting</u>** – Mulching will provide immediate protection to exposed soils during the period of short construction delays, or over winter months through the application of plant residues, or other suitable

materials, to exposed soil areas. In areas which have been seeded either for temporary or permanent cover, mulching should immediately follow seeding. On steep slopes, mulch must be supplemented with netting. The preferred mulching material is straw.

Mulch (Hay or Straw) Materials and Installation

a) Straw has been found to be one of the most effective organic mulch materials. The specifications for straw are described below, but other material may be appropriate. The straw should be air-dried; free of undesirable seeds & coarse materials. The application rate per 1,000 sq. ft. is 90-100 lbs. (2-3 bales) and the application rate per acre is 2 tons (100-120 bales). The application should cover about 90% of the surface. The use of straw mulch is appropriate where mulch is maintained for more than three months. Straw mulch is subject to wind blowing unless anchored, is the most commonly used mulching material, and has the best microenvironment for germinating seeds.

Mulch Maintenance

a) Inspect after rainstorms to check for movement of mulch or erosion. If washout, breakage, or erosion occurs, repair surface, reseed, remulch, and install new netting.
b) Straw or grass mulches that blow or wash away should be repaired promptly.
c) If plastic netting is used to anchor mulch, care should be taken during initial mowings to keep the mower height high. Otherwise, the netting can wrap up on the mower blade shafts. After a period of time, the netting degrades and becomes less of a problem.
d) Continue inspections until vegetation is well established.

Vehicle Washing & Construction Access

A stabilized construction entrance has been provided to help reduce vehicle tracking of sediments. Any paved streets adjacent to the site entrance will be swept daily to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

1) **Stabilized Construction Entrance** – An existing stabilized construction entrance shall be used for the duration of construction activity for this project.

Construction Entrance Inspection/Maintenance

a) The entrance should be maintained in a condition that will prevent tracking or flowing of sediment onto adjacent properties. This may require periodic topdressing with additional stone
b) The construction entrance and sediment disposal area shall be inspected weekly and after heavy rains or heavy use.
c) Mud and sediment tracked or washed onto public road shall be immediately removed.
d) Once mud and soil particles clog the voids in the gravel and the effectiveness of the gravel pad is no longer satisfactory, the pad must be topdressed with new stone. Replacement of the entire pad may be necessary when the pad becomes completely clogged.
e) If washing facilities are used, the sediment traps should be cleaned out as often as necessary to assure that adequate trapping efficiency and storage volume is available.
f) The pad shall be reshaped as needed for drainage and runoff control.
g) Broken road pavement on adjacent access roadways shall be repaired immediately.
h) All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil areas resulting from removal shall be permanently stabilized.

2) **Construction Road Stabilization** – Existing internal construction roads shall be used for the duration of construction activity for this project. Additional construction road shall be constructed as required with the following requirements:

The proposed stabilization of existing gravel and/or paved roadways will provide a means for construction vehicles to move around the site without causing significant erosion. The road stabilization will significantly speed up on-site work and generally improve site efficiency and working conditions during adverse weather. The construction roads will be stabilized at the beginning of construction and maintained throughout construction. The stabilized construction road will not be located in a cut or fill area until after grading has been performed. Some of the stone used will remain in place for use as part of the final base course of the road. The permanent roadway and cul-de-sac will be paved as soon as possible.

Construction Road Stabilization Design/Construction Requirements

a) A 6-inch course of 2 to 4-inch crushed rock, gravel base, or crushed surfacing base course should be applied immediately after grading or the completion of utility installation. The temporary roads should follow the contour of the natural terrain to the maximum extent possible and/or the existing gravel and/or paved roadways. Slope should not exceed 15 percent. Roadways should be carefully graded to drain to the edge of the road, forcing storm water to travel the shortest route. Provide drainage swales on each side of the roadway in the case of a crowned section, or one side in the case of a super-elevated section.
b) Drain inlets should be protected to prevent sediment-laden water entering.
c) Areas adjacent to culvert crossings and steep slopes should be seeded and mulched.
d) Dust control should be used when necessary. (Please refer to page 15 of 19)

Construction Road Stabilization Inspection/Maintenance

a) Inspect stabilized areas regularly, especially after large storm events. Add 2 to 4-inch crushed rock if necessary and restabilize any areas found to be eroding.
b) All temporary erosion and sediment control measures should be removed with 30 days after final site stabilization is achieved or after the temporary practices are no longer needed.
c) Trapped sediment should be removed or stabilized on site. Disturbed soil areas resulting from removal should be permanently stabilized.

Structural BMP Maintenance

1) **Temporary Diversion** – Temporary Diversion channels will be constructed alongside the proposed roadway until it is paved. The temporary diversion channels will route storm water to temporary sediment basins to remove sediment-laden storm water, before the storm water is allowed to discharge to the permanent detention basin. Check dams need to be utilized along the diversion channels. The maximum spacing of temporary diversion channels should be no greater than the following:

Land Slope (%)	Spacing (feet)
1% or less	300 ft
2%	200 ft
3% to 5%	150 ft
5% or greater	100 ft

Temporary Diversion Design/Construction Requirements

a) The temporary diversion channel cross-section should have a top width between two and four feet, a minimum height of 1.5 ft, and side slopes between 2:1 and 4:1.
b) The grade may be variable depending on the topography and must have a positive grade to the outlet. The maximum channel grade should be limited to 1.0 %.
c) The diverted runoff will outlet through check dams and then to a temporary sediment basin.
d) Diversions that are to serve longer than 30 working days should be seeded and mulched as soon as they are constructed, in order to preserve dike height and reduce maintenance.
e) Once the temporary diversion channels are no longer needed, they should be brought to the design grade and permanently stabilized.

Temporary Diversion Inspection/Maintenance

a) Inspect temporary diversion channels once a week and after every rainfall.
b) Damage caused by construction traffic or other activity should be repaired before the end of each working day.
c) Immediately remove sediment from the flow area and repair the diversion ridge.
d) Check outlets carefully and make timely repairs as needed.
e) When the area protected has been permanently stabilized, remove the ridge and the channel to blend with the natural ground level, and appropriately stabilize it.

2) **Check Dam** – Temporary check dams should be installed along the temporary diversion channels alongside the proposed roadway until it is paved. The check dams will lower the velocities of concentrated flows, thereby reducing erosion in the channel and promoting the settlement of sediments.

Check Dam Design/Construction Requirements

a) Check dams can be constructed of stone, sand bags filled with pea-gravel, or logs. Provide a sump immediately upstream.
b) The maximum spacing between the dams should be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
c) The stone must be placed by hand or mechanical placement (do not dump rock to form dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges. The stone used should be 2 to 4-inch size.
d) Log check dams should be constructed of 4 to 6-inch diameter logs embedded into the soil at least 18 inches.

Check Dam Inspection/Maintenance

a) Inspect after each rainfall event.

Erosion and Sediment Control Inspection and Maintenance Practices

The following are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- Built up sediment will be removed from hay bales when it has reached a depth of 6-inches.
- Hay bales will be inspected to ensure secured posts, continuous coverage and proper alignment.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts and to ensure healthy growth.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
- The Site Superintendent will be responsible for inspection, maintenance and repair activities and reports.
- Personnel selected to aid the Site Superintendent in the above responsibilities will be knowledgeable in all of the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

Non-Storm Water Discharges

During construction activities at the site, some water from the site will be suitable for discharge to the detention areas and/or temporary sediment basin areas. Non-stormwater discharges will be directed to recharge groundwater and to replenish wetland resource areas as follows:

1) Water from line flushing will be recharged if in compliance with MA Surface and Ground Water Quality Regulations.
2) Uncontaminated groundwater from de-watering excavations will also be recharged.

The construction de-watering and all non-stormwater discharges will be directed into a storm drain inlet equipped with a siltsack (or equivalent) inlet protection or a sediment basin. The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b)(14)(x).

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials and substances listed below are expected to be present on site during construction:

• Concrete • Detergents • Paints (enamel and latex) • Concrete • Tar	• Fertilizers • Petroleum Based Products • Cleaning Solvents • Wood • Masonry Block • Roofing Shingles

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Paints

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to the manufacturer's instructions or State and local regulations.

Concrete Trucks

Concrete Trucks will be allowed to wash out on-site to a designated area as directed by the Site Superintendent. Concrete waste will be disposed of in accordance with Federal, State and Local regulations.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and clean-up:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately upon discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous substances will be reported to the appropriate State or local government agency, regardless of the size.
- The spill prevention plan will be adjusted to include measure to prevent this type of spill from reoccurring and how to clean up the spill if there should be another. A description of the spill, what caused it, and the cleanup measure will also be included.
- The Site Superintendent responsible for the day-to-day site operation will be the spill prevention and cleanup coordinator.

Deicing and Snow Removal
Relative to the agricultural area that surrounds the project, environmentally appropriate deicing tools will be used. Standard snow removal plowing techniques shall be used.

8.0 – REQUESTED WAIVERS

The Comprehensive Permit program allows a Project to combine local permitting efforts under the auspices of the Zoning Board of Appeals with process input sought from all Town departments. The streamlined process allows an applicant to waiver other local permit processes and zoning criteria if design conditions are satisfactorily addressed within the permit application. A full summary of anticipated waivers can be found in Appendix E.

9.0 – CONCLUSION

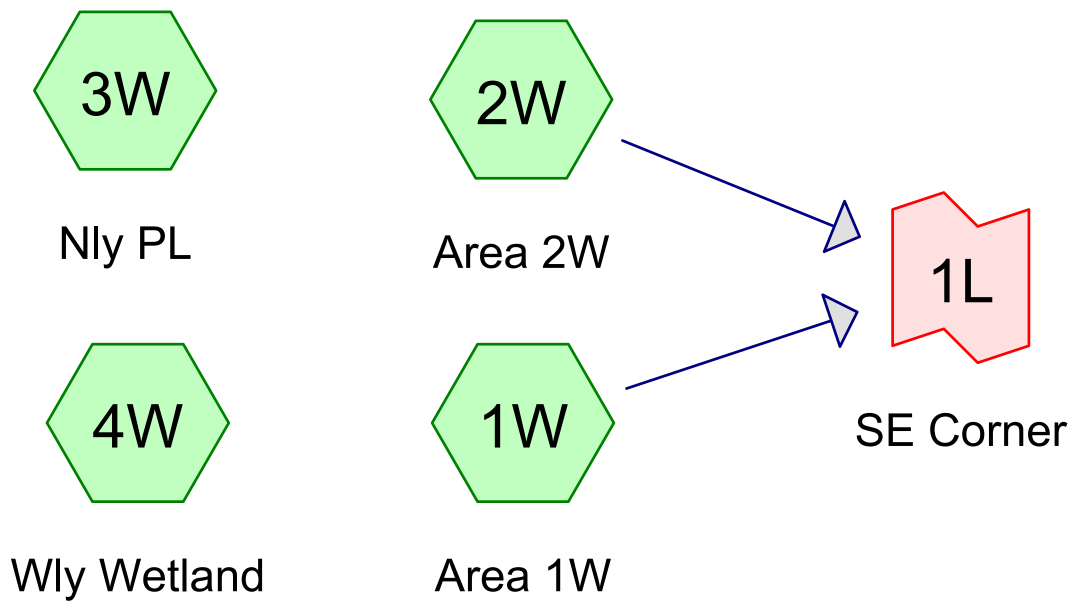
As demonstrated throughout this report by means of narrative, calculations and exhibits that appropriate best management practices and strategic site planning have been used to mitigate the impacts from the proposed development on adjacent properties and on the Town of Ashland's resources. The proposed project has been designed to minimize and prevent indirect disturbance to neighboring parcels. Strategic site design measures and accepted erosion control practices has been employed to mitigate adverse impacts to the surrounding area both during construction and after. The plan is based on a multi-dimensional approach to site layout and stormwater management , which recognizes the need for proper site planning. It relies on the applicant's well-established track record of thoughtful residential design as illustrated throughout Massachusetts and beyond. Source control of potential contaminants and implementation of stormwater runoff treatment methods serve to ensure the protection of the groundwater. The proposed stormwater system includes a number of Best Management Practices to provide improved water quality and stormwater mitigation.

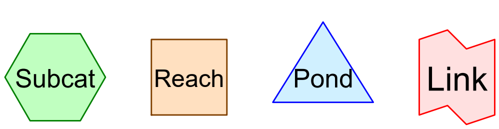
Appendix A

HYDRO-CAD PRE-DEVELOPMENT DRAINAGE ANALYSIS

ALLEN & MAJOR ASSOCIATES, INC.

APPENDIX A





Routing Diagram for 2604-01 - Existing Conditions
Prepared by {enter your company name here}, Printed 12/23/2020
HydroCAD® 10.00-26 s/n 02946 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.594	39	>75% Grass cover, Good, HSG A (1W, 2W, 3W)
1.866	74	>75% Grass cover, Good, HSG C (3W, 4W)
6.147	30	Woods, Good, HSG A (1W, 2W, 3W)
21.993	70	Woods, Good, HSG C (1W, 2W, 3W, 4W)
0.435	77	Woods, Good, HSG D (4W)
31.035	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6.741	HSG A	1W, 2W, 3W
0.000	HSG B	
23.859	HSG C	1W, 2W, 3W, 4W
0.435	HSG D	4W
0.000	Other	
31.035		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.594	0.000	1.866	0.000	0.000	2.460	>75% Grass cover, Good	1W, 2W, 3W, 4W
6.147	0.000	21.993	0.435	0.000	28.575	Woods, Good	1W, 2W, 3W, 4W
6.741	**0.000**	**23.859**	**0.435**	**0.000**	**31.035**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1W: Area 1W Runoff Area=6.318 ac 0.00% Impervious Runoff Depth>0.01"
Flow Length=1,579' Tc=12.8 min CN=43 Runoff=0.02 cfs 0.006 af

Subcatchment 2W: Area 2W Runoff Area=5.335 ac 0.00% Impervious Runoff Depth>0.26"
Flow Length=1,077' Tc=19.7 min CN=57 Runoff=0.68 cfs 0.116 af

Subcatchment 3W: Nly PL Runoff Area=10.509 ac 0.00% Impervious Runoff Depth>0.70"
Flow Length=850' Tc=14.8 min CN=69 Runoff=6.28 cfs 0.612 af

Subcatchment 4W: Wly Wetland Runoff Area=8.873 ac 0.00% Impervious Runoff Depth>0.79"
Flow Length=1,383' Tc=16.6 min CN=71 Runoff=5.97 cfs 0.585 af

Link 1L: SE Corner Inflow=0.68 cfs 0.123 af
Primary=0.68 cfs 0.123 af

Total Runoff Area = 31.035 ac Runoff Volume = 1.319 af Average Runoff Depth = 0.51"
100.00% Pervious = 31.035 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1W: Area 1W

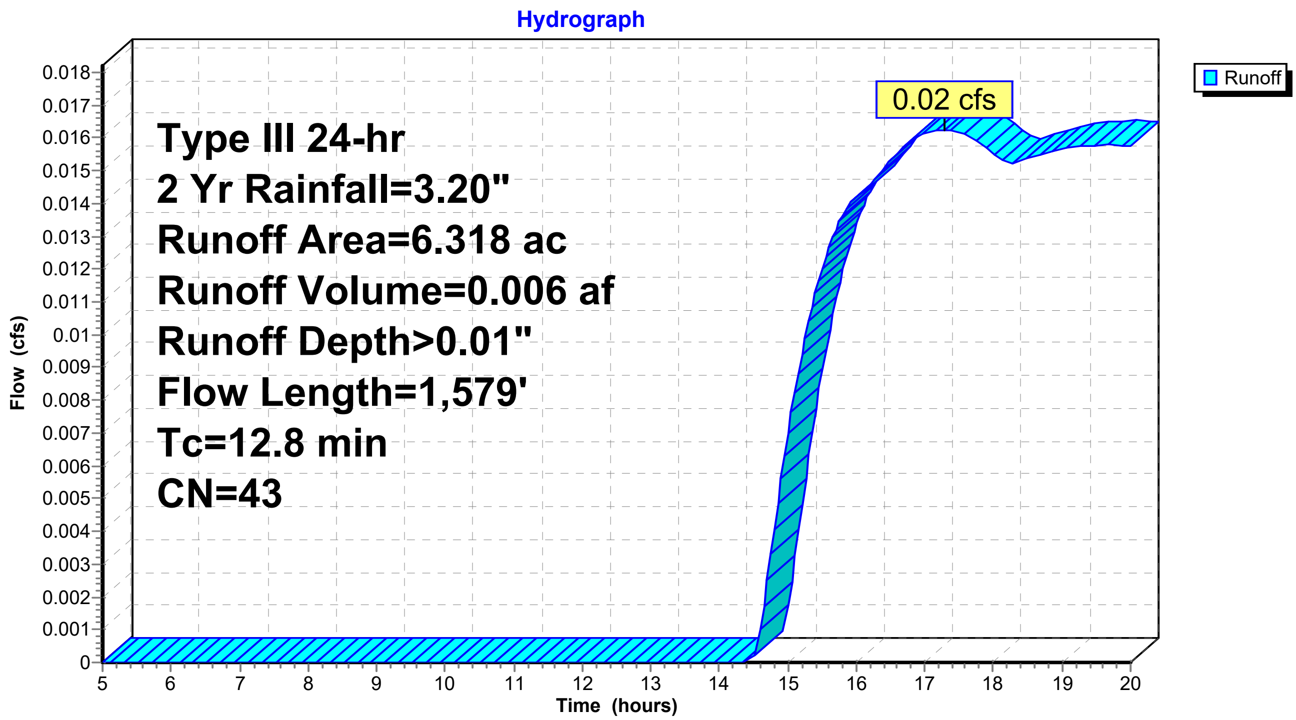
Runoff = 0.02 cfs @ 17.28 hrs, Volume= 0.006 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
4.067	30	Woods, Good, HSG A
0.315	39	>75% Grass cover, Good, HSG A
1.936	70	Woods, Good, HSG C
6.318	43	Weighted Average
6.318		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
5.3	1,529	0.0900	4.83		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
12.8	1,579	Total			

Subcatchment 1W: Area 1W



Summary for Subcatchment 2W: Area 2W

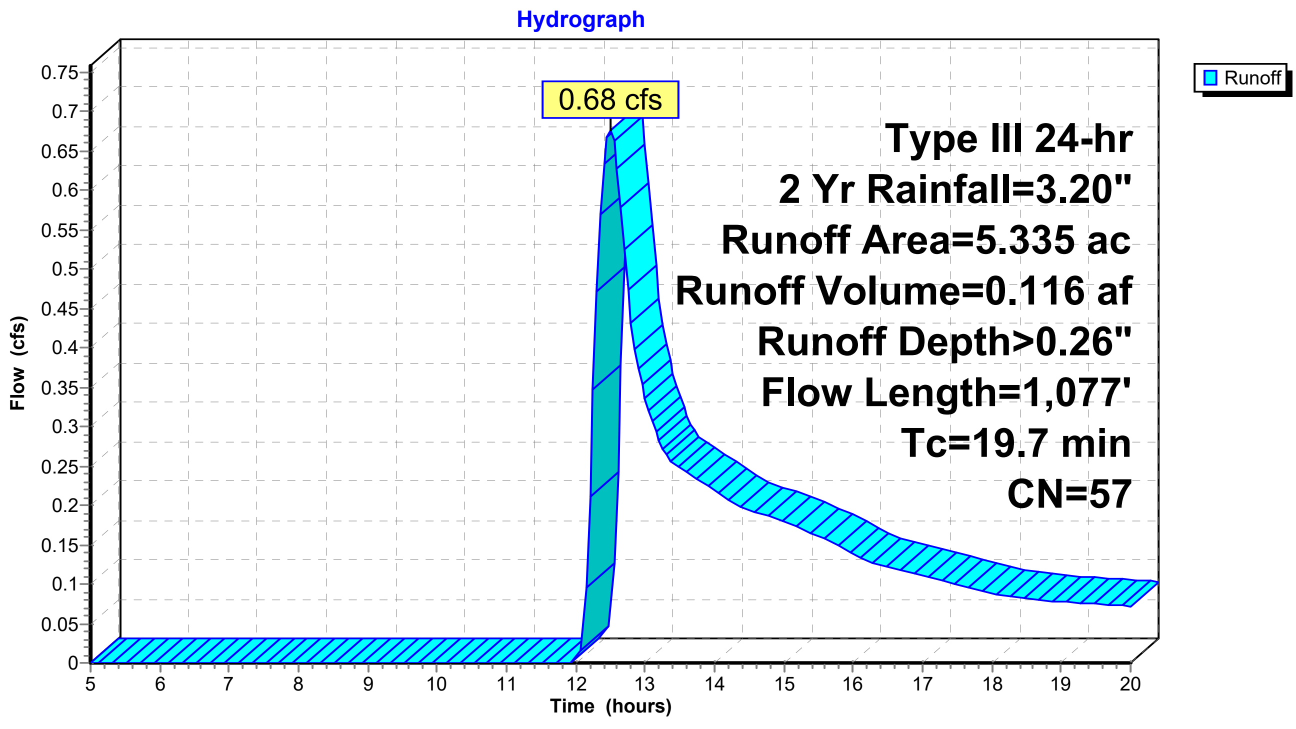
Runoff = 0.68 cfs @ 12.50 hrs, Volume= 0.116 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
1.641	30	Woods, Good, HSG A
0.173	39	>75% Grass cover, Good, HSG A
3.521	70	Woods, Good, HSG C
5.335	57	Weighted Average
5.335		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	1,027	0.1000	5.09		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.7	1,077	Total			

Subcatchment 2W: Area 2W



Summary for Subcatchment 3W: Nly PL

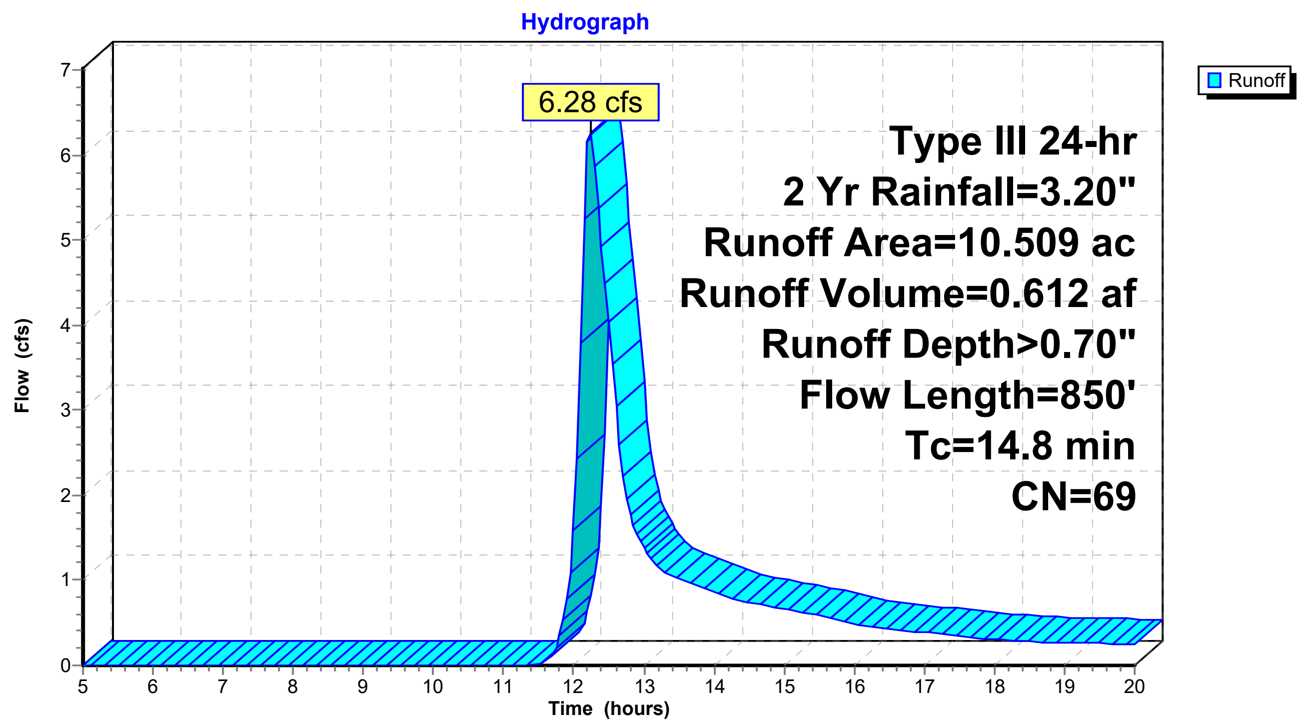
Runoff = 6.28 cfs @ 12.24 hrs, Volume= 0.612 af, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
0.439	30	Woods, Good, HSG A
0.106	39	>75% Grass cover, Good, HSG A
8.526	70	Woods, Good, HSG C
1.438	74	>75% Grass cover, Good, HSG C
10.509	69	Weighted Average
10.509		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.5	800	0.1100	5.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.8	850	Total			

Subcatchment 3W: Nly PL



Summary for Subcatchment 4W: Wly Wetland

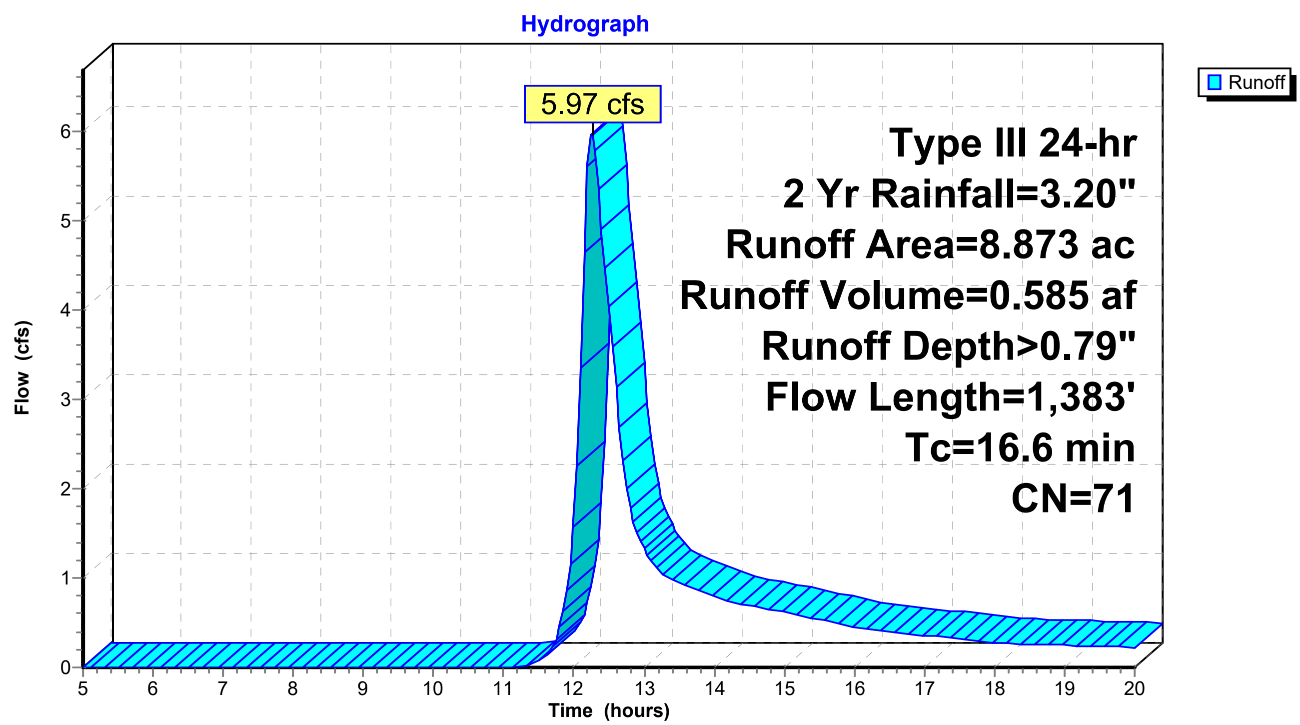
Runoff = 5.97 cfs @ 12.26 hrs, Volume= 0.585 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
8.010	70	Woods, Good, HSG C
0.428	74	>75% Grass cover, Good, HSG C
0.435	77	Woods, Good, HSG D
8.873	71	Weighted Average
8.873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.1	1,333	0.0520	3.67		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
16.6	1,383	Total			

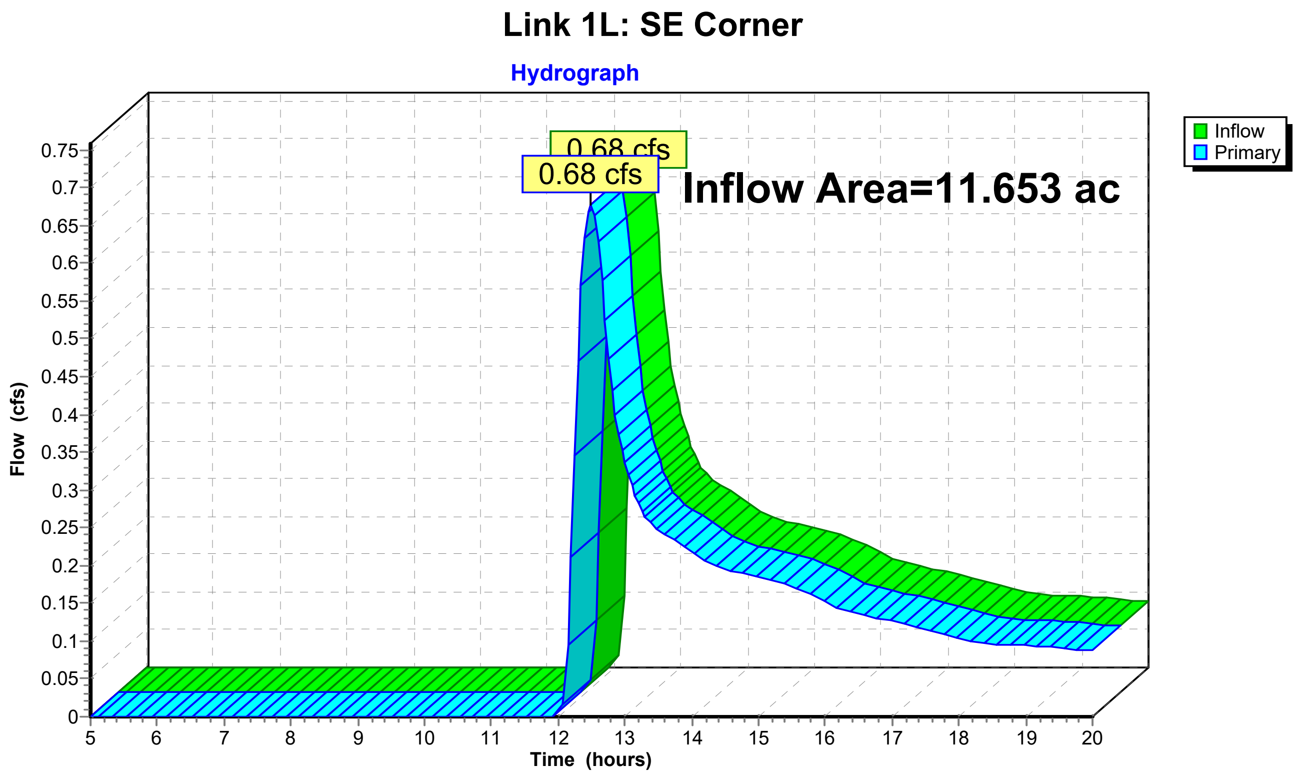
Subcatchment 4W: Wly Wetland



Summary for Link 1L: SE Corner

Inflow Area = 11.653 ac, 0.00% Impervious, Inflow Depth > 0.13" for 2 Yr event
Inflow = 0.68 cfs @ 12.50 hrs, Volume= 0.123 af
Primary = 0.68 cfs @ 12.50 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1W: Area 1W Runoff Area=6.318 ac 0.00% Impervious Runoff Depth>0.19"
Flow Length=1,579' Tc=12.8 min CN=43 Runoff=0.38 cfs 0.101 af

Subcatchment 2W: Area 2W Runoff Area=5.335 ac 0.00% Impervious Runoff Depth>0.77"
Flow Length=1,077' Tc=19.7 min CN=57 Runoff=2.91 cfs 0.343 af

Subcatchment 3W: Nly PL Runoff Area=10.509 ac 0.00% Impervious Runoff Depth>1.49"
Flow Length=850' Tc=14.8 min CN=69 Runoff=14.67 cfs 1.309 af

Subcatchment 4W: Wly Wetland Runoff Area=8.873 ac 0.00% Impervious Runoff Depth>1.63"
Flow Length=1,383' Tc=16.6 min CN=71 Runoff=13.05 cfs 1.207 af

Link 1L: SE Corner Inflow=3.14 cfs 0.444 af
Primary=3.14 cfs 0.444 af

Total Runoff Area = 31.035 ac Runoff Volume = 2.959 af Average Runoff Depth = 1.14"
100.00% Pervious = 31.035 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1W: Area 1W

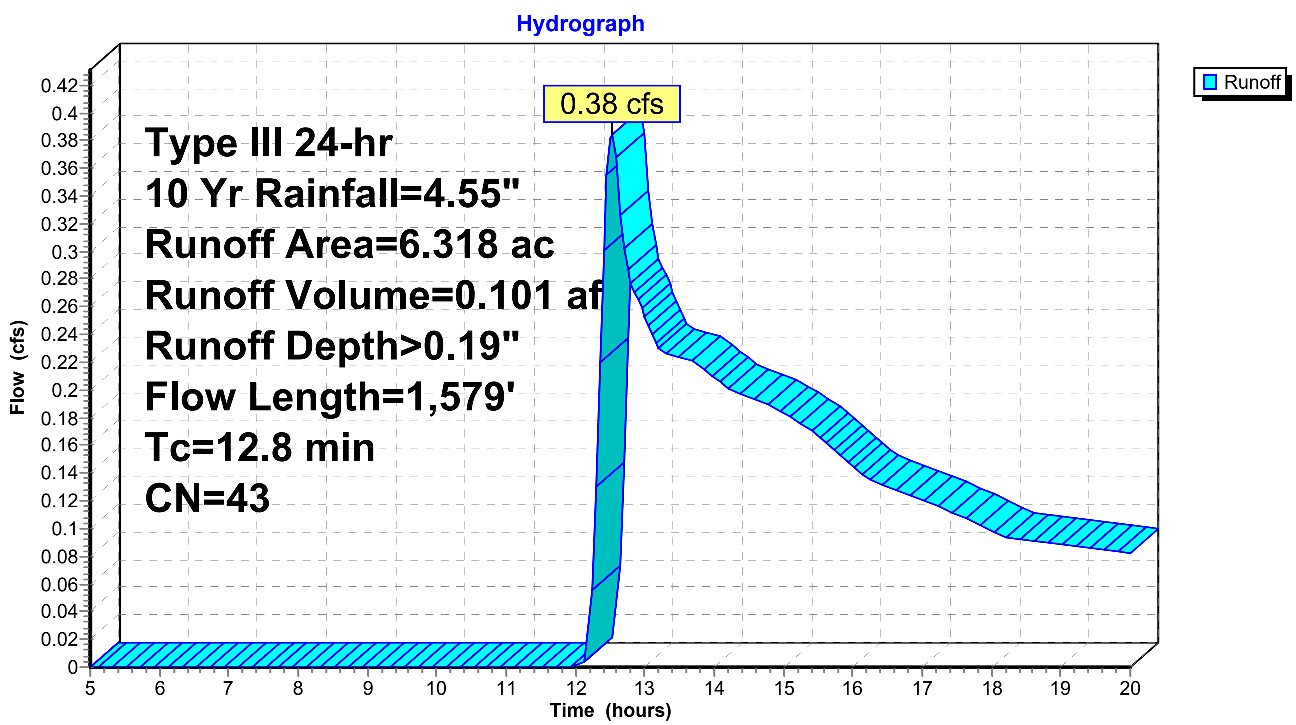
Runoff = 0.38 cfs @ 12.52 hrs, Volume= 0.101 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
4.067	30	Woods, Good, HSG A
0.315	39	>75% Grass cover, Good, HSG A
1.936	70	Woods, Good, HSG C
6.318	43	Weighted Average
6.318		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
5.3	1,529	0.0900	4.83		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
12.8	1,579	Total			

Subcatchment 1W: Area 1W



Summary for Subcatchment 2W: Area 2W

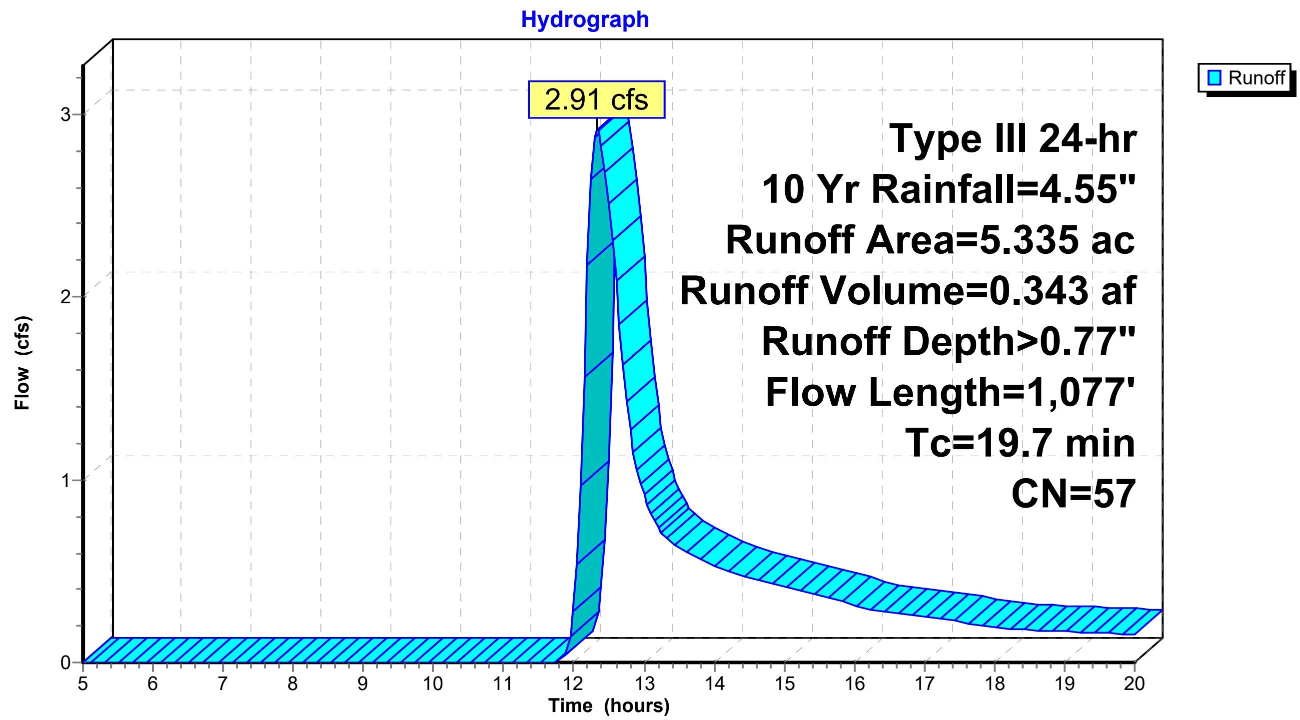
Runoff = 2.91 cfs @ 12.34 hrs, Volume= 0.343 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
1.641	30	Woods, Good, HSG A
0.173	39	>75% Grass cover, Good, HSG A
3.521	70	Woods, Good, HSG C
5.335	57	Weighted Average
5.335		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	1,027	0.1000	5.09		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.7	1,077	Total			

Subcatchment 2W: Area 2W



Summary for Subcatchment 3W: Nly PL

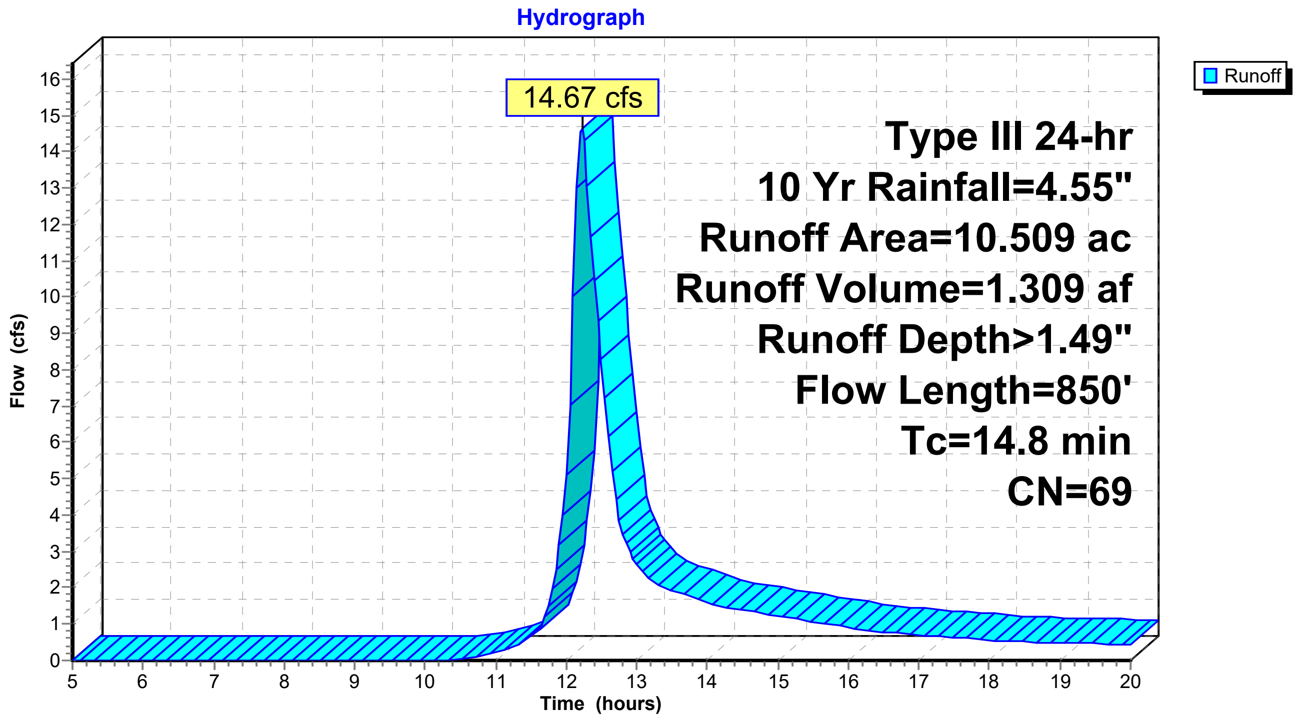
Runoff = 14.67 cfs @ 12.22 hrs, Volume= 1.309 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
0.439	30	Woods, Good, HSG A
0.106	39	>75% Grass cover, Good, HSG A
8.526	70	Woods, Good, HSG C
1.438	74	>75% Grass cover, Good, HSG C
10.509	69	Weighted Average
10.509		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.5	800	0.1100	5.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.8	850	Total			

Subcatchment 3W: Nly PL



Summary for Subcatchment 4W: Wly Wetland

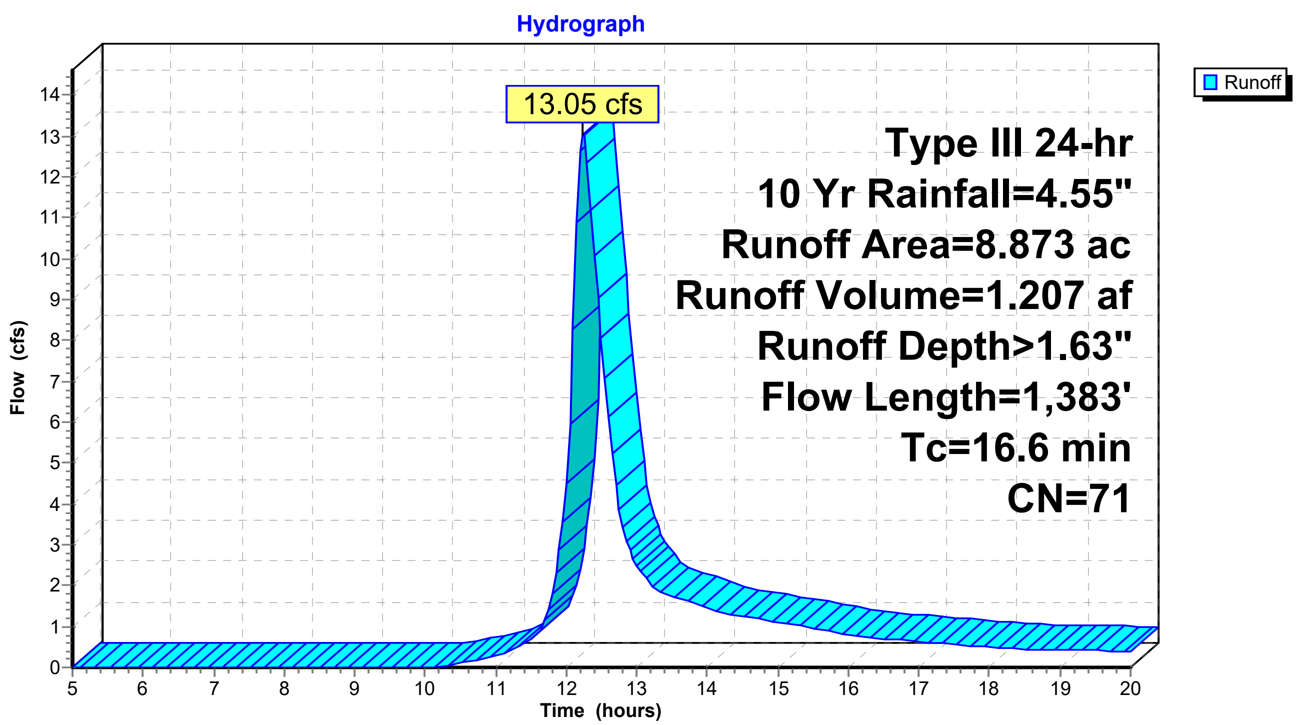
Runoff = 13.05 cfs @ 12.24 hrs, Volume= 1.207 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
8.010	70	Woods, Good, HSG C
0.428	74	>75% Grass cover, Good, HSG C
0.435	77	Woods, Good, HSG D
8.873	71	Weighted Average
8.873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.1	1,333	0.0520	3.67		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
16.6	1,383	Total			

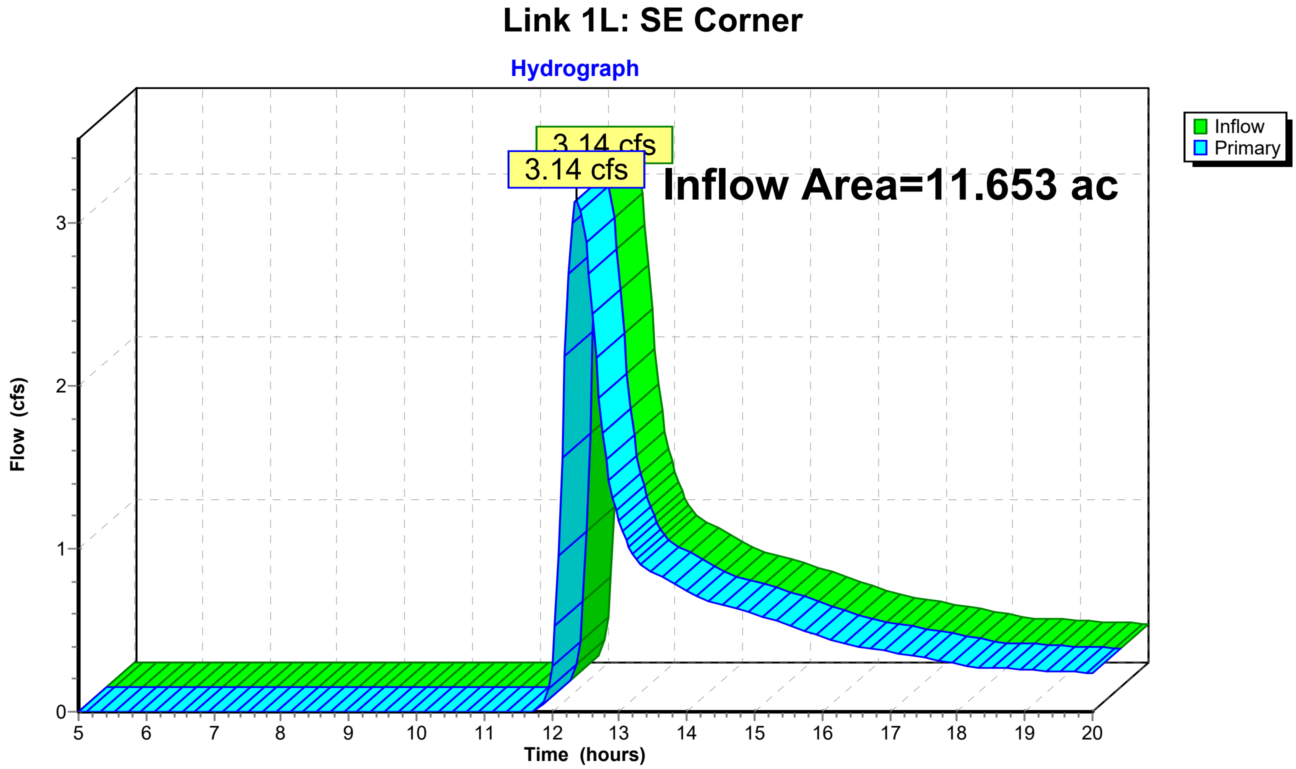
Subcatchment 4W: Wly Wetland



Summary for Link 1L: SE Corner

Inflow Area = 11.653 ac, 0.00% Impervious, Inflow Depth > 0.46" for 10 Yr event
Inflow = 3.14 cfs @ 12.37 hrs, Volume= 0.444 af
Primary = 3.14 cfs @ 12.37 hrs, Volume= 0.444 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1W: Area 1W Runoff Area=6.318 ac 0.00% Impervious Runoff Depth>0.43"
Flow Length=1,579' Tc=12.8 min CN=43 Runoff=1.37 cfs 0.224 af

Subcatchment 2W: Area 2W Runoff Area=5.335 ac 0.00% Impervious Runoff Depth>1.24"
Flow Length=1,077' Tc=19.7 min CN=57 Runoff=5.14 cfs 0.550 af

Subcatchment 3W: Nly PL Runoff Area=10.509 ac 0.00% Impervious Runoff Depth>2.14"
Flow Length=850' Tc=14.8 min CN=69 Runoff=21.35 cfs 1.874 af

Subcatchment 4W: Wly Wetland Runoff Area=8.873 ac 0.00% Impervious Runoff Depth>2.30"
Flow Length=1,383' Tc=16.6 min CN=71 Runoff=18.62 cfs 1.704 af

Link 1L: SE Corner Inflow=6.42 cfs 0.774 af
Primary=6.42 cfs 0.774 af

Total Runoff Area = 31.035 ac Runoff Volume = 4.352 af Average Runoff Depth = 1.68"
100.00% Pervious = 31.035 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1W: Area 1W

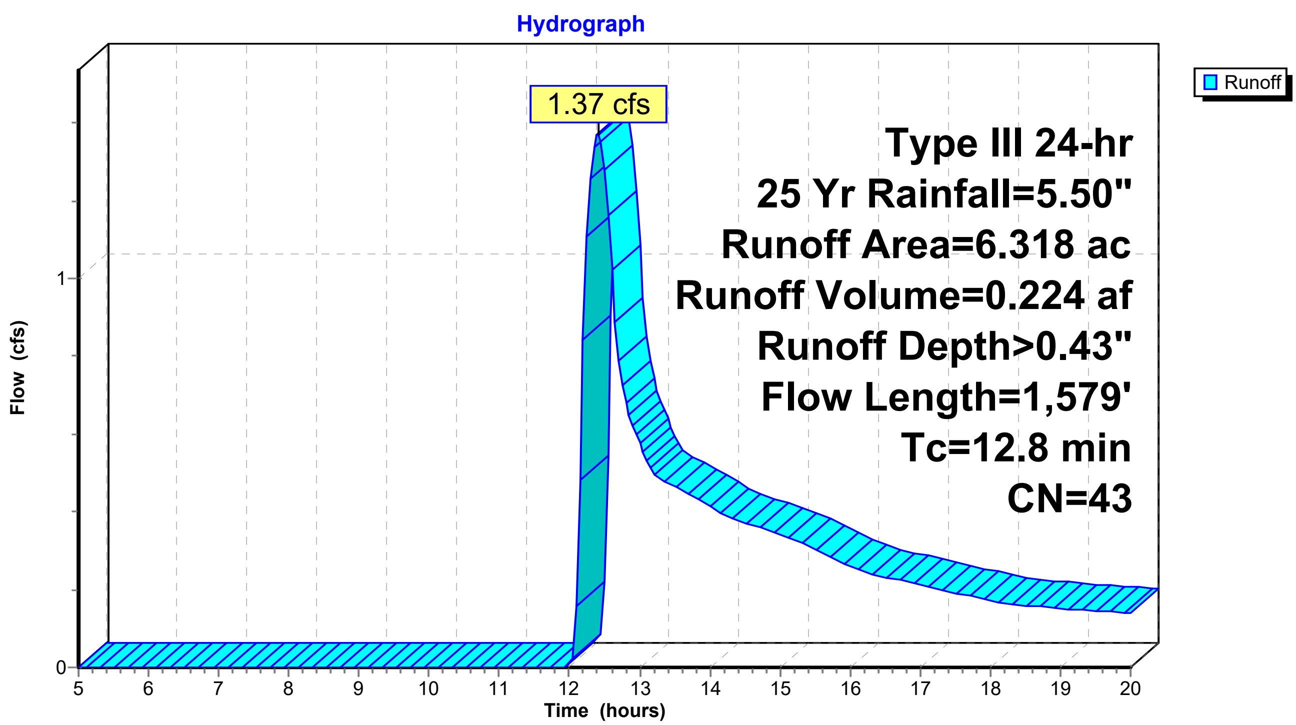
Runoff = 1.37 cfs @ 12.40 hrs, Volume= 0.224 af, Depth> 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
4.067	30	Woods, Good, HSG A
0.315	39	>75% Grass cover, Good, HSG A
1.936	70	Woods, Good, HSG C
6.318	43	Weighted Average
6.318		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
5.3	1,529	0.0900	4.83		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
12.8	1,579	Total			

Subcatchment 1W: Area 1W



Summary for Subcatchment 2W: Area 2W

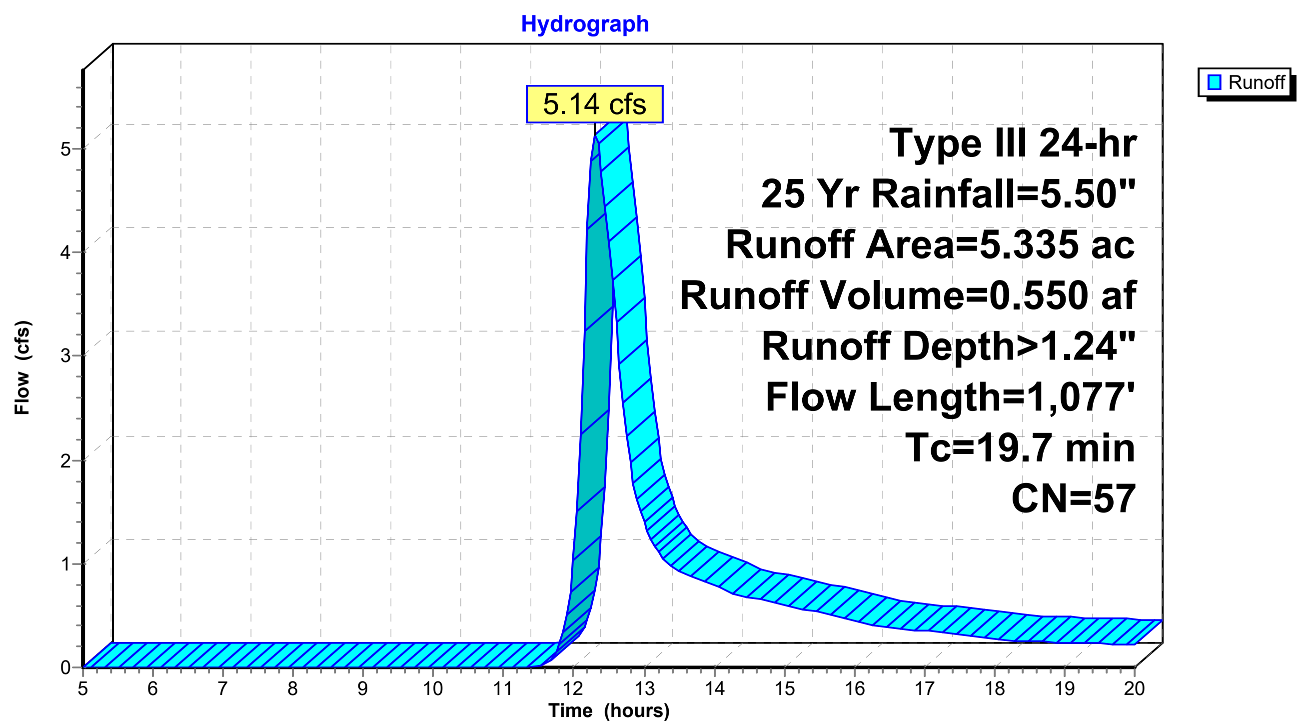
Runoff = 5.14 cfs @ 12.31 hrs, Volume= 0.550 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
1.641	30	Woods, Good, HSG A
0.173	39	>75% Grass cover, Good, HSG A
3.521	70	Woods, Good, HSG C
5.335	57	Weighted Average
5.335		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	1,027	0.1000	5.09		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.7	1,077	Total			

Subcatchment 2W: Area 2W



Summary for Subcatchment 3W: Nly PL

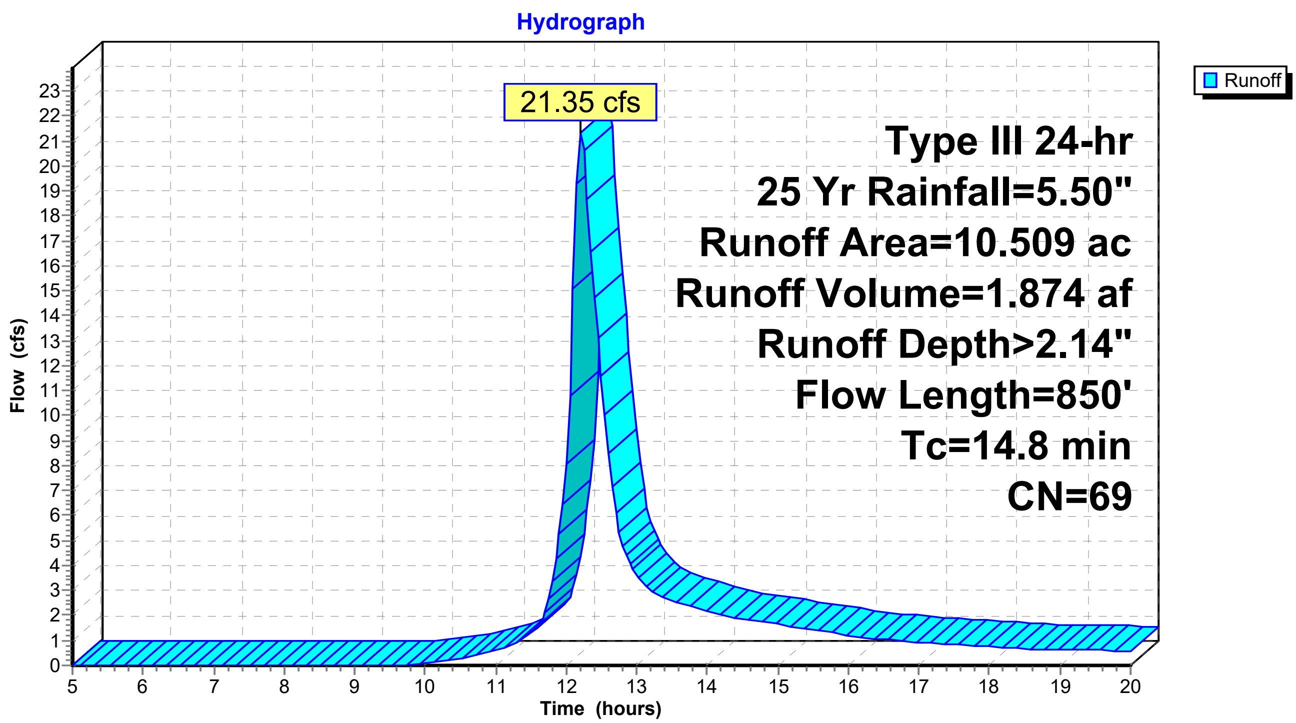
Runoff = 21.35 cfs @ 12.21 hrs, Volume= 1.874 af, Depth> 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
0.439	30	Woods, Good, HSG A
0.106	39	>75% Grass cover, Good, HSG A
8.526	70	Woods, Good, HSG C
1.438	74	>75% Grass cover, Good, HSG C
10.509	69	Weighted Average
10.509		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.5	800	0.1100	5.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.8	850	Total			

Subcatchment 3W: Nly PL



Summary for Subcatchment 4W: Wly Wetland

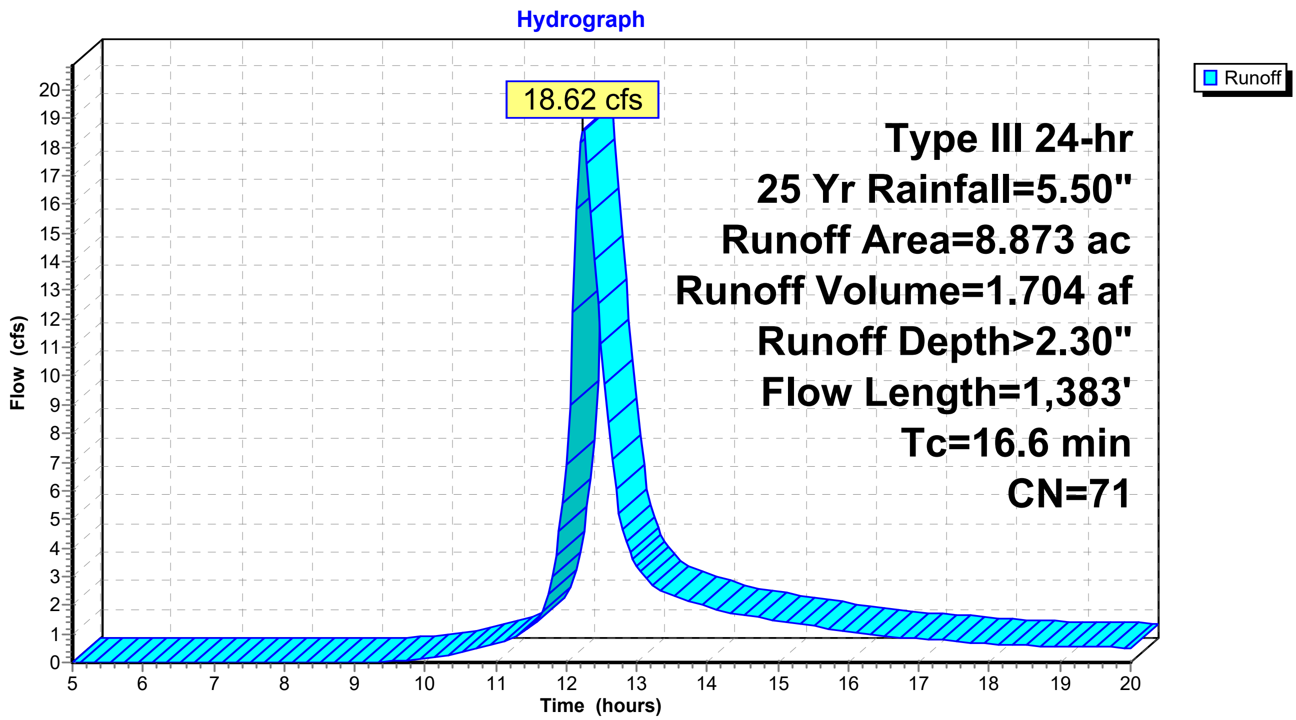
Runoff = 18.62 cfs @ 12.24 hrs, Volume= 1.704 af, Depth> 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
8.010	70	Woods, Good, HSG C
0.428	74	>75% Grass cover, Good, HSG C
0.435	77	Woods, Good, HSG D
8.873	71	Weighted Average
8.873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.1	1,333	0.0520	3.67		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
16.6	1,383	Total			

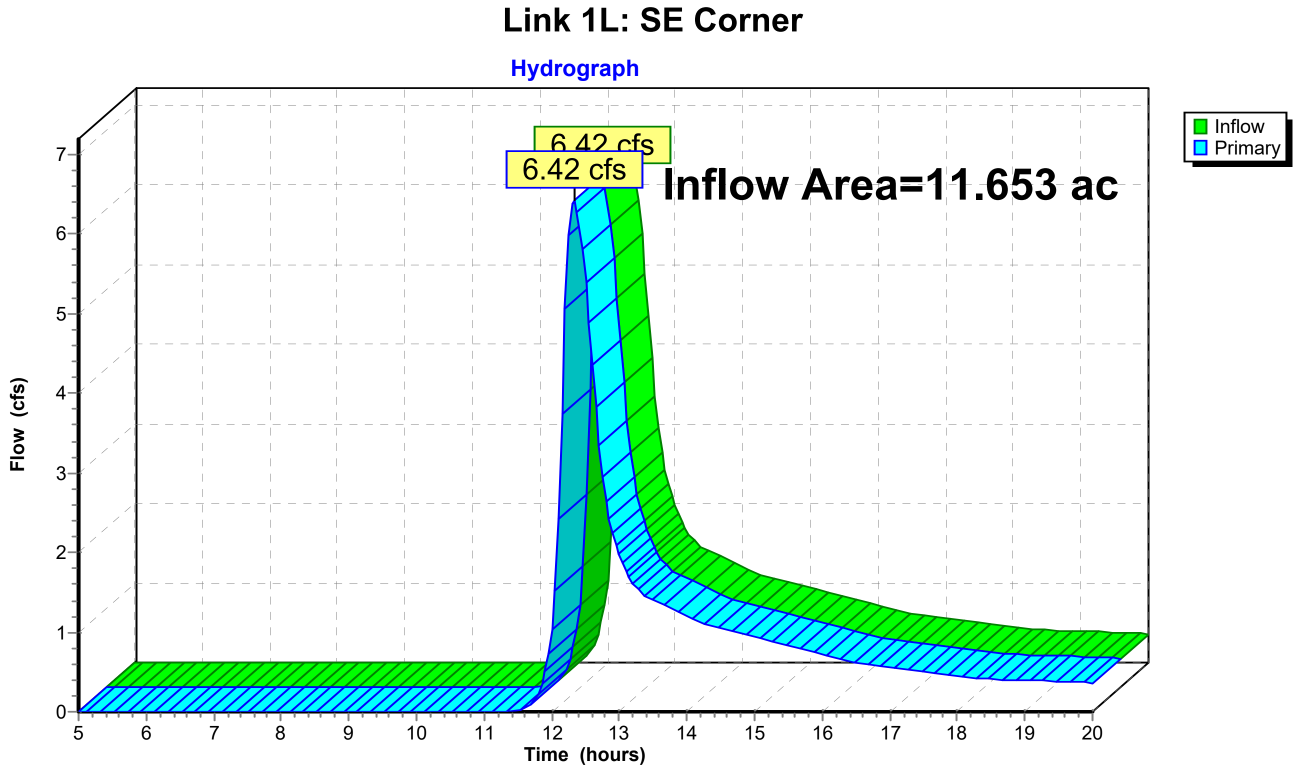
Subcatchment 4W: Wly Wetland



Summary for Link 1L: SE Corner

Inflow Area =	11.653 ac,	0.00% Impervious, Inflow Depth >	0.80"	for 25 Yr event
Inflow =	6.42 cfs @	12.33 hrs, Volume=	0.774 af	
Primary =	6.42 cfs @	12.33 hrs, Volume=	0.774 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1W: Area 1W Runoff Area=6.318 ac 0.00% Impervious Runoff Depth>0.83"
Flow Length=1,579' Tc=12.8 min CN=43 Runoff=3.55 cfs 0.434 af

Subcatchment 2W: Area 2W Runoff Area=5.335 ac 0.00% Impervious Runoff Depth>1.92"
Flow Length=1,077' Tc=19.7 min CN=57 Runoff=8.38 cfs 0.852 af

Subcatchment 3W: Nly PL Runoff Area=10.509 ac 0.00% Impervious Runoff Depth>3.02"
Flow Length=850' Tc=14.8 min CN=69 Runoff=30.36 cfs 2.648 af

Subcatchment 4W: Wly Wetland Runoff Area=8.873 ac 0.00% Impervious Runoff Depth>3.22"
Flow Length=1,383' Tc=16.6 min CN=71 Runoff=26.06 cfs 2.379 af

Link 1L: SE Corner Inflow=11.85 cfs 1.286 af
Primary=11.85 cfs 1.286 af

Total Runoff Area = 31.035 ac Runoff Volume = 6.313 af Average Runoff Depth = 2.44"
100.00% Pervious = 31.035 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1W: Area 1W

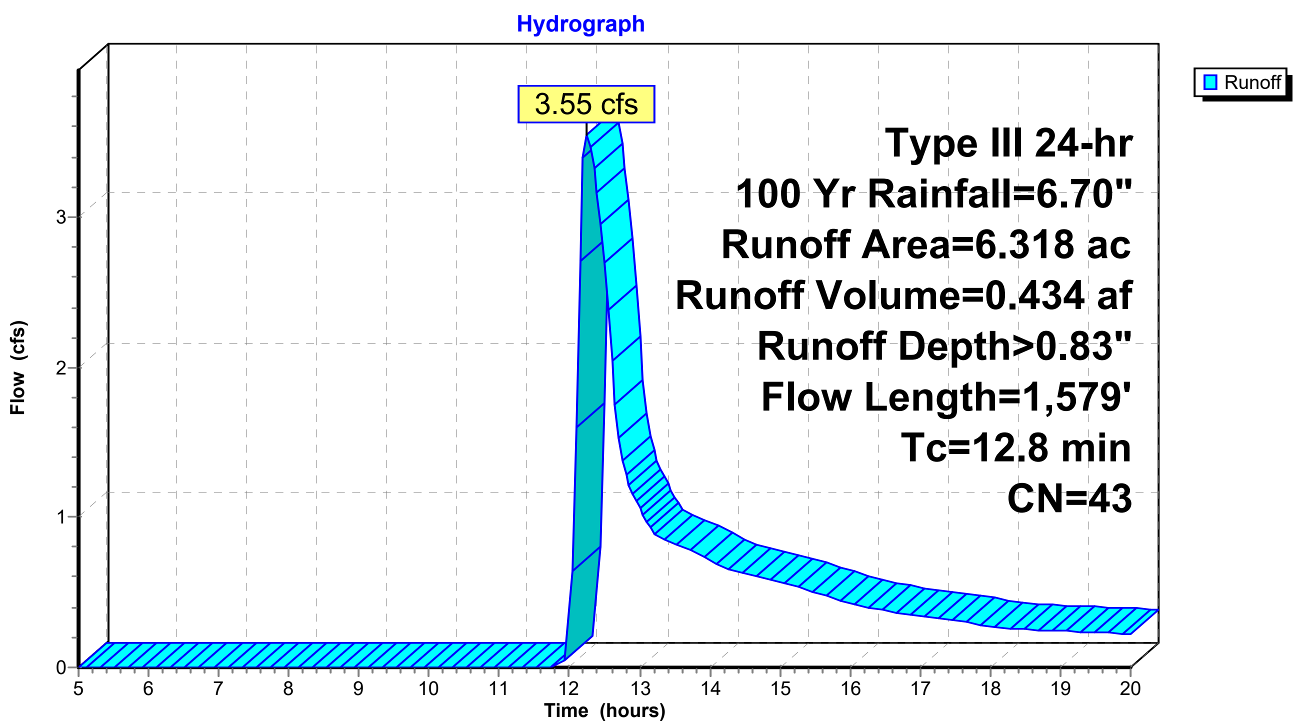
Runoff = 3.55 cfs @ 12.26 hrs, Volume= 0.434 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
4.067	30	Woods, Good, HSG A
0.315	39	>75% Grass cover, Good, HSG A
1.936	70	Woods, Good, HSG C
6.318	43	Weighted Average
6.318		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0700	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
5.3	1,529	0.0900	4.83		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
12.8	1,579	Total			

Subcatchment 1W: Area 1W



Summary for Subcatchment 2W: Area 2W

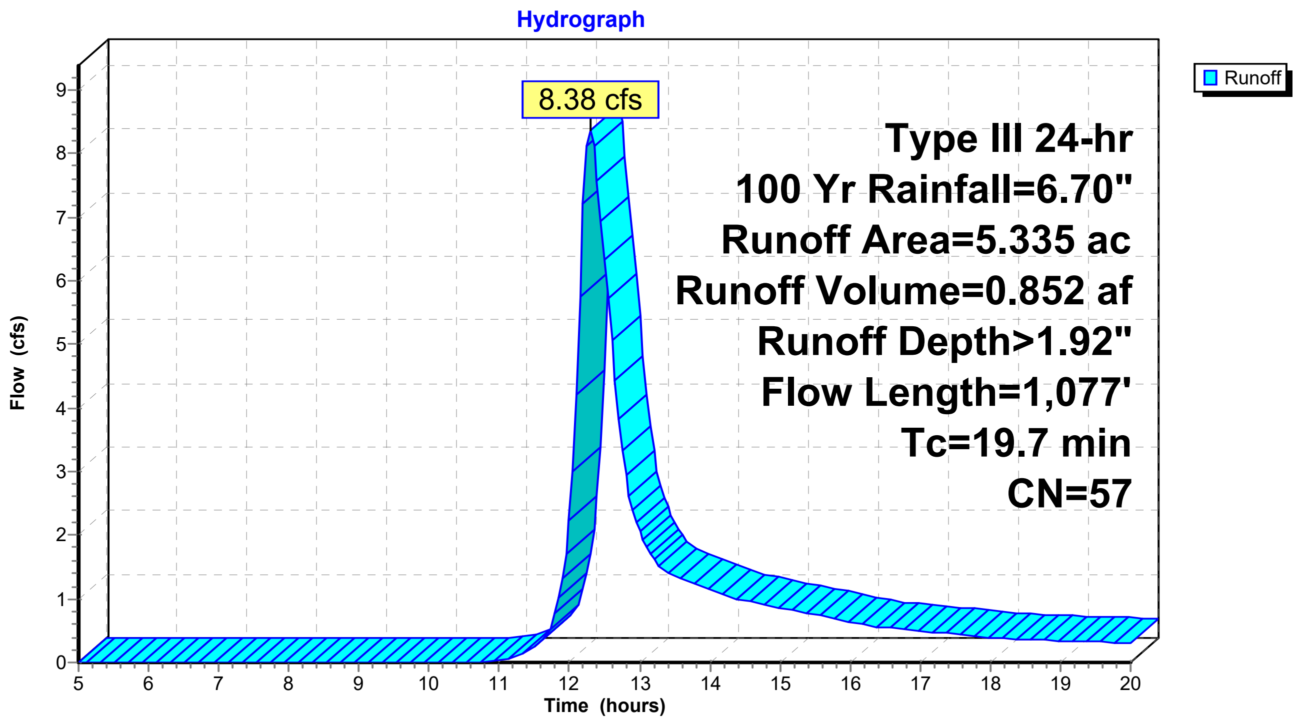
Runoff = 8.38 cfs @ 12.30 hrs, Volume= 0.852 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
1.641	30	Woods, Good, HSG A
0.173	39	>75% Grass cover, Good, HSG A
3.521	70	Woods, Good, HSG C
5.335	57	Weighted Average
5.335		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	1,027	0.1000	5.09		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.7	1,077	Total			

Subcatchment 2W: Area 2W



Summary for Subcatchment 3W: Nly PL

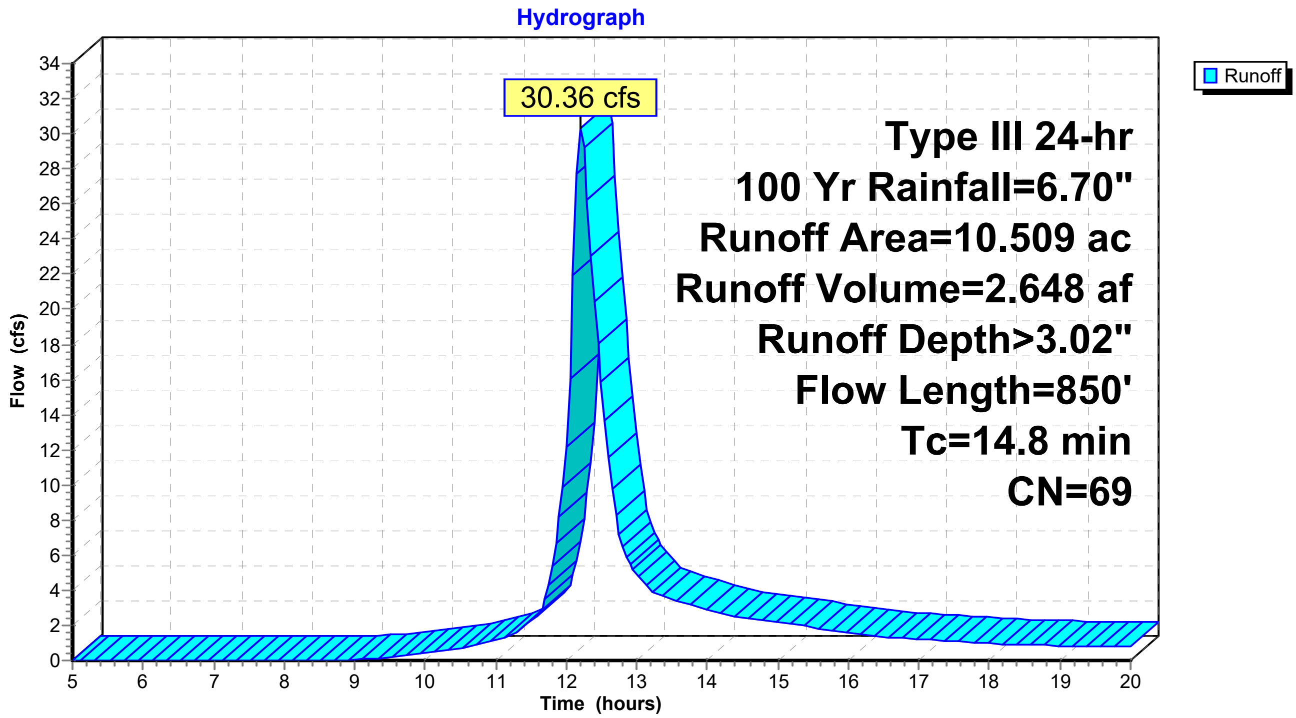
Runoff = 30.36 cfs @ 12.21 hrs, Volume= 2.648 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
0.439	30	Woods, Good, HSG A
0.106	39	>75% Grass cover, Good, HSG A
8.526	70	Woods, Good, HSG C
1.438	74	>75% Grass cover, Good, HSG C
10.509	69	Weighted Average
10.509		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.5	800	0.1100	5.34		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
14.8	850	Total			

Subcatchment 3W: Nly PL



Summary for Subcatchment 4W: Wly Wetland

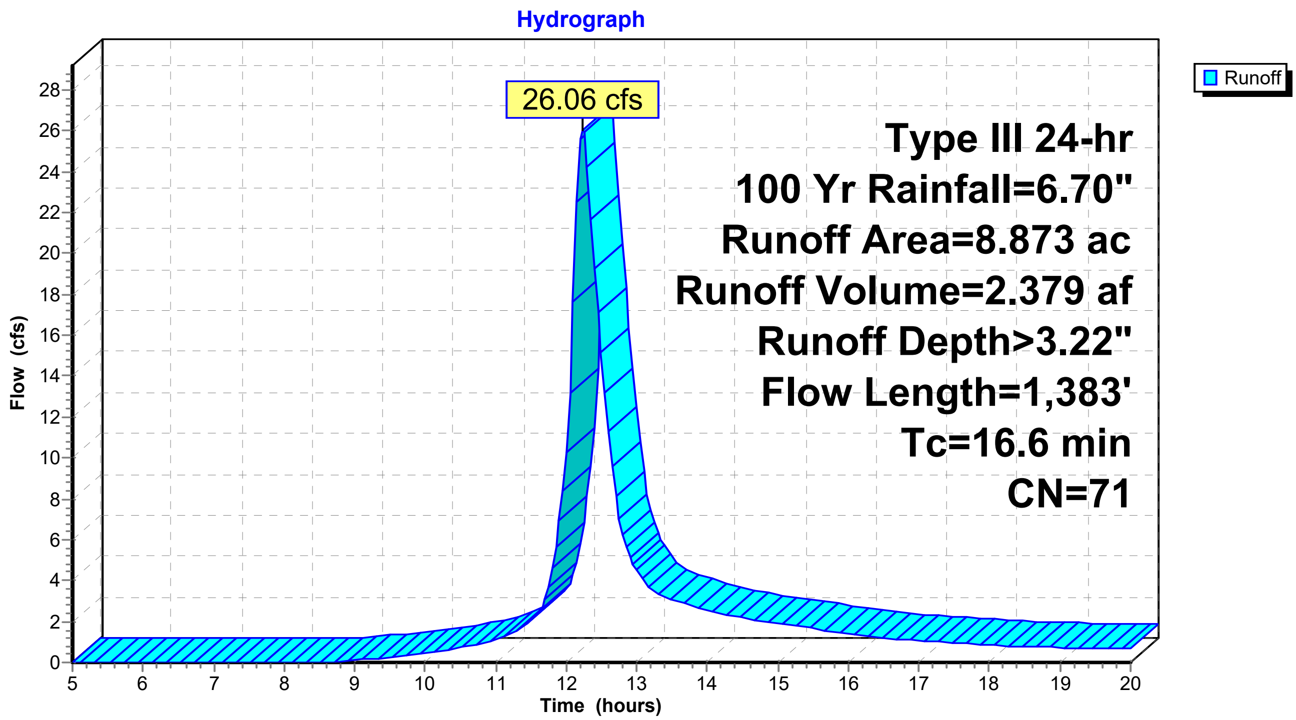
Runoff = 26.06 cfs @ 12.23 hrs, Volume= 2.379 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
8.010	70	Woods, Good, HSG C
0.428	74	>75% Grass cover, Good, HSG C
0.435	77	Woods, Good, HSG D
8.873	71	Weighted Average
8.873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.1	1,333	0.0520	3.67		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
16.6	1,383	Total			

Subcatchment 4W: Wly Wetland

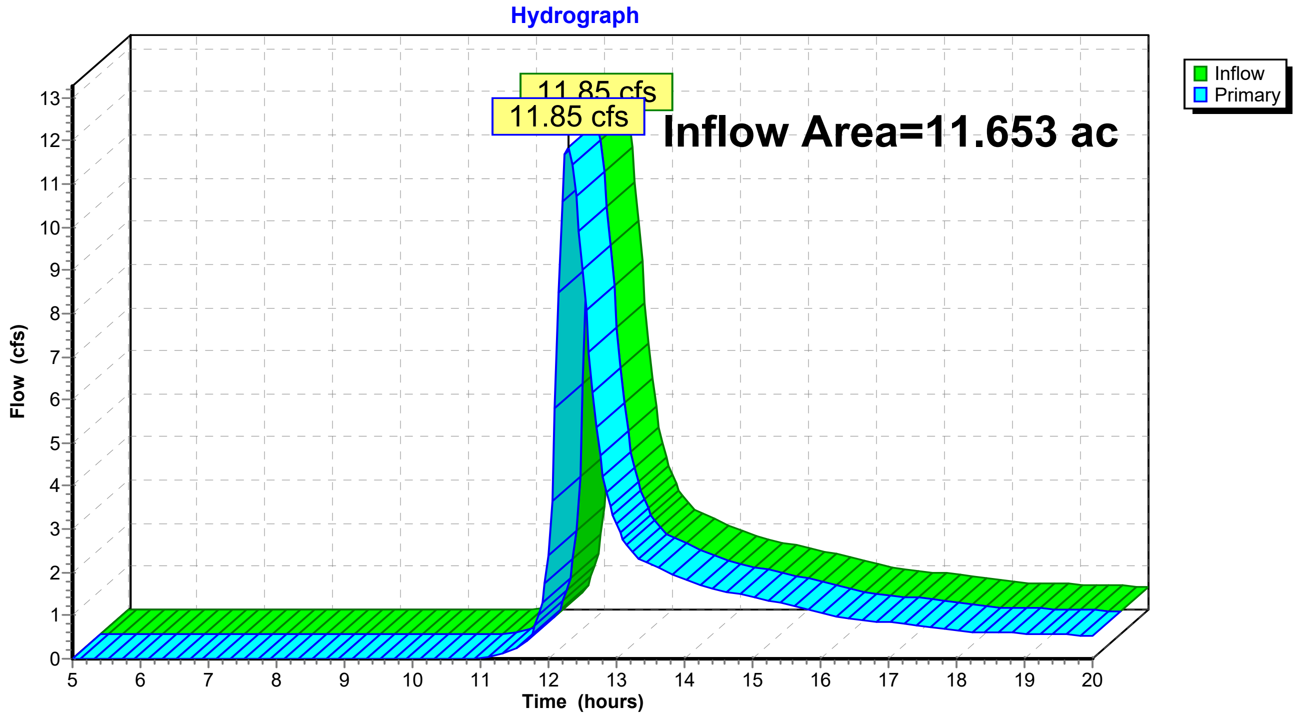


Summary for Link 1L: SE Corner

Inflow Area =	11.653 ac,	0.00% Impervious,	Inflow Depth > 1.32"	for 100 Yr event
Inflow =	11.85 cfs @	12.29 hrs, Volume=	1.286 af	
Primary =	11.85 cfs @	12.29 hrs, Volume=	1.286 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: SE Corner

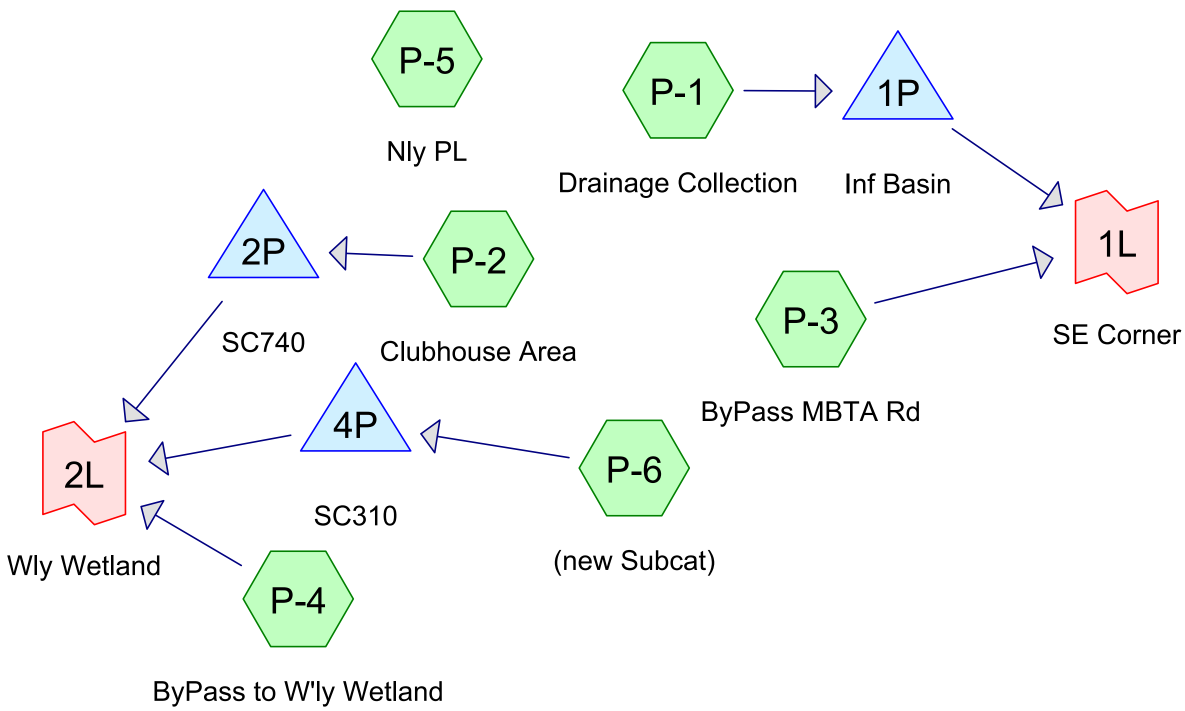


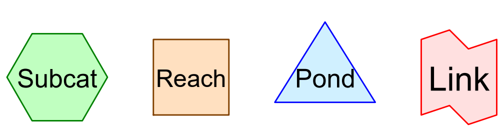
Appendix B

HYDRO-CAD POST-DEVELOPMENT DRAINAGE ANALYSIS

ALLEN & MAJOR ASSOCIATES, INC.

A P P E N D I X B





Routing Diagram for 2604-01 - Proposed Conditions
Prepared by {enter your company name here}, Printed 12/23/2020
HydroCAD® 10.00-26 s/n 02946 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.630	39	>75% Grass cover, Good, HSG A (P-1, P-3, P-5)
8.410	74	>75% Grass cover, Good, HSG C (P-1, P-2, P-3, P-4, P-5)
0.650	98	Paved parking, HSG A (P-1)
3.560	98	Paved parking, HSG C (P-1, P-2, P-4, P-5)
2.295	98	Roofs, HSG C (P-1, P-2, P-6)
3.490	30	Woods, Good, HSG A (P-1, P-3, P-5)
9.580	70	Woods, Good, HSG C (P-1, P-3, P-4, P-5)
0.430	77	Woods, Good, HSG D (P-4)
31.045	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
6.770	HSG A	P-1, P-3, P-5
0.000	HSG B	
23.845	HSG C	P-1, P-2, P-3, P-4, P-5, P-6
0.430	HSG D	P-4
0.000	Other	
31.045		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.630	0.000	8.410	0.000	0.000	11.040	>75% Grass cover, Good	P-1, P-2, P-3, P-4, P-5
0.650	0.000	3.560	0.000	0.000	4.210	Paved parking	P-1, P-2, P-4, P-5
0.000	0.000	2.295	0.000	0.000	2.295	Roofs	P-1, P-2, P-6
3.490	0.000	9.580	0.430	0.000	13.500	Woods, Good	P-1, P-3, P-4, P-5
6.770	**0.000**	**23.845**	**0.430**	**0.000**	**31.045**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	1P	280.91	277.45	119.0	0.0291	0.012	24.0	0.0	0.0
2	2P	363.28	362.54	74.0	0.0100	0.012	18.0	0.0	0.0
3	4P	365.00	364.75	25.0	0.0100	0.012	6.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Drainage Collection Runoff Area=11.764 ac 40.04% Impervious Runoff Depth>1.23"
Flow Length=345' Tc=14.0 min CN=79 Runoff=13.97 cfs 1.204 af

Subcatchment P-2: Clubhouse Area Runoff Area=2.320 ac 70.69% Impervious Runoff Depth>2.12"
Flow Length=305' Tc=12.5 min CN=91 Runoff=4.88 cfs 0.410 af

Subcatchment P-3: ByPass MBTA Rd Runoff Area=7.626 ac 0.00% Impervious Runoff Depth>0.10"
Flow Length=1,801' Tc=19.5 min CN=50 Runoff=0.15 cfs 0.063 af

Subcatchment P-4: ByPass to W'ly Wetland Runoff Area=6.820 ac 0.29% Impervious Runoff Depth>0.79"
Flow Length=258' Tc=13.6 min CN=71 Runoff=4.95 cfs 0.450 af

Subcatchment P-5: Nly PL Runoff Area=2.410 ac 1.24% Impervious Runoff Depth>0.53"
Flow Length=77' Tc=8.0 min CN=65 Runoff=1.21 cfs 0.107 af

Subcatchment P-6: (new Subcat) Runoff Area=0.105 ac 100.00% Impervious Runoff Depth>2.77"
Tc=6.0 min CN=98 Runoff=0.32 cfs 0.024 af

Pond 1P: Inf Basin Peak Elev=284.94' Storage=18,165 cf Inflow=13.97 cfs 1.204 af
Discarded=2.68 cfs 1.201 af Primary=0.00 cfs 0.000 af Outflow=2.68 cfs 1.201 af

Pond 2P: SC740 Peak Elev=366.09' Storage=0.330 af Inflow=4.88 cfs 0.410 af
Discarded=0.08 cfs 0.081 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.081 af

Pond 4P: SC310 Peak Elev=364.12' Storage=0.015 af Inflow=0.32 cfs 0.024 af
Discarded=0.01 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.010 af

Link 1L: SE Corner Inflow=0.15 cfs 0.063 af
Primary=0.15 cfs 0.063 af

Link 2L: Wly Wetland Inflow=4.95 cfs 0.450 af
Primary=4.95 cfs 0.450 af

Total Runoff Area = 31.045 ac Runoff Volume = 2.260 af Average Runoff Depth = 0.87"
79.05% Pervious = 24.540 ac 20.95% Impervious = 6.505 ac

Summary for Subcatchment P-1: Drainage Collection

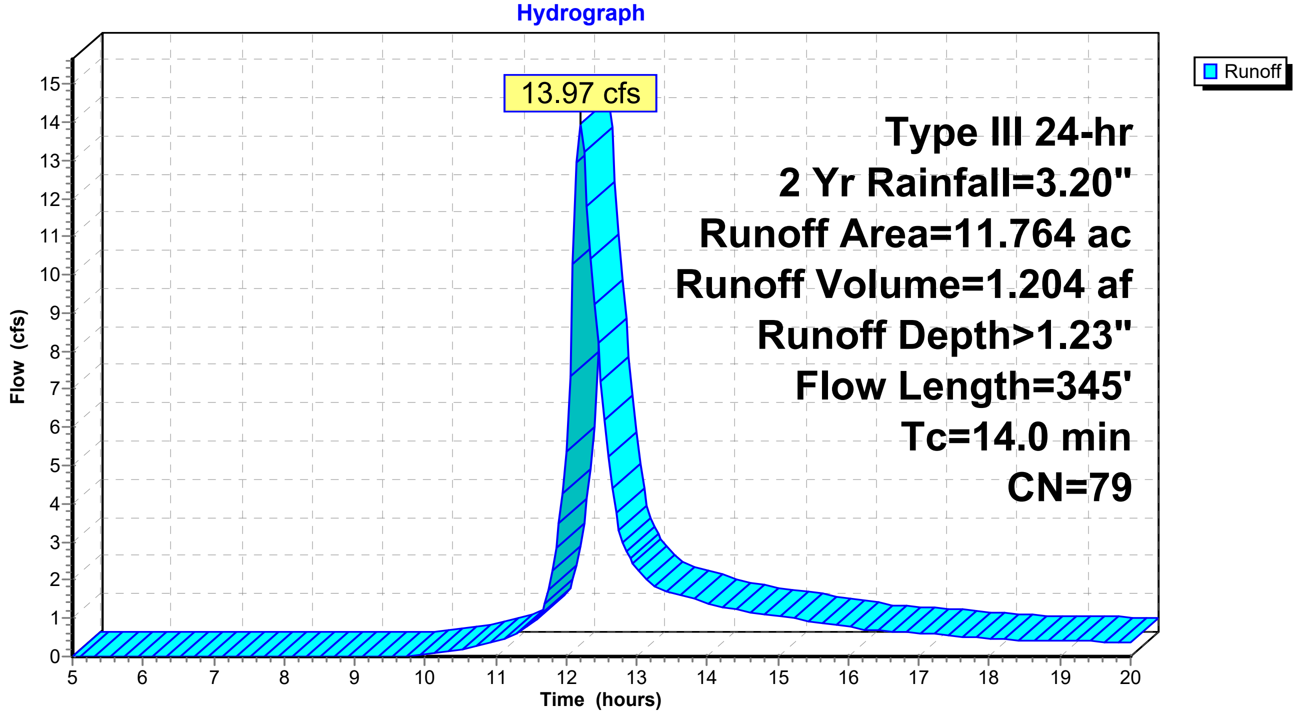
Runoff = 13.97 cfs @ 12.20 hrs, Volume= 1.204 af, Depth> 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
0.080	30	Woods, Good, HSG A
1.510	39	>75% Grass cover, Good, HSG A
0.650	98	Paved parking, HSG A
0.294	70	Woods, Good, HSG C
5.170	74	>75% Grass cover, Good, HSG C
3.240	98	Paved parking, HSG C
0.820	98	Roofs, HSG C
11.764	79	Weighted Average
7.054		59.96% Pervious Area
4.710		40.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.1	62	0.3300	9.25		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.9	88	0.0100	1.61		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
14.0	345	Total			

Subcatchment P-1: Drainage Collection



Summary for Subcatchment P-2: Clubhouse Area

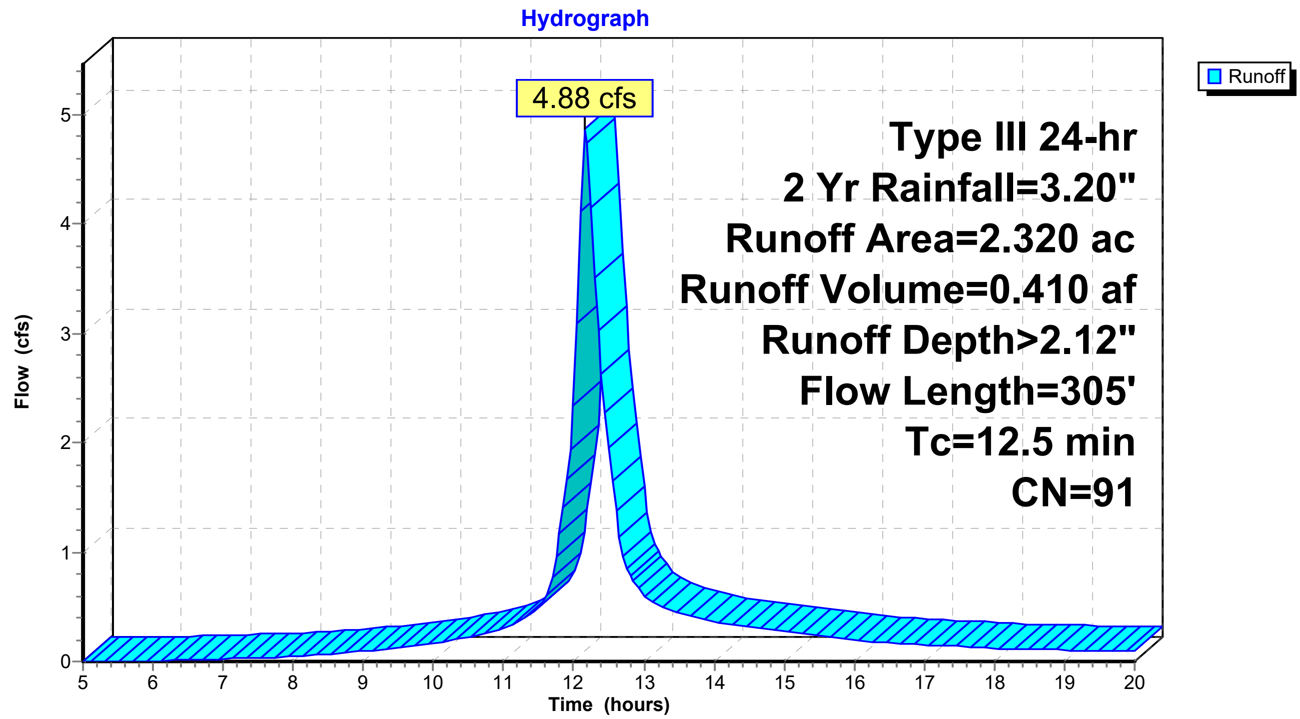
Runoff = 4.88 cfs @ 12.17 hrs, Volume= 0.410 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
0.680	74	>75% Grass cover, Good, HSG C
0.270	98	Paved parking, HSG C
1.370	98	Roofs, HSG C
2.320	91	Weighted Average
0.680		29.31% Pervious Area
1.640		70.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.7	89	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	166	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
12.5	305	Total			

Subcatchment P-2: Clubhouse Area



Summary for Subcatchment P-3: ByPass MBTA Rd

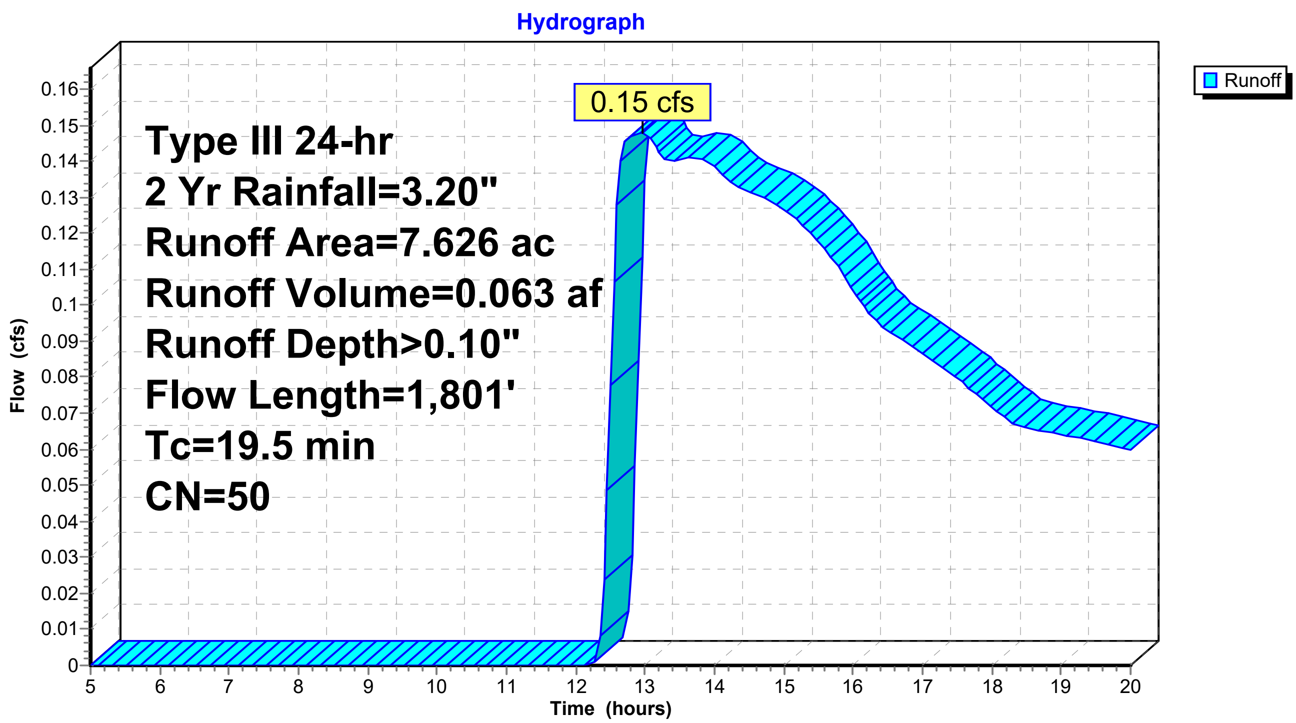
Runoff = 0.15 cfs @ 12.96 hrs, Volume= 0.063 af, Depth> 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
3.340	30	Woods, Good, HSG A
0.600	39	>75% Grass cover, Good, HSG A
3.306	70	Woods, Good, HSG C
0.380	74	>75% Grass cover, Good, HSG C
7.626	50	Weighted Average
7.626		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	1,751	0.0760	4.44		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.5	1,801	Total			

Subcatchment P-3: ByPass MBTA Rd



Summary for Subcatchment P-4: ByPass to W'ly Wetland

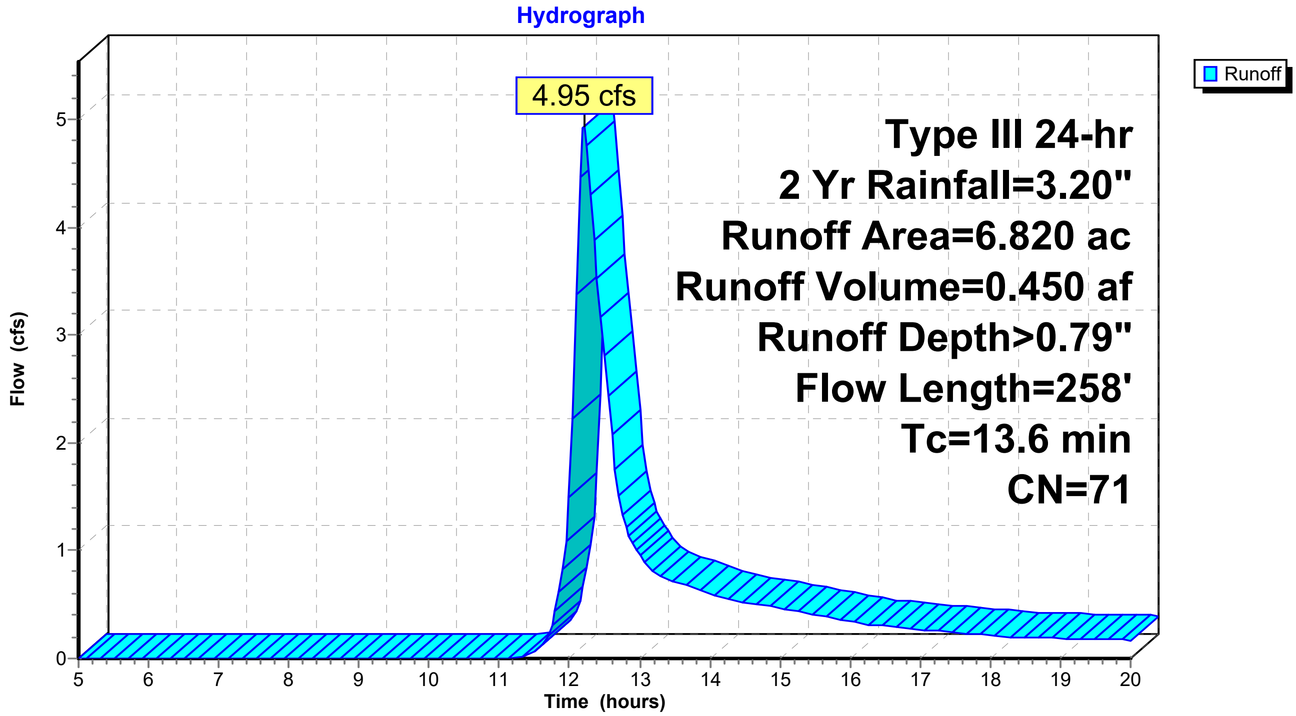
Runoff = 4.95 cfs @ 12.21 hrs, Volume= 0.450 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
5.540	70	Woods, Good, HSG C
0.830	74	>75% Grass cover, Good, HSG C
0.020	98	Paved parking, HSG C
0.430	77	Woods, Good, HSG D
6.820	71	Weighted Average
6.800		99.71% Pervious Area
0.020		0.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	208	0.0270	2.65		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.6	258	Total			

Subcatchment P-4: ByPass to W'ly Wetland



Summary for Subcatchment P-5: Nly PL

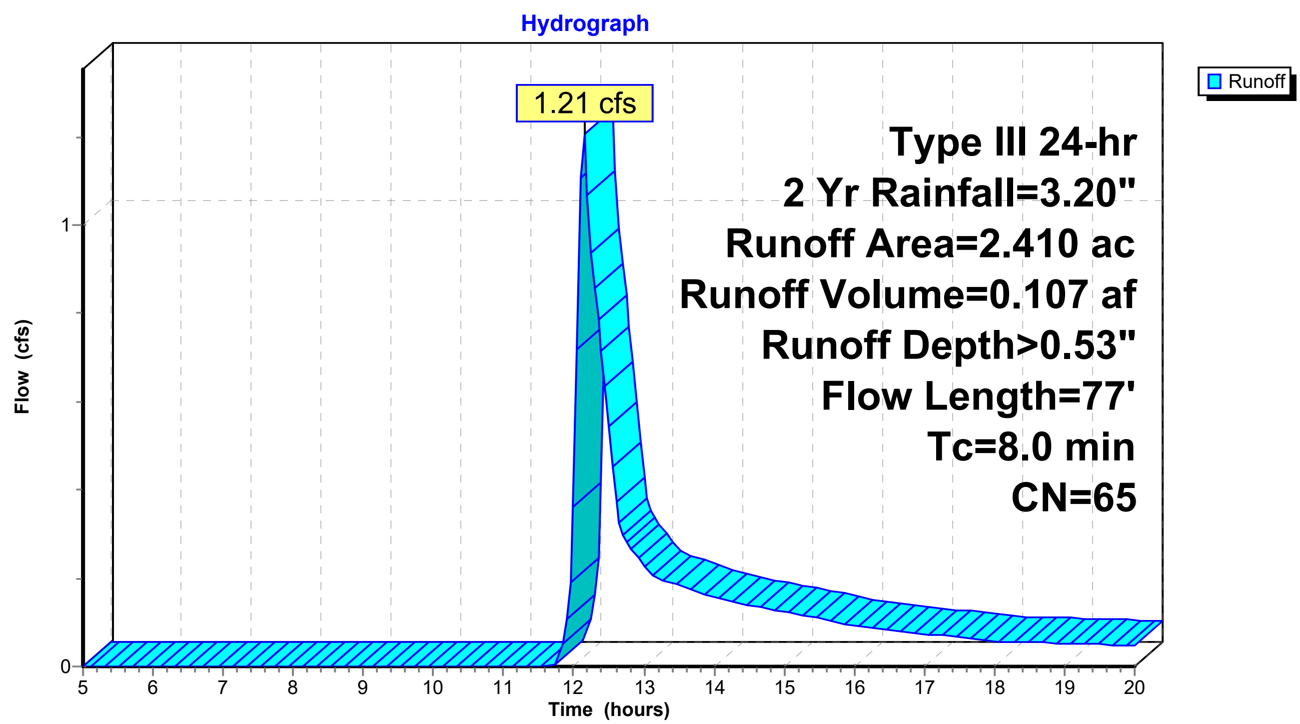
Runoff = 1.21 cfs @ 12.15 hrs, Volume= 0.107 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
0.070	30	Woods, Good, HSG A
0.520	39	>75% Grass cover, Good, HSG A
0.440	70	Woods, Good, HSG C
1.350	74	>75% Grass cover, Good, HSG C
0.030	98	Paved parking, HSG C
2.410	65	Weighted Average
2.380		98.76% Pervious Area
0.030		1.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	27	0.0700	4.26		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.0	77	Total			

Subcatchment P-5: Nly PL



Summary for Subcatchment P-6: (new Subcat)

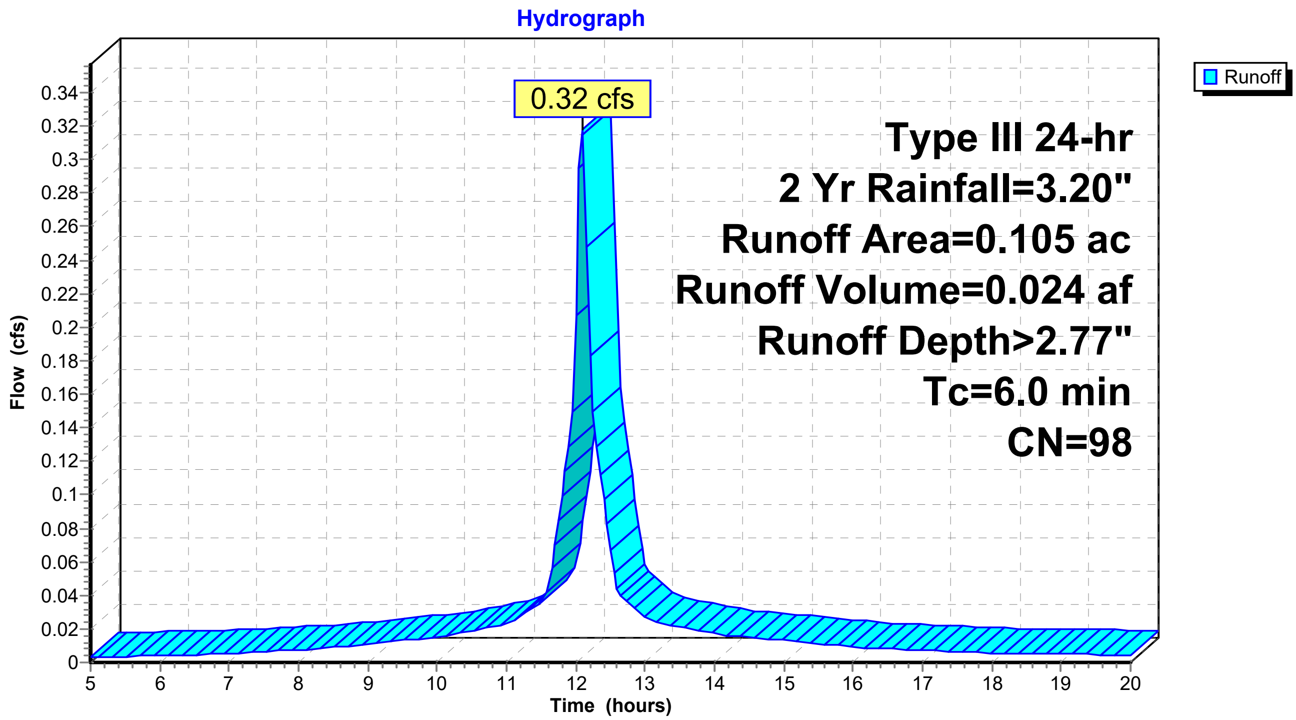
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.024 af, Depth> 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Yr Rainfall=3.20"

Area (ac)	CN	Description
0.105	98	Roofs, HSG C
0.105		100.00% Impervious Area

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

Subcatchment P-6: (new Subcat)



Summary for Pond 1P: Inf Basin

Inflow Area = 11.764 ac, 40.04% Impervious, Inflow Depth > 1.23" for 2 Yr event
Inflow = 13.97 cfs @ 12.20 hrs, Volume= 1.204 af
Outflow = 2.68 cfs @ 12.87 hrs, Volume= 1.201 af, Atten= 81%, Lag= 40.0 min
Discarded = 2.68 cfs @ 12.87 hrs, Volume= 1.201 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 284.94' @ 12.87 hrs Surf.Area= 14,006 sf Storage= 18,165 cf

Plug-Flow detention time= 60.2 min calculated for 1.201 af (100% of inflow)
Center-of-Mass det. time= 59.2 min (871.6 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1	283.50'	112,982 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

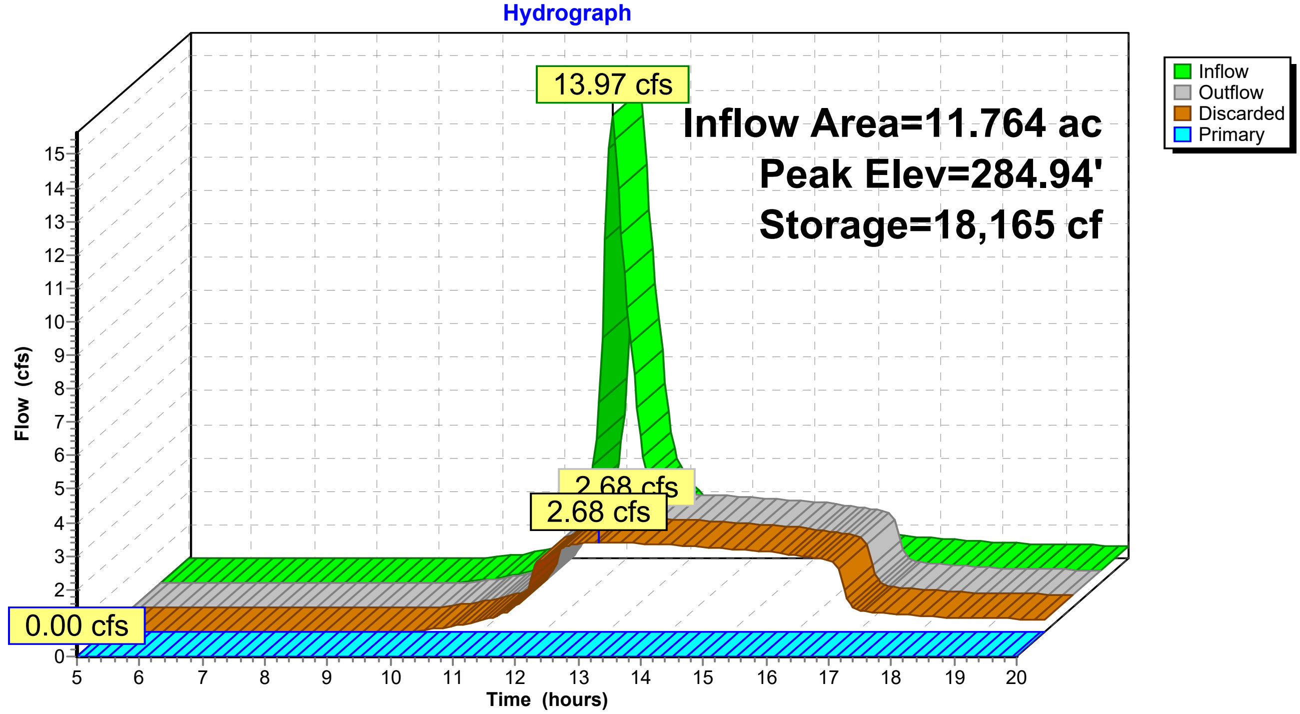
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
283.50	10,661	0	0
284.00	12,357	5,755	5,755
285.00	14,108	13,233	18,987
286.00	15,917	15,013	34,000
287.00	17,782	16,850	50,849
288.00	19,703	18,743	69,592
289.00	21,681	20,692	90,284
290.00	23,716	22,699	112,982

Device	Routing	Invert	Outlet Devices
#1	Discarded	283.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	280.91'	**24.0" Round Culvert** L= 119.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.91' / 277.45' S= 0.0291 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	286.90'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	287.25'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 2	288.50'	**16.0' 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=2.68 cfs @ 12.87 hrs HW=284.94' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 2.68 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=283.50' (Free Discharge)
└─**2=Culvert** (Passes 0.00 cfs of 19.07 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Inf Basin



Summary for Pond 2P: SC740

Inflow Area = 2.320 ac, 70.69% Impervious, Inflow Depth > 2.12" for 2 Yr event
Inflow = 4.88 cfs @ 12.17 hrs, Volume= 0.410 af
Outflow = 0.08 cfs @ 9.35 hrs, Volume= 0.081 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.08 cfs @ 9.35 hrs, Volume= 0.081 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 366.09' @ 20.00 hrs Surf.Area= 0.301 ac Storage= 0.330 af

Plug-Flow detention time= 204.2 min calculated for 0.081 af (20% of inflow)
Center-of-Mass det. time= 66.5 min (842.5 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	0.265 af	**58.50'W x 224.34'L x 3.50'H Field A** 1.054 af Overall - 0.392 af Embedded = 0.662 af x 40.0% Voids
#2A	365.00'	0.392 af	**ADS_StormTech SC-740 +Cap** x 372 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 372 Chambers in 12 Rows
		0.657 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	363.28'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.28' / 362.54' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	366.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	366.70'	**4.0" Vert. Orifice/Grate X 4.00** C= 0.600
#5	Device 2	367.50'	**6.0' 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=0.08 cfs @ 9.35 hrs HW=364.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=364.50' (Free Discharge)
└─**2=Culvert** (Passes 0.00 cfs of 5.79 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SC740 - 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

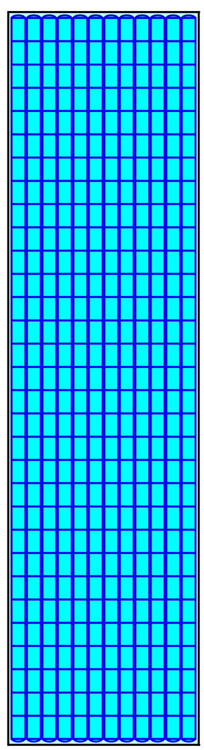
31 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 222.34' Row Length +12.0" End Stone x 2 = 224.34' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

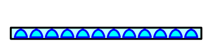
372 Chambers x 45.9 cf = 17,089.7 cf Chamber Storage

45,932.9 cf Field - 17,089.7 cf Chambers = 28,843.2 cf Stone x 40.0% Voids = 11,537.3 cf Stone Storage

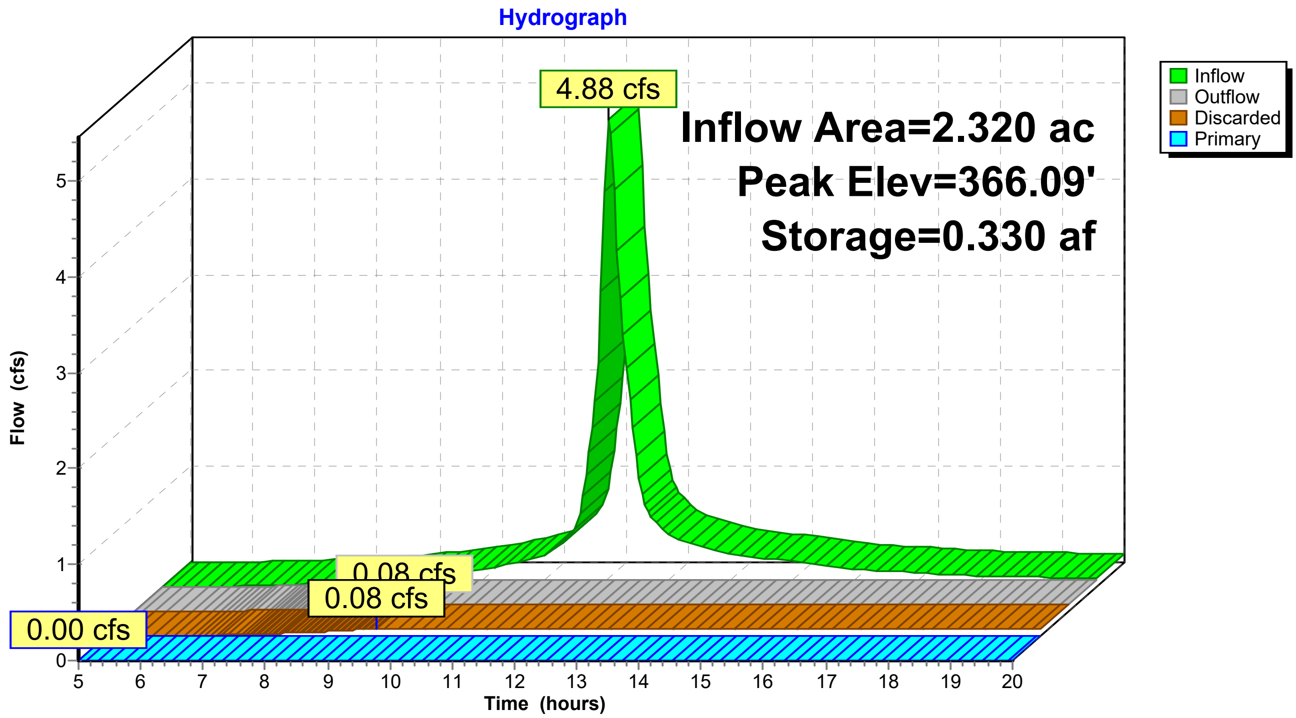
Chamber Storage + Stone Storage = 28,627.0 cf = 0.657 af
Overall Storage Efficiency = 62.3%
Overall System Size = 224.34' x 58.50' x 3.50'

372 Chambers
1,701.2 cy Field
1,068.3 cy Stone





Pond 2P: SC740



Summary for Pond 4P: SC310

[82] Warning: Early inflow requires earlier time span

Inflow Area =	0.105 ac,100.00% Impervious,	Inflow Depth > 2.77"	for 2 Yr event	
Inflow =	0.32 cfs @	12.09 hrs, Volume=	0.024 af	
Outflow =	0.01 cfs @	8.85 hrs, Volume=	0.010 af,	Atten= 97%, Lag= 0.0 min
Discarded =	0.01 cfs @	8.85 hrs, Volume=	0.010 af	
Primary =	0.00 cfs @	5.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.12' @ 16.07 hrs Surf.Area= 0.033 ac Storage= 0.015 af

Plug-Flow detention time= 175.1 min calculated for 0.010 af (40% of inflow)
Center-of-Mass det. time= 61.7 min (800.3 - 738.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	363.25'	0.024 af	**8.17'W x 174.08'L x 2.33'H Field A** 0.076 af Overall - 0.016 af Embedded = 0.060 af x 40.0% Voids
#2A	363.75'	0.016 af	**ADS_StormTech SC-310 +Cap** x 48 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 48 Chambers in 2 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.25'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	365.00'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 364.75' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.01 cfs @ 8.85 hrs HW=363.27' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=363.25' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 4P: SC310 - 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

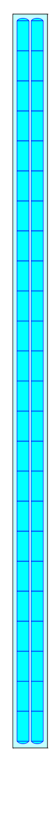
24 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 172.08' Row Length +12.0" End Stone x 2 = 174.08' Base Length
2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

48 Chambers x 14.7 cf = 707.6 cf Chamber Storage

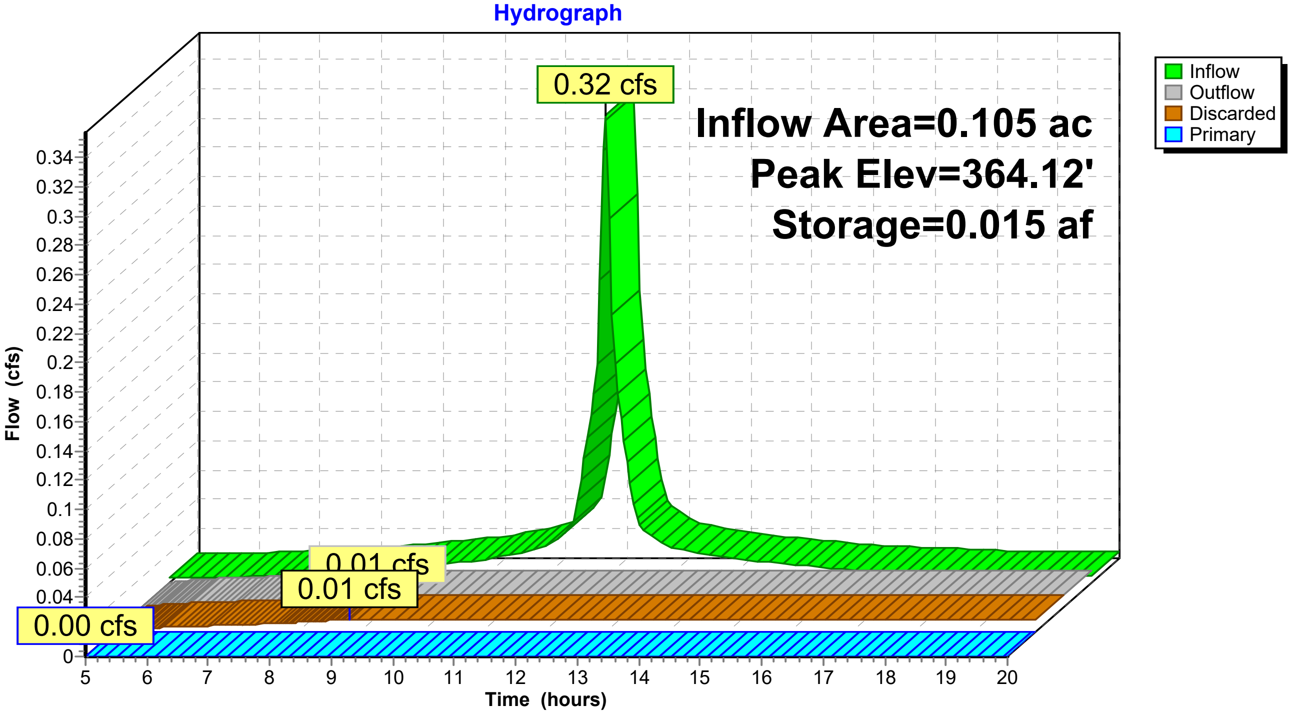
3,317.2 cf Field - 707.6 cf Chambers = 2,609.6 cf Stone x 40.0% Voids = 1,043.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,751.4 cf = 0.040 af
Overall Storage Efficiency = 52.8%
Overall System Size = 174.08' x 8.17' x 2.33'

48 Chambers
122.9 cy Field
96.7 cy Stone



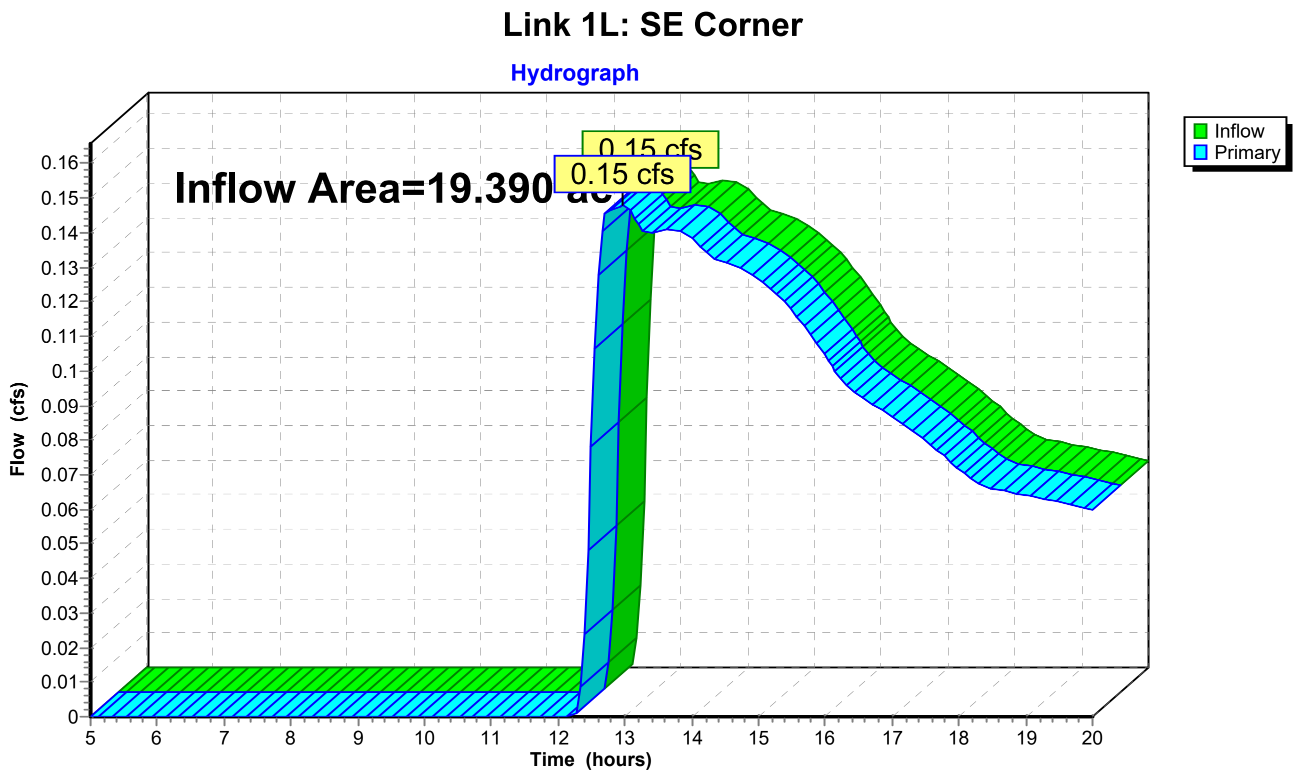
Pond 4P: SC310



Summary for Link 1L: SE Corner

Inflow Area = 19.390 ac, 24.29% Impervious, Inflow Depth > 0.04" for 2 Yr event
Inflow = 0.15 cfs @ 12.96 hrs, Volume= 0.063 af
Primary = 0.15 cfs @ 12.96 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

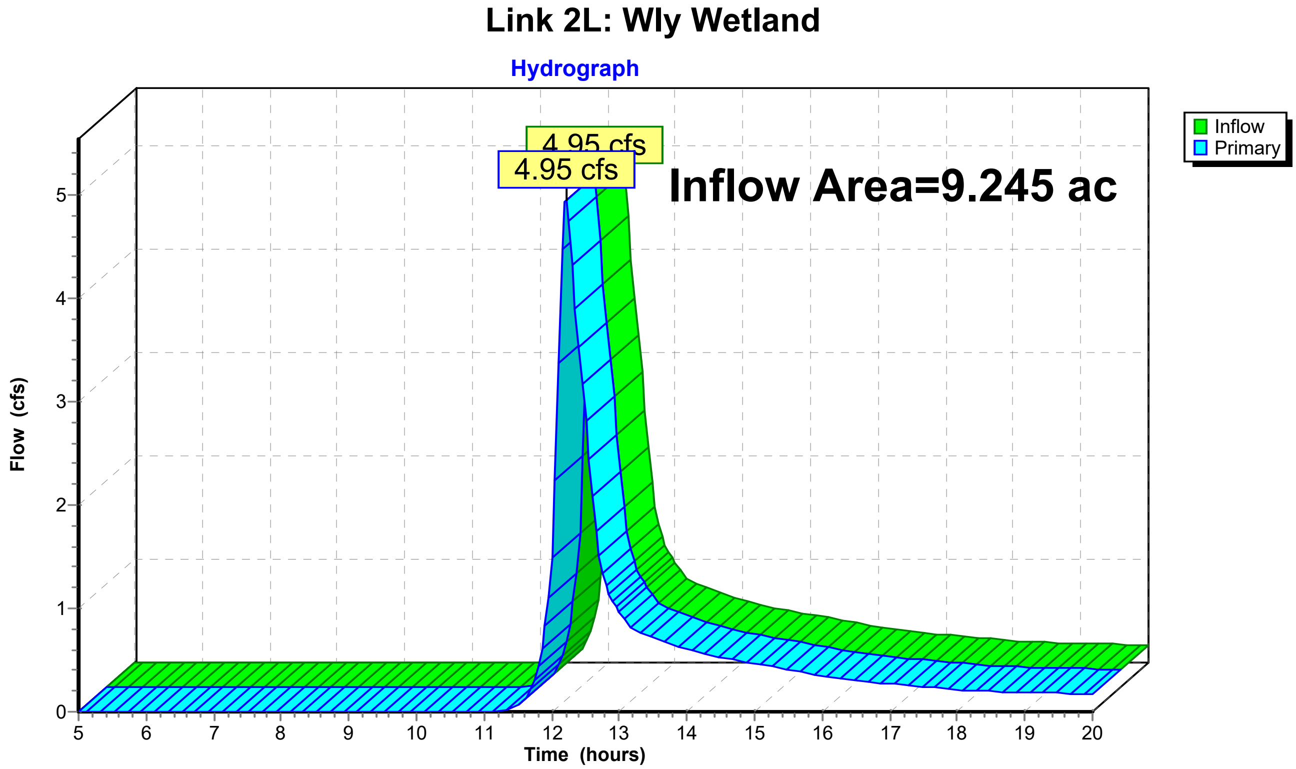
Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Link 2L: Wly Wetland

Inflow Area =	9.245 ac,	19.09% Impervious,	Inflow Depth > 0.58"	for 2 Yr event
Inflow =	4.95 cfs @	12.21 hrs, Volume=	0.450 af	
Primary =	4.95 cfs @	12.21 hrs, Volume=	0.450 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Drainage Collection Runoff Area=11.764 ac 40.04% Impervious Runoff Depth>2.25"
Flow Length=345' Tc=14.0 min CN=79 Runoff=25.73 cfs 2.201 af

Subcatchment P-2: Clubhouse Area Runoff Area=2.320 ac 70.69% Impervious Runoff Depth>3.35"
Flow Length=305' Tc=12.5 min CN=91 Runoff=7.51 cfs 0.647 af

Subcatchment P-3: ByPass MBTA Rd Runoff Area=7.626 ac 0.00% Impervious Runoff Depth>0.44"
Flow Length=1,801' Tc=19.5 min CN=50 Runoff=1.81 cfs 0.281 af

Subcatchment P-4: ByPass to W'ly Wetland Runoff Area=6.820 ac 0.29% Impervious Runoff Depth>1.63"
Flow Length=258' Tc=13.6 min CN=71 Runoff=10.82 cfs 0.929 af

Subcatchment P-5: Nly PL Runoff Area=2.410 ac 1.24% Impervious Runoff Depth>1.24"
Flow Length=77' Tc=8.0 min CN=65 Runoff=3.25 cfs 0.248 af

Subcatchment P-6: (new Subcat) Runoff Area=0.105 ac 100.00% Impervious Runoff Depth>4.01"
Tc=6.0 min CN=98 Runoff=0.46 cfs 0.035 af

Pond 1P: Inf Basin Peak Elev=286.43' Storage=41,065 cf Inflow=25.73 cfs 2.201 af
Discarded=3.20 cfs 2.118 af Primary=0.00 cfs 0.000 af Outflow=3.20 cfs 2.118 af

Pond 2P: SC740 Peak Elev=366.79' Storage=0.481 af Inflow=7.51 cfs 0.647 af
Discarded=0.08 cfs 0.090 af Primary=0.22 cfs 0.097 af Outflow=0.31 cfs 0.187 af

Pond 4P: SC310 Peak Elev=364.56' Storage=0.025 af Inflow=0.46 cfs 0.035 af
Discarded=0.01 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.010 af

Link 1L: SE Corner Inflow=1.81 cfs 0.281 af
Primary=1.81 cfs 0.281 af

Link 2L: Wly Wetland Inflow=10.82 cfs 1.025 af
Primary=10.82 cfs 1.025 af

Total Runoff Area = 31.045 ac Runoff Volume = 4.341 af Average Runoff Depth = 1.68"
79.05% Pervious = 24.540 ac 20.95% Impervious = 6.505 ac

Summary for Subcatchment P-1: Drainage Collection

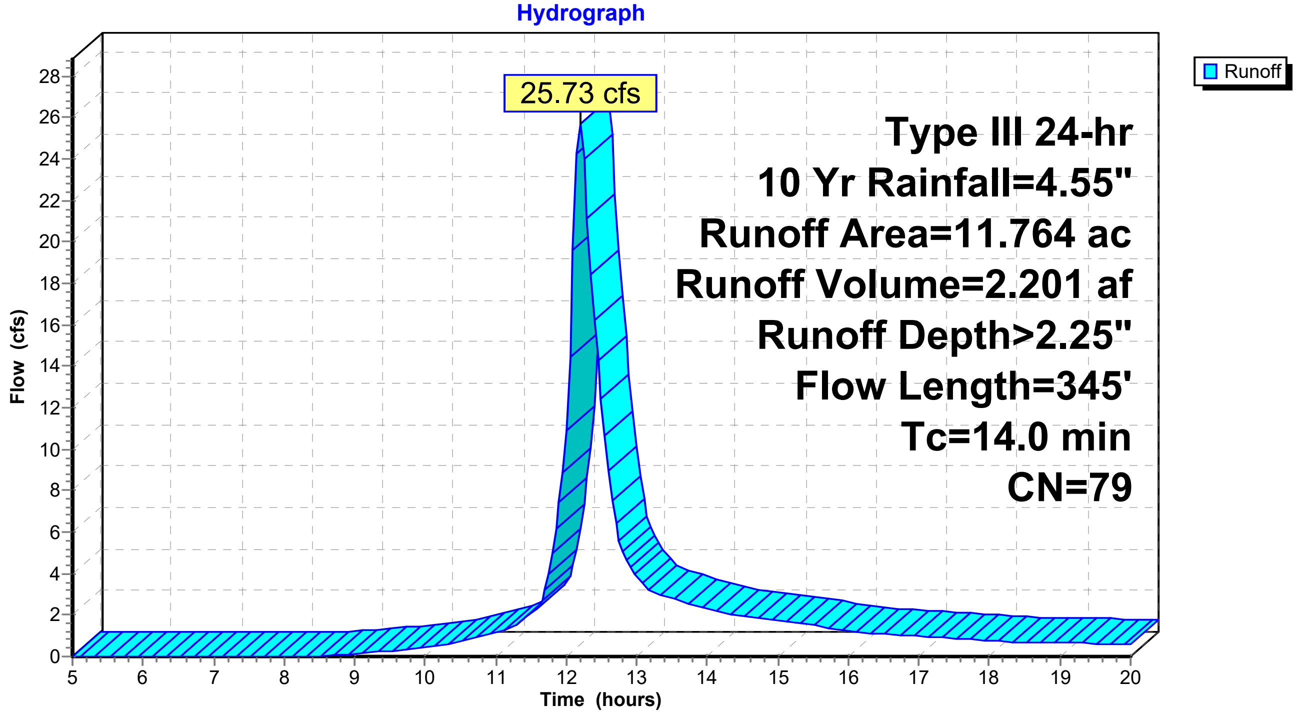
Runoff = 25.73 cfs @ 12.20 hrs, Volume= 2.201 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
0.080	30	Woods, Good, HSG A
1.510	39	>75% Grass cover, Good, HSG A
0.650	98	Paved parking, HSG A
0.294	70	Woods, Good, HSG C
5.170	74	>75% Grass cover, Good, HSG C
3.240	98	Paved parking, HSG C
0.820	98	Roofs, HSG C
11.764	79	Weighted Average
7.054		59.96% Pervious Area
4.710		40.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.1	62	0.3300	9.25		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.9	88	0.0100	1.61		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
14.0	345	Total			

Subcatchment P-1: Drainage Collection



Summary for Subcatchment P-2: Clubhouse Area

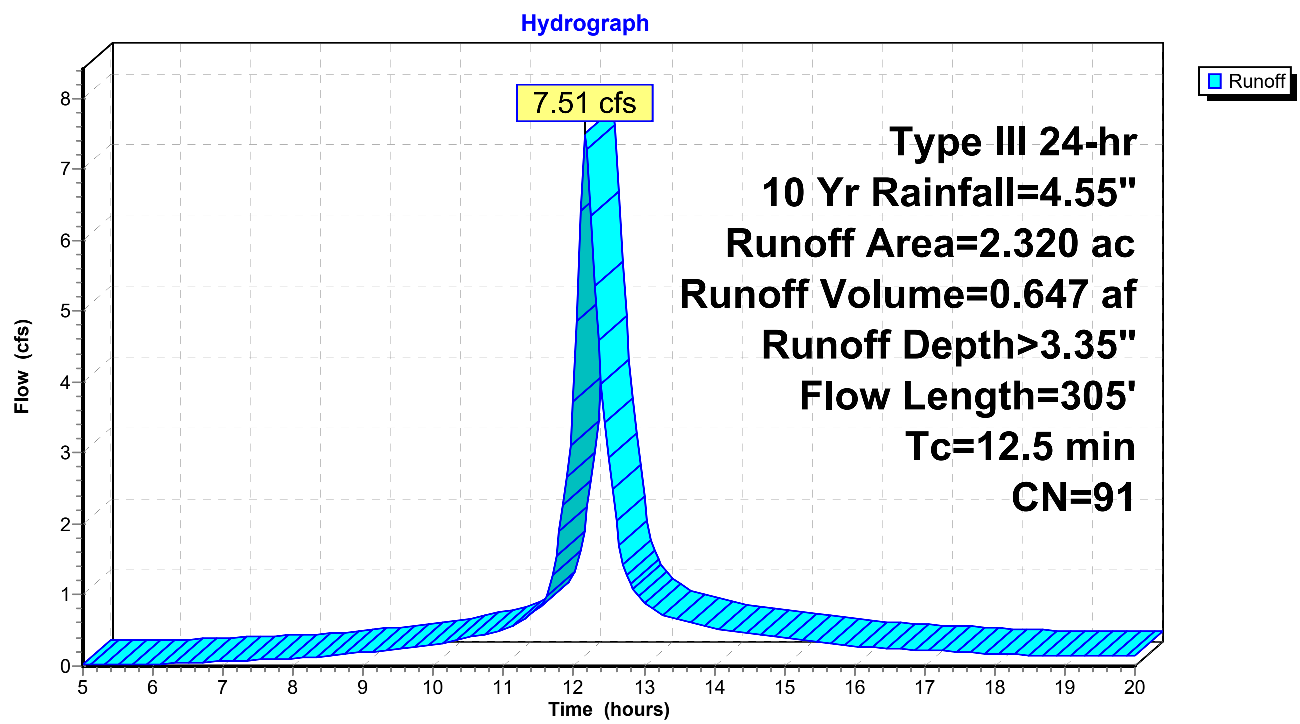
Runoff = 7.51 cfs @ 12.17 hrs, Volume= 0.647 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
0.680	74	>75% Grass cover, Good, HSG C
0.270	98	Paved parking, HSG C
1.370	98	Roofs, HSG C
2.320	91	Weighted Average
0.680		29.31% Pervious Area
1.640		70.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.7	89	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	166	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
12.5	305	Total			

Subcatchment P-2: Clubhouse Area



Summary for Subcatchment P-3: ByPass MBTA Rd

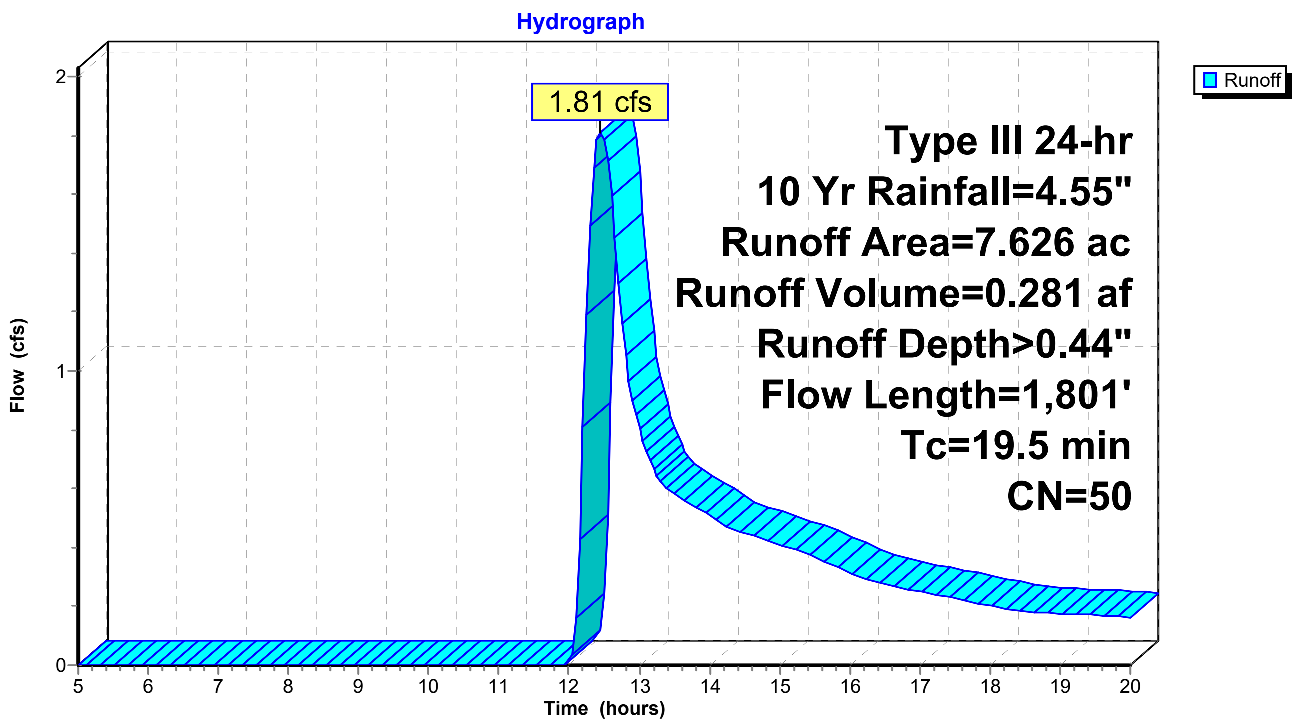
Runoff = 1.81 cfs @ 12.45 hrs, Volume= 0.281 af, Depth> 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
3.340	30	Woods, Good, HSG A
0.600	39	>75% Grass cover, Good, HSG A
3.306	70	Woods, Good, HSG C
0.380	74	>75% Grass cover, Good, HSG C
7.626	50	Weighted Average
7.626		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	1,751	0.0760	4.44		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.5	1,801	Total			

Subcatchment P-3: ByPass MBTA Rd



Summary for Subcatchment P-4: ByPass to W'ly Wetland

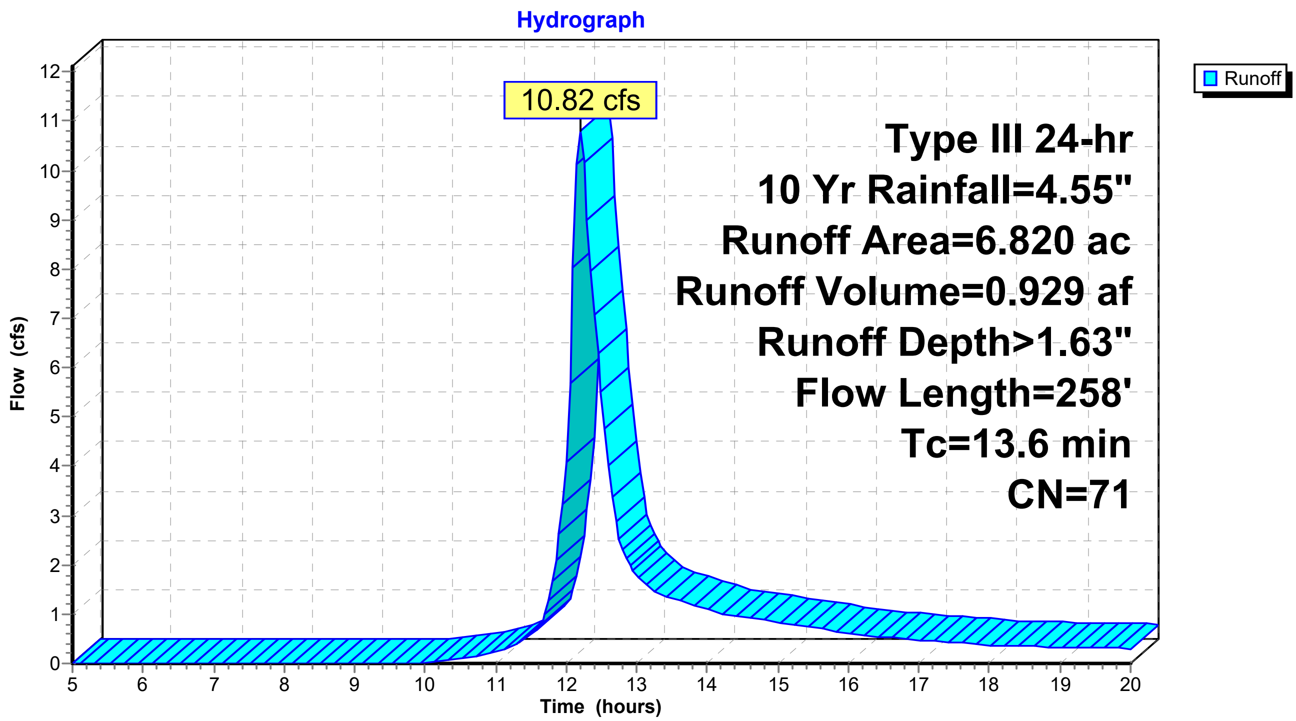
Runoff = 10.82 cfs @ 12.20 hrs, Volume= 0.929 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
5.540	70	Woods, Good, HSG C
0.830	74	>75% Grass cover, Good, HSG C
0.020	98	Paved parking, HSG C
0.430	77	Woods, Good, HSG D
6.820	71	Weighted Average
6.800		99.71% Pervious Area
0.020		0.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	208	0.0270	2.65		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.6	258	Total			

Subcatchment P-4: ByPass to W'ly Wetland



Summary for Subcatchment P-5: Nly PL

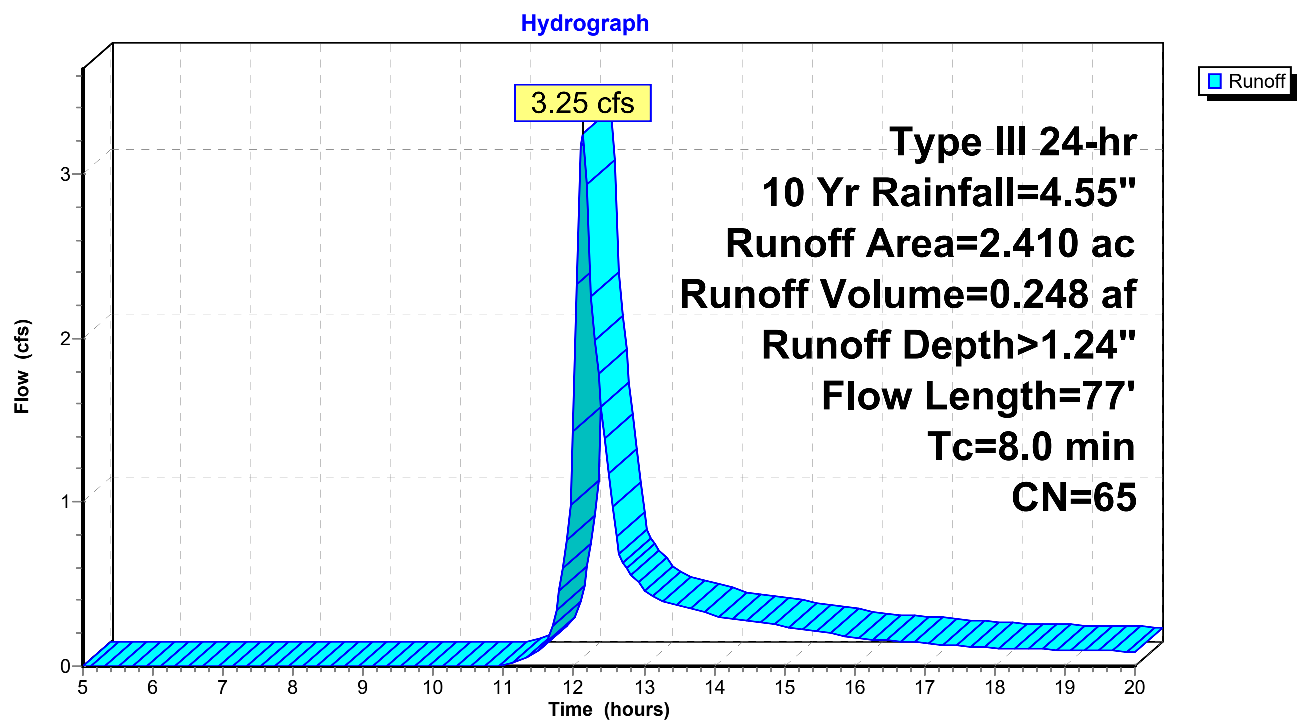
Runoff = 3.25 cfs @ 12.13 hrs, Volume= 0.248 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
0.070	30	Woods, Good, HSG A
0.520	39	>75% Grass cover, Good, HSG A
0.440	70	Woods, Good, HSG C
1.350	74	>75% Grass cover, Good, HSG C
0.030	98	Paved parking, HSG C
2.410	65	Weighted Average
2.380		98.76% Pervious Area
0.030		1.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	27	0.0700	4.26		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.0	77	Total			

Subcatchment P-5: Nly PL



Summary for Subcatchment P-6: (new Subcat)

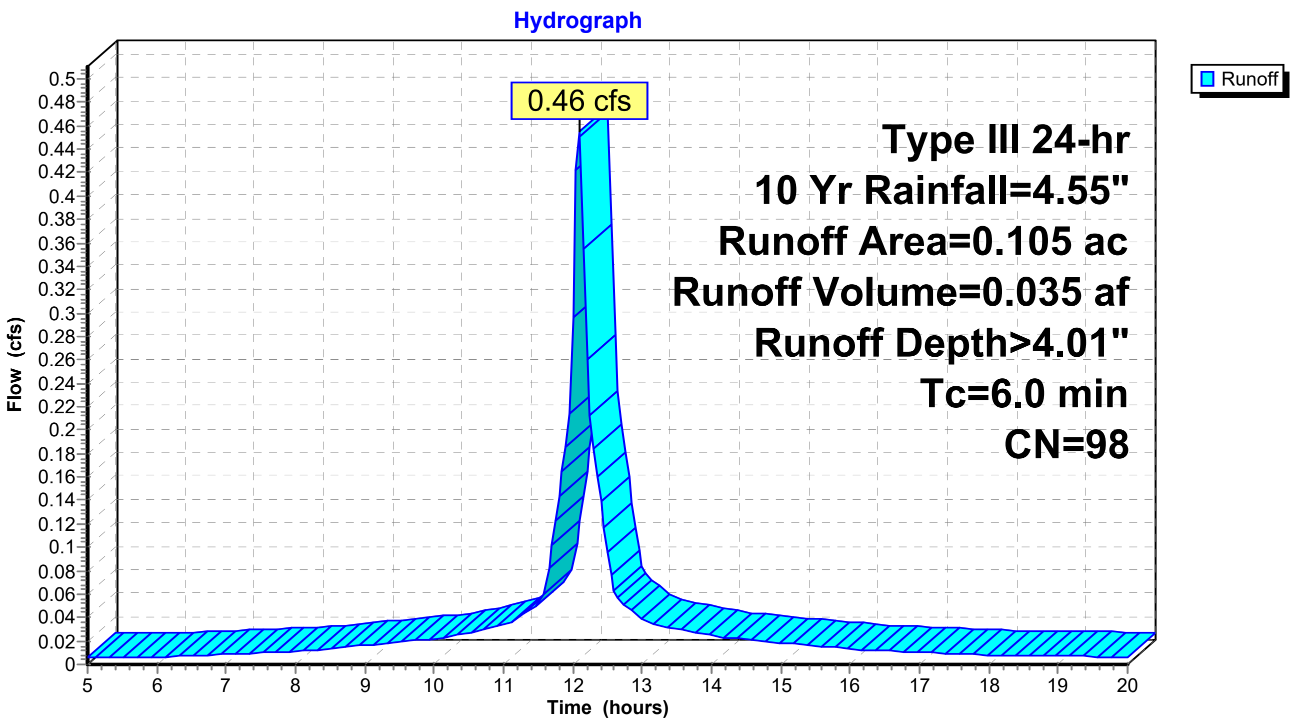
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.035 af, Depth> 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Yr Rainfall=4.55"

Area (ac)	CN	Description
0.105	98	Roofs, HSG C
0.105		100.00% Impervious Area

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

Subcatchment P-6: (new Subcat)



Summary for Pond 1P: Inf Basin

Inflow Area = 11.764 ac, 40.04% Impervious, Inflow Depth > 2.25" for 10 Yr event
Inflow = 25.73 cfs @ 12.20 hrs, Volume= 2.201 af
Outflow = 3.20 cfs @ 13.19 hrs, Volume= 2.118 af, Atten= 88%, Lag= 59.7 min
Discarded = 3.20 cfs @ 13.19 hrs, Volume= 2.118 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 286.43' @ 13.19 hrs Surf.Area= 16,724 sf Storage= 41,065 cf

Plug-Flow detention time= 134.7 min calculated for 2.111 af (96% of inflow)
Center-of-Mass det. time= 120.7 min (919.6 - 798.9)

Volume	Invert	Avail.Storage	Storage Description
#1	283.50'	112,982 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

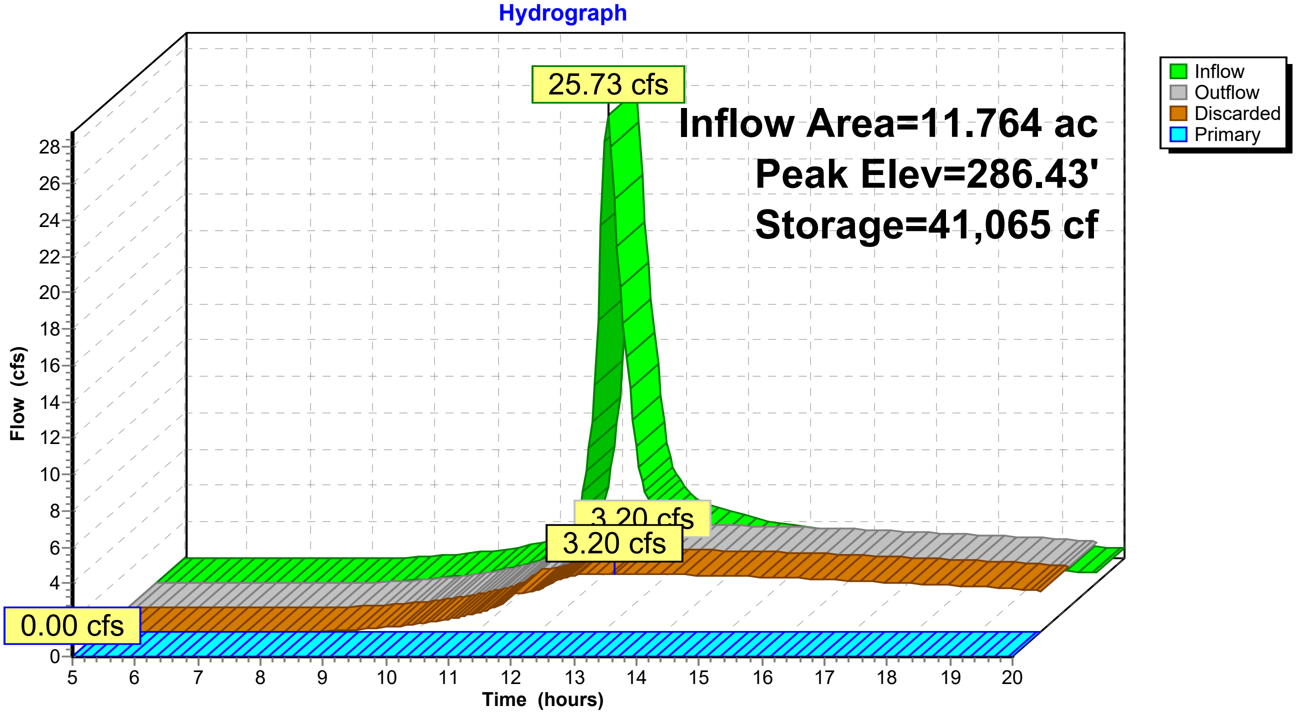
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
283.50	10,661	0	0
284.00	12,357	5,755	5,755
285.00	14,108	13,233	18,987
286.00	15,917	15,013	34,000
287.00	17,782	16,850	50,849
288.00	19,703	18,743	69,592
289.00	21,681	20,692	90,284
290.00	23,716	22,699	112,982

Device	Routing	Invert	Outlet Devices
#1	Discarded	283.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	280.91'	**24.0" Round Culvert** L= 119.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.91' / 277.45' S= 0.0291 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	286.90'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	287.25'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 2	288.50'	**16.0' 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=3.20 cfs @ 13.19 hrs HW=286.43' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.20 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=283.50' (Free Discharge)
└─**2=Culvert** (Passes 0.00 cfs of 19.07 cfs potential flow)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Inf Basin



Summary for Pond 2P: SC740

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.320 ac, 70.69% Impervious, Inflow Depth > 3.35" for 10 Yr event
Inflow = 7.51 cfs @ 12.17 hrs, Volume= 0.647 af
Outflow = 0.31 cfs @ 15.85 hrs, Volume= 0.187 af, Atten= 96%, Lag= 220.9 min
Discarded = 0.08 cfs @ 8.00 hrs, Volume= 0.090 af
Primary = 0.22 cfs @ 15.85 hrs, Volume= 0.097 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 366.79' @ 15.85 hrs Surf.Area= 0.301 ac Storage= 0.481 af

Plug-Flow detention time= 254.7 min calculated for 0.186 af (29% of inflow)
Center-of-Mass det. time= 132.8 min (898.2 - 765.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	0.265 af	**58.50'W x 224.34'L x 3.50'H Field A** 1.054 af Overall - 0.392 af Embedded = 0.662 af x 40.0% Voids
#2A	365.00'	0.392 af	**ADS_StormTech SC-740 +Cap** x 372 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 372 Chambers in 12 Rows
		0.657 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	363.28'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.28' / 362.54' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	366.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	366.70'	**4.0" Vert. Orifice/Grate X 4.00** C= 0.600
#5	Device 2	367.50'	**6.0' 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=0.08 cfs @ 8.00 hrs HW=364.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.22 cfs @ 15.85 hrs HW=366.79' (Free Discharge)
└─**2=Culvert** (Passes 0.22 cfs of 14.12 cfs potential flow)
├─**3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 3.08 fps)
├─**4=Orifice/Grate** (Orifice Controls 0.07 cfs @ 0.99 fps)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SC740 - 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

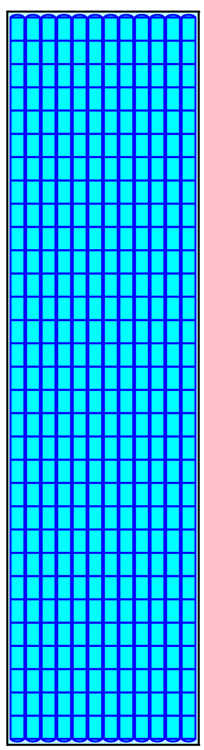
31 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 222.34' Row Length +12.0" End Stone x 2 = 224.34' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

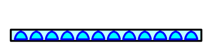
372 Chambers x 45.9 cf = 17,089.7 cf Chamber Storage

45,932.9 cf Field - 17,089.7 cf Chambers = 28,843.2 cf Stone x 40.0% Voids = 11,537.3 cf Stone Storage

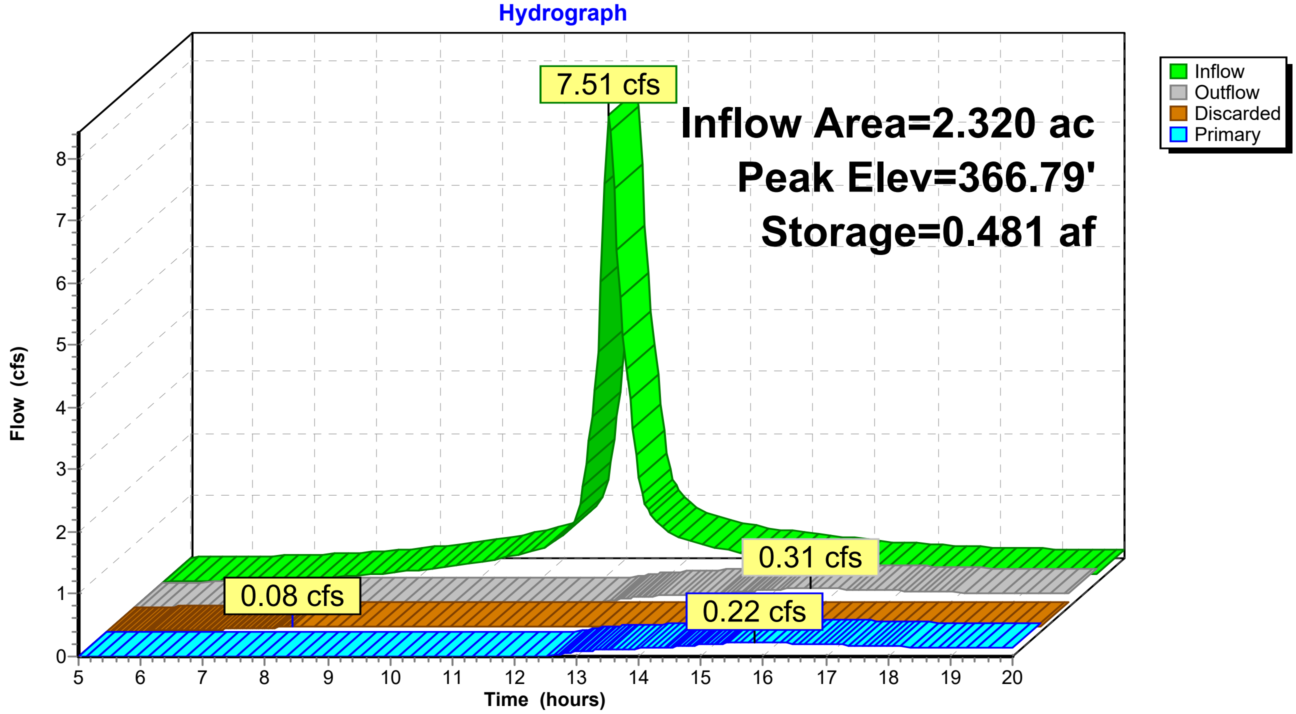
Chamber Storage + Stone Storage = 28,627.0 cf = 0.657 af
Overall Storage Efficiency = 62.3%
Overall System Size = 224.34' x 58.50' x 3.50'

372 Chambers
1,701.2 cy Field
1,068.3 cy Stone





Pond 2P: SC740



Summary for Pond 4P: SC310

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.105 ac,100.00% Impervious, Inflow Depth > 4.01" for 10 Yr event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.035 af
Outflow = 0.01 cfs @ 7.55 hrs, Volume= 0.010 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.01 cfs @ 7.55 hrs, Volume= 0.010 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.56' @ 17.60 hrs Surf.Area= 0.033 ac Storage= 0.025 af

Plug-Flow detention time= 191.1 min calculated for 0.010 af (30% of inflow)
Center-of-Mass det. time= 40.7 min (776.4 - 735.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	363.25'	0.024 af	**8.17'W x 174.08'L x 2.33'H Field A** 0.076 af Overall - 0.016 af Embedded = 0.060 af x 40.0% Voids
#2A	363.75'	0.016 af	**ADS_StormTech SC-310 +Cap** x 48 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 48 Chambers in 2 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.25'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	365.00'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 364.75' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.01 cfs @ 7.55 hrs HW=363.27' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=363.25' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 4P: SC310 - 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

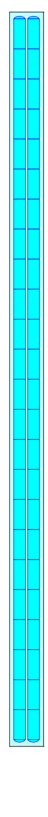
24 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 172.08' Row Length +12.0" End Stone x 2 = 174.08' Base Length
2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

48 Chambers x 14.7 cf = 707.6 cf Chamber Storage

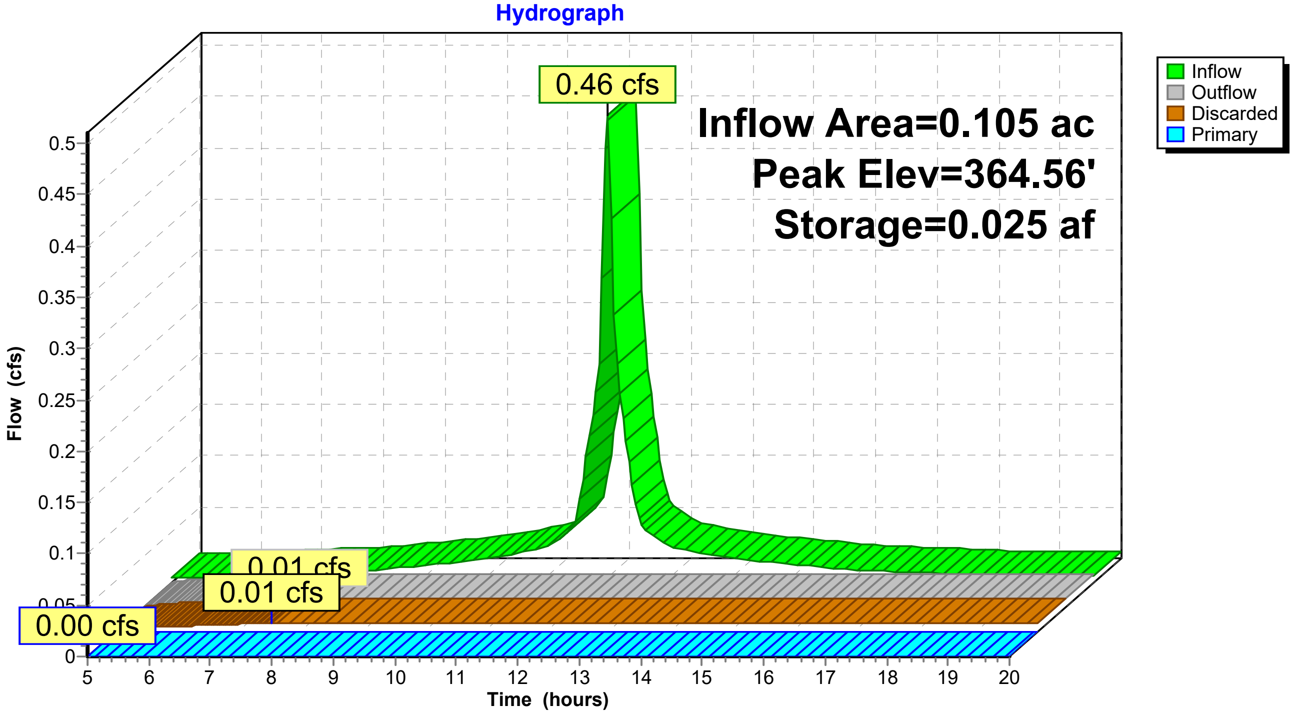
3,317.2 cf Field - 707.6 cf Chambers = 2,609.6 cf Stone x 40.0% Voids = 1,043.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,751.4 cf = 0.040 af
Overall Storage Efficiency = 52.8%
Overall System Size = 174.08' x 8.17' x 2.33'

48 Chambers
122.9 cy Field
96.7 cy Stone



Pond 4P: SC310

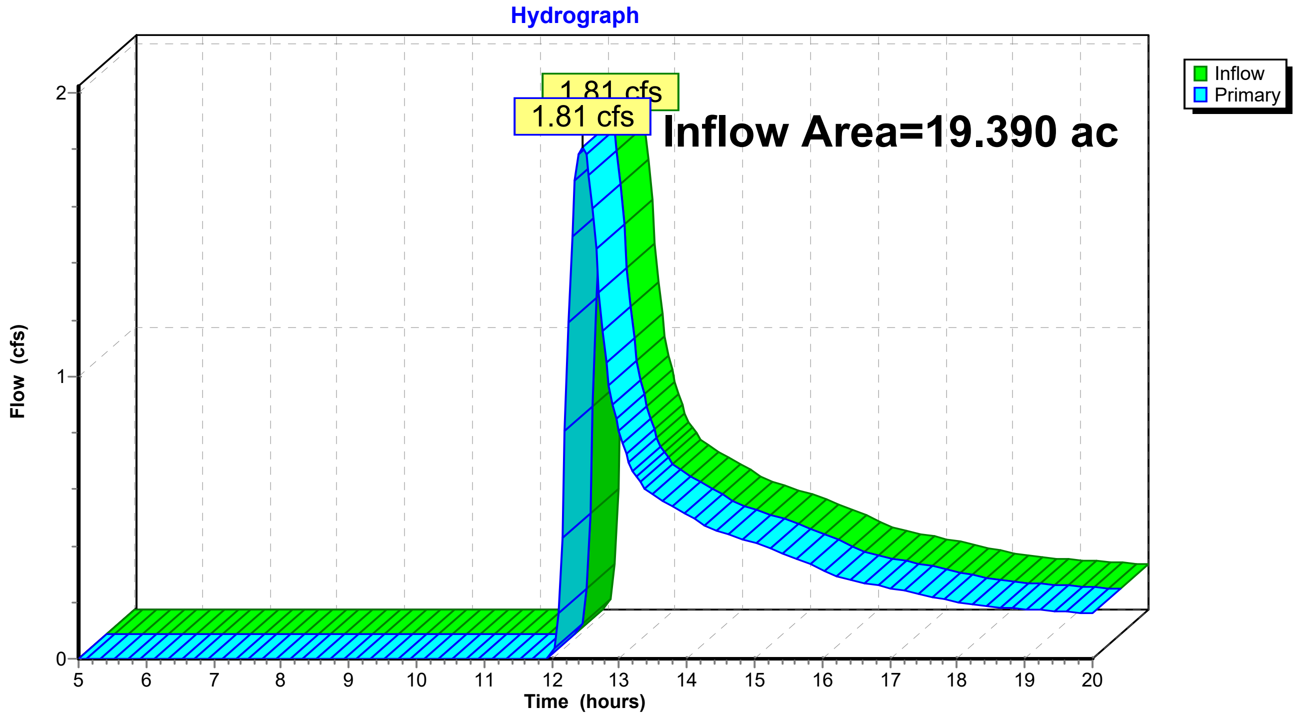


Summary for Link 1L: SE Corner

Inflow Area =	19.390 ac, 24.29% Impervious, Inflow Depth > 0.17"	for 10 Yr event	
Inflow =	1.81 cfs @ 12.45 hrs, Volume=	0.281 af	
Primary =	1.81 cfs @ 12.45 hrs, Volume=	0.281 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: SE Corner

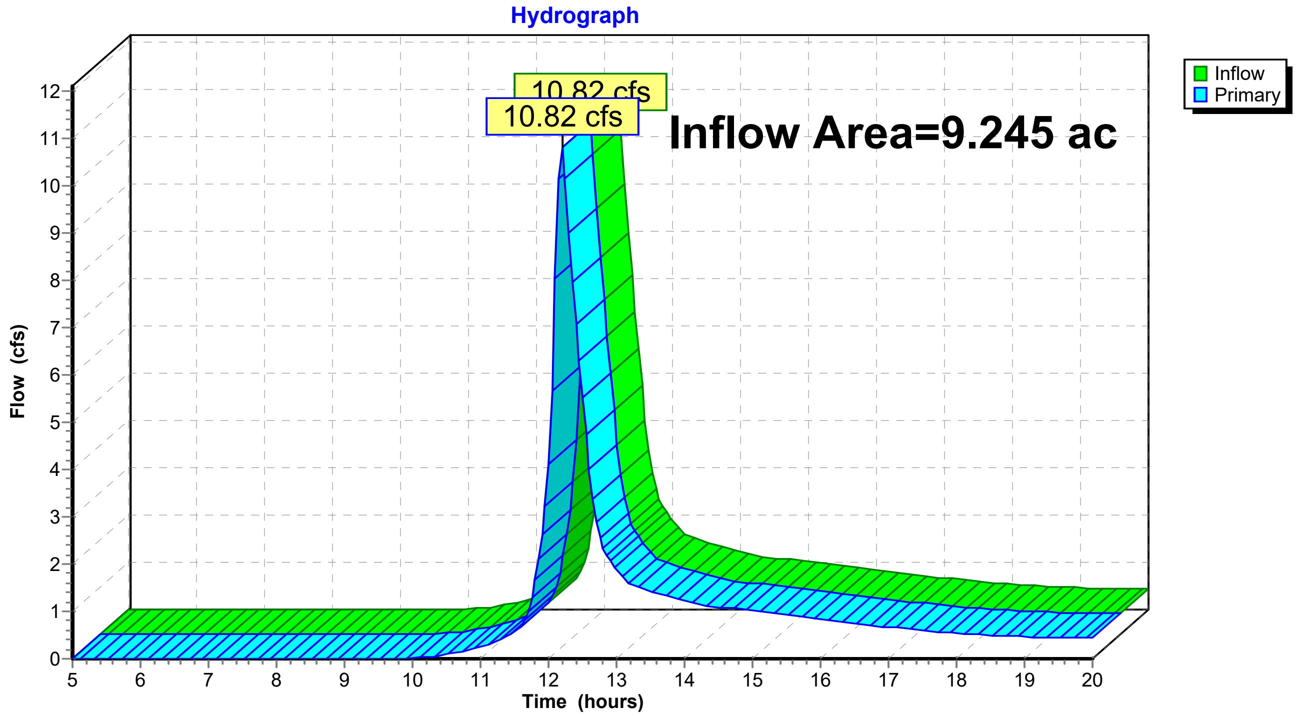


Summary for Link 2L: Wly Wetland

Inflow Area = 9.245 ac, 19.09% Impervious, Inflow Depth > 1.33" for 10 Yr event
Inflow = 10.82 cfs @ 12.20 hrs, Volume= 1.025 af
Primary = 10.82 cfs @ 12.20 hrs, Volume= 1.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: Wly Wetland



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Drainage Collection Runoff Area=11.764 ac 40.04% Impervious Runoff Depth>3.02"
Flow Length=345' Tc=14.0 min CN=79 Runoff=34.45 cfs 2.958 af

Subcatchment P-2: Clubhouse Area Runoff Area=2.320 ac 70.69% Impervious Runoff Depth>4.22"
Flow Length=305' Tc=12.5 min CN=91 Runoff=9.35 cfs 0.815 af

Subcatchment P-3: ByPass MBTA Rd Runoff Area=7.626 ac 0.00% Impervious Runoff Depth>0.79"
Flow Length=1,801' Tc=19.5 min CN=50 Runoff=4.01 cfs 0.505 af

Subcatchment P-4: ByPass to W'ly Wetland Runoff Area=6.820 ac 0.29% Impervious Runoff Depth>2.31"
Flow Length=258' Tc=13.6 min CN=71 Runoff=15.44 cfs 1.311 af

Subcatchment P-5: Nly PL Runoff Area=2.410 ac 1.24% Impervious Runoff Depth>1.83"
Flow Length=77' Tc=8.0 min CN=65 Runoff=5.00 cfs 0.367 af

Subcatchment P-6: (new Subcat) Runoff Area=0.105 ac 100.00% Impervious Runoff Depth>4.87"
Tc=6.0 min CN=98 Runoff=0.55 cfs 0.043 af

Pond 1P: Inf Basin Peak Elev=287.45' Storage=58,967 cf Inflow=34.45 cfs 2.958 af
Discarded=3.57 cfs 2.472 af Primary=0.40 cfs 0.044 af Outflow=3.97 cfs 2.515 af

Pond 2P: SC740 Peak Elev=367.00' Storage=0.521 af Inflow=9.35 cfs 0.815 af
Discarded=0.08 cfs 0.095 af Primary=0.79 cfs 0.253 af Outflow=0.88 cfs 0.347 af

Pond 4P: SC310 Peak Elev=364.97' Storage=0.032 af Inflow=0.55 cfs 0.043 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

Link 1L: SE Corner Inflow=4.01 cfs 0.548 af
Primary=4.01 cfs 0.548 af

Link 2L: Wly Wetland Inflow=15.44 cfs 1.564 af
Primary=15.44 cfs 1.564 af

Total Runoff Area = 31.045 ac Runoff Volume = 5.999 af Average Runoff Depth = 2.32"
79.05% Pervious = 24.540 ac 20.95% Impervious = 6.505 ac

Summary for Subcatchment P-1: Drainage Collection

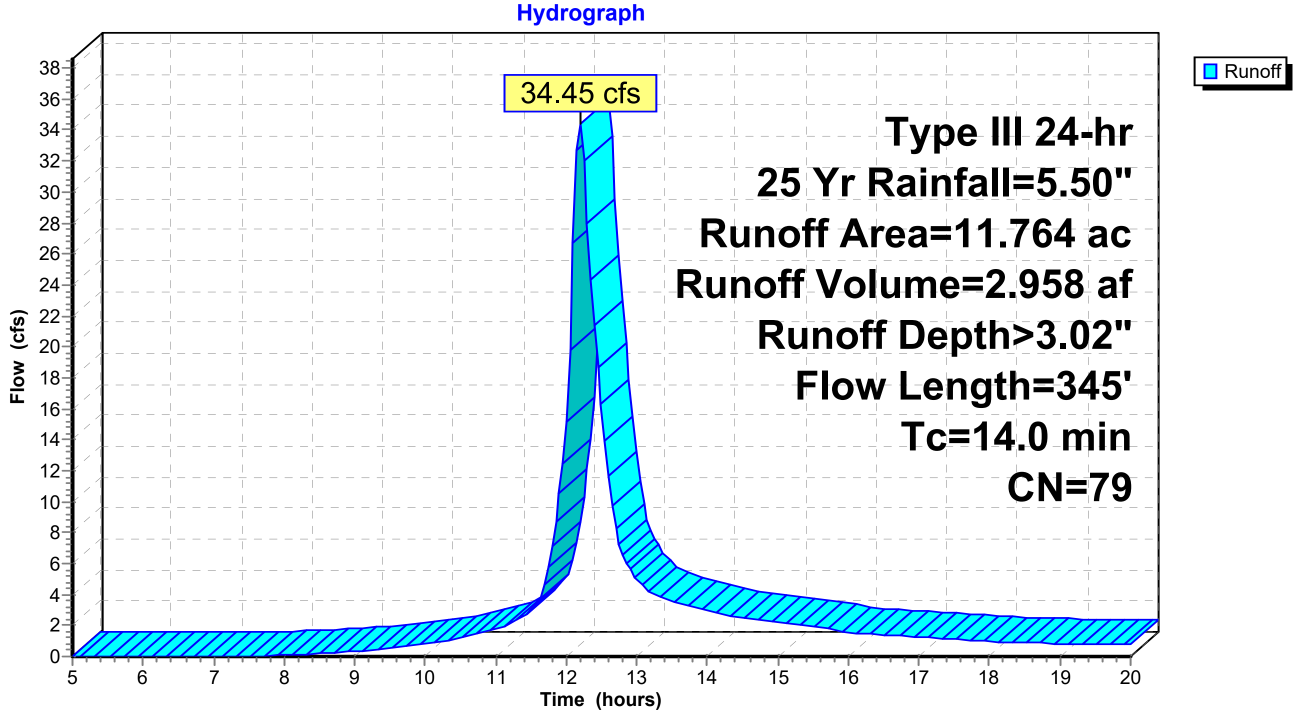
Runoff = 34.45 cfs @ 12.20 hrs, Volume= 2.958 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
0.080	30	Woods, Good, HSG A
1.510	39	>75% Grass cover, Good, HSG A
0.650	98	Paved parking, HSG A
0.294	70	Woods, Good, HSG C
5.170	74	>75% Grass cover, Good, HSG C
3.240	98	Paved parking, HSG C
0.820	98	Roofs, HSG C
11.764	79	Weighted Average
7.054		59.96% Pervious Area
4.710		40.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.1	62	0.3300	9.25		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.9	88	0.0100	1.61		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
14.0	345	Total			

Subcatchment P-1: Drainage Collection



Summary for Subcatchment P-2: Clubhouse Area

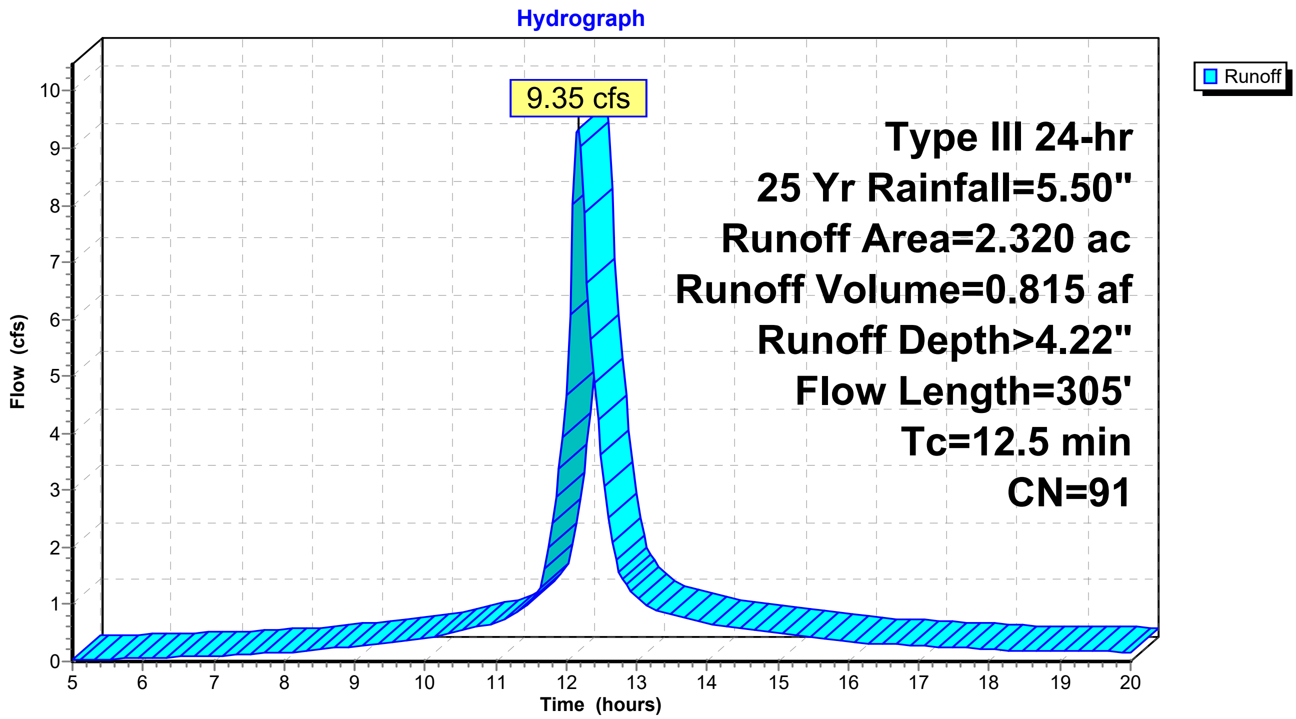
Runoff = 9.35 cfs @ 12.17 hrs, Volume= 0.815 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
0.680	74	>75% Grass cover, Good, HSG C
0.270	98	Paved parking, HSG C
1.370	98	Roofs, HSG C
2.320	91	Weighted Average
0.680		29.31% Pervious Area
1.640		70.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.7	89	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	166	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
12.5	305	Total			

Subcatchment P-2: Clubhouse Area



Summary for Subcatchment P-3: ByPass MBTA Rd

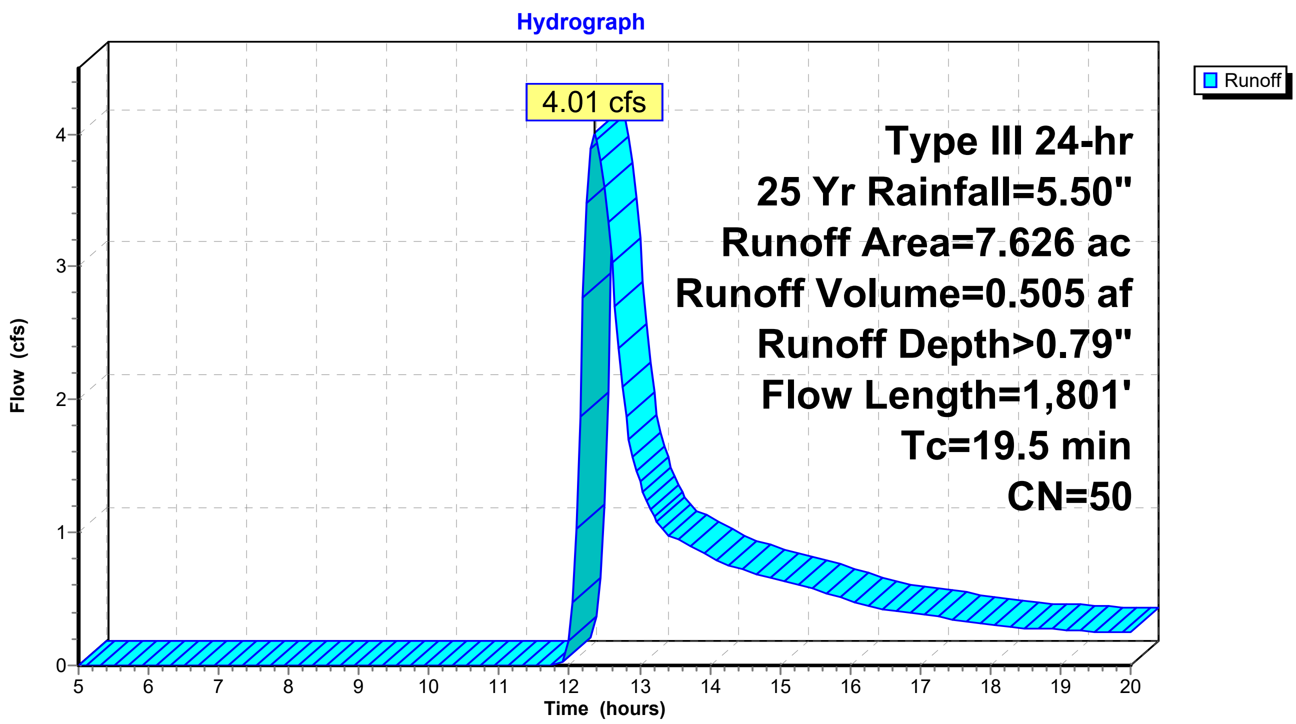
Runoff = 4.01 cfs @ 12.36 hrs, Volume= 0.505 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
3.340	30	Woods, Good, HSG A
0.600	39	>75% Grass cover, Good, HSG A
3.306	70	Woods, Good, HSG C
0.380	74	>75% Grass cover, Good, HSG C
7.626	50	Weighted Average
7.626		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	1,751	0.0760	4.44		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.5	1,801	Total			

Subcatchment P-3: ByPass MBTA Rd



Summary for Subcatchment P-4: ByPass to W'ly Wetland

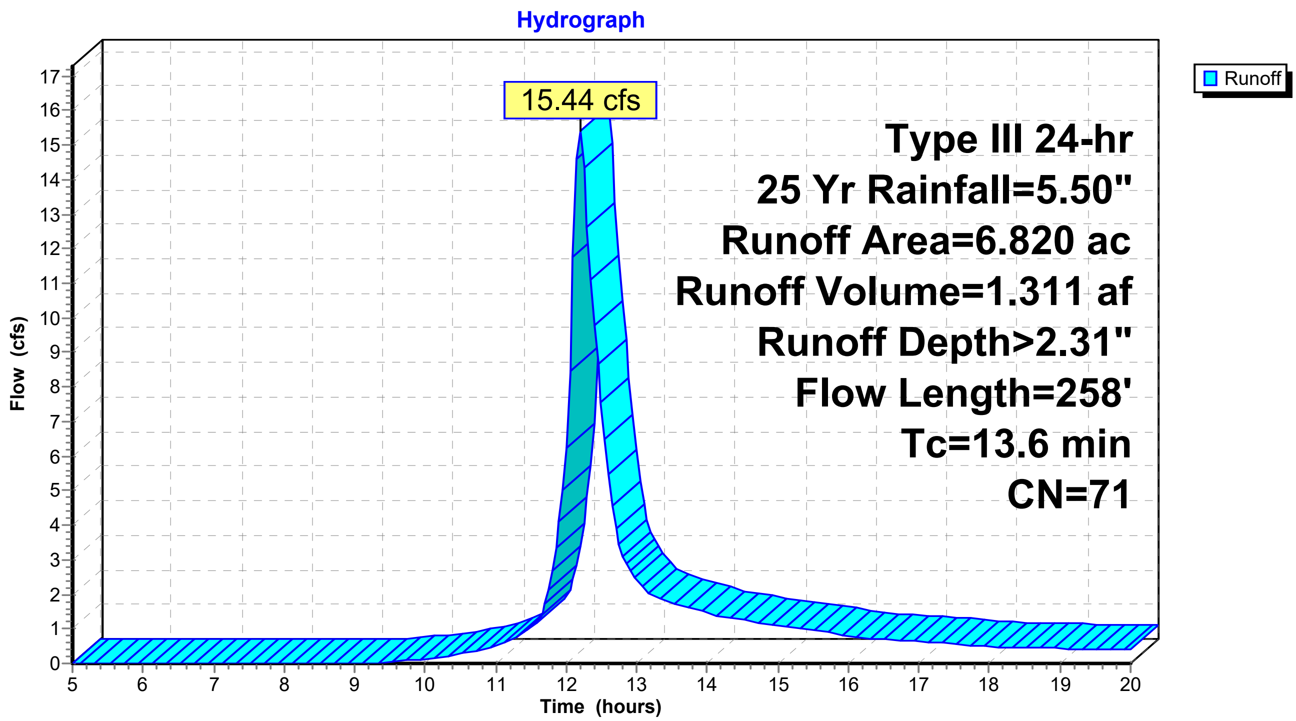
Runoff = 15.44 cfs @ 12.20 hrs, Volume= 1.311 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
5.540	70	Woods, Good, HSG C
0.830	74	>75% Grass cover, Good, HSG C
0.020	98	Paved parking, HSG C
0.430	77	Woods, Good, HSG D
6.820	71	Weighted Average
6.800		99.71% Pervious Area
0.020		0.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	208	0.0270	2.65		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.6	258	Total			

Subcatchment P-4: ByPass to W'ly Wetland



Summary for Subcatchment P-5: Nly PL

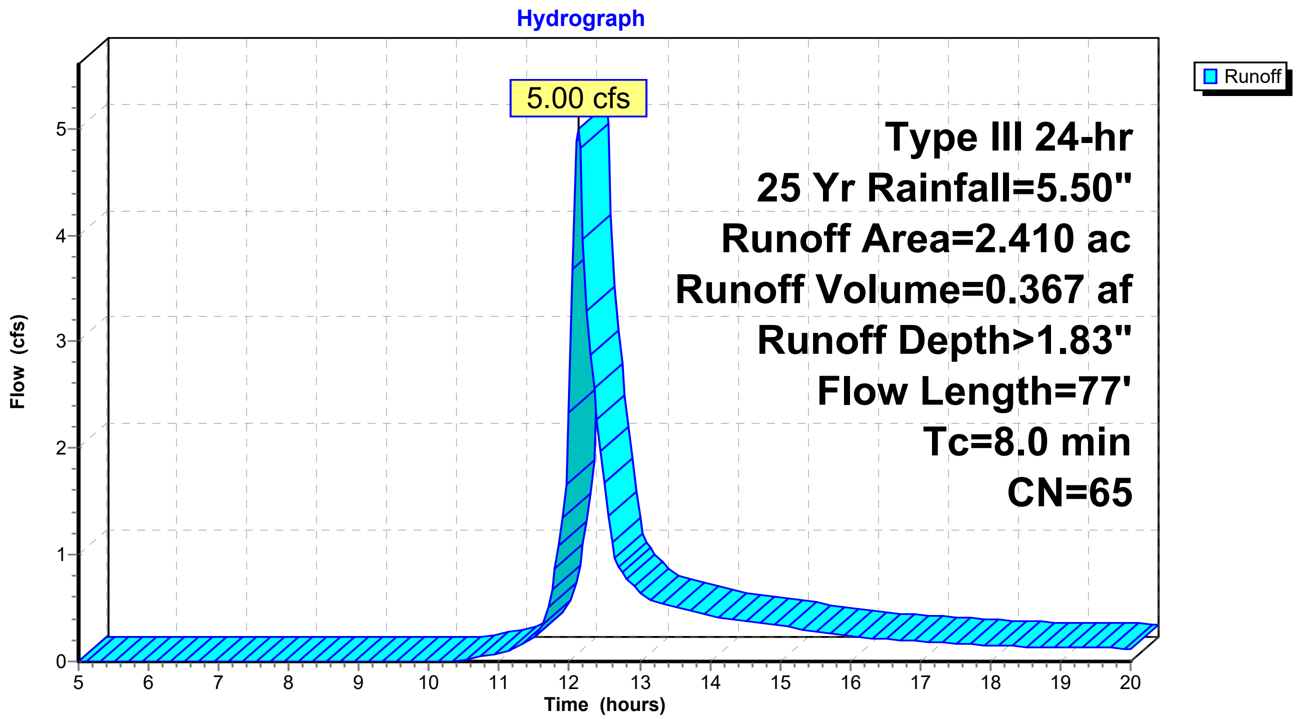
Runoff = 5.00 cfs @ 12.12 hrs, Volume= 0.367 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
0.070	30	Woods, Good, HSG A
0.520	39	>75% Grass cover, Good, HSG A
0.440	70	Woods, Good, HSG C
1.350	74	>75% Grass cover, Good, HSG C
0.030	98	Paved parking, HSG C
2.410	65	Weighted Average
2.380		98.76% Pervious Area
0.030		1.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	27	0.0700	4.26		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.0	77	Total			

Subcatchment P-5: Nly PL



Summary for Subcatchment P-6: (new Subcat)

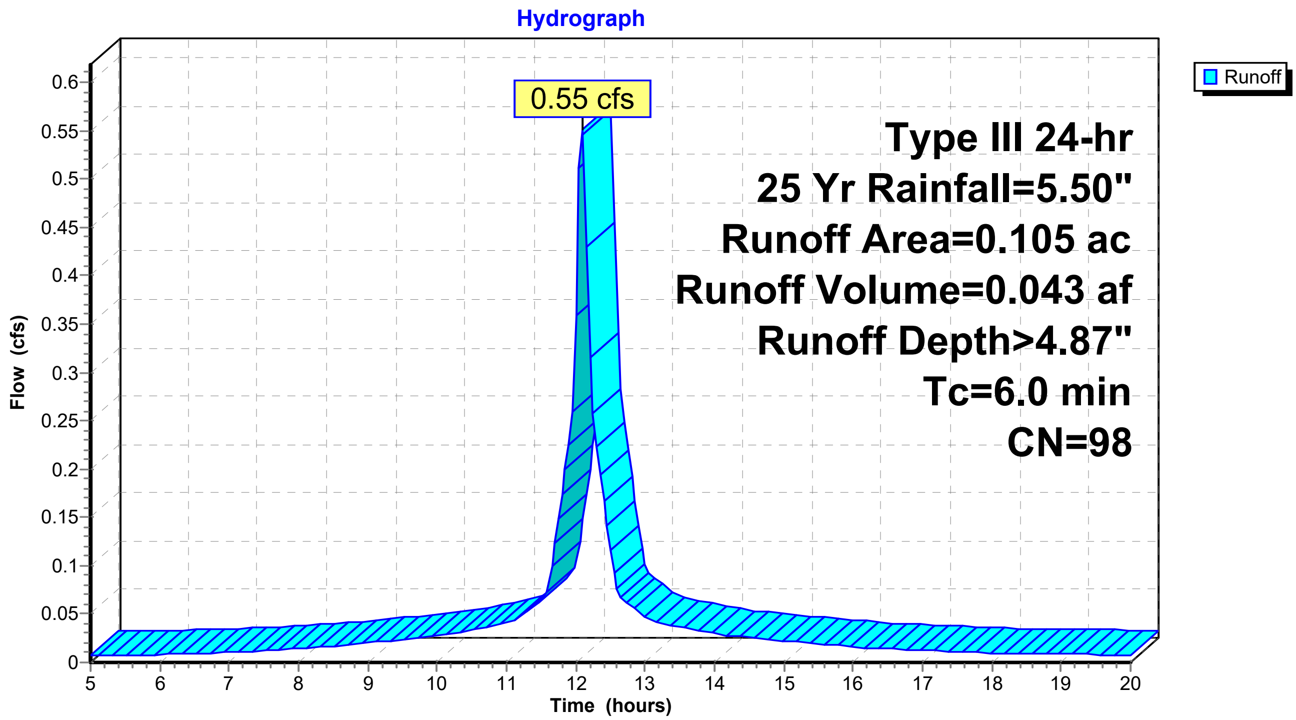
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.043 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Yr Rainfall=5.50"

Area (ac)	CN	Description
0.105	98	Roofs, HSG C
0.105		100.00% Impervious Area

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

Subcatchment P-6: (new Subcat)



Summary for Pond 1P: Inf Basin

Inflow Area = 11.764 ac, 40.04% Impervious, Inflow Depth > 3.02" for 25 Yr event
Inflow = 34.45 cfs @ 12.20 hrs, Volume= 2.958 af
Outflow = 3.97 cfs @ 13.25 hrs, Volume= 2.515 af, Atten= 88%, Lag= 63.3 min
Discarded = 3.57 cfs @ 13.25 hrs, Volume= 2.472 af
Primary = 0.40 cfs @ 13.25 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 287.45' @ 13.25 hrs Surf.Area= 18,638 sf Storage= 58,967 cf

Plug-Flow detention time= 161.6 min calculated for 2.507 af (85% of inflow)
Center-of-Mass det. time= 118.7 min (910.9 - 792.2)

Volume	Invert	Avail.Storage	Storage Description
#1	283.50'	112,982 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

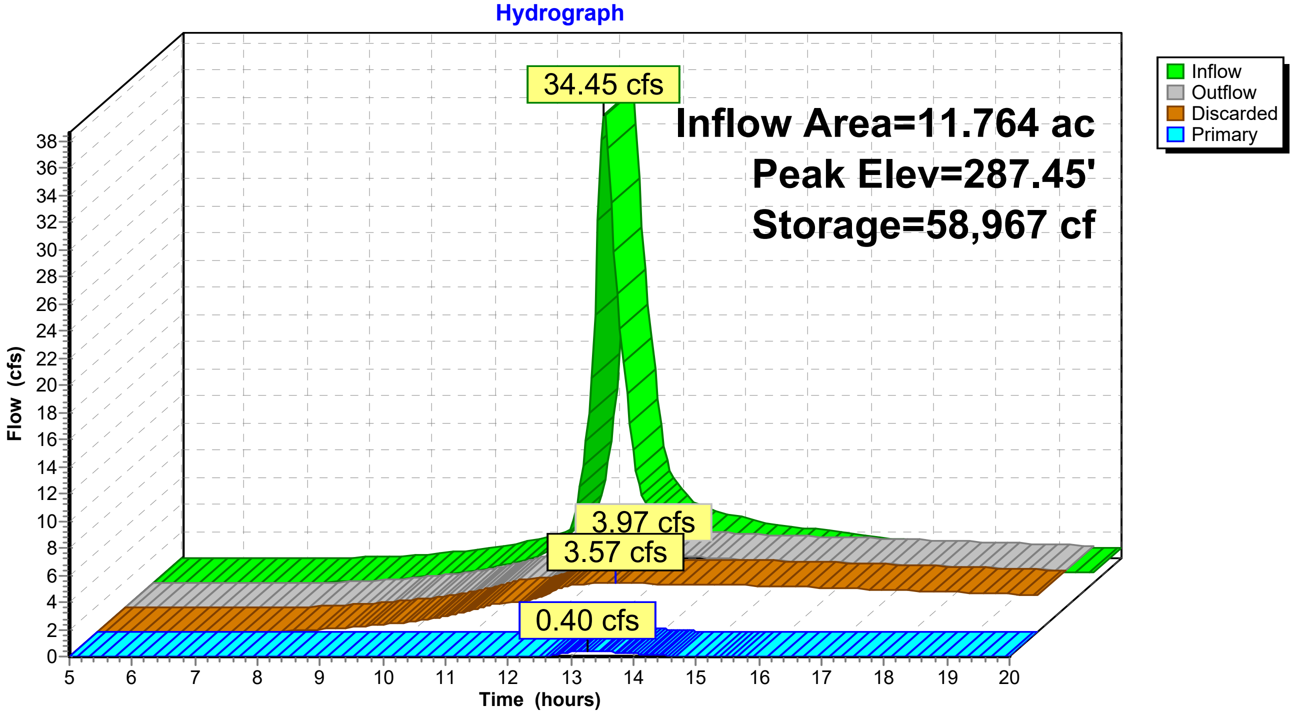
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
283.50	10,661	0	0
284.00	12,357	5,755	5,755
285.00	14,108	13,233	18,987
286.00	15,917	15,013	34,000
287.00	17,782	16,850	50,849
288.00	19,703	18,743	69,592
289.00	21,681	20,692	90,284
290.00	23,716	22,699	112,982

Device	Routing	Invert	Outlet Devices
#1	Discarded	283.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	280.91'	**24.0" Round Culvert** L= 119.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.91' / 277.45' S= 0.0291 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	286.90'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	287.25'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 2	288.50'	**16.0' 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=3.57 cfs @ 13.25 hrs HW=287.45' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.57 cfs)

Primary OutFlow Max=0.39 cfs @ 13.25 hrs HW=287.45' (Free Discharge)
└─**2=Culvert** (Passes 0.39 cfs of 35.59 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.27 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.32 cfs @ 1.51 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Inf Basin



Summary for Pond 2P: SC740

[82] Warning: Early inflow requires earlier time span

Inflow Area = 2.320 ac, 70.69% Impervious, Inflow Depth > 4.22" for 25 Yr event
Inflow = 9.35 cfs @ 12.17 hrs, Volume= 0.815 af
Outflow = 0.88 cfs @ 13.31 hrs, Volume= 0.347 af, Atten= 91%, Lag= 68.4 min
Discarded = 0.08 cfs @ 7.20 hrs, Volume= 0.095 af
Primary = 0.79 cfs @ 13.31 hrs, Volume= 0.253 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 367.00' @ 13.31 hrs Surf.Area= 0.301 ac Storage= 0.521 af

Plug-Flow detention time= 213.8 min calculated for 0.347 af (43% of inflow)
Center-of-Mass det. time= 115.7 min (876.3 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	0.265 af	**58.50'W x 224.34'L x 3.50'H Field A** 1.054 af Overall - 0.392 af Embedded = 0.662 af x 40.0% Voids
#2A	365.00'	0.392 af	**ADS_StormTech SC-740 +Cap** x 372 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 372 Chambers in 12 Rows
		0.657 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	363.28'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.28' / 362.54' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	366.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	366.70'	**4.0" Vert. Orifice/Grate X 4.00** C= 0.600
#5	Device 2	367.50'	**6.0' 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=0.08 cfs @ 7.20 hrs HW=364.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.79 cfs @ 13.31 hrs HW=367.00' (Free Discharge)
└─**2=Culvert** (Passes 0.79 cfs of 14.66 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.19 cfs @ 3.80 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.61 cfs @ 1.85 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SC740 - 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

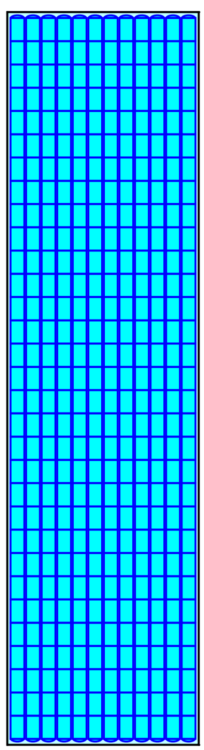
31 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 222.34' Row Length +12.0" End Stone x 2 = 224.34' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

372 Chambers x 45.9 cf = 17,089.7 cf Chamber Storage

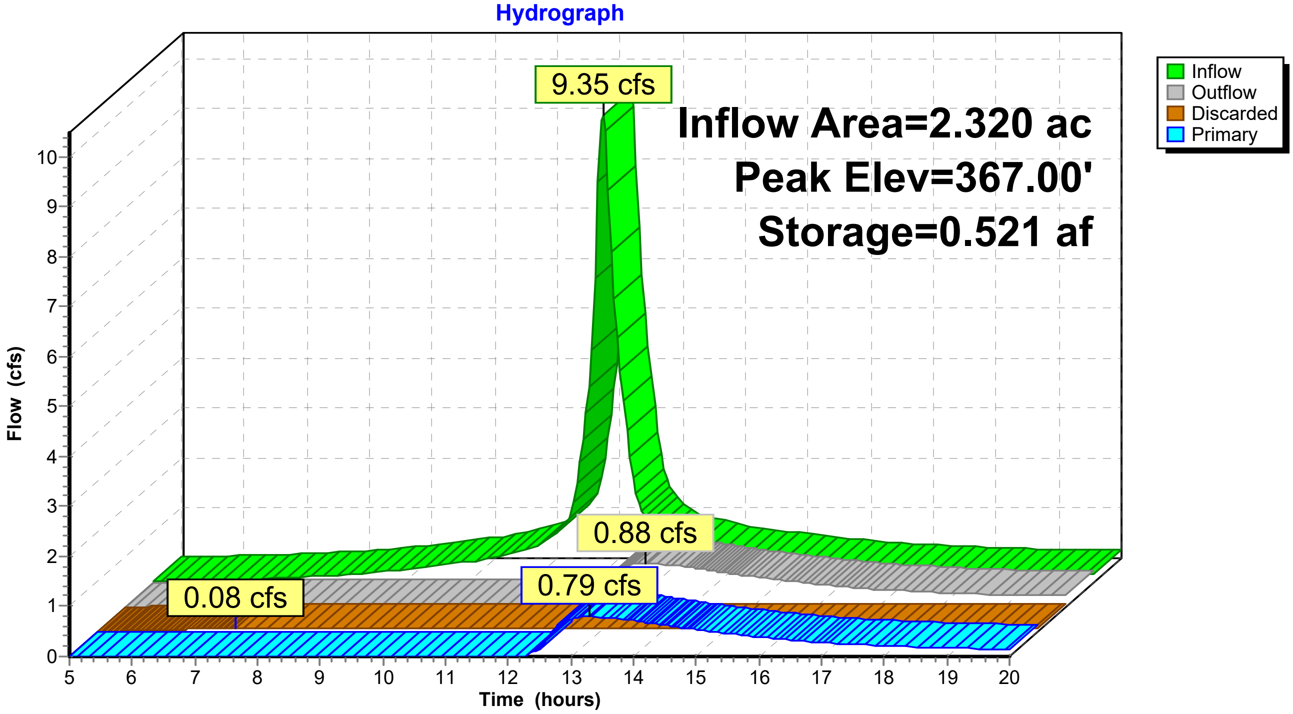
45,932.9 cf Field - 17,089.7 cf Chambers = 28,843.2 cf Stone x 40.0% Voids = 11,537.3 cf Stone Storage

Chamber Storage + Stone Storage = 28,627.0 cf = 0.657 af
Overall Storage Efficiency = 62.3%
Overall System Size = 224.34' x 58.50' x 3.50'

372 Chambers
1,701.2 cy Field
1,068.3 cy Stone



Pond 2P: SC740



Summary for Pond 4P: SC310

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.105 ac,100.00% Impervious, Inflow Depth > 4.87" for 25 Yr event
Inflow = 0.55 cfs @ 12.09 hrs, Volume= 0.043 af
Outflow = 0.01 cfs @ 6.80 hrs, Volume= 0.011 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.01 cfs @ 6.80 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.97' @ 18.57 hrs Surf.Area= 0.033 ac Storage= 0.032 af

Plug-Flow detention time= 206.3 min calculated for 0.011 af (25% of inflow)
Center-of-Mass det. time= 32.4 min (767.0 - 734.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	363.25'	0.024 af	**8.17'W x 174.08'L x 2.33'H Field A** 0.076 af Overall - 0.016 af Embedded = 0.060 af x 40.0% Voids
#2A	363.75'	0.016 af	**ADS_StormTech SC-310 +Cap** x 48 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 48 Chambers in 2 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.25'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	365.00'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 364.75' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.01 cfs @ 6.80 hrs HW=363.27' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=363.25' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 4P: SC310 - 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

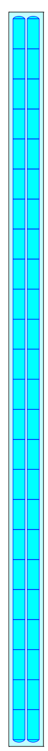
24 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 172.08' Row Length +12.0" End Stone x 2 = 174.08' Base Length
2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

48 Chambers x 14.7 cf = 707.6 cf Chamber Storage

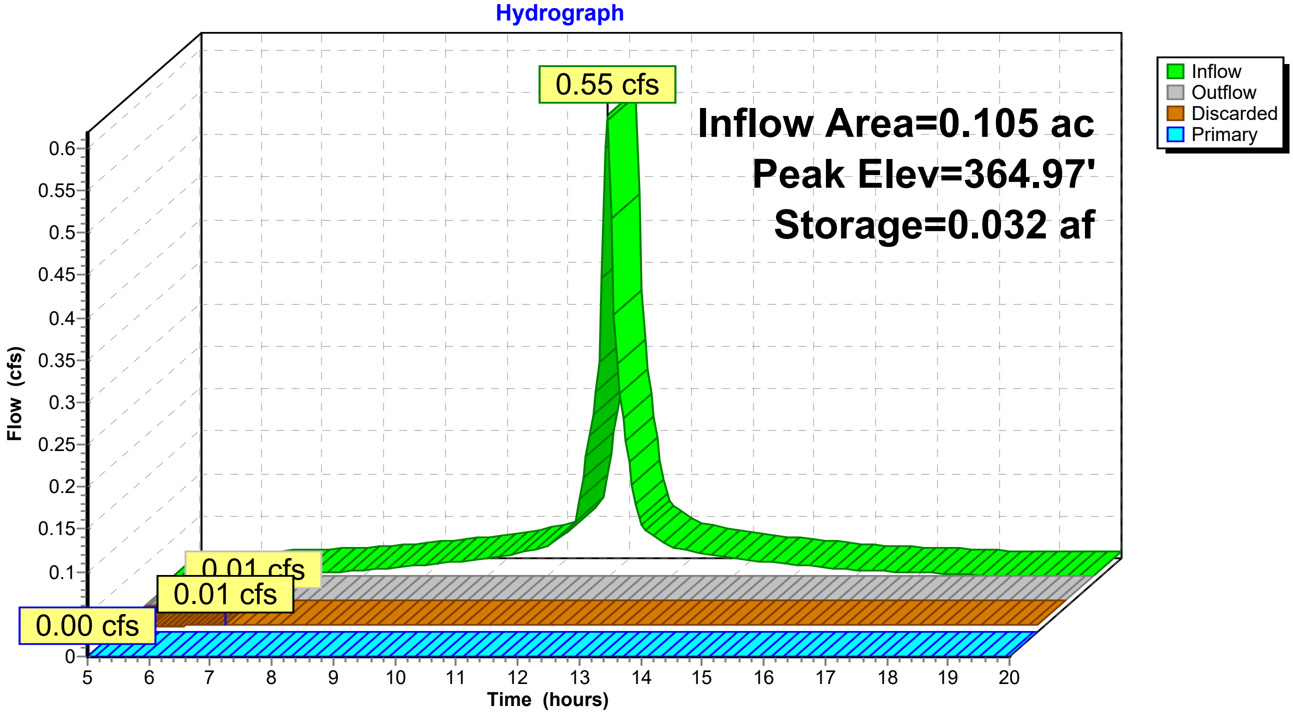
3,317.2 cf Field - 707.6 cf Chambers = 2,609.6 cf Stone x 40.0% Voids = 1,043.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,751.4 cf = 0.040 af
Overall Storage Efficiency = 52.8%
Overall System Size = 174.08' x 8.17' x 2.33'

48 Chambers
122.9 cy Field
96.7 cy Stone



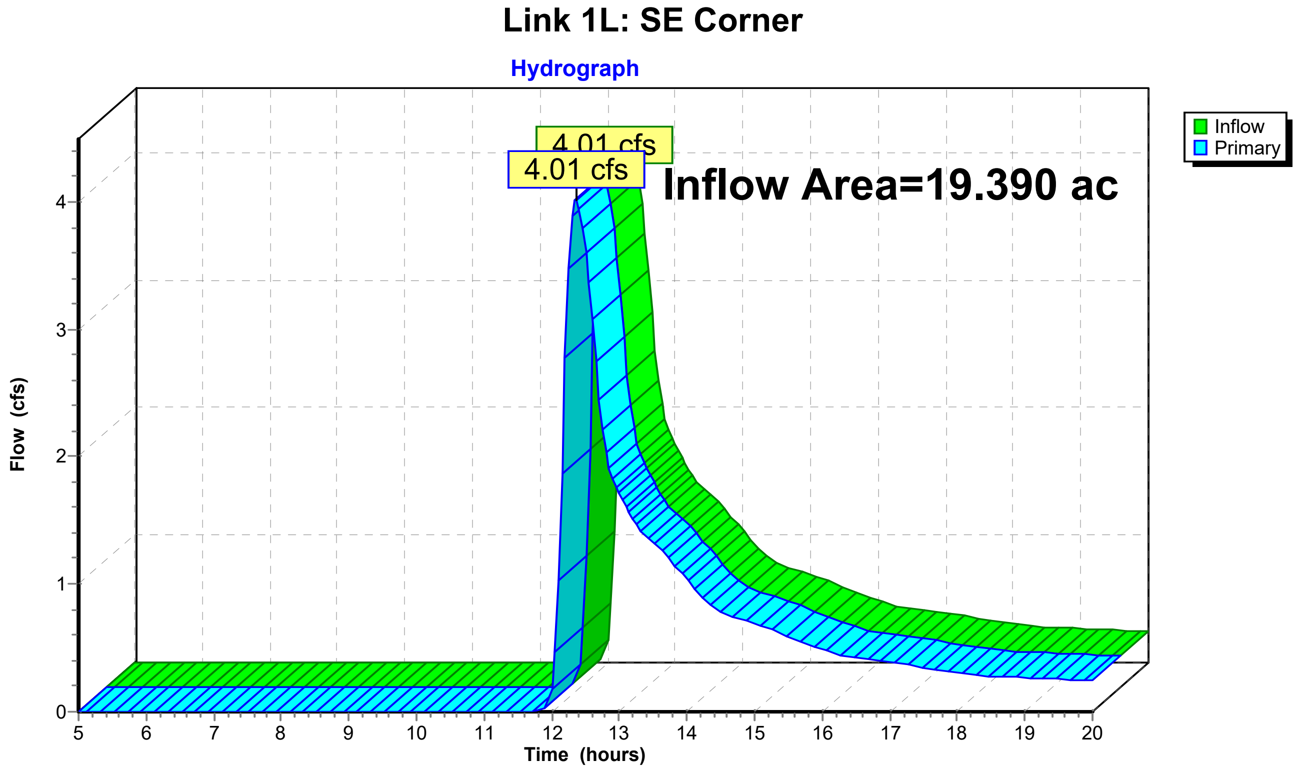
Pond 4P: SC310



Summary for Link 1L: SE Corner

Inflow Area = 19.390 ac, 24.29% Impervious, Inflow Depth > 0.34" for 25 Yr event
Inflow = 4.01 cfs @ 12.36 hrs, Volume= 0.548 af
Primary = 4.01 cfs @ 12.36 hrs, Volume= 0.548 af, Atten= 0%, Lag= 0.0 min

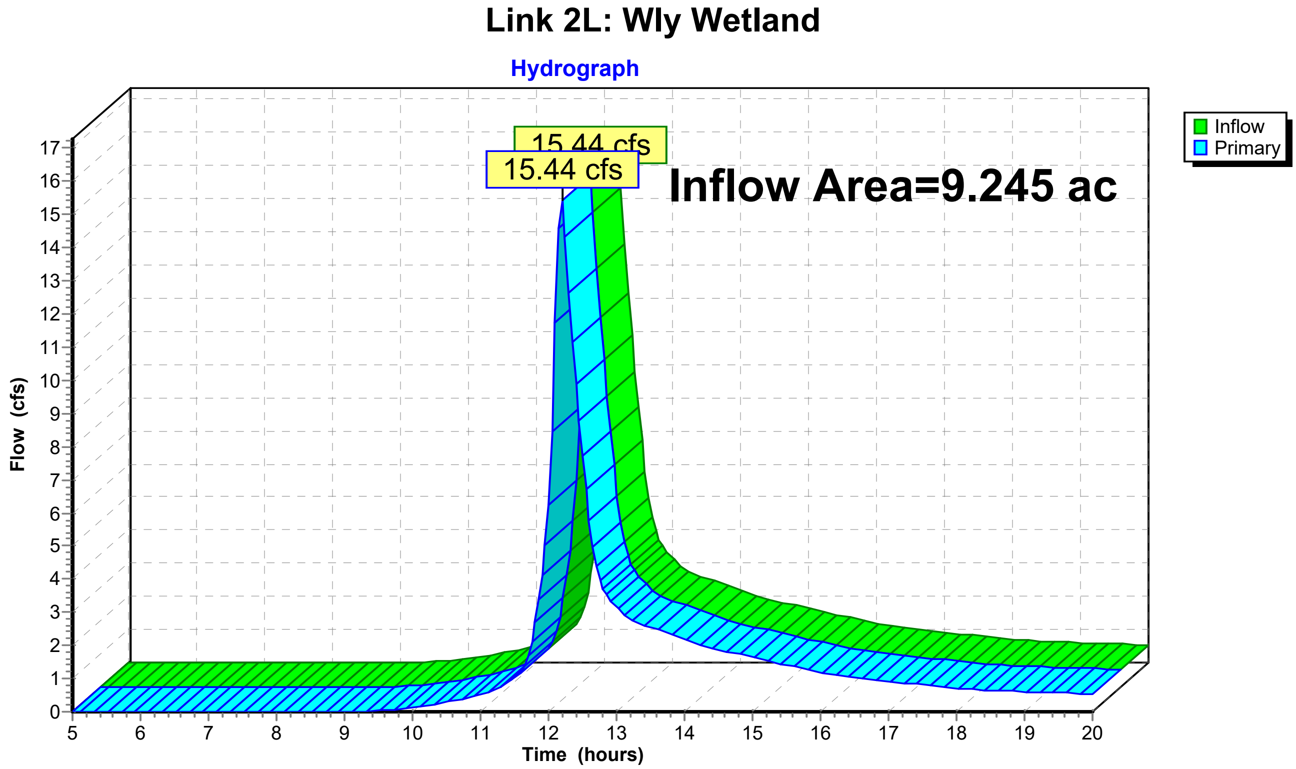
Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Summary for Link 2L: Wly Wetland

Inflow Area =	9.245 ac, 19.09% Impervious, Inflow Depth > 2.03"	for 25 Yr event	
Inflow =	15.44 cfs @ 12.20 hrs, Volume=	1.564 af	
Primary =	15.44 cfs @ 12.20 hrs, Volume=	1.564 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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: Drainage Collection Runoff Area=11.764 ac 40.04% Impervious Runoff Depth>4.03"
Flow Length=345' Tc=14.0 min CN=79 Runoff=45.70 cfs 3.955 af

Subcatchment P-2: Clubhouse Area Runoff Area=2.320 ac 70.69% Impervious Runoff Depth>5.32"
Flow Length=305' Tc=12.5 min CN=91 Runoff=11.66 cfs 1.029 af

Subcatchment P-3: ByPass MBTA Rd Runoff Area=7.626 ac 0.00% Impervious Runoff Depth>1.34"
Flow Length=1,801' Tc=19.5 min CN=50 Runoff=7.71 cfs 0.850 af

Subcatchment P-4: ByPass to W'ly Wetland Runoff Area=6.820 ac 0.29% Impervious Runoff Depth>3.22"
Flow Length=258' Tc=13.6 min CN=71 Runoff=21.60 cfs 1.830 af

Subcatchment P-5: Nly PL Runoff Area=2.410 ac 1.24% Impervious Runoff Depth>2.65"
Flow Length=77' Tc=8.0 min CN=65 Runoff=7.37 cfs 0.532 af

Subcatchment P-6: (new Subcat) Runoff Area=0.105 ac 100.00% Impervious Runoff Depth>5.97"
Tc=6.0 min CN=98 Runoff=0.67 cfs 0.052 af

Pond 1P: Inf Basin Peak Elev=288.41' Storage=77,812 cf Inflow=45.70 cfs 3.955 af
Discarded=3.93 cfs 2.751 af Primary=2.83 cfs 0.545 af Outflow=6.76 cfs 3.296 af

Pond 2P: SC740 Peak Elev=367.59' Storage=0.608 af Inflow=11.66 cfs 1.029 af
Discarded=0.08 cfs 0.098 af Primary=2.16 cfs 0.457 af Outflow=2.25 cfs 0.555 af

Pond 4P: SC310 Peak Elev=365.12' Storage=0.034 af Inflow=0.67 cfs 0.052 af
Discarded=0.01 cfs 0.011 af Primary=0.04 cfs 0.009 af Outflow=0.05 cfs 0.019 af

Link 1L: SE Corner Inflow=8.58 cfs 1.395 af
Primary=8.58 cfs 1.395 af

Link 2L: Wly Wetland Inflow=21.68 cfs 2.296 af
Primary=21.68 cfs 2.296 af

Total Runoff Area = 31.045 ac Runoff Volume = 8.249 af Average Runoff Depth = 3.19"
79.05% Pervious = 24.540 ac 20.95% Impervious = 6.505 ac

Summary for Subcatchment P-1: Drainage Collection

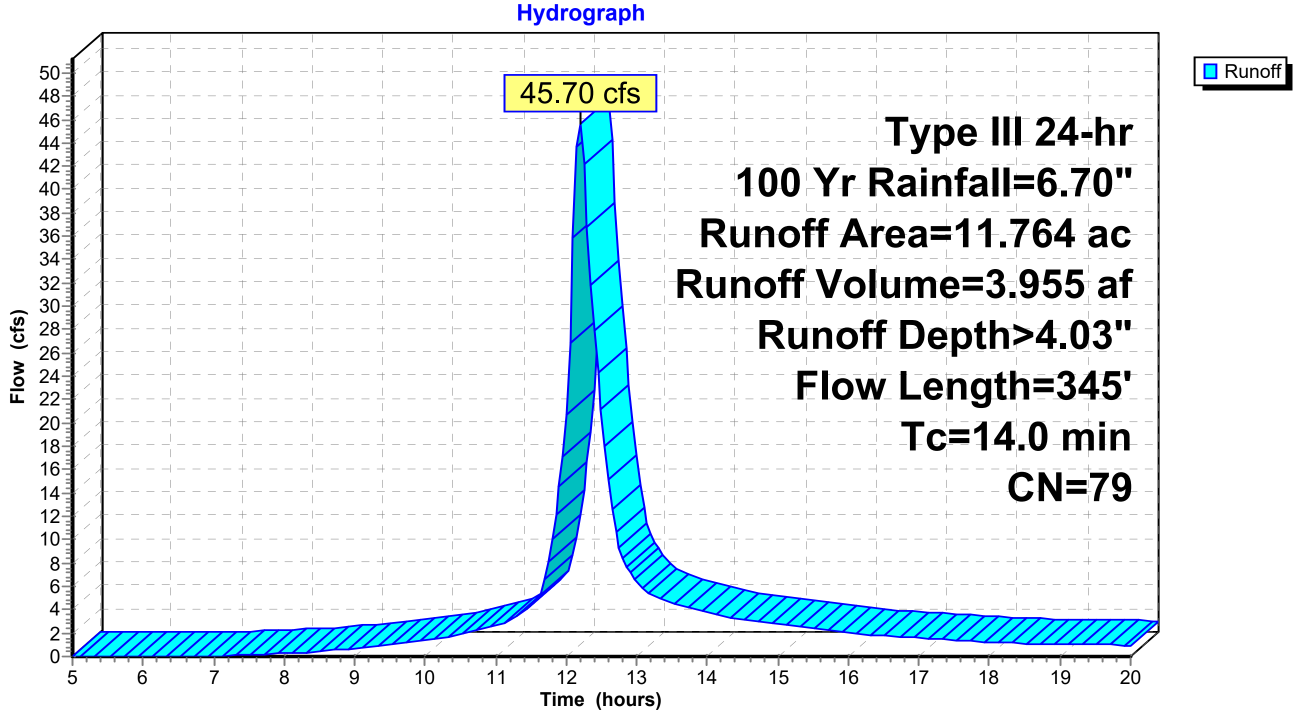
Runoff = 45.70 cfs @ 12.19 hrs, Volume= 3.955 af, Depth> 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
0.080	30	Woods, Good, HSG A
1.510	39	>75% Grass cover, Good, HSG A
0.650	98	Paved parking, HSG A
0.294	70	Woods, Good, HSG C
5.170	74	>75% Grass cover, Good, HSG C
3.240	98	Paved parking, HSG C
0.820	98	Roofs, HSG C
11.764	79	Weighted Average
7.054		59.96% Pervious Area
4.710		40.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.1	62	0.3300	9.25		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.9	88	0.0100	1.61		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
14.0	345	Total			

Subcatchment P-1: Drainage Collection



Summary for Subcatchment P-2: Clubhouse Area

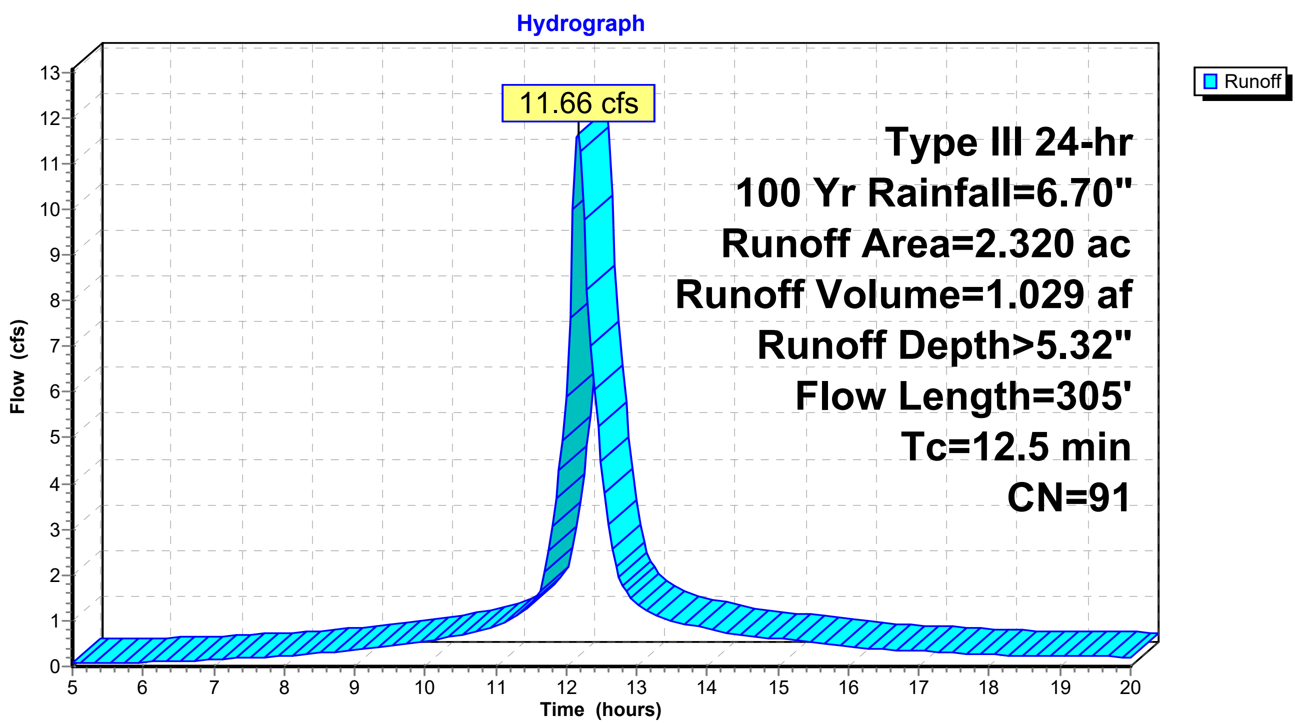
Runoff = 11.66 cfs @ 12.17 hrs, Volume= 1.029 af, Depth> 5.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
0.680	74	>75% Grass cover, Good, HSG C
0.270	98	Paved parking, HSG C
1.370	98	Roofs, HSG C
2.320	91	Weighted Average
0.680		29.31% Pervious Area
1.640		70.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.7	89	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.0	166	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
12.5	305	Total			

Subcatchment P-2: Clubhouse Area



Summary for Subcatchment P-3: ByPass MBTA Rd

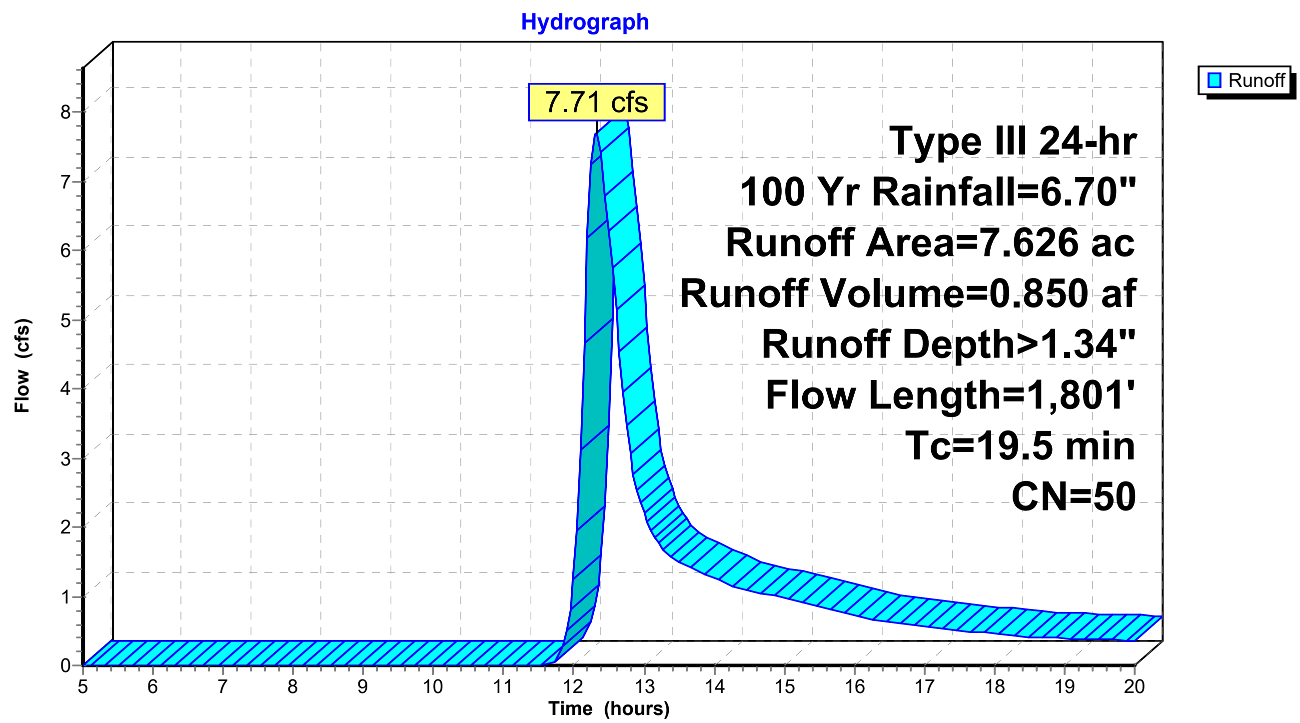
Runoff = 7.71 cfs @ 12.32 hrs, Volume= 0.850 af, Depth> 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
3.340	30	Woods, Good, HSG A
0.600	39	>75% Grass cover, Good, HSG A
3.306	70	Woods, Good, HSG C
0.380	74	>75% Grass cover, Good, HSG C
7.626	50	Weighted Average
7.626		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	50	0.0180	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	1,751	0.0760	4.44		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
19.5	1,801	Total			

Subcatchment P-3: ByPass MBTA Rd



Summary for Subcatchment P-4: ByPass to W'ly Wetland

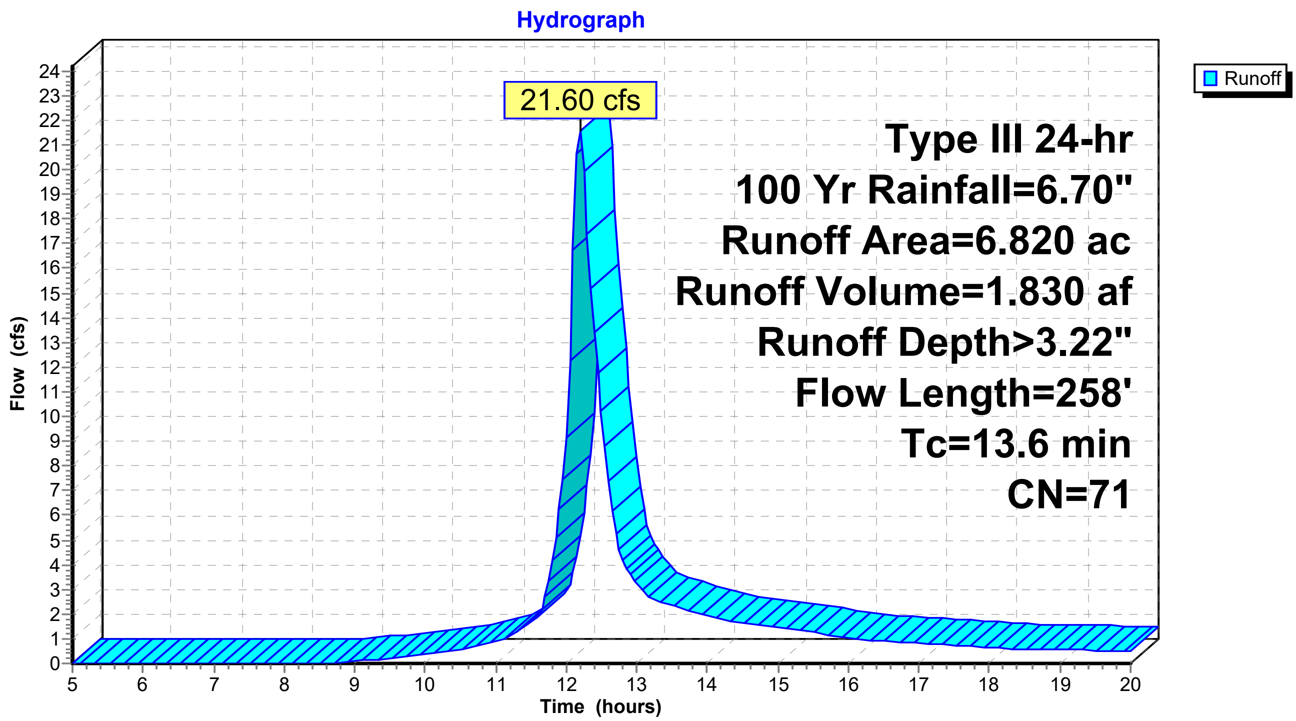
Runoff = 21.60 cfs @ 12.19 hrs, Volume= 1.830 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
5.540	70	Woods, Good, HSG C
0.830	74	>75% Grass cover, Good, HSG C
0.020	98	Paved parking, HSG C
0.430	77	Woods, Good, HSG D
6.820	71	Weighted Average
6.800		99.71% Pervious Area
0.020		0.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	208	0.0270	2.65		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
13.6	258	Total			

Subcatchment P-4: ByPass to W'ly Wetland



Summary for Subcatchment P-5: Nly PL

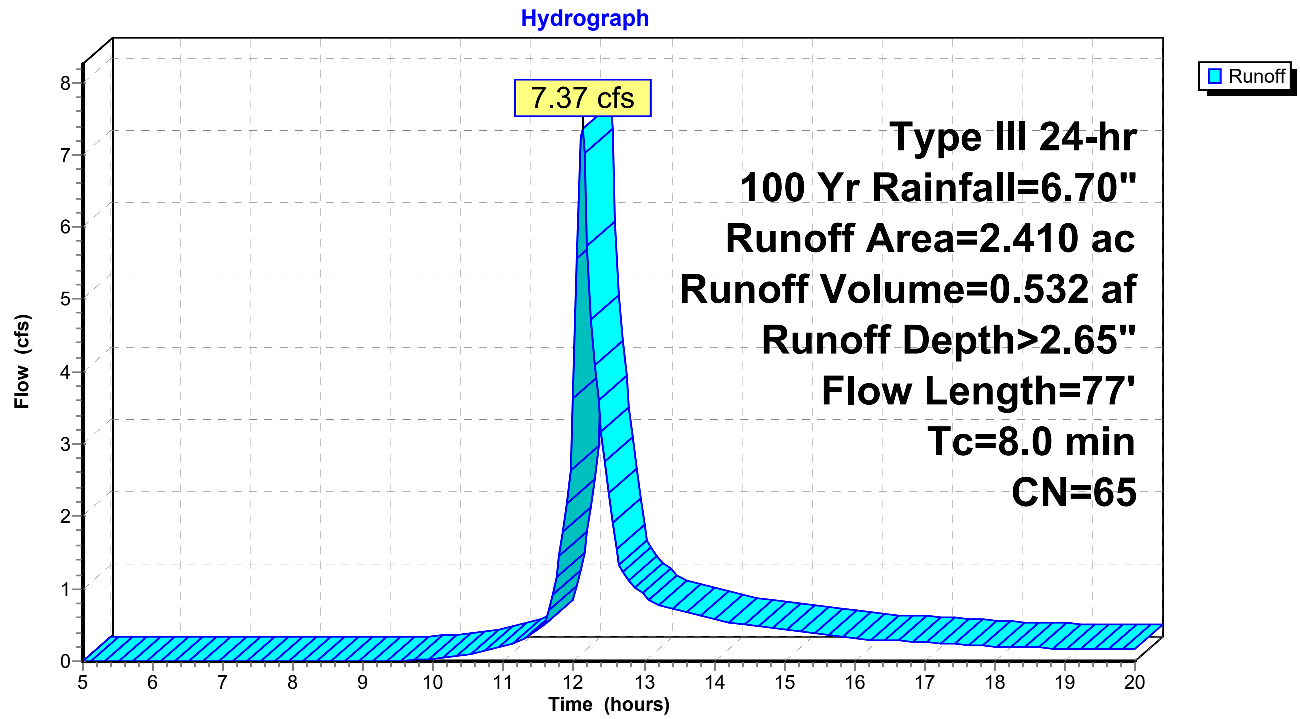
Runoff = 7.37 cfs @ 12.12 hrs, Volume= 0.532 af, Depth> 2.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
0.070	30	Woods, Good, HSG A
0.520	39	>75% Grass cover, Good, HSG A
0.440	70	Woods, Good, HSG C
1.350	74	>75% Grass cover, Good, HSG C
0.030	98	Paved parking, HSG C
2.410	65	Weighted Average
2.380		98.76% Pervious Area
0.030		1.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	27	0.0700	4.26		**Shallow Concentrated Flow, B-C**
					Unpaved Kv= 16.1 fps
8.0	77	Total			

Subcatchment P-5: Nly PL



Summary for Subcatchment P-6: (new Subcat)

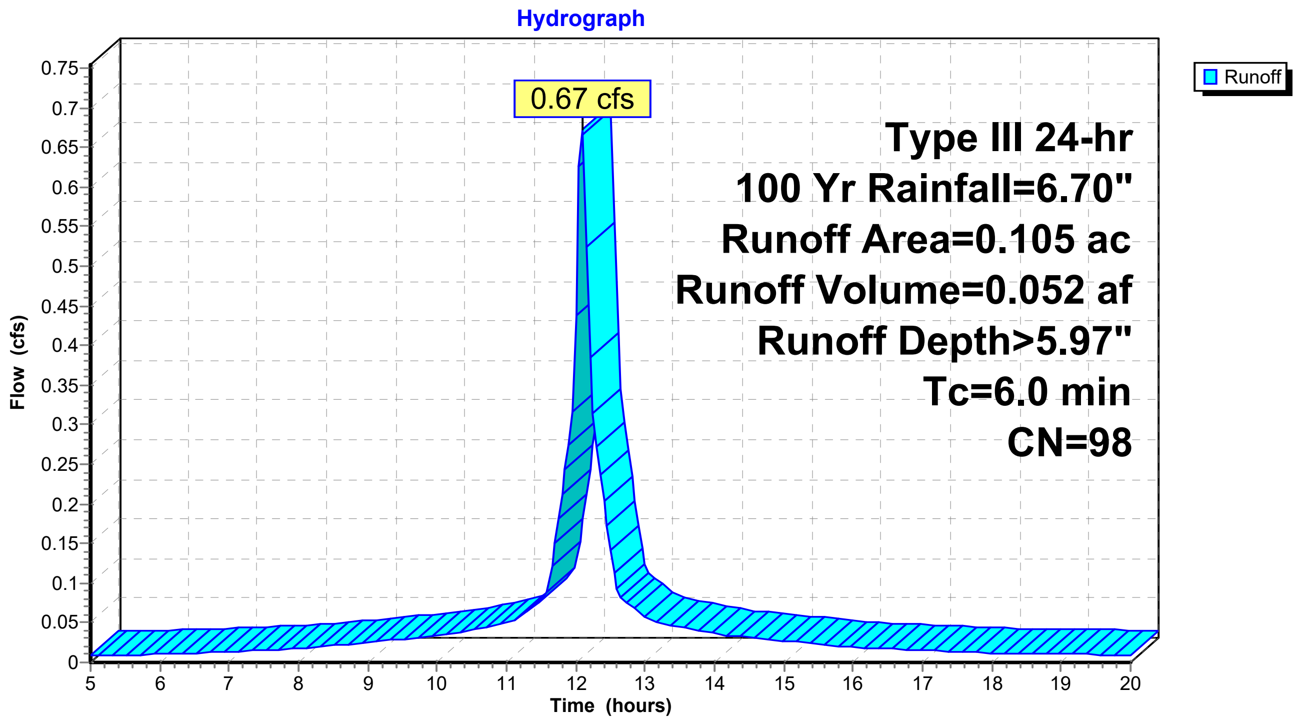
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 0.052 af, Depth> 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Yr Rainfall=6.70"

Area (ac)	CN	Description
0.105	98	Roofs, HSG C
0.105		100.00% Impervious Area

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

Subcatchment P-6: (new Subcat)



Summary for Pond 1P: Inf Basin

Inflow Area =	11.764 ac,	40.04% Impervious,	Inflow Depth > 4.03"	for 100 Yr event
Inflow =	45.70 cfs @	12.19 hrs, Volume=	3.955 af	
Outflow =	6.76 cfs @	12.96 hrs, Volume=	3.296 af,	Atten= 85%, Lag= 45.7 min
Discarded =	3.93 cfs @	12.96 hrs, Volume=	2.751 af	
Primary =	2.83 cfs @	12.96 hrs, Volume=	0.545 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 288.41' @ 12.96 hrs Surf.Area= 20,512 sf Storage= 77,812 cf

Plug-Flow detention time= 147.9 min calculated for 3.296 af (83% of inflow)
Center-of-Mass det. time= 101.3 min (886.7 - 785.4)

Volume	Invert	Avail.Storage	Storage Description
#1	283.50'	112,982 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

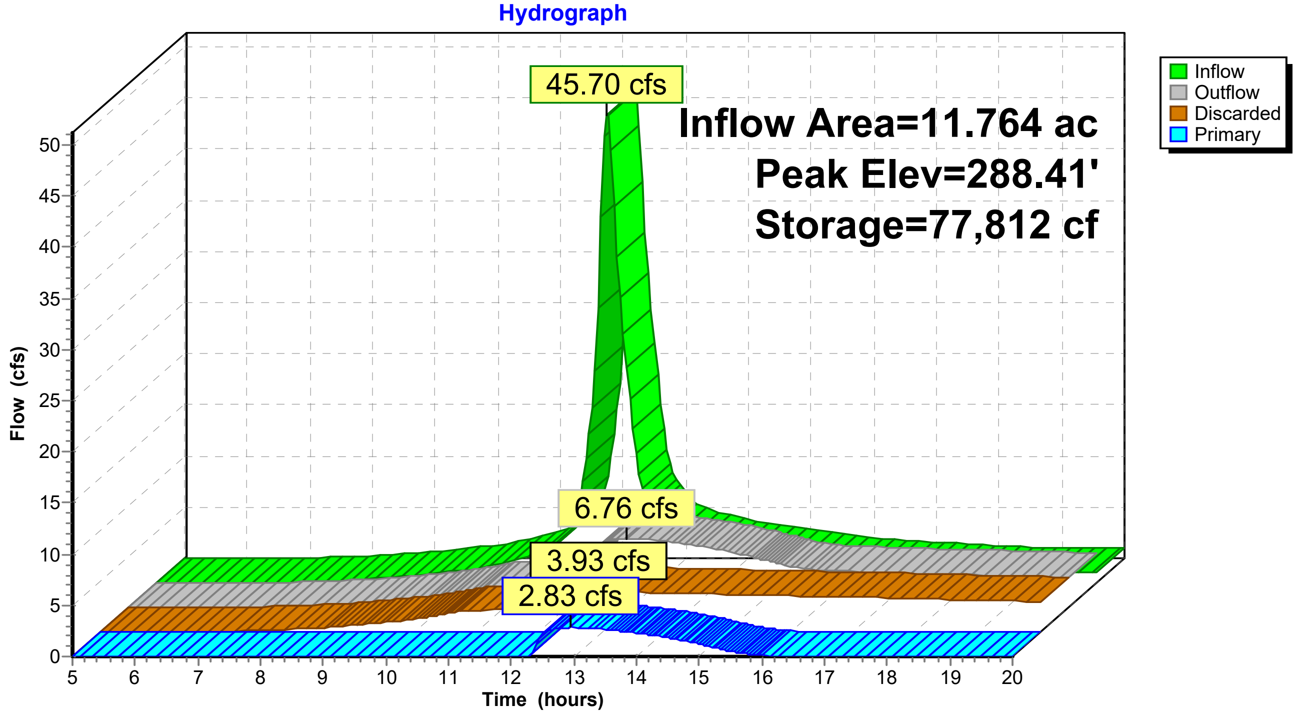
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
283.50	10,661	0	0
284.00	12,357	5,755	5,755
285.00	14,108	13,233	18,987
286.00	15,917	15,013	34,000
287.00	17,782	16,850	50,849
288.00	19,703	18,743	69,592
289.00	21,681	20,692	90,284
290.00	23,716	22,699	112,982

Device	Routing	Invert	Outlet Devices
#1	Discarded	283.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	280.91'	**24.0" Round Culvert** L= 119.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 280.91' / 277.45' S= 0.0291 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#3	Device 2	286.90'	**2.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	287.25'	**6.0" Vert. Orifice/Grate X 3.00** C= 0.600
#5	Device 2	288.50'	**16.0' 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=3.93 cfs @ 12.96 hrs HW=288.41' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 3.93 cfs)

Primary OutFlow Max=2.83 cfs @ 12.96 hrs HW=288.41' (Free Discharge)
└─**2=Culvert** (Passes 2.83 cfs of 38.56 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 5.75 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 2.70 cfs @ 4.59 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Inf Basin



Summary for Pond 2P: SC740

[82] Warning: Early inflow requires earlier time span

```
Inflow Area =        2.320 ac, 70.69% Impervious, Inflow Depth >  5.32"   for 100 Yr event
Inflow      =       11.66 cfs @  12.17 hrs, Volume=          1.029 af
Outflow     =        2.25 cfs @  12.70 hrs, Volume=          0.555 af, Atten= 81%, Lag= 32.0 min
Discarded   =        0.08 cfs @   6.40 hrs, Volume=          0.098 af
Primary     =        2.16 cfs @  12.70 hrs, Volume=          0.457 af
```

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 367.59' @ 12.70 hrs Surf.Area= 0.301 ac Storage= 0.608 af

Plug-Flow detention time= 186.1 min calculated for 0.555 af (54% of inflow)
Center-of-Mass det. time= 101.9 min (858.0 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	364.50'	0.265 af	**58.50'W x 224.34'L x 3.50'H Field A** 1.054 af Overall - 0.392 af Embedded = 0.662 af x 40.0% Voids
#2A	365.00'	0.392 af	**ADS_StormTech SC-740 +Cap** x 372 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 372 Chambers in 12 Rows
		0.657 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	364.50'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	363.28'	**18.0" Round Culvert** L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.28' / 362.54' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#3	Device 2	366.25'	**3.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	366.70'	**4.0" Vert. Orifice/Grate X 4.00** C= 0.600
#5	Device 2	367.50'	**6.0' 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=0.08 cfs @ 6.40 hrs HW=364.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=2.16 cfs @ 12.70 hrs HW=367.59' (Free Discharge)
└─**2=Culvert** (Passes 2.16 cfs of 16.06 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.26 cfs @ 5.31 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 1.43 cfs @ 4.10 fps)
  └─**5=Broad-Crested Rectangular Weir** (Weir Controls 0.47 cfs @ 0.85 fps)

Pond 2P: SC740 - 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

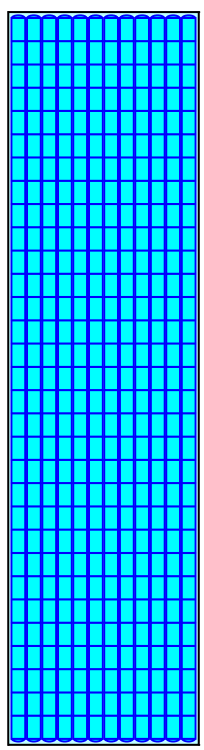
31 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 222.34' Row Length +12.0" End Stone x 2 = 224.34' Base Length
12 Rows x 51.0" Wide + 6.0" Spacing x 11 + 12.0" Side Stone x 2 = 58.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

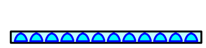
372 Chambers x 45.9 cf = 17,089.7 cf Chamber Storage

45,932.9 cf Field - 17,089.7 cf Chambers = 28,843.2 cf Stone x 40.0% Voids = 11,537.3 cf Stone Storage

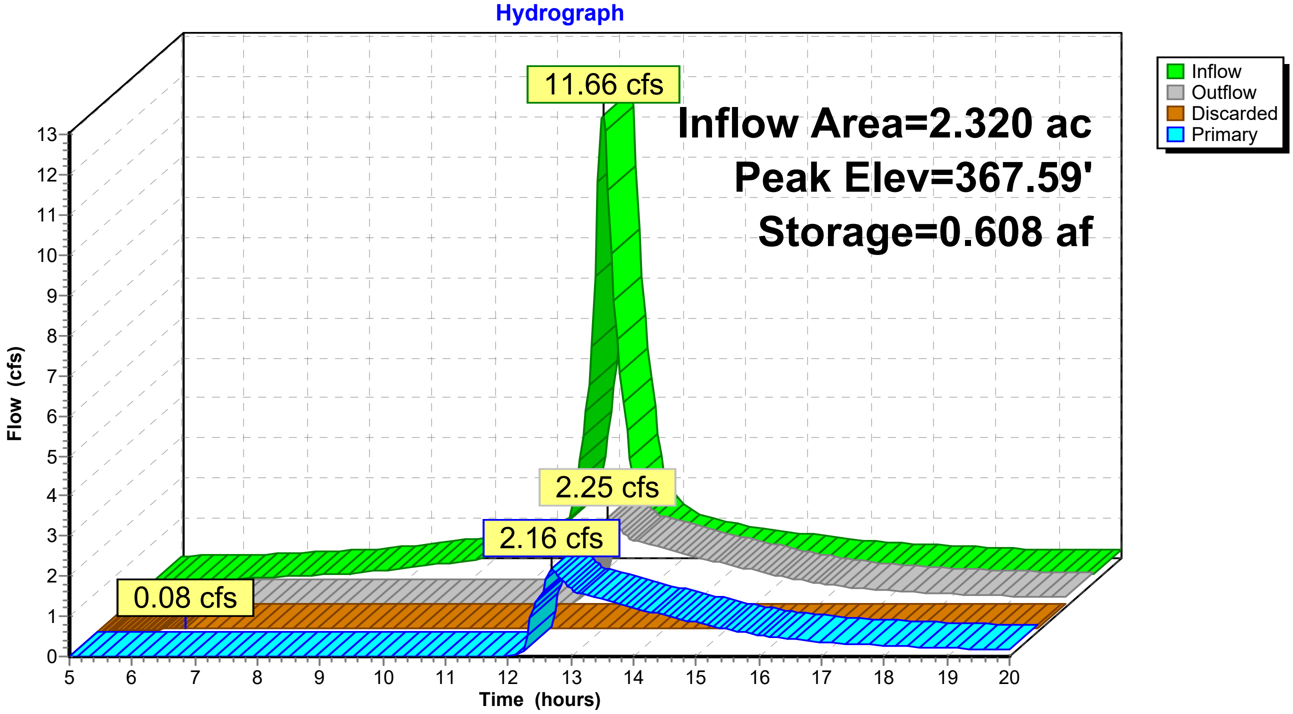
Chamber Storage + Stone Storage = 28,627.0 cf = 0.657 af
Overall Storage Efficiency = 62.3%
Overall System Size = 224.34' x 58.50' x 3.50'

372 Chambers
1,701.2 cy Field
1,068.3 cy Stone





Pond 2P: SC740



Summary for Pond 4P: SC310

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.105 ac,100.00% Impervious, Inflow Depth > 5.97" for 100 Yr event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 0.052 af
Outflow = 0.05 cfs @ 13.45 hrs, Volume= 0.019 af, Atten= 93%, Lag= 81.6 min
Discarded = 0.01 cfs @ 6.05 hrs, Volume= 0.011 af
Primary = 0.04 cfs @ 13.45 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 365.12' @ 13.45 hrs Surf.Area= 0.033 ac Storage= 0.034 af

Plug-Flow detention time= 212.3 min calculated for 0.019 af (37% of inflow)
Center-of-Mass det. time= 86.1 min (819.8 - 733.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	363.25'	0.024 af	**8.17'W x 174.08'L x 2.33'H Field A** 0.076 af Overall - 0.016 af Embedded = 0.060 af x 40.0% Voids
#2A	363.75'	0.016 af	**ADS_StormTech SC-310 +Cap** x 48 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 48 Chambers in 2 Rows
		0.040 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.25'	**0.270 in/hr Exfiltration over Surface area**
#2	Primary	365.00'	**6.0" Round Culvert** L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 365.00' / 364.75' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

Discarded OutFlow Max=0.01 cfs @ 6.05 hrs HW=363.27' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.04 cfs @ 13.45 hrs HW=365.12' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.04 cfs @ 1.62 fps)

Pond 4P: SC310 - 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

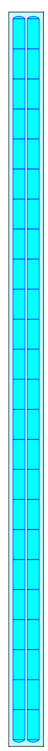
24 Chambers/Row x 7.12' Long +0.60' Cap Length x 2 = 172.08' Row Length +12.0" End Stone x 2 = 174.08' Base Length
2 Rows x 34.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.17' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

48 Chambers x 14.7 cf = 707.6 cf Chamber Storage

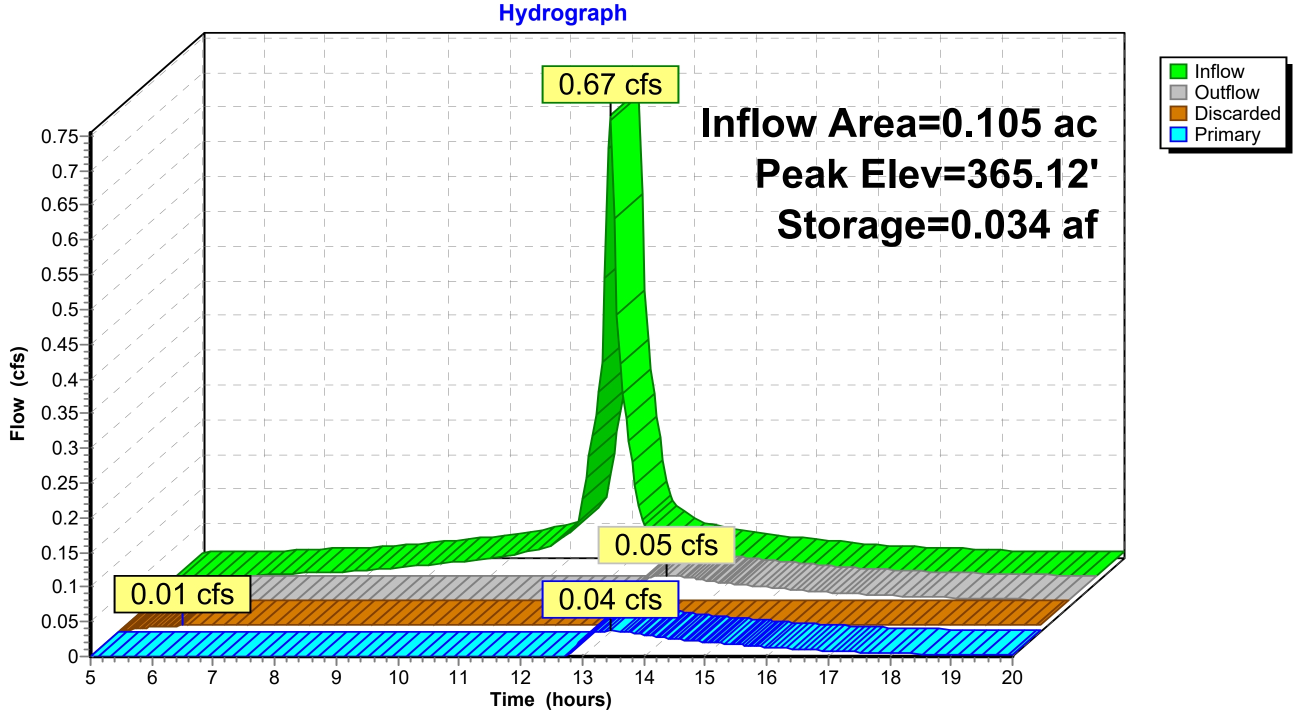
3,317.2 cf Field - 707.6 cf Chambers = 2,609.6 cf Stone x 40.0% Voids = 1,043.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,751.4 cf = 0.040 af
Overall Storage Efficiency = 52.8%
Overall System Size = 174.08' x 8.17' x 2.33'

48 Chambers
122.9 cy Field
96.7 cy Stone



Pond 4P: SC310

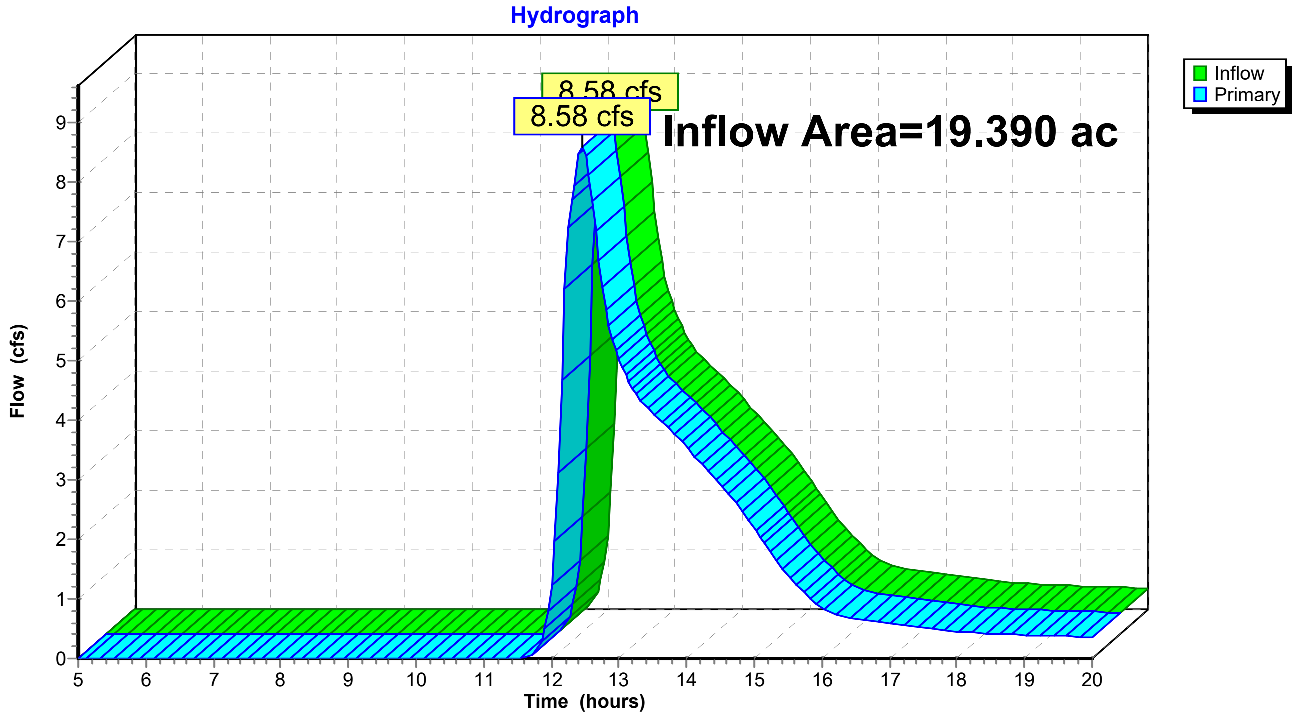


Summary for Link 1L: SE Corner

Inflow Area =	19.390 ac, 24.29% Impervious, Inflow Depth > 0.86"	for 100 Yr event	
Inflow =	8.58 cfs @ 12.45 hrs, Volume=	1.395 af	
Primary =	8.58 cfs @ 12.45 hrs, Volume=	1.395 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 1L: SE Corner

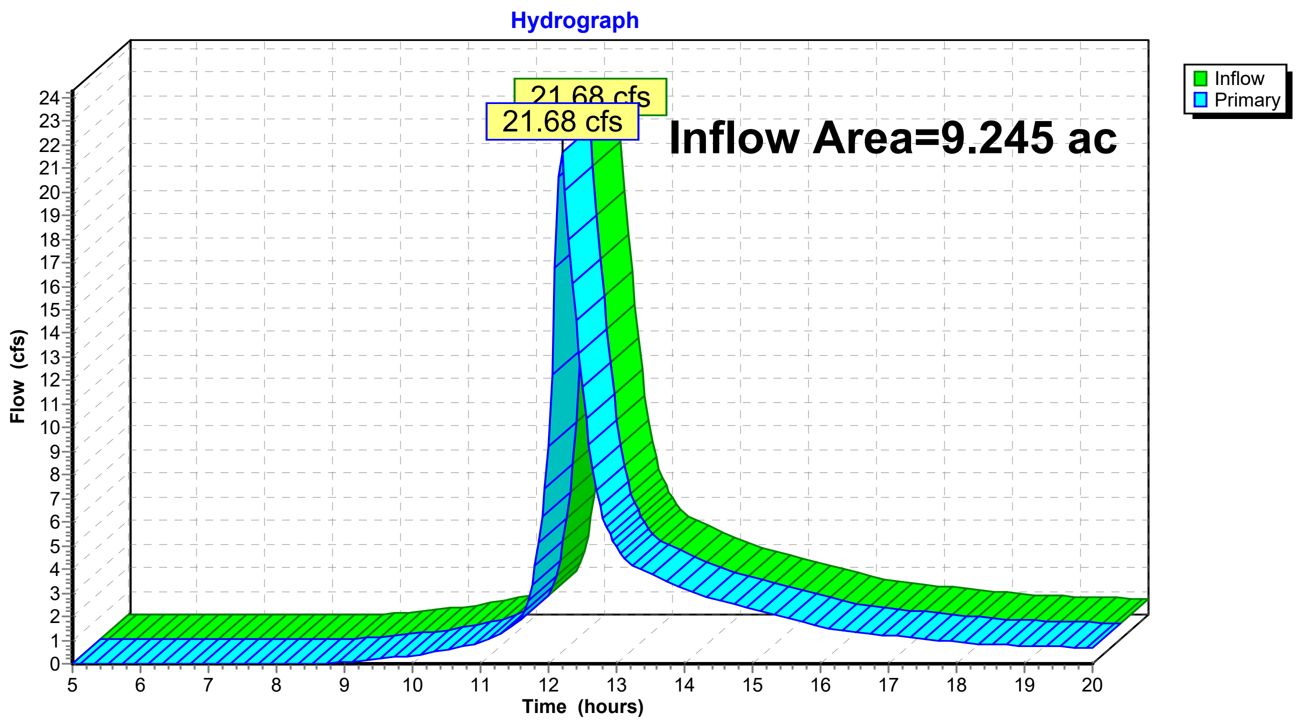


Summary for Link 2L: Wly Wetland

Inflow Area =	9.245 ac,	19.09% Impervious,	Inflow Depth > 2.98"	for 100 Yr event
Inflow =	21.68 cfs @	12.19 hrs, Volume=	2.296 af	
Primary =	21.68 cfs @	12.19 hrs, Volume=	2.296 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 2L: Wly Wetland



Appendix C

Stormwater Checklist
TSS Calculation Worksheet
Illicit Discharge Statement
Pipe Sizing
Soil Information

A P P E N D I X C

STORMWATER CHECKLIST

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

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 (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): ____________________

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 (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 (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 (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.

TSS CALCULATION WORKSHEET

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Subsurface Infiltration System 1

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	25%	**1.00**	0.25	0.75
Proprietary Contech Unit	50%	0.75	0.37	0.38
Stormtech SC-740 Chambers	80%	0.38	0.30	.08
		.08		

Total TSS Removal = 92%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Arbella at Ashland

Prepared By: PGM

Date: 12/23/2020

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

TSS Removal Calculation Worksheet

Location: Infiltration Basin

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	25%	**1.00**	0.25	0.75
Proprietary Contech Unit	50%	0.75	0.37	0.38
Infiltration Basin	80%	0.38	0.30	0.08
		0.08		

Total TSS Removal = 92%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Arbella at Ashland

Prepared By: PGM

Date: 12/23/2020

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

Project: **Arbella at Ashland**
Location: **Ashland, MA**
Prepared For: **Allen & Major / Paul Matos**

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1/2" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1/2" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1/2" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
PDMH 17	0.46	0.0007188	5.0	0.083	0.50	773.00	0.28
PDMH 23	4.65	0.0072656	10.0	0.167	0.50	677.00	2.46
PDMH 24	0.31	0.0004844	5.0	0.083	0.50	773.00	0.19

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

ARBELLA AT ASHLAND
ASHLAND, MA

Area	**0.46 ac**	Unit Site Designation	**PDMH 17**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**5 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.3
0.04	9.5%	18.8%	0.02	0.02	9.5
0.06	8.7%	27.5%	0.02	0.02	8.7
0.08	10.1%	37.6%	0.03	0.03	10.1
0.10	7.2%	44.8%	0.04	0.04	7.1
0.12	6.0%	50.8%	0.05	0.05	6.0
0.14	6.3%	57.1%	0.06	0.06	6.2
0.16	5.6%	62.7%	0.07	0.07	5.5
0.18	4.7%	67.4%	0.07	0.07	4.6
0.20	3.6%	71.0%	0.08	0.08	3.5
0.25	8.2%	79.1%	0.10	0.10	7.9
0.50	14.9%	94.0%	0.21	0.21	13.7
0.75	3.2%	97.3%	0.31	0.31	2.8
1.00	1.2%	98.5%	0.41	0.41	1.0
1.50	0.7%	99.2%	0.62	0.62	0.5
2.00	0.8%	100.0%	0.83	0.83	0.5
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.8

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**90.3%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

ARBELLA AT ASHLAND
ASHLAND, MA

Area	4.65 ac	Unit Site Designation	PDMH 23
Weighted C	0.9	Rainfall Station #	68
t_c	10 min		
CDS Model	2025-5	CDS Treatment Capacity	**3.2 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.08	0.08	9.3
0.04	9.5%	18.8%	0.17	0.17	9.4
0.06	8.7%	27.5%	0.25	0.25	8.5
0.08	10.1%	37.6%	0.33	0.33	9.7
0.10	7.2%	44.8%	0.42	0.42	6.8
0.12	6.0%	50.8%	0.50	0.50	5.6
0.14	6.3%	57.1%	0.59	0.59	5.8
0.16	5.6%	62.7%	0.67	0.67	5.1
0.18	4.7%	67.4%	0.75	0.75	4.2
0.20	3.6%	71.0%	0.84	0.84	3.2
0.25	8.2%	79.1%	1.05	1.05	7.0
0.50	14.9%	94.0%	2.09	2.09	10.5
0.75	3.2%	97.3%	3.14	3.14	1.8
1.00	1.2%	98.5%	4.19	3.20	0.5
1.50	0.7%	99.2%	6.28	3.20	0.2
2.00	0.8%	100.0%	8.37	3.20	0.2
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					87.9
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	92.4%
				Predicted Net Annual Load Removal Efficiency =	**81.5%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

ARBELLA AT ASHLAND
ASHLAND, MA

Area	**0.31 ac**	Unit Site Designation	**PDMH 24**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**5 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.3
0.04	9.5%	18.8%	0.01	0.01	9.5
0.06	8.7%	27.5%	0.02	0.02	8.7
0.08	10.1%	37.6%	0.02	0.02	10.1
0.10	7.2%	44.8%	0.03	0.03	7.2
0.12	6.0%	50.8%	0.03	0.03	6.0
0.14	6.3%	57.1%	0.04	0.04	6.3
0.16	5.6%	62.7%	0.04	0.04	5.6
0.18	4.7%	67.4%	0.05	0.05	4.7
0.20	3.6%	71.0%	0.06	0.06	3.6
0.25	8.2%	79.1%	0.07	0.07	8.1
0.50	14.9%	94.0%	0.14	0.14	14.4
0.75	3.2%	97.3%	0.21	0.21	3.0
1.00	1.2%	98.5%	0.28	0.28	1.1
1.50	0.7%	99.2%	0.42	0.42	0.6
2.00	0.8%	100.0%	0.56	0.56	0.6
					98.9

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**92.4%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

ILLICIT DISCHARGE STATEMENT

ILLICIT DISCHARGE STATEMENT

Project: Arbella at Ashland
Ashland, MA

Date: December 23, 2020

The stormwater management system proposed shall not be connected to the wastewater management system and shall not be contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease per Massachusetts DEP stormwater standard 10.

Engineer:

Allen & Major Associates, Inc.
10 Main Street
Lakeville, MA 02347

______________________________ ______________________________

Print Name Signature

Owner:

UA Senior Manager, LLC
Rensselaer Technology Park 300 Jordon Road
Troy, NY 12180

______________________________ ______________________________

Print Name Signature

PIPE SIZING

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: **25**
K= 230 B= 30

Title ***Stormwater Conveyance Sizing (25 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Minimum Slope:	0.50%	
Minimum Size:	12	inch
Rainfall Intensity (in/hr):	6.57	(25 year storm)
Manning's n:	0.012	HDPE
Manning's n:	0.013	RCP
Min. Velocity:	2.00	fps
Max. Velocity:	12.00	fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
Infiltration Basin																
PCB 1A	PDMH 1	25.43	359.93	359.80	0.5000	CIRCULAR	12.000	0.0120	1.48	0 00:05	3.56	0.12	2.73	0.54	0.52	Good
PCB 1B	PDMH 1	24.97	359.92	359.80	0.5000	CIRCULAR	12.000	0.0120	1.78	0 00:05	3.72	0.11	2.73	0.65	0.59	Good
PDMH 1	PDMH 2	85.08	359.70	358.64	1.2500	CIRCULAR	12.000	0.0120	3.23	0 00:05	6.09	0.23	4.32	0.75	0.64	Good
PCB 2A	PDMH 2	13	358.79	358.73	0.5000	CIRCULAR	12.000	0.0120	0.60	0 00:05	2.80	0.07	2.73	0.22	0.32	Good
PCB 2B	PDMH 2	7	358.80	358.73	1.0000	CIRCULAR	12.000	0.0120	0.54	0 00:05	3.47	0.03	3.86	0.14	0.25	Good
PDMH 2	PDMH 3	50	358.39	358.05	0.6700	CIRCULAR	15.000	0.0120	4.34	0 00:05	5.17	0.16	5.74	0.76	0.81	Good
PCB 3A	PDMH 3	17	358.66	358.46	1.2100	CIRCULAR	12.000	0.0120	1.88	0 00:05	5.25	0.05	4.24	0.44	0.46	Good
BLDG 8 ROOF	PDMH 3	26	358.69	358.46	0.8900	CIRCULAR	12.000	0.0120	0.29	0 00:05	3.19	0.14	3.65	0.08	0.19	Good
PDMH 3	PDMH 4	148	357.83	357.10	0.5000	CIRCULAR	18.000	0.0120	6.34	0 00:05	5.15	0.48	8.02	0.79	1.00	Good
PDMH 4	PDMH 5	113	357.00	356.43	0.5000	CIRCULAR	18.000	0.0120	6.30	0 00:06	5.12	0.37	8.05	0.78	1.00	Good
PCB 5A	PDMH 5	17.09	359.17	359.00	1.0000	CIRCULAR	12.000	0.0120	1.67	0 00:05	4.75	0.06	3.86	0.43	0.46	Good
BLDG 9 ROOF	PDMH 5	25.78	359.26	359.00	1.0000	CIRCULAR	12.000	0.0120	0.47	0 00:05	3.54	0.12	3.86	0.12	0.23	Good
PDMH 5	PDMH 6	205.00	356.33	354.69	0.8000	CIRCULAR	18.000	0.0120	8.05	0 00:06	6.55	0.52	10.18	0.79	1.00	Good
PCB 6A	PDMH 6	17.09	358.00	357.66	2.0000	CIRCULAR	12.000	0.0120	2.42	0 00:05	6.75	0.04	5.46	0.44	0.47	Good
BLDG 10 ROOF	PDMH 6	25.59	358.26	358.00	1.0000	CIRCULAR	12.000	0.0120	0.47	0 00:05	3.53	0.12	3.86	0.12	0.23	Good
PDMH 6	PDMH 7	109.91	354.59	353.22	1.25	CIRCULAR	18.00	0.0120	10.340	0 00:06	8.08	0.23	12.72	0.81	1.03	Good
PDMH 7	PDMH 8	81.37	353.12	352.10	1.25	CIRCULAR	18.00	0.0120	10.330	0 00:06	8.05	0.17	12.72	0.81	1.03	Good
PCB 8A	PDMH 8	17.87	358.50	357.96	3.00	CIRCULAR	12.00	0.0120	1.040	0 00:05	6.21	0.05	6.69	0.16	0.27	Good
BLDG ROOF 11	PDMH 8	25.65	358.26	358.00	1.00	CIRCULAR	12.00	0.0120	0.530	0 00:05	3.51	0.12	3.86	0.14	0.25	Good
PDMH 8	PDMH 9	104.17	351.60	351.08	0.50	CIRCULAR	24.00	0.0120	11.520	0 00:06	5.94	0.29	17.33	0.66	1.19	Good
PCB 9A	PDMH 9	42.65	358.00	356.72	3.00	CIRCULAR	12.00	0.0120	0.620	0 00:05	5.61	0.13	6.69	0.09	0.21	Good
PDMH 9	PDMH 10	57.19	350.98	350.69	0.50	CIRCULAR	24.00	0.0120	11.980	0 00:06	5.96	0.16	17.33	0.69	1.22	Good
PCB 10A	PDMH 10	13.38	357.50	357.10	3.00	CIRCULAR	12.00	0.0120	1.310	0 00:05	6.62	0.03	6.69	0.20	0.30	Good
PDMH 10	PDMH 11	125.78	350.59	349.96	0.50	CIRCULAR	24.00	0.0120	12.920	0 00:06	6.12	0.34	17.33	0.75	1.29	Good
PCB 16A	PDMH 16	29.63	370.15	370.00	0.50	CIRCULAR	12.00	0.0120	1.140	0 00:05	3.36	0.15	2.73	0.42	0.45	Good
PCB 16B	PDMH 16	31.36	370.16	370.00	0.50	CIRCULAR	12.00	0.0120	0.210	0 00:05	2.72	0.19	2.73	0.08	0.19	Good
PCB 16C	PDMH 16	65.41	368.50	368.17	0.50	CIRCULAR	12.00	0.0120	0.360	0 00:05	3.64	0.3	2.73	0.13	0.24	Good
PDMH 16	PDMH 15	103.49	368.07	367.56	0.50	CIRCULAR	15.00	0.0120	1.670	0 00:05	3.70	0.47	4.95	0.34	0.50	Good
PCB 15A	PDMH 15	8.33	369.29	369.12	2.00	CIRCULAR	12.00	0.0120	1.720	0 00:05	6.16	0.02	5.46	0.31	0.39	Good
PDMH 15	PDMH 14	103.14	367.46	366.42	1.00	CIRCULAR	15.00	0.0120	3.250	0 00:05	5.65	0.3	7.00	0.46	0.60	Good
PCB 14A	PDMH 14	79.00	369.66	368.63	1.30	CIRCULAR	12.00	0.0120	0.230	0 00:05	4.54	0.29	4.45	0.05	0.16	Good

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: **25**

K= 230 B= 30

Title ***Stormwater Conveyance Sizing (25 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Minimum Slope:	0.50%	
Minimum Size:	12	inch
Rainfall Intensity (in/hr):	6.57	(25 year storm)
Manning's n:	0.012	HDPE
Manning's n:	0.013	RCP
Min. Velocity:	2.00	fps
Max. Velocity:	12.00	fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
PDMH 14	PDMH 13	121.70	366.31	365.09	1.00	CIRCULAR	15.00	0.0120	3.460	0 00:05	5.79	0.35	7.05	0.49	0.62	Good
BLDG 5 ROOF	PCB 13A	56.70	367.07	366.50	1.00	CIRCULAR	12.00	0.0120	1.210	0 00:05	4.87	0.19	3.86	0.31	0.38	Good
PCB 13A	PDMH 13	19.20	366.38	366.00	2.0000	CIRCULAR	12.000	0.0120	1.82	0 00:05	6.25	0.05	5.46	0.33	0.40	Good
PCB 13B	PDMH 13	6.59	366.14	366.04	1.56	CIRCULAR	12.00	0.0120	1.730	0 00:05	5.64	0.02	4.83	0.36	0.41	Good
PCB 13C	PDMH 13	34.47	366.58	366.04	1.56	CIRCULAR	12.00	0.0120	0.320	0 00:05	4.06	0.14	4.83	0.07	0.18	Good
PDMH 13	PDMH 12	222.35	364.99	358.83	2.7700	CIRCULAR	15.000	0.0120	6.96	0 00:05	10.00	0.37	11.63	0.60	0.70	Good
PCB 12A	PDMH 12	16.26	359.66	359.25	2.50	CIRCULAR	12.00	0.0120	0.740	0 00:05	5.26	0.05	6.10	0.12	0.24	Good
PCB 12B	PDMH 12	14.53	359.40	359.25	1.00	CIRCULAR	12.00	0.0120	1.100	0 00:05	4.25	0.06	3.86	0.28	0.36	Good
BLDG 4 ROOF	PDMH 12	36.88	359.62	359.25	1.00	CIRCULAR	12.00	0.0120	1.210	0 00:05	4.37	0.14	3.86	0.31	0.38	Good
PDMH 12	PDMH 11	44.24	358.85	357.08	4.00	CIRCULAR	15.00	0.0120	9.730	0 00:05	12.32	0.06	14.00	0.70	0.77	Good
PCB 11A	PDMH 11	40.06	357.92	357.32	1.50	CIRCULAR	12.00	0.0120	2.760	0 00:10	6.26	0.11	4.73	0.58	0.55	Good
PCB 11B	PDMH 11	12.26	357.44	357.32	1.00	CIRCULAR	12.00	0.0120	0.290	0 00:05	2.89	0.07	3.86	0.07	0.18	Good
PDMH 11	PDMH 18	180.52	349.86	342.64	4.00	CIRCULAR	24.00	0.0120	23.800	0 00:06	15.51	0.19	49.02	0.49	0.98	Good
PCB 18A	PDMH 18	19.92	345.25	344.71	2.70	CIRCULAR	12.00	0.0120	1.690	0 00:05	6.84	0.05	6.34	0.27	0.35	Good
PCB 18B	PDMH 18	13.44	345.25	344.71	4.00	CIRCULAR	12.00	0.0120	0.590	0 00:05	5.82	0.04	7.72	0.08	0.19	Good
PDMH 18	PDMH 19	187.43	339.50	332.00	4.00	CIRCULAR	24.00	0.0120	25.540	0 00:06	15.79	0.2	49.02	0.52	1.02	Good
PCB 19A	PDMH 19	21.08	330.50	330.00	2.37	CIRCULAR	12.00	0.0120	0.520	0 00:05	4.68	0.08	5.94	0.09	0.20	Good
PCB 19B	PDMH 19	12.86	330.50	330.00	3.89	CIRCULAR	12.00	0.0120	1.390	0 00:05	7.36	0.03	7.61	0.18	0.29	Good
PDMH 19	PDMH 20	147.45	325.87	318.50	5.00	CIRCULAR	24.00	0.0120	26.980	0 00:06	17.39	0.14	54.80	0.49	0.99	Good
PDMH 20	PDMH 21	100.61	313.50	309.48	4.00	CIRCULAR	24.00	0.0120	26.970	0 00:06	15.98	0.1	49.02	0.55	1.06	Good
PCB 21A	PDMH 21	23.91	312.48	312.00	2.00	CIRCULAR	12.00	0.0120	0.620	0 00:05	4.62	0.09	5.46	0.11	0.23	Good
PCB 21B	PDMH 21	20.01	312.40	312.00	2.00	CIRCULAR	12.00	0.0120	0.800	0 00:05	4.98	0.07	5.46	0.15	0.26	Good
PDMH 21	PDMH 22	219.35	303.77	295.00	4.00	CIRCULAR	24.00	0.0120	28.000	0 00:06	16.15	0.23	49.02	0.57	1.08	Good
PCB 22A	PDMH 22	30.37	294.25	293.64	2.00	CIRCULAR	12.00	0.0120	0.650	0 00:05	4.69	0.11	5.46	0.12	0.23	Good
PCB 22B	PDMH 22	15.53	293.95	293.64	2.00	CIRCULAR	12.00	0.0120	0.680	0 00:05	4.74	0.05	5.46	0.12	0.24	Good
PDMH 22	PDMH 23(WQS)	39.63	286.89	286.00	2.25	CIRCULAR	24.00	0.0120	28.950	0 00:06	12.97	0.05	36.78	0.79	1.34	Good
PDMH 23(WQS)	PFES 1	20.22	286.00	285.55	2.25	CIRCULAR	24.00	0.0120	28.950	0 00:06	12.96	0.03	36.74	0.79	1.34	Good
PCB 24A	PDMH 24(WQS)	6.55	279.46	279.20	4.00	CIRCULAR	12.00	0.0120	1.060	0 00:05	6.90	0.02	7.72	0.14	0.25	Good
PCB 24B	PDMH 24(WQS)	60.00	279.50	279.20	0.50	CIRCULAR	12.00	0.0120	0.980	0 00:05	4.04	0.25	2.73	0.36	0.41	Good
PDMH 24(WQS)	PDMH 31	5.93	279.10	279.04	1.00	CIRCULAR	12.00	0.0120	2.010	0 00:05	4.96	0.02	3.86	0.52	0.51	Good
OCS	PDMH 31	118.45	280.91	277.45	2.93	CIRCULAR	24.00	0.0120	0.000	0 00:00	0.00		41.92	0.00	0.00	Good
PDMH 31	PFES 2	258.12	277.35	269.61	3.00	CIRCULAR	24.00	0.0120	1.980	0 00:05	7.06	0.61	42.45	0.05	0.29	Good

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: 25

K= 230 B= 30

Title ***Stormwater Conveyance Sizing (25 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Minimum Slope:	0.50%	
Minimum Size:	12	inch
Rainfall Intensity (in/hr):	6.57	(25 year storm)
Manning's n:	0.012	HDPE
Manning's n:	0.013	RCP
Min. Velocity:	2.00	fps
Max. Velocity:	12.00	fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
Subsurface Infiltration																
PAD 1	PDMH 27	61.22	365.00	364.69	0.50	CIRCULAR	12.00	0.0120	0.480	0 00:10	3.31	0.31	2.73	0.18	0.28	Good
BLDG 6 ROOF	PDMH 27	19.47	365.75	365.56	1.00	CIRCULAR	12.00	0.0120	1.240	0 00:05	4.38	0.07	3.86	0.32	0.39	Good
BLDG 7 ROOF	PDMH 27	8.97	365.75	365.57	2.00	CIRCULAR	12.00	0.0120	0.650	0 00:05	4.66	0.03	5.46	0.12	0.23	Good
PDMH 27	PDMH 28	65.81	364.59	364.26	0.50	CIRCULAR	12.00	0.0120	2.090	0 00:05	3.87	0.28	2.73	0.76	0.65	Good
PCB 17A	PDMH 17(WQS)	14.42	365.00	364.93	0.50	CIRCULAR	12.00	0.0120	0.680	0 00:05	2.89	0.08	2.73	0.25	0.34	Good
PCB 17B	PDMH 17(WQS)	4.31	365.01	364.93	2.00	CIRCULAR	12.00	0.0120	0.850	0 00:05	5.05	0.01	5.46	0.16	0.27	Good
PDMH 17(WQS)	PDMH 28	7.07	364.40	364.26	2.00	CIRCULAR	12.00	0.0120	1.530	0 00:05	5.96	0.02	5.46	0.28	0.36	Good
PDMH 28	PDMH 29	39.05	364.00	363.80	0.50	CIRCULAR	15.00	0.0120	3.580	0 00:05	4.41	0.15	4.95	0.72	0.79	Good
BLDG 1 ROOF	PDMH 26A	11.88	369.50	369.26	2.00	CIRCULAR	12.00	0.0120	2.420	0 00:05	6.75	0.03	5.46	0.44	0.47	Good
PDMH 26A	PDMH 26	305.80	369.16	366.10	1.00	CIRCULAR	12.00	0.0120	2.270	0 00:05	7.73	0.66	3.86	0.59	0.55	Good
BLDG 2 ROOF	PDMH 26	18.68	370.00	369.63	2.0000	CIRCULAR	12.000	0.0120	2.77	0 00:05	6.99	0.04	5.46	0.51	0.50	Good
PDMH 26	INF 1A	58.47	363.50	363.50	0.00	CIRCULAR	18.00	0.0120	4.820	0 00:05	3.32	0.29	5.09	0.95	1.16	Good
BLDG 3 ROOF	PDMH 25	23.54	370.43	370.00	1.81	CIRCULAR	12.00	0.0120	1.650	0 00:05	5.88	0.07	5.20	0.32	0.39	Good
PDMH 25	INF 1B	18.33	369.90	368.57	7.28	CIRCULAR	12.00	0.0120	1.650	0 00:05	9.69	0.03	10.41	0.16	0.27	Good
PDMH (OCS)	PDMH 30	73.73	363.24	362.50	1.00	CIRCULAR	18.00	0.0120	0.000	0 00:00	0.00		11.38	0.00	0.00	Good
PDMH 30	PFES 3	185.31	362.40	361.01	0.75	CIRCULAR	18.00	0.0120	0.000	0 00:00	0.00		9.86	0.00	0.00	Good

ALLEN & MAJOR ASSOCIATES, INC.

Title **_Stormwater Conveyance Sizing (25 YEAR STORM)_**
Project **_Arbella at Ashland - Ashland, MA_**
Date 12-23-2020
A&M Project Number: 2604-01

Watershed	Drainage Node ID	Area (acres)	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
1	PCB 24B	0.22	0.7000	0.55	0.38	1.00	6.571	0 00:05:00
2	PCB 24A	0.21	0.7600	0.55	0.42	1.06	6.571	0 00:05:00
3	PCB 22B	0.16	0.6700	0.55	0.37	0.68	6.571	0 00:05:00
4	PCB 21B	0.21	0.5800	0.55	0.32	0.81	6.571	0 00:05:00
5	PCB 19A	0.12	0.6700	0.55	0.37	0.53	6.571	0 00:05:00
6	PCB 19B	0.57	0.3700	0.55	0.20	1.39	6.571	0 00:05:00
7	PCB 18B	0.17	0.5400	0.55	0.30	0.59	6.571	0 00:05:00
8	PCB 18A	0.64	0.4000	0.55	0.22	1.69	6.571	0 00:05:00
9	PCB 11B	0.05	0.8400	0.55	0.46	0.29	6.571	0 00:05:00
10	PCB 10A	0.34	0.5800	0.55	0.32	1.31	6.571	0 00:05:00
11	PCB 9A	0.17	0.5500	0.55	0.30	0.63	6.571	0 00:05:00
12	BLDG 1 ROOF	0.41	0.9000	0.55	0.49	2.43	6.571	0 00:05:00
13	PCB 8A	0.20	0.7900	0.55	0.43	1.04	6.571	0 00:05:00
14	BLDG ROOF 11	0.09	0.9000	0.55	0.49	0.53	6.571	0 00:05:00
15	PCB 6A	0.55	0.6700	0.55	0.37	2.43	6.571	0 00:05:00
16	BLDG 10 ROOF	0.08	0.9000	0.55	0.49	0.47	6.571	0 00:05:00
17	BLDG 2 ROOF	0.47	0.9000	0.55	0.49	2.78	6.571	0 00:05:00
18	PCB 5A	0.36	0.7200	0.55	0.39	1.68	6.571	0 00:05:00
19	BLDG 9 ROOF	0.08	0.9000	0.55	0.49	0.47	6.571	0 00:05:00
20	PCB 3A	0.42	0.6900	0.55	0.38	1.88	6.571	0 00:05:00
21	BLDG 8 ROOF	0.05	0.9000	0.55	0.49	0.30	6.571	0 00:05:00
22	PCB 2B	0.10	0.8100	0.55	0.44	0.55	6.571	0 00:05:00
23	PCB 2A	0.12	0.7900	0.55	0.43	0.61	6.571	0 00:05:00
24	PCB 1A	0.34	0.6600	0.55	0.36	1.49	6.571	0 00:05:00
25	PCB 1B	0.56	0.4900	0.55	0.27	1.79	6.571	0 00:05:00
26	BLDG 7 ROOF	0.11	0.9000	0.55	0.49	0.65	6.571	0 00:05:00
26A	PAD 1	0.24	0.3600	0.96	0.35	0.49	5.750	0 00:10:00
27	BLDG 6 ROOF	0.21	0.9000	0.55	0.49	1.24	6.571	0 00:05:00
28	PCB 17A	0.14	0.7300	0.55	0.40	0.69	6.571	0 00:05:00
29	PCB 17B	0.57	0.2300	0.55	0.13	0.86	6.571	0 00:05:00
30	BLDG 3 ROOF	0.28	0.9000	0.55	0.49	1.66	6.571	0 00:05:00
31	PCB 16C	0.16	0.3400	0.55	0.19	0.37	6.571	0 00:05:00
32	PCB 16A	0.35	0.5000	0.55	0.27	1.15	6.571	0 00:05:00
33	PCB 15A	0.37	0.7000	0.55	0.38	1.72	6.571	0 00:05:00
34	PCB 16B	0.05	0.6000	0.55	0.33	0.21	6.571	0 00:05:00
35	PCB 14A	0.08	0.4400	0.55	0.24	0.24	6.571	0 00:05:00
36	PCB 13B	0.52	0.5100	0.55	0.28	1.74	6.571	0 00:05:00
37	PCB 13C	0.08	0.6300	0.55	0.35	0.33	6.571	0 00:05:00

Title ***Stormwater Conveyance Sizing (25 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Watershed	Drainage Node ID	Area (acres)	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
38	PCB 13A	0.13	0.7200	0.55	0.39	0.62	6.571	0 00:05:00
39	BLDG 5 ROOF	0.21	0.9000	0.55	0.49	1.22	6.571	0 00:05:00
40	PCB 12A	0.15	0.7500	0.55	0.41	0.75	6.571	0 00:05:00
41	PCB 11A	1.50	0.3200	0.96	0.31	2.76	5.750	0 00:10:00
42	BLDG 4 ROOF	0.21	0.9000	0.55	0.49	1.22	6.571	0 00:05:00
43	PCB 12B	0.36	0.4600	0.55	0.25	1.10	6.571	0 00:05:00
44	PCB 21A	0.14	0.6900	0.55	0.38	0.62	6.571	0 00:05:00
45	PCB 22A	0.15	0.6700	0.55	0.37	0.66	6.571	0 00:05:00

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: **100**
K= 290 B= 31

Title ***Stormwater Conveyance Sizing (100 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Minimum Slope:	0.50%	
Minimum Size:	12	inch
Rainfall Intensity (in/hr):	8.05	(25 year storm)
Manning's n:	0.012	HDPE
Manning's n:	0.013	RCP
Min. Velocity:	2.00	fps
Max. Velocity:	12.00	fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
Infiltration Basin																
PCB 1A	PDMH 1	25.43	359.93	359.80	0.5000	CIRCULAR	12.000	0.0120	1.81	0 00:05	3.73	0.11	2.73	0.66	0.59	Good
PCB 1B	PDMH 1	24.97	359.92	359.80	0.5000	CIRCULAR	12.000	0.0120	2.18	0 00:05	3.88	0.11	2.73	0.80	0.67	Good
PDMH 1	PDMH 2	85.08	359.70	358.64	1.2500	CIRCULAR	12.000	0.0120	3.96	0 00:05	6.31	0.22	4.32	0.92	0.75	Good
PCB 2A	PDMH 2	13	358.79	358.73	0.5000	CIRCULAR	12.000	0.0120	0.74	0 00:05	2.96	0.07	2.73	0.27	0.35	Good
PCB 2B	PDMH 2	7	358.80	358.73	1.0000	CIRCULAR	12.000	0.0120	0.67	0 00:05	3.68	0.03	3.86	0.17	0.28	Good
PDMH 2	PDMH 3	50	358.39	358.05	0.6700	CIRCULAR	15.000	0.0120	5.32	0 00:05	5.35	0.16	5.74	0.93	0.95	Good
PCB 3A	PDMH 3	17	358.66	358.46	1.2100	CIRCULAR	12.000	0.0120	2.30	0 00:05	5.52	0.05	4.24	0.54	0.52	Good
BLDG 8 ROOF	PDMH 3	26	358.69	358.46	0.8900	CIRCULAR	12.000	0.0120	0.36	0 00:05	3.33	0.13	3.65	0.10	0.21	Good
PDMH 3	PDMH 4	148	357.83	357.10	0.5000	CIRCULAR	18.000	0.0120	7.76	0 00:05	5.34	0.46	8.02	0.97	1.18	Good
PDMH 4	PDMH 5	113	357.00	356.43	0.5000	CIRCULAR	18.000	0.0120	7.71	0 00:06	5.30	0.35	8.05	0.96	1.17	Good
PCB 5A	PDMH 5	17.09	359.17	359.00	1.0000	CIRCULAR	12.000	0.0120	2.05	0 00:05	5.00	0.06	3.86	0.53	0.52	Good
BLDG 9 ROOF	PDMH 5	25.78	359.26	359.00	1.0000	CIRCULAR	12.000	0.0120	0.58	0 00:05	3.57	0.12	3.86	0.15	0.26	Good
PDMH 5	PDMH 6	205.00	356.33	354.69	0.8000	CIRCULAR	18.000	0.0120	9.85	0 00:06	6.79	0.50	10.18	0.97	1.18	Good
PCB 6A	PDMH 6	17.09	358.00	357.66	2.0000	CIRCULAR	12.000	0.0120	2.97	0 00:05	7.11	0.04	5.46	0.54	0.52	Good
BLDG 10 ROOF	PDMH 6	25.59	358.26	358.00	1.0000	CIRCULAR	12.000	0.0120	0.58	0 00:05	3.56	0.12	3.86	0.15	0.26	Good
PDMH 6	PDMH 7	109.91	354.59	353.22	1.25	CIRCULAR	18.00	0.0120	12.620	0 00:06	8.32	0.22	12.72	0.99	1.22	Good
PDMH 7	PDMH 8	81.37	353.12	352.10	1.25	CIRCULAR	18.00	0.0120	12.610	0 00:06	8.28	0.16	12.72	0.99	1.22	Good
PCB 8A	PDMH 8	17.87	358.50	357.96	3.00	CIRCULAR	12.00	0.0120	1.280	0 00:05	6.57	0.05	6.69	0.19	0.30	Good
BLDG ROOF 11	PDMH 8	25.65	358.26	358.00	1.00	CIRCULAR	12.00	0.0120	0.650	0 00:05	3.66	0.12	3.86	0.17	0.28	Good
PDMH 8	PDMH 9	104.17	351.60	351.08	0.50	CIRCULAR	24.00	0.0120	14.050	0 00:06	6.20	0.28	17.33	0.81	1.37	Good
PCB 9A	PDMH 9	42.65	358.00	356.72	3.00	CIRCULAR	12.00	0.0120	0.760	0 00:05	5.67	0.13	6.69	0.11	0.23	Good
PDMH 9	PDMH 10	57.19	350.98	350.69	0.50	CIRCULAR	24.00	0.0120	14.620	0 00:06	6.20	0.15	17.33	0.84	1.41	Good
PCB 10A	PDMH 10	13.38	357.50	357.10	3.00	CIRCULAR	12.00	0.0120	1.610	0 00:05	7.01	0.03	6.69	0.24	0.33	Good
PDMH 10	PDMH 11	125.78	350.59	349.96	0.50	CIRCULAR	24.00	0.0120	15.770	0 00:06	6.34	0.33	17.33	0.91	1.50	Good
PCB 16A	PDMH 16	29.63	370.15	370.00	0.50	CIRCULAR	12.00	0.0120	1.400	0 00:05	3.51	0.14	2.73	0.51	0.51	Good
PCB 16B	PDMH 16	31.36	370.16	370.00	0.50	CIRCULAR	12.00	0.0120	0.260	0 00:05	2.85	0.18	2.73	0.09	0.21	Good
PCB 16C	PDMH 16	65.41	368.50	368.17	0.50	CIRCULAR	12.00	0.0120	0.440	0 00:05	3.78	0.29	2.73	0.16	0.27	Good
PDMH 16	PDMH 15	103.49	368.07	367.56	0.50	CIRCULAR	15.00	0.0120	2.040	0 00:05	3.90	0.44	4.95	0.41	0.56	Good
PCB 15A	PDMH 15	8.33	369.29	369.12	2.00	CIRCULAR	12.00	0.0120	2.100	0 00:05	6.50	0.02	5.46	0.39	0.43	Good
PDMH 15	PDMH 14	103.14	367.46	366.42	1.00	CIRCULAR	15.00	0.0120	4.000	0 00:05	5.94	0.29	7.00	0.57	0.68	Good
PCB 14A	PDMH 14	79.00	369.66	368.63	1.30	CIRCULAR	12.00	0.0120	0.290	0 00:05	4.69	0.28	4.45	0.06	0.17	Good

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: **100**

K= 290 B= 31

Title ***Stormwater Conveyance Sizing (100 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Minimum Slope:	0.50%	
Minimum Size:	12	inch
Rainfall Intensity (in/hr):	8.05	(25 year storm)
Manning's n:	0.012	HDPE
Manning's n:	0.013	RCP
Min. Velocity:	2.00	fps
Max. Velocity:	12.00	fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
PDMH 14	PDMH 13	121.70	366.31	365.09	1.00	CIRCULAR	15.00	0.0120	4.260	0 00:05	6.09	0.33	7.05	0.60	0.70	Good
BLDG 5 ROOF	PCB 13A	56.70	367.07	366.50	1.00	CIRCULAR	12.00	0.0120	1.480	0 00:05	4.97	0.19	3.86	0.38	0.43	Good
PCB 13A	PDMH 13	19.20	366.38	366.00	2.0000	CIRCULAR	12.000	0.0120	2.22	0 00:05	6.60	0.05	5.46	0.41	0.44	Good
PCB 13B	PDMH 13	6.59	366.14	366.04	1.56	CIRCULAR	12.00	0.0120	2.120	0 00:05	5.95	0.02	4.83	0.44	0.46	Good
PCB 13C	PDMH 13	34.47	366.58	366.04	1.56	CIRCULAR	12.00	0.0120	0.400	0 00:05	4.15	0.14	4.83	0.08	0.19	Good
PDMH 13	PDMH 12	222.35	364.99	358.83	2.7700	CIRCULAR	15.000	0.0120	8.59	0 00:05	10.49	0.35	11.63	0.74	0.80	Good
PCB 12A	PDMH 12	16.26	359.66	359.25	2.50	CIRCULAR	12.00	0.0120	0.910	0 00:05	5.59	0.05	6.10	0.15	0.26	Good
PCB 12B	PDMH 12	14.53	359.40	359.25	1.00	CIRCULAR	12.00	0.0120	1.350	0 00:05	4.48	0.05	3.86	0.35	0.41	Good
BLDG 4 ROOF	PDMH 12	36.88	359.62	359.25	1.00	CIRCULAR	12.00	0.0120	1.490	0 00:05	4.62	0.13	3.86	0.39	0.43	Good
PDMH 12	PDMH 11	44.24	358.85	357.08	4.00	CIRCULAR	15.00	0.0120	12.020	0 00:05	12.83	0.06	14.00	0.86	0.89	Good
PCB 11A	PDMH 11	40.06	357.92	357.32	1.50	CIRCULAR	12.00	0.0120	3.390	0 00:10	6.56	0.1	4.73	0.72	0.63	Good
PCB 11B	PDMH 11	12.26	357.44	357.32	1.00	CIRCULAR	12.00	0.0120	0.350	0 00:05	3.06	0.07	3.86	0.09	0.20	Good
PDMH 11	PDMH 18	180.52	349.86	342.64	4.00	CIRCULAR	24.00	0.0120	29.290	0 00:06	16.31	0.18	49.02	0.60	1.11	Good
PCB 18A	PDMH 18	19.92	345.25	344.71	2.70	CIRCULAR	12.00	0.0120	2.070	0 00:05	7.23	0.05	6.34	0.33	0.39	Good
PCB 18B	PDMH 18	13.44	345.25	344.71	4.00	CIRCULAR	12.00	0.0120	0.720	0 00:05	6.17	0.04	7.72	0.09	0.21	Good
PDMH 18	PDMH 19	187.43	339.50	332.00	4.00	CIRCULAR	24.00	0.0120	31.480	0 00:06	16.59	0.19	49.02	0.64	1.17	Good
PCB 19A	PDMH 19	21.08	330.50	330.00	2.37	CIRCULAR	12.00	0.0120	0.640	0 00:05	4.96	0.07	5.94	0.11	0.22	Good
PCB 19B	PDMH 19	12.86	330.50	330.00	3.89	CIRCULAR	12.00	0.0120	1.700	0 00:05	7.81	0.03	7.61	0.22	0.32	Good
PDMH 19	PDMH 20	147.45	325.87	318.50	5.00	CIRCULAR	24.00	0.0120	33.290	0 00:06	18.29	0.13	54.80	0.61	1.13	Good
PDMH 20	PDMH 21	100.61	313.50	309.48	4.00	CIRCULAR	24.00	0.0120	33.280	0 00:06	16.77	0.1	49.02	0.68	1.21	Good
PCB 21A	PDMH 21	23.91	312.48	312.00	2.00	CIRCULAR	12.00	0.0120	0.760	0 00:05	4.89	0.08	5.46	0.14	0.25	Good
PCB 21B	PDMH 21	20.01	312.40	312.00	2.00	CIRCULAR	12.00	0.0120	0.980	0 00:05	5.27	0.06	5.46	0.18	0.29	Good
PDMH 21	PDMH 22	219.35	303.77	295.00	4.00	CIRCULAR	24.00	0.0120	34.580	0 00:06	16.95	0.22	49.02	0.71	1.24	Good
PCB 22A	PDMH 22	30.37	294.25	293.64	2.00	CIRCULAR	12.00	0.0120	0.800	0 00:05	4.98	0.1	5.46	0.15	0.26	Good
PCB 22B	PDMH 22	15.53	293.95	293.64	2.00	CIRCULAR	12.00	0.0120	0.830	0 00:05	5.03	0.05	5.46	0.15	0.26	Good
PDMH 22	PDMH 23(WQS)	39.63	286.89	286.00	2.25	CIRCULAR	24.00	0.0120	35.790	0 00:06	13.35	0.05	36.78	0.97	1.59	Good
PDMH 23(WQS)	PFES 1	20.22	286.00	285.55	2.25	CIRCULAR	24.00	0.0120	35.790	0 00:06	13.32	0.03	36.74	0.97	1.60	Good
PCB 24A	PDMH 24(WQS)	6.55	279.46	279.20	4.00	CIRCULAR	12.00	0.0120	1.300	0 00:05	7.31	0.01	7.72	0.17	0.28	Good
PCB 24B	PDMH 24(WQS)	60.00	279.50	279.20	0.50	CIRCULAR	12.00	0.0120	1.200	0 00:05	4.30	0.23	2.73	0.44	0.46	Good
PDMH 24(WQS)	PDMH 31	5.93	279.10	279.04	1.00	CIRCULAR	12.00	0.0120	2.470	0 00:05	5.21	0.02	3.86	0.64	0.58	Good
OCS	PDMH 31	118.45	280.91	277.45	2.93	CIRCULAR	24.00	0.0120	0.000	0 00:00	0.00		41.92	0.00	0.00	Good
PDMH 31	PFES 2	258.12	277.35	269.61	3.00	CIRCULAR	24.00	0.0120	2.440	0 00:05	7.50	0.57	42.45	0.06	0.32	Good

ALLEN & MAJOR ASSOCIATES, INC.

DESIGN YEAR: 100

K= 290 B= 31

Title **_Stormwater Conveyance Sizing (100 YEAR STORM)_**

Project **_Arbella at Ashland - Ashland, MA_**

Date 12-23-2020

A&M Project Number: 2604-01

Minimum Slope: 0.50%

Minimum Size: 12 inch

Rainfall Intensity (in/hr): 8.05 (25 year storm)

Manning's n: 0.012 HDPE

Manning's n: 0.013 RCP

Min. Velocity: 2.00 fps

Max. Velocity: 12.00 fps

From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (inches)	Manning's Roughness	Peak Flow (cfs)	Time of Peak Flow (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth (ft)	Reported Condition
Subsurface Infiltration																
PAD 1	PDMH 27	61.22	365.00	364.69	0.50	CIRCULAR	12.00	0.0120	0.590	0 00:10	3.41	0.3	2.73	0.22	0.32	Good
BLDG 6 ROOF	PDMH 27	19.47	365.75	365.56	1.00	CIRCULAR	12.00	0.0120	1.510	0 00:05	4.63	0.07	3.86	0.39	0.43	Good
BLDG 7 ROOF	PDMH 27	8.97	365.75	365.57	2.00	CIRCULAR	12.00	0.0120	0.790	0 00:05	4.95	0.03	5.46	0.15	0.26	Good
PDMH 27	PDMH 28	65.81	364.59	364.26	0.50	CIRCULAR	12.00	0.0120	2.560	0 00:05	4.00	0.27	2.73	0.94	0.77	Good
PCB 17A	PDMH 17(WQS)	14.42	365.00	364.93	0.50	CIRCULAR	12.00	0.0120	0.830	0 00:05	3.06	0.08	2.73	0.31	0.38	Good
PCB 17B	PDMH 17(WQS)	4.31	365.01	364.93	2.00	CIRCULAR	12.00	0.0120	1.050	0 00:05	5.37	0.01	5.46	0.19	0.30	Good
PDMH 17(WQS)	PDMH 28	7.07	364.40	364.26	2.00	CIRCULAR	12.00	0.0120	1.880	0 00:05	6.30	0.02	5.46	0.34	0.40	Good
PDMH 28	PDMH 29	39.05	364.00	363.80	0.50	CIRCULAR	15.00	0.0120	4.380	0 00:05	4.58	0.14	4.95	0.88	0.91	Good
BLDG 1 ROOF	PDMH 26A	11.88	369.50	369.26	2.00	CIRCULAR	12.00	0.0120	2.960	0 00:05	7.10	0.03	5.46	0.54	0.52	Good
PDMH 26A	PDMH 26	305.80	369.16	366.10	1.00	CIRCULAR	12.00	0.0120	2.800	0 00:05	8.06	0.63	3.86	0.73	0.63	Good
BLDG 2 ROOF	PDMH 26	18.68	370.00	369.63	2.0000	CIRCULAR	12.000	0.0120	3.39	0 00:05	7.33	0.04	5.46	0.62	0.57	Good
PDMH 26	INF 2A	58.47	363.50	363.50	0.00	CIRCULAR	18.00	0.0120	5.510	0 00:05	3.46	0.28	5.09	1.08	1.50	Good
BLDG 3 ROOF	PDMH 25	23.54	370.43	370.00	1.81	CIRCULAR	12.00	0.0120	2.020	0 00:05	6.21	0.06	5.20	0.39	0.43	Good
PDMH 25	INF 1A	18.33	369.90	368.57	7.28	CIRCULAR	12.00	0.0120	2.020	0 00:05	10.27	0.03	10.41	0.19	0.30	Good
PDMH (OCS)	PDMH 30	73.73	363.24	362.50	1.00	CIRCULAR	18.00	0.0120	0.000	0 00:00	0.00		11.38	0.00	0.00	Good
PDMH 30	PFES 3	185.31	362.40	361.01	0.75	CIRCULAR	18.00	0.0120	0.000	0 00:00	0.00		9.86	0.00	0.00	Good

ALLEN & MAJOR ASSOCIATES, INC.

Title *Stormwater Conveyance Sizing (100 YEAR STORM)*
Project *Arbella at Ashland - Ashland, MA*
Date 12-23-2020
A&M Project Number: 2604-01

Watershed	Drainage Node ID	Area (acres)	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
1	PCB 24B	0.22	0.7000	0.67	0.47	1.22	8.056	0 00:05:00
2	PCB 24A	0.21	0.7600	0.67	0.51	1.30	8.056	0 00:05:00
3	PCB 22B	0.16	0.6700	0.67	0.45	0.84	8.056	0 00:05:00
4	PCB 21B	0.21	0.5800	0.67	0.39	0.99	8.056	0 00:05:00
5	PCB 19A	0.12	0.6700	0.67	0.45	0.65	8.056	0 00:05:00
6	PCB 19B	0.57	0.3700	0.67	0.25	1.70	8.056	0 00:05:00
7	PCB 18B	0.17	0.5400	0.67	0.36	0.73	8.056	0 00:05:00
8	PCB 18A	0.64	0.4000	0.67	0.27	2.07	8.056	0 00:05:00
9	PCB 11B	0.05	0.8400	0.67	0.56	0.35	8.056	0 00:05:00
10	PCB 10A	0.34	0.5800	0.67	0.39	1.61	8.056	0 00:05:00
11	PCB 9A	0.17	0.5500	0.67	0.37	0.77	8.056	0 00:05:00
12	BLDG 1 ROOF	0.41	0.9000	0.67	0.60	2.97	8.056	0 00:05:00
13	PCB 8A	0.20	0.7900	0.67	0.53	1.28	8.056	0 00:05:00
14	BLDG ROOF 11	0.09	0.9000	0.67	0.60	0.65	8.056	0 00:05:00
15	PCB 6A	0.55	0.6700	0.67	0.45	2.97	8.056	0 00:05:00
16	BLDG 10 ROOF	0.08	0.9000	0.67	0.60	0.58	8.056	0 00:05:00
17	BLDG 2 ROOF	0.47	0.9000	0.67	0.60	3.41	8.056	0 00:05:00
18	PCB 5A	0.36	0.7200	0.67	0.48	2.06	8.056	0 00:05:00
19	BLDG 9 ROOF	0.08	0.9000	0.67	0.60	0.58	8.056	0 00:05:00
20	PCB 3A	0.42	0.6900	0.67	0.46	2.31	8.056	0 00:05:00
21	BLDG 8 ROOF	0.05	0.9000	0.67	0.60	0.36	8.056	0 00:05:00
22	PCB 2B	0.10	0.8100	0.67	0.54	0.67	8.056	0 00:05:00
23	PCB 2A	0.12	0.7900	0.67	0.53	0.75	8.056	0 00:05:00
24	PCB 1A	0.34	0.6600	0.67	0.44	1.82	8.056	0 00:05:00
25	PCB 1B	0.56	0.4900	0.67	0.33	2.20	8.056	0 00:05:00
26	BLDG 7 ROOF	0.11	0.9000	0.67	0.60	0.80	8.056	0 00:05:00
26	PAD 1	0.24	0.3600	1.18	0.42	0.60	7.073	0 00:10:00
27	BLDG 6 ROOF	0.21	0.9000	0.67	0.60	1.52	8.056	0 00:05:00
28	PCB 17A	0.14	0.7300	0.67	0.49	0.84	8.056	0 00:05:00
29	PCB 17B	0.57	0.2300	0.67	0.15	1.05	8.056	0 00:05:00
30	BLDG 3 ROOF	0.28	0.9000	0.67	0.60	2.03	8.056	0 00:05:00
31	PCB 16C	0.16	0.3400	0.67	0.23	0.45	8.056	0 00:05:00
32	PCB 16A	0.35	0.5000	0.67	0.34	1.41	8.056	0 00:05:00
33	PCB 15A	0.37	0.7000	0.67	0.47	2.11	8.056	0 00:05:00
34	PCB 16B	0.05	0.6000	0.67	0.40	0.26	8.056	0 00:05:00
35	PCB 14A	0.08	0.4400	0.67	0.30	0.29	8.056	0 00:05:00
36	PCB 13B	0.52	0.5100	0.67	0.34	2.13	8.056	0 00:05:00
37	PCB 13C	0.08	0.6300	0.67	0.42	0.40	8.056	0 00:05:00

Title ***Stormwater Conveyance Sizing (100 YEAR STORM)***
Project ***Arbella at Ashland - Ashland, MA***
Date 12-23-2020
A&M Project Number: 2604-01

Watershed	Drainage Node ID	Area (acres)	Weighted Runoff Coefficient	Accumulated Precipitation (inches)	Total Runoff (inches)	Peak Runoff (cfs)	Rainfall Intensity (inches/hr)	Time of Concentration (days hh:mm:ss)
38	PCB 13A	0.13	0.7200	0.67	0.48	0.75	8.056	0 00:05:00
39	BLDG 5 ROOF	0.21	0.9000	0.67	0.60	1.50	8.056	0 00:05:00
40	PCB 12A	0.15	0.7500	0.67	0.50	0.92	8.056	0 00:05:00
41	PCB 11A	1.50	0.3200	1.18	0.38	3.40	7.073	0 00:10:00
42	BLDG 4 ROOF	0.21	0.9000	0.67	0.60	1.50	8.056	0 00:05:00
43	PCB 12B	0.36	0.4600	0.67	0.31	1.35	8.056	0 00:05:00
44	PCB 21A	0.14	0.6900	0.67	0.46	0.76	8.056	0 00:05:00
45	PCB 22A	0.15	0.6700	0.67	0.45	0.81	8.056	0 00:05:00

SOILS INFORMATION

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

November 9, 2020

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: 1:4,880 if printed on A landscape (11" x 8.5") sheet.

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 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	2.1	6.3%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	7.6	22.5%
307D	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	6.8	20.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	9.8	29.2%
336B	Rainbow silt loam, 3 to 8 percent slopes, very stony	0.5	1.5%
416B	Narragansett silt loam, 3 to 8 percent slopes, very stony	5.1	15.1%
416C	Narragansett silt loam, 8 to 15 percent slopes, very stony	1.8	5.2%
Totals for Area of Interest		**33.6**	**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

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Depressions, drumlins, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w675
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 4 percent
Landform: Drainageways, drumlins, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony

Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

307D—Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w67l
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony
Percent of map unit: 9 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony
Percent of map unit: 5 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony
Percent of map unit: 1 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting
National map unit symbol: 2t2qs
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, extremely stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

336B—Rainbow silt loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9932
Elevation: 110 to 520 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rainbow and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rainbow

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, toeslope
Landform position (three-dimensional): Nose slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Friable fine-loamy eolian deposits over dense loamy lodgment till derived from metamorphic rock

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 22 inches: silt loam
H3 - 22 to 32 inches: very fine sandy loam
H4 - 32 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 18 to 21 inches
Frequency of flooding: None

Frequency of ponding: None
Available water capacity: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Broadbrook
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Paxton
Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge
Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, toeslope
Landform position (three-dimensional): Head slope, base slope, nose slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

416B—Narragansett silt loam, 3 to 8 percent slopes, very stony

Map Unit Setting
National map unit symbol: 9940
Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Narragansett and similar soils: 80 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits and/or friable silty eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: silt loam
Bw - 7 to 35 inches: silt loam
2C1 - 35 to 60 inches: very gravelly loamy sand
2C2 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Haven

Percent of map unit: 10 percent
Landform: Plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Scituate

Percent of map unit: 5 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, summit

Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Canton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

416C—Narragansett silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9941
Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Narragansett and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable silty eolian deposits and/or friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: silt loam
Bw - 7 to 35 inches: silt loam
2C1 - 35 to 60 inches: very gravelly loamy sand
2C2 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Scituate

Percent of map unit: 3 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

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Appendix D

TRAFFIC INFORMATION

ALLEN & MAJOR ASSOCIATES, INC.

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D

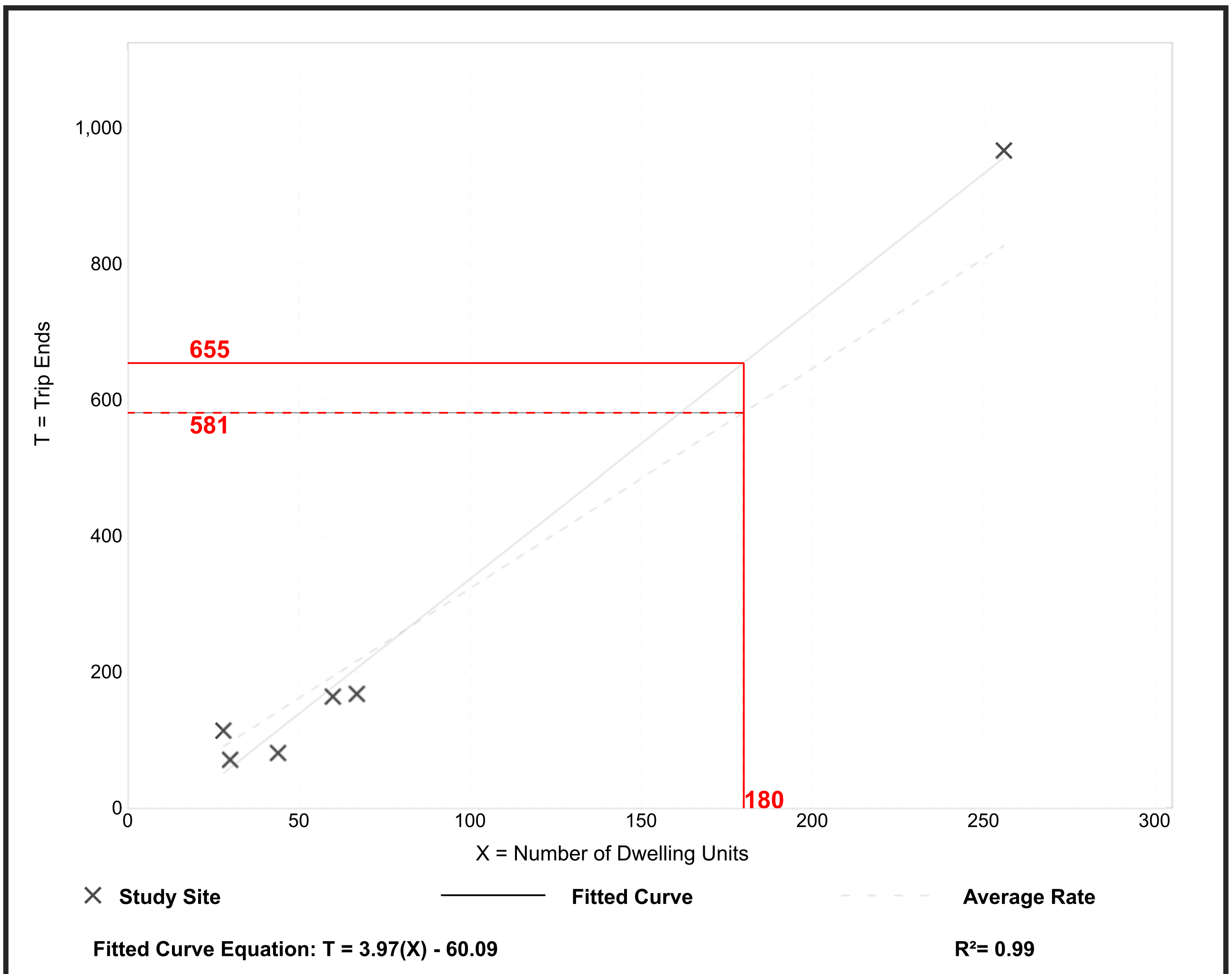
Senior Adult Housing - Attached
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Saturday**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	6
Avg. Num. of Dwelling Units:	81
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.23	1.84 - 4.07	0.79

Data Plot and Equation



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(252)

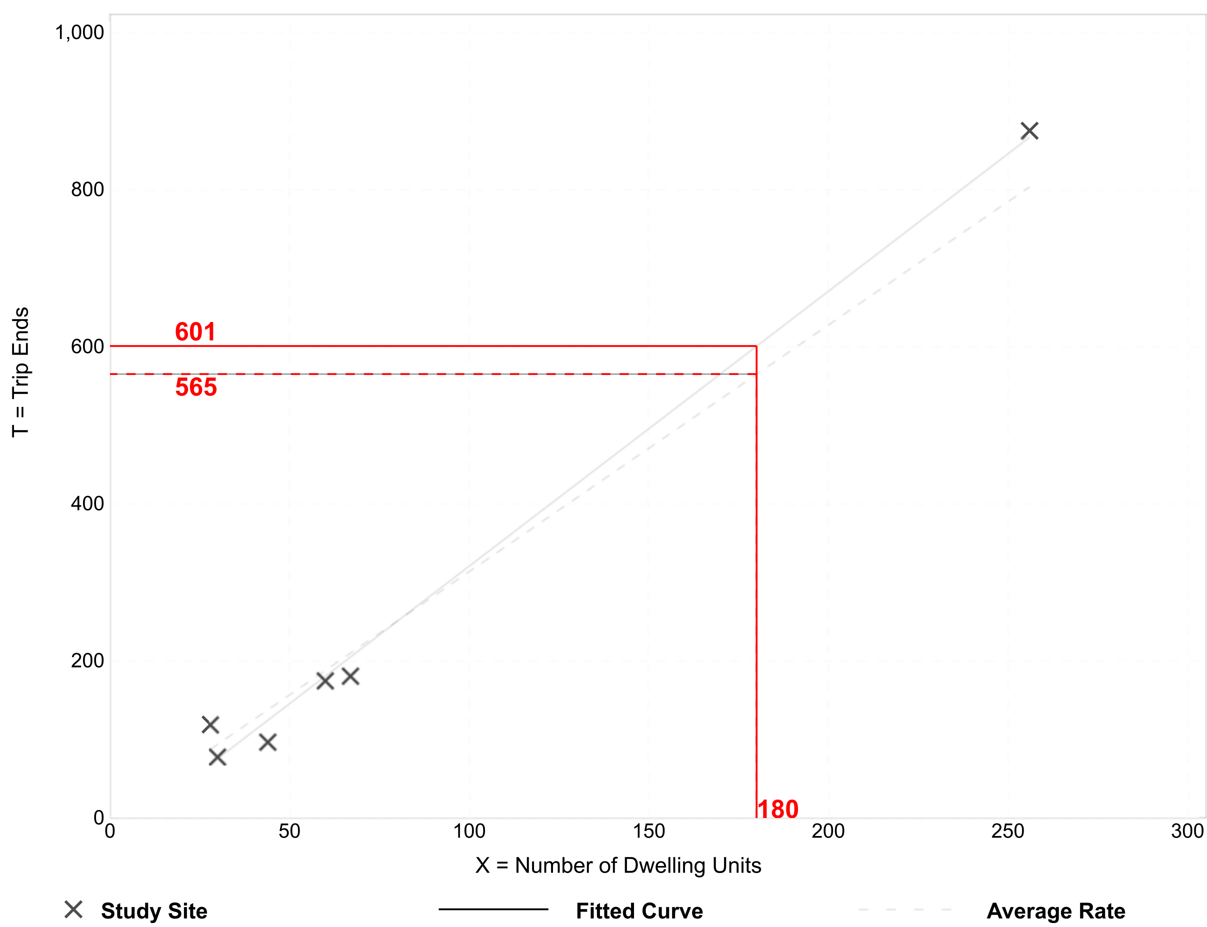
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Sunday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. Num. of Dwelling Units: 81
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.14	2.20 - 4.25	0.54

Data Plot and Equation



Fitted Curve Equation: T = 3.50(X) - 29.08 **R^2= 0.99**

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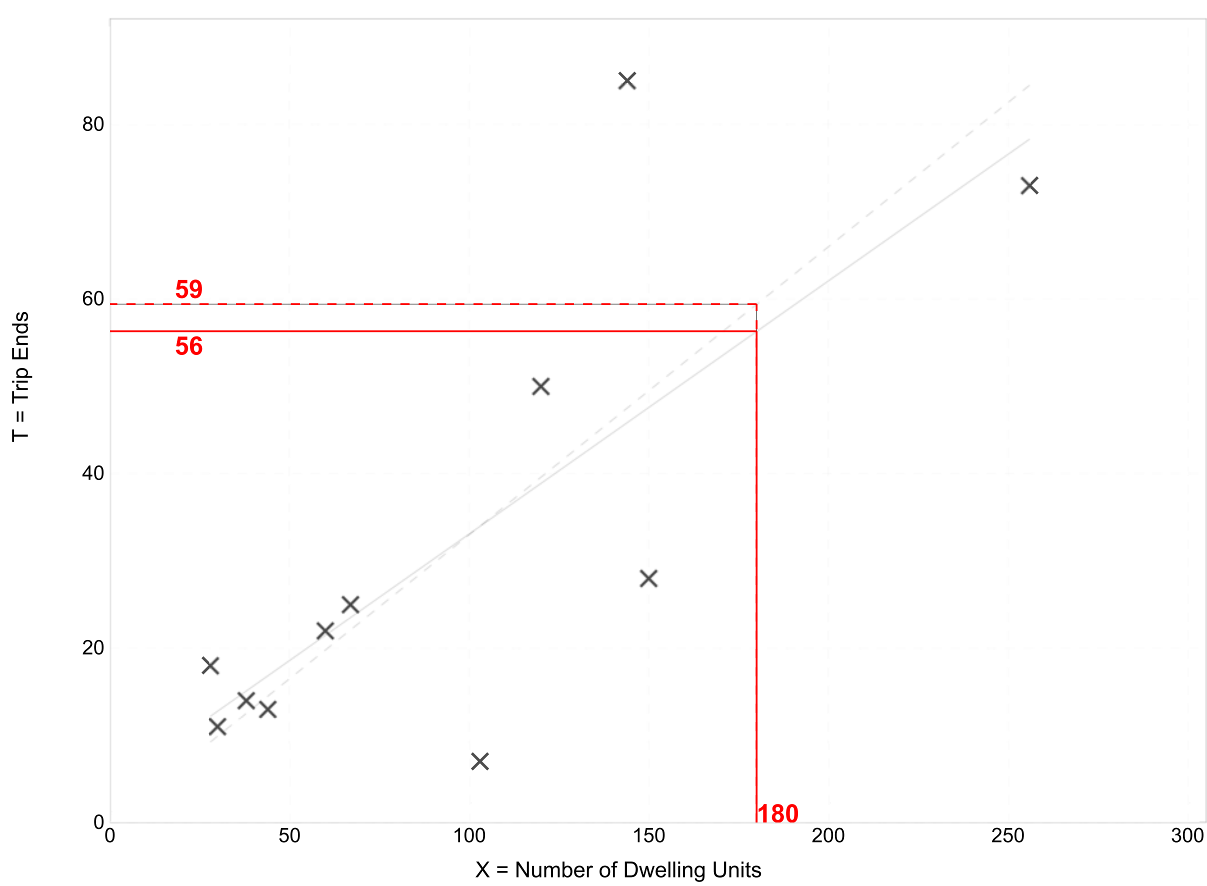
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	AM Peak Hour of Generator
Setting/Location:	**General Urban/Suburban**
Number of Studies:	11
Avg. Num. of Dwelling Units:	95
Directional Distribution:	47% entering, 53% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.33	0.07 - 0.64	0.16

Data Plot and Equation



Study Site **Fitted Curve** **Average Rate**

Fitted Curve Equation: T = 0.29(X) + 4.09 **R^2= 0.59**

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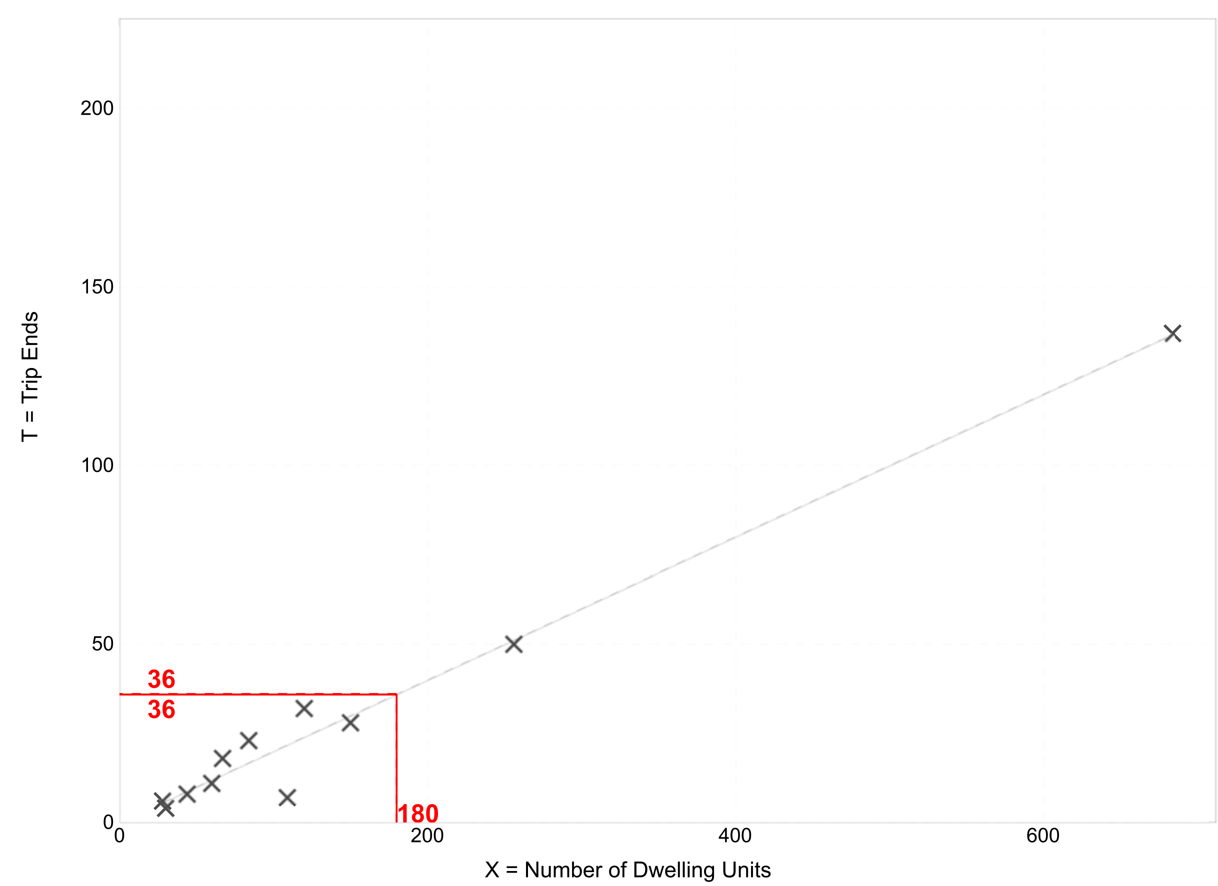
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	11
Avg. Num. of Dwelling Units:	148
Directional Distribution:	35% entering, 65% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.06 - 0.27	0.05

Data Plot and Equation



Study Site — Fitted Curve — Average Rate

Fitted Curve Equation: T = 0.20(X) - 0.18 **R^2= 0.98**

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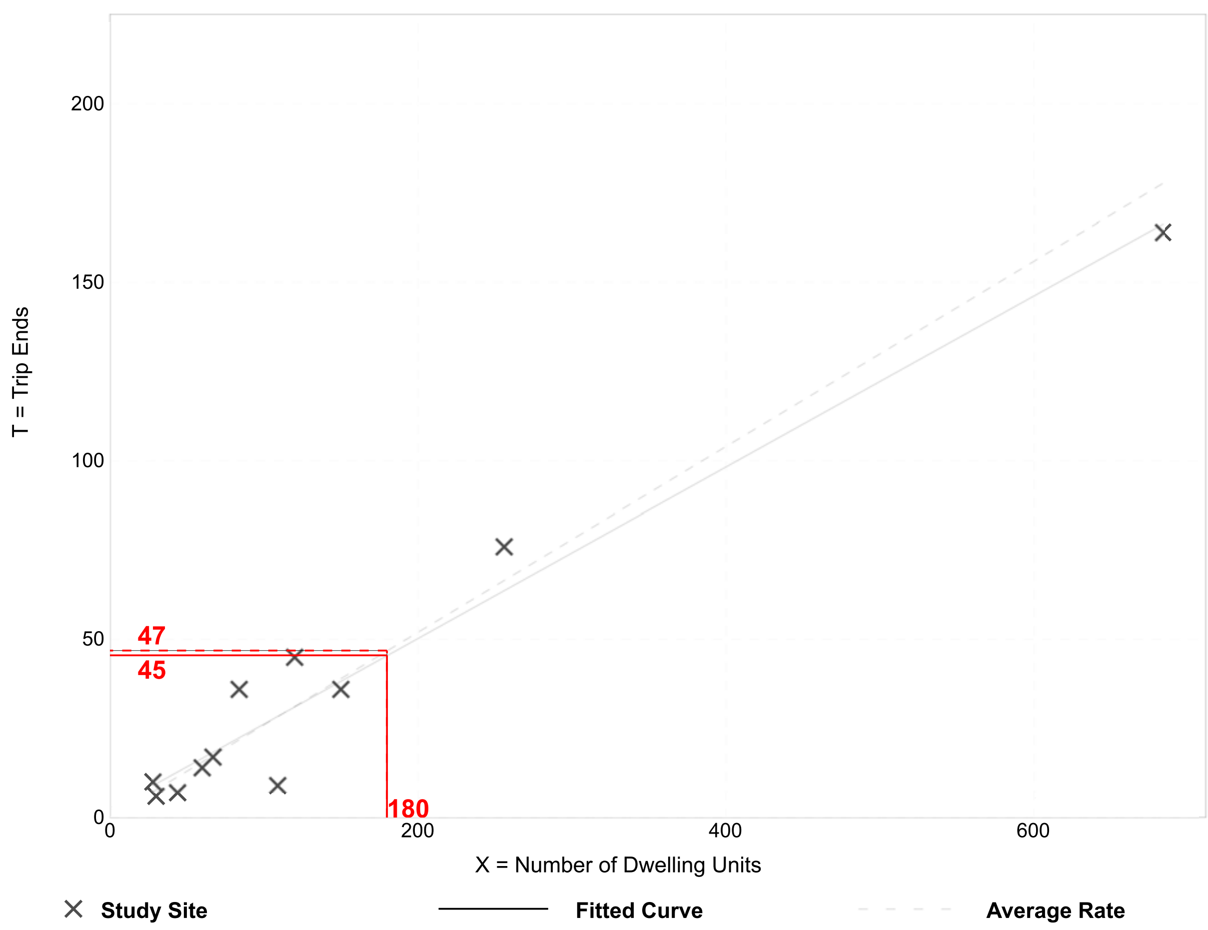
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,** **Peak Hour of Adjacent Street Traffic,** **One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	11
Avg. Num. of Dwelling Units:	148
Directional Distribution:	55% entering, 45% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.26	0.08 - 0.43	0.08

Data Plot and Equation



Fitted Curve Equation: $T = 0.24(X) + 2.26$

$R^2 = 0.96$

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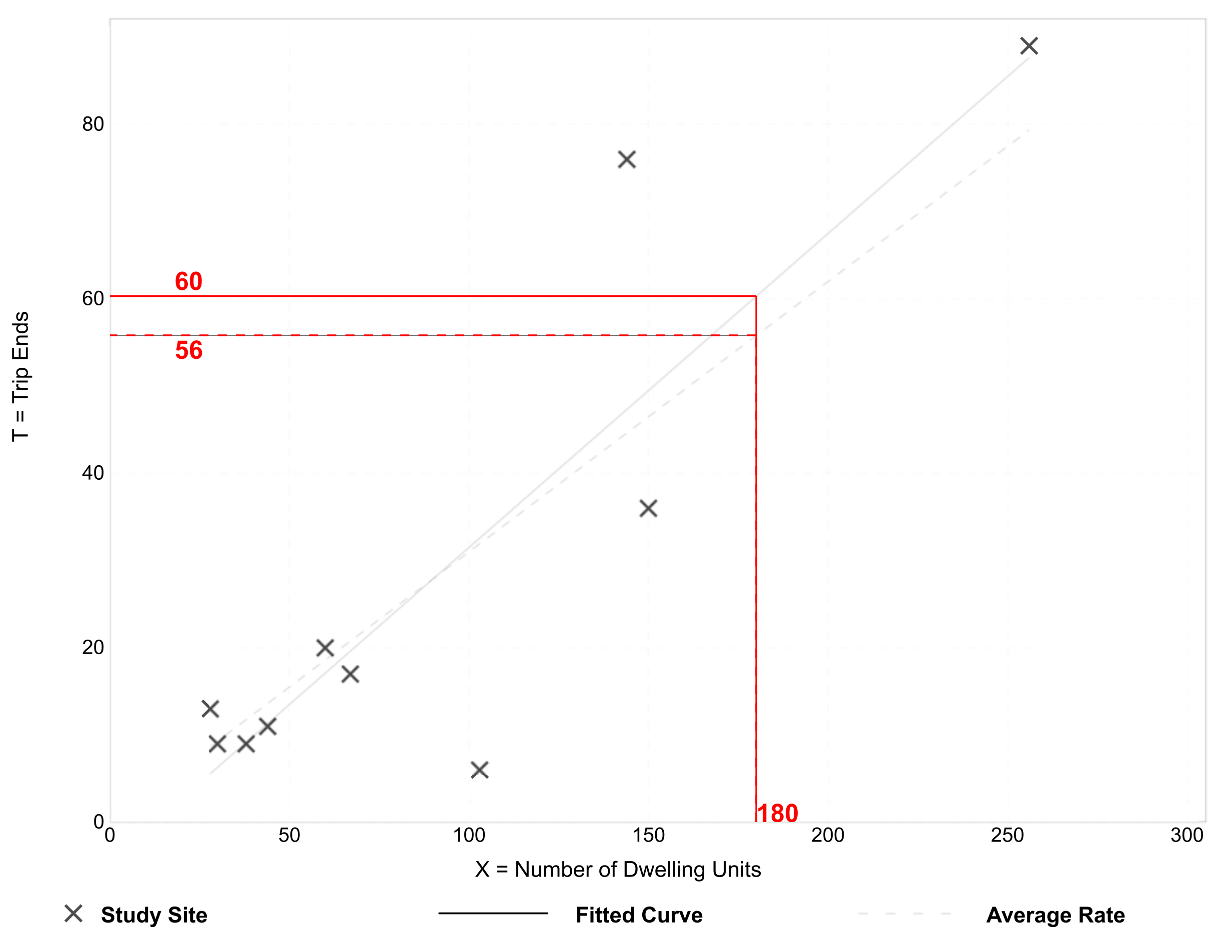
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	PM Peak Hour of Generator
Setting/Location:	**General Urban/Suburban**
Number of Studies:	10
Avg. Num. of Dwelling Units:	92
Directional Distribution:	53% entering, 47% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.31	0.06 - 0.53	0.14

Data Plot and Equation



Fitted Curve Equation: T = 0.36(X) - 4.50 **R^2= 0.78**

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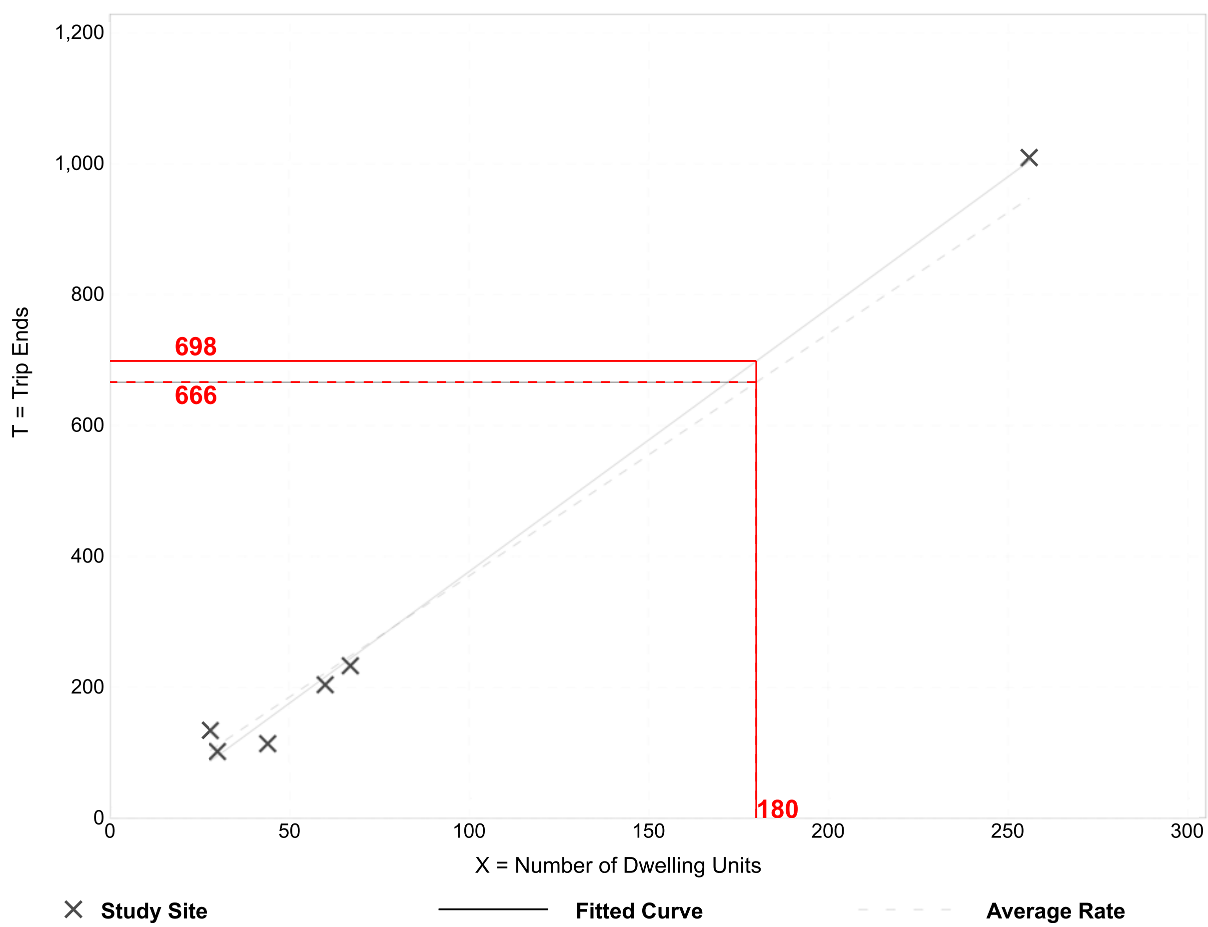
Senior Adult Housing - Attached
(252)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	6
Avg. Num. of Dwelling Units:	81
Directional Distribution:	50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.70	2.59 - 4.79	0.53

Data Plot and Equation



Fitted Curve Equation: T = 4.02(X) - 25.37 **R^2= 0.99**

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Appendix E
REQUESTED WAIVERS

A
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Arbella at Ashland
Senior development
MBTA Roadway in Ashland, Massachusetts
December 6, 2019

PRELIMINARY WAIVER REQUEST LIST TO ACCOMPANY THE LOCAL INITIATIVE PROGRAM APPLICATION FOR COMPREHENSIVE PERMIT PROJECTS

The Applicant's requested exceptions are based on the Plans entitled "Issued for DHCD LIP Application – MBTA Roadway, Ashland, MA" prepared by Allen & Major Associates, Inc., dated December 6, 2019 ("Site Development Plans"). Subsequent amendments to the Site Development Plans or the applicable Ordinances, By-Laws and/or Regulations may require different or additional waivers, thus the Applicant respectfully reserves all of its rights to supplement or amend the list.

By design intent, the applicant shall seek to conform to the local zoning code and has sought relief only where necessary to support the project and would not result in condition that compromised standard engineering practice, public safety, or other adverse condition if granted.

Waivers are based on the Town of Ashland Town Bylaw and subsections as noted below.

I. The Property is located in the Rail Transit District (RTD) Areas A, E, and F as depicted on the Site Development Plans. The Project requires the following waivers:

	CHAPTER	SECTION REQUIREMENT	PROPOSED
	§242 – Soil Removal		
1.	**Section 242-3 A.**	Except as otherwise provided in § 242-4 and 242-5 herein, no earth shall be removed from any lot in the Town of Ashland unless a permit shall have first been obtained by the owner from the Board.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested.
	§247 – Stormwater Management and Illicit Discharges and Connections		
2.	**Section 247 Stormwater Management and Illicit Discharges and Connections**	Regulation of activities that result in the disturbance of land and the creation of stormwater runoff is necessary for the protection of the Town of Ashland to safeguard the health, safety, and welfare of the general public and protect the natural resources of the Town. The purpose of this bylaw is to comply with the Environmental Protection Agency's National Pollutant Discharge Elimination System Phase II program by preventing or diminishing stormwater impacts by controlling runoff and preventing soil erosion and	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Conservation Commission review, otherwise, a waiver is requested from Section 247, in its entirety, from the bylaw. The project shall be designed in accordance with the Massachusetts Stormwater Standards.

	CHAPTER	SECTION REQUIREMENT	PROPOSED
		sedimentation resulting from site construction, development and other circumstances, and eliminating non-stormwater discharges into the Town's municipal storm sewer system. § 247-1-8Administration. A. The Conservation Commission shall be the permit granting authority for the issuance of a stormwater management permit and shall administer, implement and enforce this bylaw. Any powers granted to or duties imposed upon the Commission may be delegated in writing by the Commission to its employees or agents or other municipal employees as appropriate. Such permit applications shall be submitted, considered, and issued only in accordance with the provisions of this bylaw and the regulations adopted pursuant to this bylaw.	
§280 – Wetlands Protection			
3.	**Section 280**	The purpose of this bylaw is to protect the wetlands, water resources, flood prone areas, and adjoining upland areas in the Town of Ashland by controlling activities deemed by the Conservation Commission likely to have a significant or cumulative effect on resource area values, including but not limited to the following: public or private water supply, groundwater supply, flood control, erosion and sedimentation control, storm damage prevention, water quality, prevention and control of pollution, wildlife habitat, rare species habitat including rare plant and animal species, agriculture, and aquaculture, deemed important to the community.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Conservation Commission review, otherwise, a waiver is requested from Section 280, in its entirety, from the bylaw. If applicable, the project will be designed in accordance with the performance standards of the Massachusetts Wetlands Protection Act.
§282 – Zoning			
4.	**Section 5.1.2 Schedule of Parking Area Requirements**	Dwellings – 2 spaces per dwelling unit	Relief from the quantity of spaces required is requested. The senior project proposed has a historical adequacy of 1 space per apartment unit.
5.	**Section 5.2 Loading Requirements**	"Adequate off-street loading spaces or loading areas shall be provided and maintained . . . "	Relief from strict adherence to this section is sought. No marked loading spaces shall be provided.

	CHAPTER	SECTION REQUIREMENT	PROPOSED
			Moving trucks, and similar, shall be coordinated with the management office for move-in processes that do not encumber the project or circulation.
6.	**Section 5.2.8 Special Permit**	Any loading requirement set forth herein may be reduced upon the issuance of a special permit by the Planning Board if the Board finds that the reduction is not inconsistent with public health and safety, or that reduction promotes a public benefit.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested.
7.	**Section 5.4.4 Interior Landscaping in Parking Areas**	Parking areas containing eight or more spaces shall contain or be bordered by at least one tree per eight spaces. . . .	A waiver from this requirement is requested to allow for the necessary installation of protective guardrails to site slopes that are required to accommodate site topography. Adequate plantings shall be provided to achieve the design intent of the bylaw but with site specific accommodations.
8.	**Section 5.4.4 3, Landscaped Islands and buffers**	Landscaped islands and buffer shall have a minimum area of one hundred fifty square feet and minimum width of eight feet and shall contain at least one tree per one hundred square feet.	The Site Development Plans propose islands and areas of the specified width, but is of the opinion that the viability of multiple trees within a confined area may affect their long term viability. A waiver is requested from this provision of the bylaw.
9.	**5.7.3 1. Environmental Standards, Erosion Control**	No grading shall take place on slopes in excess of a horizontal of three and a vertical of one slope except under special permit from the Planning Board . . .	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested.
10.	**5.8 Site Alteration Special Permit**	Intent and Purpose. The intent of this section is to promote and protect the public health, safety, and welfare through the preservation and protection of the environment and by recognizing the vital importance of free and vegetation growth in the ecological system. It is further the purpose of this section to: 1. Preserve and protect the natural scenic beauty and related natural resources in the Town of Ashland; 2. Limit land clearing and alteration of natural topography prior to site	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested from this Section.

	CHAPTER	SECTION REQUIREMENT	PROPOSED
		plan, preliminary plan, and/or definitive plan approval; 3. 3. To protect, preserve, and promote the aesthetic appeal, character, and value of the surrounding neighborhoods; and, 4. 4. To regulate prior to development plan approval, the removal of natural vegetation, especially major trees, and excavation and alteration of land, in order to minimize any danger of erosion, sedimentation, flooding, water pollution, unnecessary detraction from natural visual setting, obstruction of significant views, and other adverse impacts of development.	
11.	**Section 8.4.4. Permitted Uses**	Permitted Residential component uses in Area "A" per use plan, (d) Dwelling Multi-family, For Rent: N (No)	The applicant seeks a waiver from this restriction to allow rentable, senior multi-family units located within Area A of the RTD.
12.	**Section 8.4.6 Dimensional Requirements 4. Building Area**	Building Area. Age Restricted, Attached; Age Restricted. Detached and Age Restricted Multifamily, Dwelling and Dwelling Multifamily, For Rent Unit Requirements in a Rail Transit District (RTD). Determined based upon the total cumulative land area of the applicable Areas (A, C, D or E) as specified in the formula set forth herein, at a density of: (i) 10 units per acre for Age Restricted, Attached; Age Restricted, Detached; and Age Restricted, Multifamily; and (ii) twenty (20) units per acre for Dwelling Multifamily, For Rent (permitted in Area E only). Written computation of the foregoing density shall be provided at the time of the filing of a Site Plan Application with the Planning Board.	The applicant seeks a waiver from strict adherence to this calculation. The subject property contains 37.99 acres, sufficient to meet the density requirements for 180 proposed units as designated on the Site Development Plans. By Development Agreement, 20-24 acres of land (final area to be agreed upon by the Town of Ashland) is to be deeded to the Town of Ashland. The transfer of land to the Town of Ashland will result in a net project area of between 13.99 to 17.99 acres resulting in higher density that noted under Section 8.4.6. for the resulting land.
13.	**Section 8.4.6 Dimensional Requirements 11. Building/Structure Height**	Building/Structure Height. Except as otherwise specifically provided herein, the maximum height of any Dwelling Multifamily, For Rent structure) in a Rail Transit District (RTD) shall be three (3) stories above grade (four stories at the rear	The applicant seeks a waiver to construct 2-5 story apartment buildings. The increase in height allows for no loss in program elements (180 units) but minimizes the development footprint to

	CHAPTER	SECTION REQUIREMENT	PROPOSED
		of the building if the slope of the land permits) and the maximum height of any Age Restricted, Attached, Age Restricted, Detached, and Age Restricted, Multifamily building and any accessory structure related to such age restricted dwelling building shall not exceed two (2) stories above grade (three stories at the rear of the building if the slope of the land permits). The maximum height of any commercial building permitted in a Rail Transit District (RTD) shall be thirty (30) feet. The maximum height may be increased to fifty (50) feet within the Rail Transit District (RTD) upon the grant of a Special Permit and in accordance with the State Building Code.	increase perimeter buffers and setbacks to adjacent uses.
14.	**Section 8.4.8 Parking and Loading Requirements**	Parking and Loading Requirements. Except in a TVC which shall be governed by Section 8.4.14.12.a, below, parking and loading requirements shall be in conformance with Sections 5.1 and 5.2.	The applicant requests a waiver to minimize parking in keeping with the limitations identified per Sections 5.1 and 5.2 above.
15.	**Section 8.4.13 Requirements of a Site Development Plan**	Requirements of a Site Development Plan. The submission of a parcel Site Development Plan (refer to § 10.0, Definitions) shall meet all criteria set forth in this Section as well as Section 9.4.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested from this Section.
16.	**Section 9.4 Site Plan Review**	Site Plan Review	A waiver is requested in keeping with the RTD cross reference contained under Section 8.4.13. It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Planning Board review, otherwise, a waiver is requested from this Section.
17.	**Section 9.6 Design Plan Review**	Purpose. The purpose of the Design Review is to coordinate the aesthetic development of designated areas in Town through land, site, architectural, and sign review. This shall occur through an open process that involves the community and as guided by relevant documents, the	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Design Plan Review, otherwise, a waiver is requested from this Section.

	CHAPTER	SECTION REQUIREMENT	PROPOSED
		Design Guidelines, as well as commonly accepted design standards. Applicability and Authority. The DRC shall review applications for Site Plan Review submitted under Section 9.4 of the Ashland Zoning Bylaw, provided the property exists in the following areas of town: 1. Downtown and Pleasant Street: The geographic center of Ashland, including the Ashland Downtown District zoning districts. 2. Route 135 Corridor: Properties with frontage on Route 135 and in the Highway Commerce, Industrial, Neighborhood Commerce, or Wildwood Mixed Use Zoning districts. 3. Route 126 Corridor: Properties with frontage on Route 126 and in the Highway Commerce, Village Commerce, or Multifamily zoning districts. 4. Properties with projects requiring design review per section 9.4.7 of Chapter 282 (Zoning) of the Town of Ashland Code.	
18.	**Section 9.7 Rate of Development Bylaw, Section 9.7.3 Building Permit Limitation.**	Building Permit Limitation: Each such Project to which this Bylaw applies may receive only 25% of its the proposed building permits for the proposed buildings or lots approved in said Project in a given year. For example, for an eight-lot subdivision, only two building permits for single or two family buildings may be issued per year; and for a condominium or apartment complex containing eight buildings to be used for residential units, only two buildings per year may receive building permits. Each fraction of a unit or building shall be rounded down with a minimum of one.	The applicant seeks a waiver from the limitation of building permit issuance given the scope of the project if permits are requested prior to the expiration of the Rate of Development Bylaw as outlined in Section 9.7.5 as "four years following its effective date [November 28, 2016 Special Town Meeting, Article 13].
§343 – Stormwater Management			

	CHAPTER	SECTION REQUIREMENT	PROPOSED
19.	**Section 343 Stormwater Management**	The purposes of these Stormwater Management Regulations are to: Protect, maintain and enhance the public health, safety, environment, and general welfare by establishing minimum requirements and procedures to control the adverse effects of increased post-development stormwater runoff, decreased groundwater recharge, and nonpoint source pollution associated with new development and redevelopment, as more specifically addressed in the Stormwater Management Bylaw of the Town of Ashland . . . The Rules and Regulations (Regulations) contained herein have been adopted by the Town of Ashland Conservation Commission (Commission) in accordance with the Town of Ashland Stormwater Management Bylaw.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Conservation Commission review, otherwise, a waiver is requested. The project shall be designed in accordance with the Massachusetts Stormwater Standards.
§348 – Wetlands Protection			
20.	**Section 348**	The purpose of these regulations is to protect the wetlands, water resources, flood prone areas, and adjoining upland areas in the Town of Ashland by controlling activities deemed by the Commission likely to have a significant or cumulative effect on resource area values, including but not limited to the following: public or private water supply, groundwater supply, flood control, erosion and sedimentation control, storm damage prevention, water quality, prevention and control of pollution, wildlife habitat, rare species habitat including rare plant and animal species, agriculture, and aquaculture, deemed important to the community. The failure of these regulations to address all aspects of the bylaw, or a legal declaration of their invalidity in part or in whole, shall not act to suspend or invalidate the effect of the bylaw.	It is the applicant's opinion that a Comprehensive Permit issued duly by the Zoning Board of Appeals will meet this criteria and therefore not require Conservation Commission review, otherwise, a waiver is requested from Section 348, in its entirety, from the bylaw. If applicable, the project will be designed in accordance with the performance standards of the Massachusetts Wetlands Protection Act.

ALLEN & MAJOR ASSOCIATES, INC.

Appendix F

HYDRANT FLOW REPORTS

APPENDIX F

ALLEN & MAJOR ASSOCIATES, INC.

10 Main Street
Lakeville, MA 02347
Tel: (508) 923-1010
Fax: (508) 923-6309

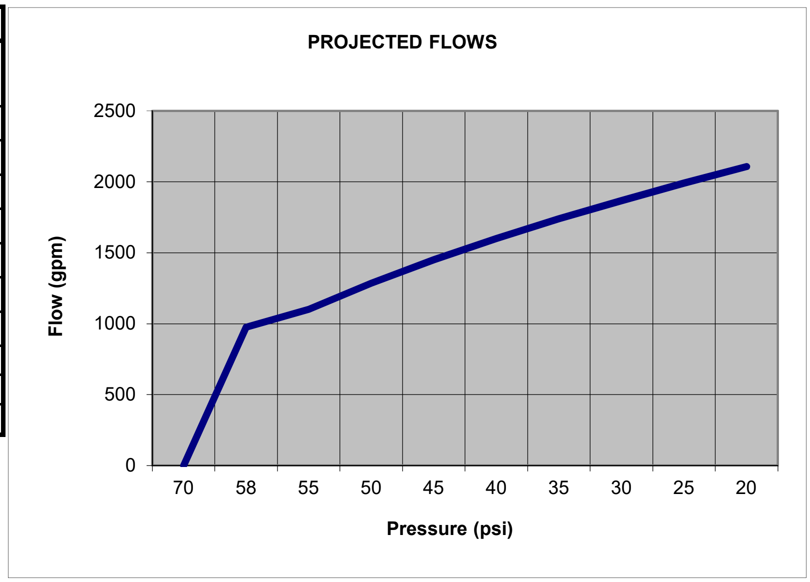
Title:	***Hydrant Flow Test Summary***
Project:	***Arbella at Ashland***
Date:	October 29, 2020
Start Time:	10:00 AM
End Time:	10:30 AM
A&M#:	2604-01
Location:	Memorial Drive
Performed By:	Joe Sanda (A&M)
Witnessed By:	Ashland DPW
Purpose of test:	Determine static & residual pressure for 12" D.I.C.L. water main on Memorial Drive
Pitot Gauge:	2" Pitotless Nozzle + Open Atmosphere
Pressure Gauge:	2-1/2" Static/Residual Pressure Gauge
Situation:	Pumps on/Woodridge valve closed

HYDRANT A (PRESSURE)	***Observed Pressure (psi)***	***Pressure Drop (psi)***	***Elevation (feet)***
STATIC	70	0	281.3
RESIDUAL	58	12.00	281.3

HYDRANT B (FLOW)	***Orifice Diameter***	***Pitot Reading (psi)***	***Hose Monster K Factor***	***Flow Rate (gpm)***	***Elevation (feet)***
OUTLET	2.0	34	167.20	975	251.1

PROJECTED RESULTS**

Flow (gpm)	Residual (psi)
0	70
975	58
1100	55
1285	50
1449	45
1599	40
1738	35
1868	30
1990	25
2107	20



SEE ATTACHED SKETCH FOR HYDRANT LOCATIONS
SEE ATTACHED SHEET FOR FLOW RATE FACTORS AND FORMULA

Equation:

$Q_2 = Q_1 * (S-R_2)^{0.54} / (S-R_1)^{0.54}$

Where:

S=Static Pressure | R_2=Projected Pressure | Q_2=Projected Flow Rate | Q_1=Measured Flow Rate

R_1=Residual Pressure | Q_1=Measured Flow Rate

Represent values obtained during the field investigation on **October 28, 2019.**

****Hydrant flow results** represent the pressure and flow values obtained on the date and time indicated and are not representative of other factors that may affect the municipal water system outside of the test window. Adequacy and consistency of flow availability shall be determined by a fire protection engineer. Fire protection engineer should also consult with the municipal water officials as part of the due diligence/design process.

Title:	***Hydrant Flow Test Summary***
Project:	***Arbella at Ashland***
Date:	October 29, 2020
Start Time:	10:30 AM
End Time:	11:00 AM
A&M#:	2604-01
Location:	Memorial Drive
Performed By:	Joe Sanda (A&M)
Witnessed By:	Ashland DPW
Purpose of test:	Determine static & residual pressure for 12" D.I.C.L. water main on Memorial Drive
Pitot Gauge:	2" Pitotless Nozzle + Open Atmosphere
Pressure Gauge:	2-1/2" Static/Residual Pressure Gauge
Situation:	Pumps off/Woodridge valve open

ALLEN & MAJOR ASSOCIATES, INC.

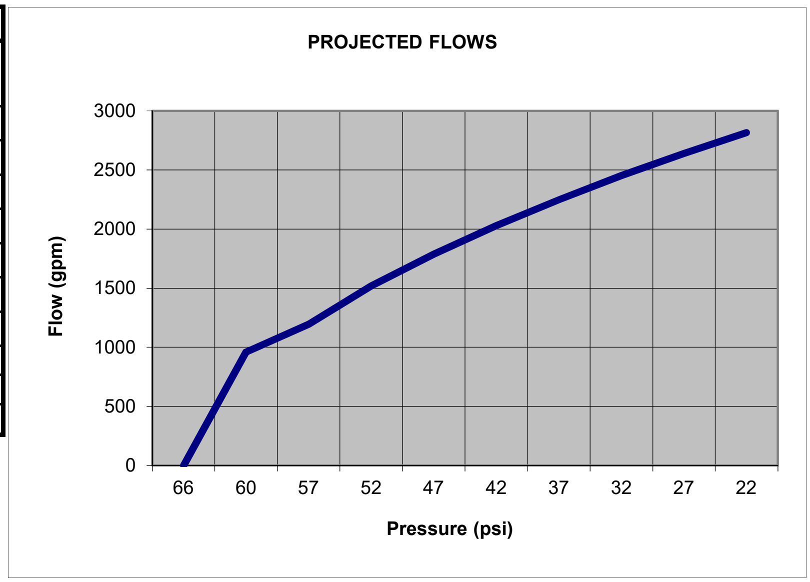
10 Main Street
Lakeville, MA 02347
Tel: (508) 923-1010
Fax: (508) 923-6309

HYDRANT A (PRESSURE)	***Observed Pressure (psi)***	***Pressure Drop (psi)***	***Elevation (feet)***
STATIC	66	0	281.3
RESIDUAL	60	6.00	281.3

HYDRANT B (FLOW)	***Orifice Diameter***	***Pitot Reading (psi)***	***Hose Monster K Factor***	***Flow Rate (gpm)***	***Elevation (feet)***
OUTLET	2.0	33	167.20	960	251.1

PROJECTED RESULTS**

Flow (gpm)	Residual (psi)
0	66
960	60
1196	57
1518	52
1790	47
2031	42
2249	37
2451	32
2639	27
2817	22



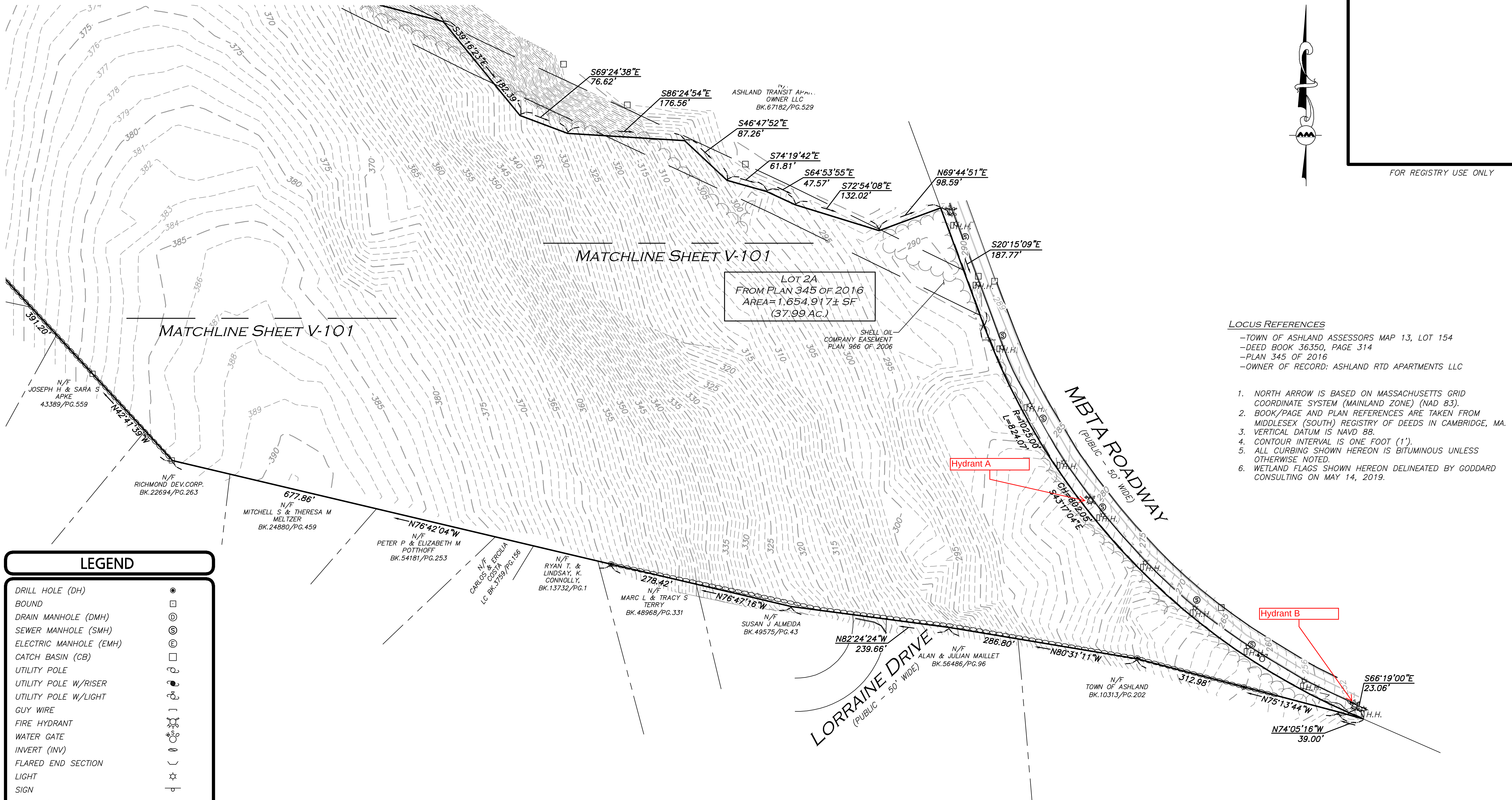
SEE ATTACHED SKETCH FOR HYDRANT LOCATIONS
SEE ATTACHED SHEET FOR FLOW RATE FACTORS AND FORMULA

Equation:
$Q_2 = Q_1*(S-R_2)^{0.54}/(S-R_1)^{0.54}$
Where:

S=Static Pressure	R_2=Projected Pressure	Q_2=Projected Flow Rate	Q_1=Measured Flow Rate
R_1=Residual Pressure	Q_1=Measured Flow Rate		

Represent values obtained during the field investigation on **October 28, 2019.**

****Hydrant flow results** represent the pressure and flow values obtained on the date and time indicated and are not representative of other factors that may affect the municipal water system outside of the test window. Adequacy and consistency of flow availability shall be determined by a fire protection engineer. Fire protection engineer should also consult with the municipal water officials as part of the due diligence/design process.



FOR REGISTRY USE ONLY

LEGEND

DRILL HOLE (DH)	
BOUND	
DRAIN MANHOLE (DMH)	
SEWER MANHOLE (SMH)	
ELECTRIC MANHOLE (EMH)	
CATCH BASIN (CB)	
UTILITY POLE	
UTILITY POLE W/RISER	
UTILITY POLE W/LIGHT	
GUY WIRE	
FIRE HYDRANT	
WATER GATE	
INVERT (INV)	
FLARED END SECTION	
LIGHT	
SIGN	
WETLAND FLAG	A31
HAND HOLE	H.H.
RIP-RAP	
BUILDING	
WETLAND	
EASEMENT LINE	
1' CONTOUR	53
5' CONTOUR	55
PROPERTY LINE	
ABUTTERS LINE	
STONE WALL	
RETAINING WALL	
TREE LINE	
EDGE OF PAVEMENT	
EDGE OF GRAVEL	
CURB	
CHAIN LINK FENCE	
GUARDRAIL	
BITUMINOUS	BIT.
FOUND	FND
NOW OR FORMERLY	N/F
BOOK	BK.
PAGE	PG.
CERTIFICATE OF TITLE	COT
LAND COURT	L.C.
LAND COURT CASE	L.C.C.

LOCUS REFERENCES

- TOWN OF ASHLAND ASSESSORS MAP 13, LOT 154
- DEED BOOK 36350, PAGE 314
- PLAN 345 OF 2016
- OWNER OF RECORD: ASHLAND RTD APARTMENTS LLC

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 BITUMINOUS UNLESS OTHERWISE NOTED.
6. WETLAND FLAGS SHOWN HEREON DELINEATED BY GODDARD CONSULTING ON MAY 14, 2019.

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.

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft

N:\PROJECTS\2604-01\SURVEY\DRAWINGS\CURRENT\S-2604-01-EC.DWG
FB# ???? PG. ???

WE HEREBY CERTIFY THAT:

THIS PLAN IS THE RESULT OF AN ACTUAL ON THE GROUND SURVEY PERFORMED ON OR BETWEEN MAY 1, 2019 AND JUNE 7, 2019.
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 ASHLAND ASSESSOR'S INFORMATION.
THE ABOVE IS CERTIFIED TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION AND BELIEF.

ALLEN & MAJOR ASSOCIATES, INC.

ISSUED FOR REVIEW
JUNE 7, 2019

PROFESSIONAL LAND SURVEYOR FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
GABELRY DEVELOPMENT, LLC
300 JORDAN ROAD
TROY, NY 12180

PROJECT:
LOT 2A
MBTA ACCESS ROAD
ASHLAND, MA

PROJECT NO.	2604-01	DATE:	06/07/19
SCALE:	1" = 80'	DWG. NAME:	S-2604-01-EC
DRAFTED BY:	KAC	CHECKED BY:	NIL

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil & structural engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY, SUITE 5
WOBURN MA 01801-8501
TEL: (781) 935-6889
FAX: (781) 935-2896
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: EXISTING CONDITIONS

SHEET No. V-102

Calculating Flow-rates

The flow charts we provide with the Pitotless Nozzle™, Hose Monster® and Nozzle Inserts are correct and should be referred to first. Our flow charts are calculated using K-Factors derived from testing performed at FM Approvals. It is common for third-party software to use the pitot formula to compute flow-rate. The 2½" Hose Monster uses a pitot to measure velocity pressure. The Pitotless Nozzle and 4" and 4½" Hose Monsters do not use a pitot, and the pitot formula has to be tricked into calculating correct flow-rates. Entering the coefficients into a program that uses orifice diameter, coefficient and velocity pressure should give relatively accurate flow-rates. Check results against our flow charts.

Here are the equations used for calculating flow-rates and predicting flow-rates. Use the orifice diameter, coefficient or K-factor found on the next page.

K-factor Formula

Computes a flow-rate in GPM given a psi and a K-factor of the flow device.

$$Q = \sqrt{P} \times K$$

Q = flow-rate in GPM, P = velocity pressure in psi, K = K-factor of flow device

Pitot Formula

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM, P = velocity pressure in psi, D = orifice diameter in inches
C = coefficient of flow device

Equation for Determining Rated Capacity

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity).

The example below enables you to find the predicted flow-rate at 20 psi residual pressure.

$$Q_R = Q_F \times (H_R^{0.54} / H_F^{0.54})$$

Q_R = Flow-rate predicted at the desired residual pressure in GPM

Q_F = Total test flow-rate measured during test in GPM
(GPM measured from Hose Monster or Pitotless Nozzle)

H_R = Pressure drop from static pressure to desired residual pressure
(Static – 20 psi [if 20 psi is the desired residual pressure])

H_F = Actual pressure drop measured during the test (Static – Actual Residual)

(Source: NFPA 291, 2010)

Conversion Factors

Here are some conversion factors for switching between US and metric units:

Flow-rate:

US Gallons per Minute x 3.785 = Liters per Minute
Liters per Minute x 0.264 = US Gallons per Minute

US Gallons per Minute x 0.1337 = Cubic Feet per Minute
Cubic Feet per Minute x 7.481 = US Gallons per Minute

Volume:

US Gallons x 3.785 = Liters
Liters x 0.264 = US Gallons

US Gallons x 0.8327 = Imperial Gallons
Imperial Gallons x 1.201 = US Gallons

Cubic Feet x 7.48051945 = US Gallons
US Gallons x 0.1337 = Cubic Feet

Pressure:

psi x 0.0689 = Bars
Bars x 14.5038 = psi

psi x 6894.757 = Pascals
Pascals x 0.000145 = psi

Bars x 100,000 = Pascals
Pascals x 0.00001 = Bars

Weight of Water:

US Gallons of Water x 8.3454 = Pounds
Cubic Feet of Water x 62.42796 = Pounds

Length:

Meters x 3.2808 = Feet
Feet x 0.3048 = Meters

Coefficient and K-Factor Table for Various Flow Devices

last update: 2/14/2012

Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" Pitotless Nozzle + Little Hose Monster™	156.0	1.31	2"	10–70	490–1300
2" Pitotless Nozzle + 2½" Hose Monster Steel	164.8	1.38	2"	10–80	520–1380
2" Pitotless Nozzle + Open Atmosphere	167.2	1.40	2"	10–70	530–1400
1¾" Pitotless Nozzle + Little Hose Monster	104.7	1.15	1.75"	10–90	330–1000
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	106.6	1.17	1.75"	10–90	340–1010
1¾" Pitotless Nozzle + Open Atmosphere	109.7	1.20	1.75"	10–90	350–1040
1⅛" Pitotless Nozzle + Little Hose Monster	37.2	0.98	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + 2½" Hose Monster Steel	37.4	0.99	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + Open Atmosphere	37.0	0.98	1.125"	5–90	80–350
1" Pitotless Nozzle + Little Hose Monster	27.2	0.91	1"	3–90	50–260
1" Pitotless Nozzle + 2½" Hose Monster Steel	27.6	0.93	1"	3–90	50–260
1" Pitotless Nozzle + Open Atmosphere	27.7	0.93	1"	3–90	50–260

In-Line Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" In-line Pitotless Nozzle	165.3	1.38	2"	10–75	530–1430
1¾" In-line Pitotless Nozzle	109.9	1.20	1.75"	5–80	250–980
1⅛" In-line Pitotless Nozzle	38.4	1.02	1.125"	5–70	90–320

BigBoy Hose Monster™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4 to 10 psi (BigBoy Hose Monster)	382.9	1.38	3.05"	4–10	766–1211
11 to 36 psi (BigBoy Hose Monster)	376.0	1.35	3.05"	11–36	1247–2256
37 to 53 psi (BigBoy Hose Monster)	372.0	1.34	3.05"	37–53	2263–2708

Note: Due to the shape and size of the BigBoy Pitotless Nozzle, the BigBoy Hose Monster uses three different k-factors over its operating range.

2½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2½" Hose Monster	168.67	0.906	2.5"	10–75	530–1460
1¾" Nozzle Insert	89.04	0.975	1.75"	10–75	280–770
1⅛" Nozzle Insert	37.36	0.99	1.125"	10–75	120–320

4" and 4½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4½" Hose Monster	331.07	0.548	4.5"	10–75	1050–2870
4" Hose Monster	339.65	0.712	4"	10–75	1070–2940

Using Software

Use the table below if you are using software that requires the coefficient input to be less than '1.0'. Notice that the orifice diameter must be changed from its true diameter in order to accommodate the lower coefficient. This is necessary only for the 2" Pitotless Nozzle and the ¾" Pitotless Nozzle.

Device	Coefficient	Orifice Diameter
2" Pitotless Nozzle + Little Hose Monster	0.99	2.30"
2" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	2.36"
2" Pitotless Nozzle + Open Atmosphere	0.99	2.38"
1¾" Pitotless Nozzle + Little Hose Monster	0.99	1.88"
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	1.90"
1¾" Pitotless Nozzle + Open Atmosphere	0.99	1.93"

Note: If your software uses the Theoretical Discharge Formula, found in NFPA 291, 4.7.3, the coefficient of discharge can be used to produce flow rates that will match our flow charts.

A hand-held pitot directly at a hydrant outlet

Outlet Type	Coefficient
Outlet smooth and rounded	0.9
Outlet square and sharp	0.8
Outlet square and projecting into barrel	0.7
If a stream straightener is used	0.95

Classifying and Marking of Hydrants

Rated Capacity at 20 psi	Class	Marking Color of Hydrant Tops and Nozzles
≥1500 GPM	AA	Light Blue
1000–1499 GPM	A	Green
500–999 GPM	B	Orange
≤499 GPM	C	Red

The above are the NFPA hydrant classifications and color markings for various rated capacities. Source: NFPA 291, 5.1, 2010.

2" PITOTLESS NOZZLE™

PN2GRV

FLOW CHART

10 - 50 PSI	Little Hose Monster™	Open Atmosphere
PSI	GPM	GPM
10	493	529
11	517	555
12	540	579
13	562	603
14	584	626
15	604	648
16	624	669
17	643	689
18	662	709
19	680	729
20	698	748
21	715	766
22	732	784
23	748	802
24	764	819
25	780	836
26	795	853
27	811	869
28	825	885
29	840	900
30	854	916
31	869	931
32	882	946
33	896	960
34	910	975
35	923	989
36	936	1003
37	949	1017
38	962	1031
39	974	1044
40	987	1057
41	999	1071
42	1011	1084
43	1023	1096
44	1035	1109
45	1046	1122
46	1058	1134
47	1069	1146
48	1081	1158
49	1092	1170
50	1103	1182

51 - 70 PSI	Little Hose Monster™	Open Atmosphere
PSI	GPM	GPM
51	1114	1194
52	1125	1206
53	1136	1217
54	1146	1229
55	1157	1240
56	1167	1251
57	1178	1262
58	1188	1273
59	1198	1284
60	1208	1295
61	1218	1306
62	1228	1317
63	1238	1327
64	1248	1338
65	1258	1348
66	1267	1358
67	1277	1369
68	1286	1379
69	1296	1389
70	1305	1399

Key Flow Test Points	Little Hose Monster™	Open Atmosphere
GPM	PSI	PSI
500	10.7	9.1
562.5	13.0	11.3
750	23.1	20.1
1000	41.1	35.8
1125	52.0	45.3
1500	92.5	80.5

The readings on this chart are based on which device the Pitotless Nozzle is connected to.
It is the user's responsibility to verify that the correct chart and column is being used.

- **Little Hose Monster™ (HML).** Use this column when the Pitotless Nozzle is connected to a Little Hose Monster.

- **Open Atmosphere.** Use this column when the Pitotless Nozzle is connected directly to a test header or hydrant flowing openly to atmosphere.

This chart is FM Approved for flow rate accuracy. Please call us or instruct the Authority Having Jurisdiction to call us if there are any questions. Additional copies of flow charts are available at: www.hosemonster.com

Pitotless Nozzle™ Grooved

INSTRUCTIONS

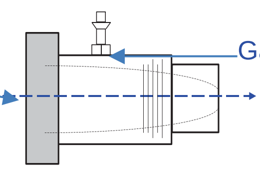
US Patent 6,874,375

The Pitotless Nozzle Grooved (PN#GRV) must be used with the Little Hose Monster (HML) **or** attached directly to a hydrant or test header valve discharging into open atmosphere. The flow chart has columns entitled Little Hose Monster™ and Open Atmosphere. Be sure to use the appropriate column to determine flow rates. *Call us if you are considering a configuration not listed here.*

SETUP

The gauge connection on the Pitotless Nozzle is a factory-installed male end of a quick disconnect coupling. One female counterpart is included and additional ones can be purchased separately. Attach the female end of the quick disconnect coupling directly to the gauge or remote reader adapter and use the quick disconnect feature to attach and remove. Do not remove the male quick disconnect from the Pitotless Nozzle as it will damage the threads on the Pitotless Nozzle.

We recommend a gauge with an accuracy rating of ½% or better and of a suitable range.



Using the Pitotless Nozzle with the Little Hose Monster™

Line up the Pitotless Nozzle outlet at the inlet of the Little Hose Monster with the gauge port rotated to 45° off either side of vertical. Push the Nozzle all the way in until the latch lever arms hook into the groove. Rotate the Nozzle right or left until the latch levers snap parallel to the body and the gauge port is in the desired position. The gauge port can be positioned so that a gauge can be viewed in a vertical position, or horizontal to the left or right side of the Little Hose Monster. Insert the locking pins all the way through the pinhole and latch-lever arm. When the Pitotless Nozzle is installed, securely attach a hose using a spanner wrench. Make sure the hose lays flat and is not twisted.

If using the Pitotless Nozzle on a Hydrant or Test Header Valve

The Pitotless Nozzle must be attached securely to a pump test header valve or hydrant. Secure the female swivel coupling of the Pitotless Nozzle directly to a hydrant nozzle or test header valve. The Pitotless Nozzle points in the direction the water will flow. Clear water discharge path.

Flow Charts

Pitotless Nozzle flow charts must be used to determine discharge flow rate. The use of flow charts of a different device or size will result in incorrect readings. Within the flow chart is a column for "Little Hose Monster" and for "Open Atmosphere". Use the "Little Hose Monster" flows if the Pitotless Nozzle is attached to a Little Hose Monster. Use the "Open Atmosphere" flows if the Pitotless Nozzle is attached directly on a hydrant or test header valve discharging out into the open. Flow charts are provided with the Pitotless Nozzle and additional copies are available on our website at **www.HoseMonster.com/literature.html**

WARNING:

- **Do not** attach the Pitotless Nozzle to the end of a hose unless the Hose Monster is attached to it or unless it is permanently secured.
- **Do not** attach a hose to the male outlet end of the Pitotless Nozzle under any circumstance. The resulting backpressure will distort flow rate measurement.
- **Do not** remove the quick disconnect gauge port fitting. The aluminum threads will be damaged. Contact The Hose Monster Company directly for any repairs.

HOSE MONSTER COMPANY™

MANUFACTURED BY:
The Hose Monster Company
(888) 202-9987 Toll Free
(847) 434-0073 Fax
Service@FlowTest.com
www.HoseMonster.com

Appendix G

EWS-1 Existing Watershed Plan

PWS-1 Proposed Watershed Plan

Allen & Major Associates, Inc.

A P P E N D I X G

ISSUED FOR DHCD LIP APPLICATION
08-07-2020

PHILIP L. CORDEIRO CIVIL NO. 47083 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
UA SENIOR MANAGER, LLC
RENSSELAER TECHNOLOGY PARK
300 JORDAN ROAD
TROY, NY 12180

PROJECT:
ARBELLA AT ASHLAND
ASHLAND, MA

PROJECT NO.	2604-01	DATE:	08-07-2020
SCALE:	1" = 80'	DWG. NAME:	C2604-01
DESIGNED BY:	CMcC/PGM	CHECKED BY:	PLC

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
10 MAIN STREET
LAKEVILLE, MA 02347
TEL: (508) 923-1010
FAX: (508) 923-6309
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
EXISTING WATERSHED PLAN	EWS-1

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ISSUED FOR DHCD LIP APPLICATION
08-07-2020

COMMONWEALTH OF MASSACHUSETTS
PHILIP L. CORDEIRO
CIVIL
NO. 47083
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
UA SENIOR MANAGER, LLC
RENSSELAER TECHNOLOGY PARK
300 JORDAN ROAD
TROY, NY 12180

PROJECT:

ARBELLA AT ASHLAND
ASHLAND, MA

PROJECT NO.	2604-01	DATE:	08-07-2020
SCALE:	1" = 80'	DWG. NAME:	C2604-01
DESIGNED BY:	CMcC/PGM	CHECKED BY:	PLC

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com

10 MAIN STREET
LAKEVILLE, MA 02347
TEL: (508) 923-1010
FAX: (508) 923-6309

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE: PROPOSED WATERSHED PLAN

SHEET No. PWS-1

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Appendix H

PROJECT ELIGIBILITY LETTER

ALLEN & MAJOR ASSOCIATES, INC.

APPENDIX H

Commonwealth of Massachusetts
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT
Charles D. Baker, Governor ◆ Karyn E. Polito, Lt. Governor ◆ Jennifer D. Maddox, Undersecretary

December 30, 2020

Ms. Yolanda Greaves, Chair
Select Board
101 Main Street
Ashland, MA 01721

Mr. Michael J. Uccelini, President and CEO
United Group of Companies, Inc.
300 Jordan Road
Troy, NY 12180

RE: The Arbella at Ashland, Ashland, MA
Determination of Project Eligibility under the Local Initiative Program (LIP)

Dear Ms. Greaves and Mr. Uccelini:

I am pleased to inform you that your application for project eligibility under the Local Initiative Program (LIP) for the proposed Arbella at Ashland project has been approved. This approval is based on your application that sets forth a plan for the development of 180 rental units. The proposed rents for the LIP units are generally consistent with the standards for affordable housing to be included in a community's Chapter 40B affordable housing stock.

As part of the review process, Department of Housing and Community Development (DHCD) staff performed an on-site inspection of the proposed project site on November 10, 2020. DHCD has made the following findings:

1. The proposed project appears generally eligible under the requirements of LIP, subject to final program review and approval;
2. The site of the proposed project is generally appropriate for residential development;
3. The conceptual plan is generally appropriate for the site on which the project is located;
4. The proposed project appears financially feasible in the context of the Ashland housing market;
5. The initial pro forma for the project appears financially feasible and consistent with cost examination and limitations on profits and distributions on the basis of estimated development costs;
6. The project sponsor and the development team meet the general eligibility standards of LIP; and,
7. The project sponsor has provided evidence of site control.

The proposed project must comply with all state and local codes not specifically exempted by a comprehensive permit.

Please provide us with a copy of the comprehensive permit as soon as it is issued. The DHCD legal office will review the comprehensive permit and other project documentation. Additional information may be requested as is deemed necessary. Following the issuance of the comprehensive permit, the specifics of this project must be formalized in a regulatory agreement signed by the municipality, the project developer, and DHCD prior to starting construction.

As stated in the application, the Arbella at Ashland project will consist of 180 units, 45 of which will be affordable; all will be eligible for inclusion in the Ashland subsidized housing inventory. The affordable units will be marketed and rented to eligible households whose annual income may not exceed 80% of area median income, adjusted for household size, as determined by the U.S. Department of Housing and Urban Development.

The conditions that must be met prior to final DHCD approval include:

1. A final affirmative fair marketing and lottery plan with related forms shall be submitted that reflects LIP requirements including consistency with the *Comprehensive Permit Guidelines, Section III, Affirmative Fair Housing Marketing Plans;*

2. Any changes to the application it has just reviewed and approved, including but not limited to alterations in unit mix, rents, development team, unit design, site plan and financial pro forma reflecting land value, must be approved by DHCD;

3. The project must be organized and operated so as not to violate the state anti-discrimination statute (M.G.L. c151B) or the Federal Fair Housing statute (42 U.S.C. s.3601 et seq.). No restriction on occupancy may be imposed on the affordable unit (other than those created by state or local health and safety laws regulating the number of occupants in dwelling units); and

4. The Town shall submit to DHCD the finalized details of the comprehensive permit.

As the Arbella at Ashland project nears completion of construction, DHCD staff may visit the site to ensure that the development meets program guidelines.

When the units have received Certificates of Occupancy, the developer must submit to both DHCD and the Ashland Board of Selectmen a project cost examination for the comprehensive permit project.

This letter shall expire two years from this date or on December 30, 2022, unless a comprehensive permit has been issued.

We congratulate the Town of Ashland and the United Group of Companies, Inc. on your efforts to work together to increase the Town's supply of affordable housing. If you have any questions as you proceed with the project, please call Alana Murphy at 617-573-1301.

Sincerely,

Catherine Racer
Associate Director

cc: Michael Herbert, Town Manager
John F. Trefethen, Chair, Zoning Board of Appeals
Office of the Chief Counsel, DHCD

Enc.

RESPONSIBILITY FOR COST CERTIFICATION:

By your signature below, United Group of Companies, Inc., acknowledges and accepts this approval letter, including the obligation under law to provide the Department of Housing and Community Development and the Town of Ashland with a project cost examination.

Signature:______________________________

Name (print):___________________________

Date:__________________________________

Upon receipt, please make copy of this letter and return a signed copy to Division of Housing Development, Department of Housing and Community Development, 100 Cambridge Street, Boston, MA 02114 ATTN: Local Initiative Program

Arbella at Ashland, Ashland, Massachusetts

LOCAL INITIATIVE PROGRAM – COMPREHENSIVE PERMIT

Sponsor:
United Group of Companies, Inc.
300 Jordan Road
Troy, NY 12180

Project Addresses:
MBTA Access Road
Ashland, MA 01721

This project will provide rental opportunities according to the following breakdown:

Type of Unit	# of Units	# of Bdrms.	# of Baths	Gross SF	Utility Allowance	Maximum Rent
Market Units	59	1	1	712	N/A	$2,350
	2	1	1	844		$2,750
	3	1	1	801		$2,600
	2	1	1	814		$2,675
	3	1	1	766		$2,550
	2	1	1	929		$3,000
	4	1	1	1,104		$3,150
	23	2	2	1,120		$3,330
	7	2	2	1,121		$3,300
	6	2	2	1,260		$3,700
	8	2	2	2,010		$4,700
	4	2	2	2,163		$4,950
	12	2	2	2,189		$5,100

LIP Units	13	1	1	712	TBD	$1,843
	3	1	1	712		$1,454
	2	1	1	712		$1,198
	2	1	1	766		$1,843
	2	1	1	929		$1,843
	10	2	2	1,120		$2,067
	2	2	2	1,120		$1,629
	2	2	2	1,120		$1,341
	7	2	2	1,121		$2,067
	2.	2	2	1,260		$2,067
Total Units	180					

Appendix I

DEVELOPMENT AGREEMENT

ALLEN & MAJOR ASSOCIATES, INC.

A P P E N D I X I

Development Agreement

This Agreement is entered into this the 15 day of July, 2020 by and between the Town of Ashland, 101 Main Street, Ashland MA by and through its Board of Selectmen ("Town") and UA Senior Manager, LLC and/or its successor and assigns a New York limited liability company located at 300 Jordan Road, New York, 12180 ("Developer").

WHEREAS, the Developer seeks to develop a certain portion of a parcel of property located in the Rail Transit District ("RTD") known as Lot 2, consisting of 37.99 acres +/- (the reference to as the "Property" or "Premises") as fully described on Exhibit A, and as more fully set forth on the plans attached hereto, which include a site plan, floor plans, building elevations and building sections, and which shall be referred to as the "Proposed Plan" more specifically set forth on Exhibit B, for development of a senior residential facility to be known as The Arbella at Ashland (the "Project").

WHEREAS, the Developer has control of the Premises pursuant to an Offer to Purchase/Purchase and Sale Agreement by and between the Premises Owner, Ashland RTD Apartments LLC and GABELRY Development, LLC, dated February 21, 2019, which was duly assigned to and assumed by the Developer; and

WHEREAS, the Town has an interest in the Premises by that certain Declaration of Restriction from Ashland RTD Apartments LLC to the Town recorded in Book 72181 Page 31 in the Middlesex Registry of Deeds; and

WHEREAS, the Developer requires certain agreements and approvals from the Town including, but not limited to, a Local Initiative Program Application ("LIP") and Comprehensive Permit for the Premises under MGL Chapter 40B, the regulatory issues thereunder and agreement on the location of the remainder of the open space and recreation on the Premises; and

WHEREAS, the Town has reviewed the Developer's preliminary site plan and has requested certain changes, including relocating the access drive, reorientation of apartment buildings, moving the townhouses, including reducing the footprint and generally shifting the overall development area to the north, as depicted in the Preliminary Design Plan attached as Exhibit B, which is hereby accepted and approved by the Parties; and

WHEREAS, the Premises is subject to a certain Declaration of Development Restrictions and Development Agreement between Megunko Transit District, LLC ("Megunko" or the "Declarant") and the Town of Ashland dated August 18, 2015, which also incorporate certain terms of a Covenant agreement dated June 20, 2000 and an Amendment to the Covenant agreement dated September 24, 2015 (collectively, the "Megunko Development Agreement"), which identifies certain commitments and agreements between Megunko and the Town as well payments to be made by Megunko to the Town in exchange for specifically described benefits that apply to the Premises; and

WHEREAS, the Town desires that the Developer undertake the "Project" and will support the Developer's LIP Application and Comprehensive Permit Application (the "Corporation Permit Application") under MGL Chapter 40B and the regulation issued thereunder as described herein.

NOW THEREFORE for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged and for the mutual promises set forth below, the Parties agree as follows:

1. The Developer shall develop the Premises by constructing no more than one hundred eighty (180) multi-family one and two-bedroom rental units including twenty-four (24) rental townhomes in the following configuration and within the following parameters:

a. There will be no more than 156 garden style rental units and no more than 24 town house style rental units, all of which shall include a mix of one-bedroom and two-bedroom units, the percentage mix of which shall be at Developer's discretion to be depicted on the Developer's proposed site plans (the "Proposed Site Plan") submitted as part of the foregoing application.

b. There will be a clubhouse and related amenities.

c. 25% of the units will be deemed affordable and the mix of the affordable units will be as follows: four (4)) will be affordable at 50% of the average mean family income level of the Greater Boston U.S. Census tract, five (5) will be affordable at 60% of the average mean family income level of the Greater Boston U.S. Census tract and the remainder thirty-six (36) units will be affordable at 80% of the average mean family income level of the Greater Boston U.S. Census tract (the "Affordable Units"). The units must be configured in such a way and at such affordability levels that all of the units, including market rate units, can be included on the town's affordable housing inventory kept by DHCD.

d. The Affordable Units will be proportionately distributed among the 156 garden style rental units. The Town agrees that it will strongly support the position that none of the Affordable Units will be included among the townhouse style rental units.

e. The buildings shall be up to 4 stories at the front and 5 stories at the rear as allowed by the slope of the site and the building heights shall not exceed the height as shown on the Proposed Site Plan.

f. The Project shall be a senior residential development limited to tenants who are at least 62 years of age.

g. The number of buildings shall be limited to those on the Proposed Site Plan.

h. The parking ratio shall not less than one parking space per unit.

i. The Project shall be built in substantial conformance with the Proposed Site Plan.

j. The Developer shall provide up to twenty thousand dollars ($20,000.00) to the Town for peer review during the permitting process to be paid at the submission of the comprehensive permit application and up to another one hundred thousand ($100,000.00) for construction oversight to be paid prior to the issuance of the Building Permit. The actual cost for the described services will be supported by third party invoices provided by the Town to the Developer. Should the actual costs be less than the above stated amounts, the unused portion of the payments will be returned to the Developer within thirty (30) days following the issuance of a certificate of occupancy.

k. The final plan submitted with the Comprehensive Permit shall include (i) a 150 foot undisturbed buffer zone along the southerly boundary of the Property adjacent to the "Apple Ridge" single family subdivision as shown in Exhibit C and identified as the "RTD Area F" (For avoidance of doubt the parties acknowledge that Area F is 100 feet wide as shown on Exhibit C. However, the parties agree that there will be no disturbance for an additional 50 feet beyond Area F for a total of 150 feet undisturbed area.) with an average undisturbed buffer zone of 200 feet; and (ii) a "Limit of Work" boundary as indicated in Exhibit D. The area beyond the Limit of Work boundary shall be an additional undisturbed buffer excluding the constructed entrance and stormwater management facilities along the southerly boundary line of the Property adjacent to the "Apple Ridge" single family subdivision as shown on Exhibit D. If any clearing or grading occurs beyond the Limit of Work boundary during construction, Developer will revegetate the area after the completion of construction.

l. The Developer shall provide surety in the amount of $500,000 in favor of the Town prior to the issuance of any building permit or undertaking any site work to guarantee that no damage occurs to the MBTA Access Road (the "Access Road") beyond its current condition. The Town represents that the Access Road is currently constructed per the approved construction drawings pertaining to the Mass Works Grant Application and Mass Works Grant Agreement and that the Access Road is constructed to the Town's specifications and standards. A video survey of the road will be performed in advance of the start of construction to establish the current condition.

2. The Developer will convey to the Town at closing fee simple title to the approximately 20.69 acres as depicted and described on the Proposed Site Plan, and the deed to the Town will restrict the conveyed area to remain forever as "open space" and for conservation purposes (the "Conservation Land"). The restrictions hereby made do not grant to the public in general

any right to enter the Premises but shall grant the right of the public to enter the Conservation Land. In the event the Conservation Land cannot be accessed off of the MBTA Access Road, then the Developer shall allow access at a designated point off of the Premises entry drive to the Conservation Land. The Developer shall not be responsible for the construction of the access point but may be requested to construct the access drive to accommodate the entry point. All other rights not expressly granted are hereby reserved to the Developer, including without limitation, fee ownership of the remainder of the Premises.

3. The Developer shall complete the LIP Application in consultation with the Town. The Developer will thereafter apply for all appropriate permits with the Town in order to undertake the Project.

4. All residential development on any portion of the Premises shall be subject to the requirements of the Comprehensive Permit and any dwelling units shall be developed and managed in compliance with the requirements for the same as specified by the regulations of the Massachusetts Department of Housing and Community Development ("DHCD"), or its successor, and the Town shall take such action to permit such units to be included as part of the Town's Subsidized Housing Inventory ("SHI") pursuant to the requirements of DHCD. The affordable units shall be managed in accordance with a regulatory agreement in form and substance satisfactory to the Town and DHCD.

5. The Developer shall pay to the Town, in accordance with the Megunko Development Agreement, its pro rata share of the $75,000 annual road maintenance, which amount shall be $20,000, to begin in the initial year commencing 30-days following the issuance of a certificate of occupancy, but in no event earlier than July 1, 2021 to the maintenance fees associated with the care and maintenance of the sidewalks and the Access Road.

6. The Developer shall pay to the Town ONE MILLION FOUR HUNDRED FIFTY THOUSAND ($1,450,000) (the "Applicable Fees") in lieu of the following: all other financial obligations of the Megunko Development Agreement including but not limited to; archeological study; participation and financial contributions to an Ashland Rail Transit District Association shuttle bus; all building permit fees (including HVAC, fire protection, electrical, wiring, plumbing and gas) peer review fee, co-urbanization fee, traffic fee, parking fee, public safety fee, inflow and infiltration fees, tree clearing fees, other impact fees and other fees that may otherwise be payable to the Town in connection with the construction and development of the Project. The foregoing shall not relieve Ashland Apartments RTD LLC or Megunko Transit District LLC of any outstanding mortgages or liens on the Property. Said amounts to be paid as follows: ½ prior the issuance of the first building permit and ½ prior to the issuance of the first certificate of occupancy.

7. The Developer agrees that no three (3) bedroom residential units shall be included in the Project.

8. All roads and drives within the development shall be and always remain private. The Developer agrees not to petition a Town Meeting for the acceptance of same as public ways. All snow plowing, trash pick-up, recycling, lighting and electricity, water and sewer from the point at

which the Premises shares a property line with the "Access Road" so called inward to the Premises shall at all times remain private and the Town shall have no responsibility for same.

9. A. The obligations provided for herein shall run with the Premises and shall be binding upon Developer, its successors, and assigns. A notice thereof in the form attached hereto as Exhibit E shall be executed by Developer and the Grantee and recorded with the Registry of Deeds upon execution hereof.

B. Notwithstanding the foregoing, the restrictions set forth herein shall run with the portion of the Premises which is subject to reversion to the Town of Ashland pursuant to that certain Restriction recorded in Book 72182 Page 30 and dated January 31, 2019 and which land will hereinafter be deeded to the Town from the Developer.

10. Any notice hereunder shall be in writing and shall be deemed duly given if mailed by certified or registered mail, postage and registration charges paid, by overnight delivery service with receipt, or by hand delivery to the Town of Ashland and the Developer at the addresses set forth below:

To the Town:

Town of Ashland
101 Main Street, 1st Floor
Town Hall –Ashland, MA 01721
Attention: Town Manager

With a copy to:

Lisa L. Mead, Esquire
Mead, Talerman, & Costa, LLC
30 Green Street
Newburyport, MA 01950
978 463 7700
Lisa@mtclawyers.com

To Developer:

Michael J. Uccellini
UA Senior Manager, LLC
300 Jordan Road
Troy, New York 12180
m.uccellini@ugoc.com
Phone: 518-687-7305

With a copy to:

John R. Mineaux, Esquire
Roemer Wallens Gold & Mineaux LLP
13 Columbia Circle
Albany, NY 12203
JMineaux@rwgmlaw.com
Phone: (518) 265-6969

Robert C. Buckley, Esquire
Riemer Braunstein, LLP
100 Cambridge Street
Boston. MA 02114-4527
RBuckley@riemerlaw.com
Phone: 617-880-3459

11. It is the express intention of the Developer that each and every term, condition and provision hereof be fully enforceable and binding on the Premises. Should, however, any one or more of the provisions contained herein for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof, but each shall be construed as if such invalid, illegal or unenforceable provision had never been included.

12. This Agreement shall be governed and constructed in accordance with the laws of the Commonwealth of Massachusetts. Nothing in this Agreement shall affect the rights of the Town of Ashland, in the exercise of any of its powers under applicable law with respect to the proposed development of the Property, including, but not limited, to the powers of the Ashland Zoning Board of Appeals as to the Comprehensive Permit or the Conservation Commission in its Notice of Intent process as regulated by the terms of G.L. c. 40B §§20-23.

13. After recording of this Agreement, this Agreement can only be modified if such modification is in writing signed by the Developer and the Board of Selectmen.

14. If either the Developer or the Town shall default in the performance of any term, covenant or condition of this Development Agreement, which default shall continue for more than sixty (60) days after written notice to Developer or the Town, as applicable, (or if such default shall be reasonably expected to take more than one hundred twenty (120) days to cure or commercially reasonable time to cure if Developer is making efforts to cure said default, said longer period of time), either party shall have the right to (i) formally place the other in default and pursue customary available legal recourse, (ii) terminate this Development Agreement; (iii) withhold any approvals issued by the Town or benefits provided by the Developer, as applicable; or (iv) exercise any other remedy available at law or in equity, including commencing an action for specific performance. The prevailing party shall reimburse the opposing party its reasonable legal fees and other expenses in seeking enforcement hereof. Any and all amounts due hereunder and any obligations hereof of the Developer, if any, shall be considered a Municipal Charge and may be enforced pursuant to G.L. c. 40 § 57.

15. This Development Agreement shall be effective as of the date it shall be executed by both Developer and the Town. The Developer acknowledges and agrees that there are provisions here in which effect that certain Amendment to the Covenant dated September 15, 2015 and which

control activities on the property and that in order to effectuate same, the Board of Selectmen, Planning Board and Ashland RTD Apartments LLC must agree to modify the Covenant prior to those provisions becoming effective. In the event that any party shall refuse to cooperate and agree to modify the Covenant on or before December 31, 2020, then this Agreement shall be null and void and neither party shall have further recourse against the other.

16. Through this Agreement, the Board of Selectmen do hereby release any and all restrictions on the Premises which may be applicable to the Premises only by the Megunko Development Agreement notice of which is recorded in the Middlesex South Registry of Deeds Book __ Page __. The Declarant does hereby release the Town from any and all obligations the Town has or may have to the Declarant under the Megunko Development Agreement with regard to the Premises. The Declarant therein has joined this Agreement for the purpose of acknowledging and releasing said restrictions and burdens only in so far as they apply to the Premises herein and for the purpose of acknowledging the representations included herein that pertain to the Declarant. The foregoing releases shall not relieve Ashland Apartments RTD LLC or Megunko Transit District LLC of any outstanding mortgages or liens on the Property. The Town represents and warrants that: (i) the Access Road has been constructed and completed pursuant to the approved construction drawings as set forth in the Mass Works Grant Application and the Mass Works Grant Agreement, such that public water, sewer, gas and electric services are currently available at the Access Road adjacent to the Property; and (ii) the Developer shall receive and have the benefit of all of the rights and benefits under the Megunko Development Agreement, the Mass Works Grant Application and the Mass Works Grant Agreement as they each pertain to Lot 2. The Developer shall be responsible for any additional utilities that may need to be extended to the Premises.

17. Prior to the initiation of any court proceeding regarding the terms of this Agreement or performance thereunder, the Town and the Developer agree that such disputes shall be first subject to nonbinding mediation, for a period not longer than sixty (60) days.

18. This Development Agreement is the entire agreement among the parties with respect to the subject matter hereof and supersedes all prior and contemporaneous oral and written agreements and discussions.

[Signatures Appear on Next Succeeding Page]

IN WITNESS WHEREOF, this instrument is sealed and delivered as of this ____ day of July, 2020.

Town
Board of Selectmen
By:

____
Michael Herbert, Town Manager
Duly Authorized

Developer
UA Senior Manager, LLC

____
Michael J. Uccellini, Manager

As to release of Declaration of Development Agreement and Restrictions, August 18, 2015 as it applies to Lot 2.

Ashland Apartments RTD LLC

____
Robert E. Gayner, Manager

Megunko Transit District LLC

____
Robert E. Gayner, Manager

EXHIBIT A
PREMISES

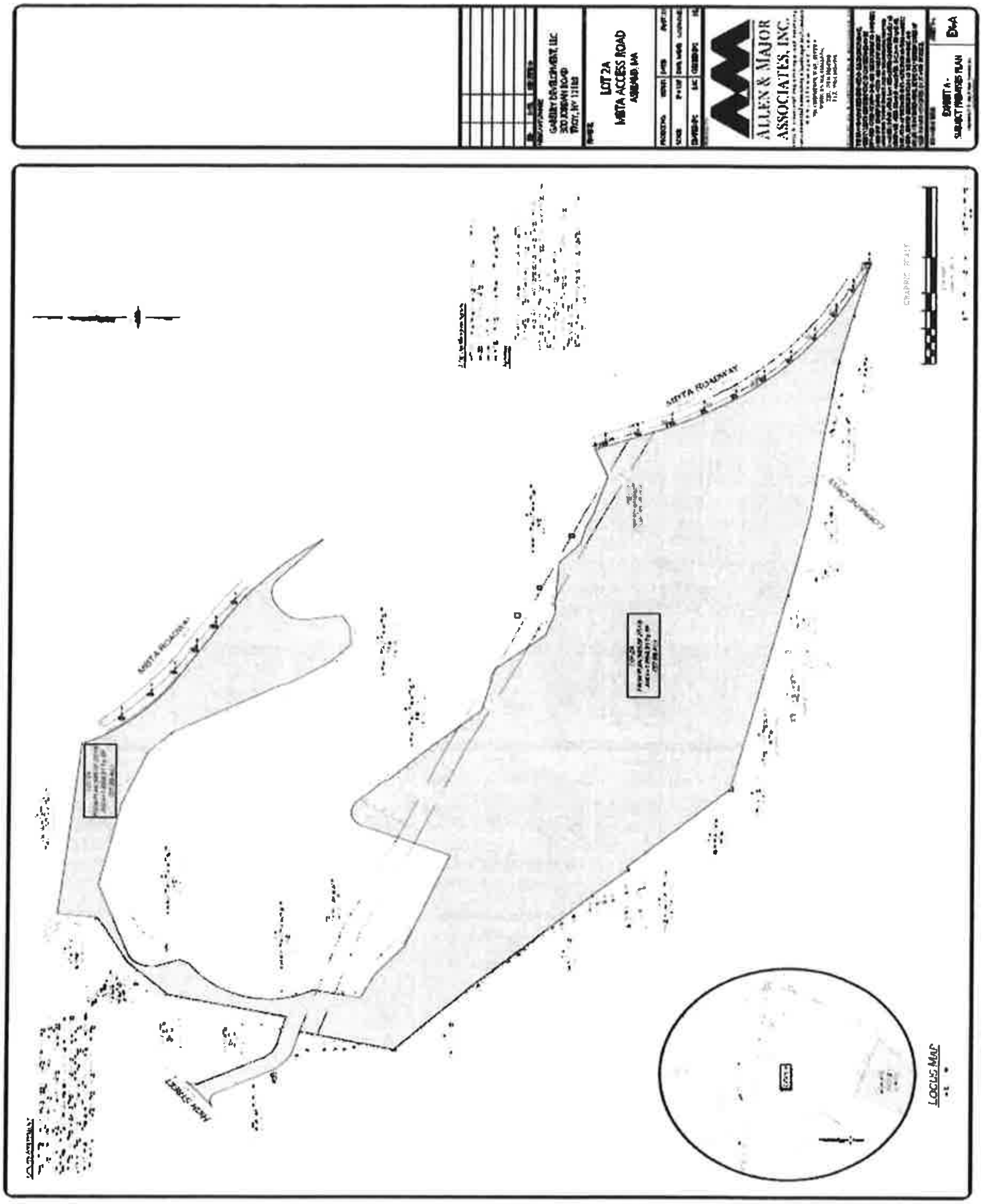

EXHIBIT B PRELIMINARY DESIGN PLAN

<u>**Exhibit C**</u>

<u>**100 Foot Buffer Zone – Area F**</u>

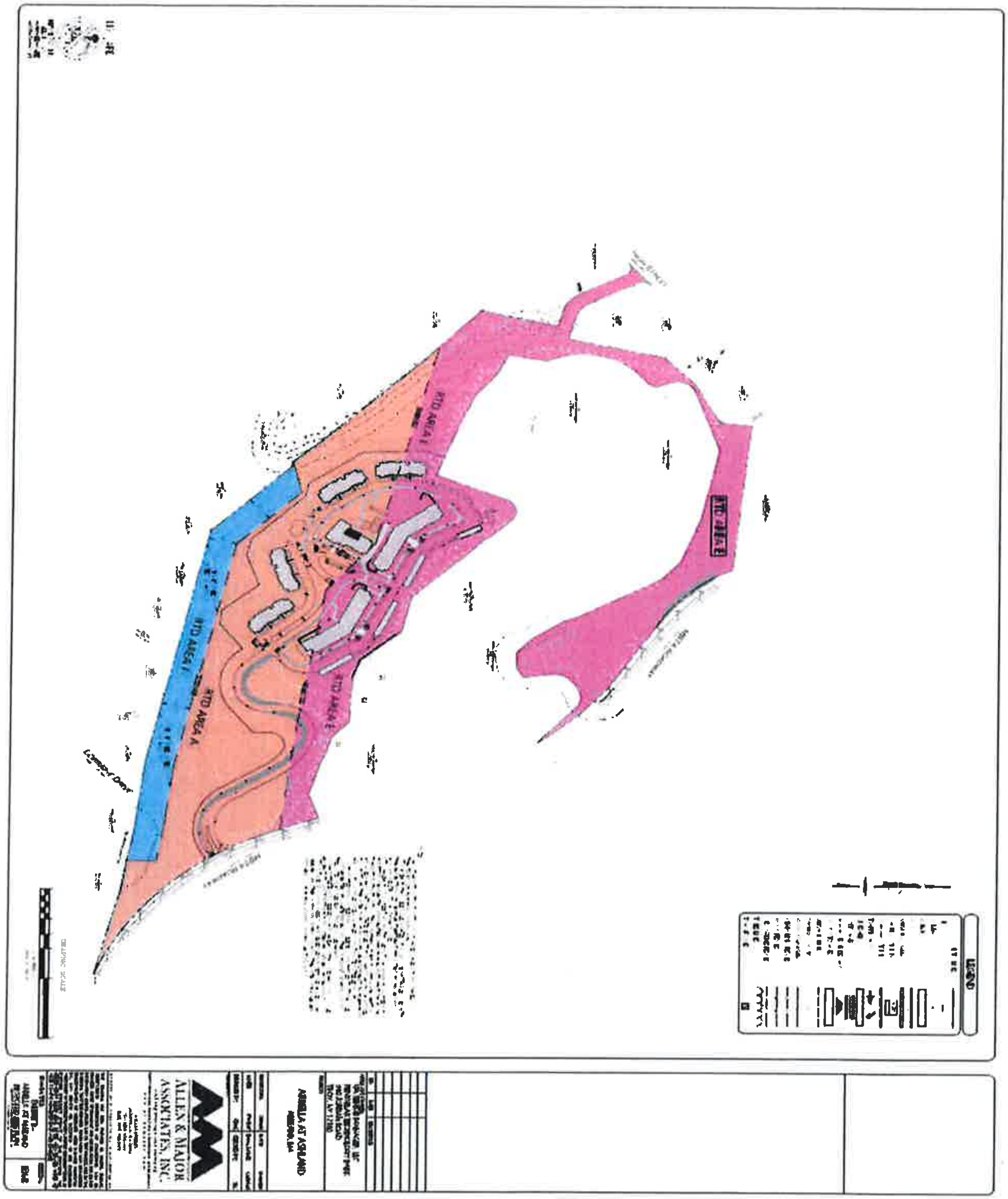

EXHIBIT D

LIMIT OF WORK PLAN

2571978.2
2574352.4

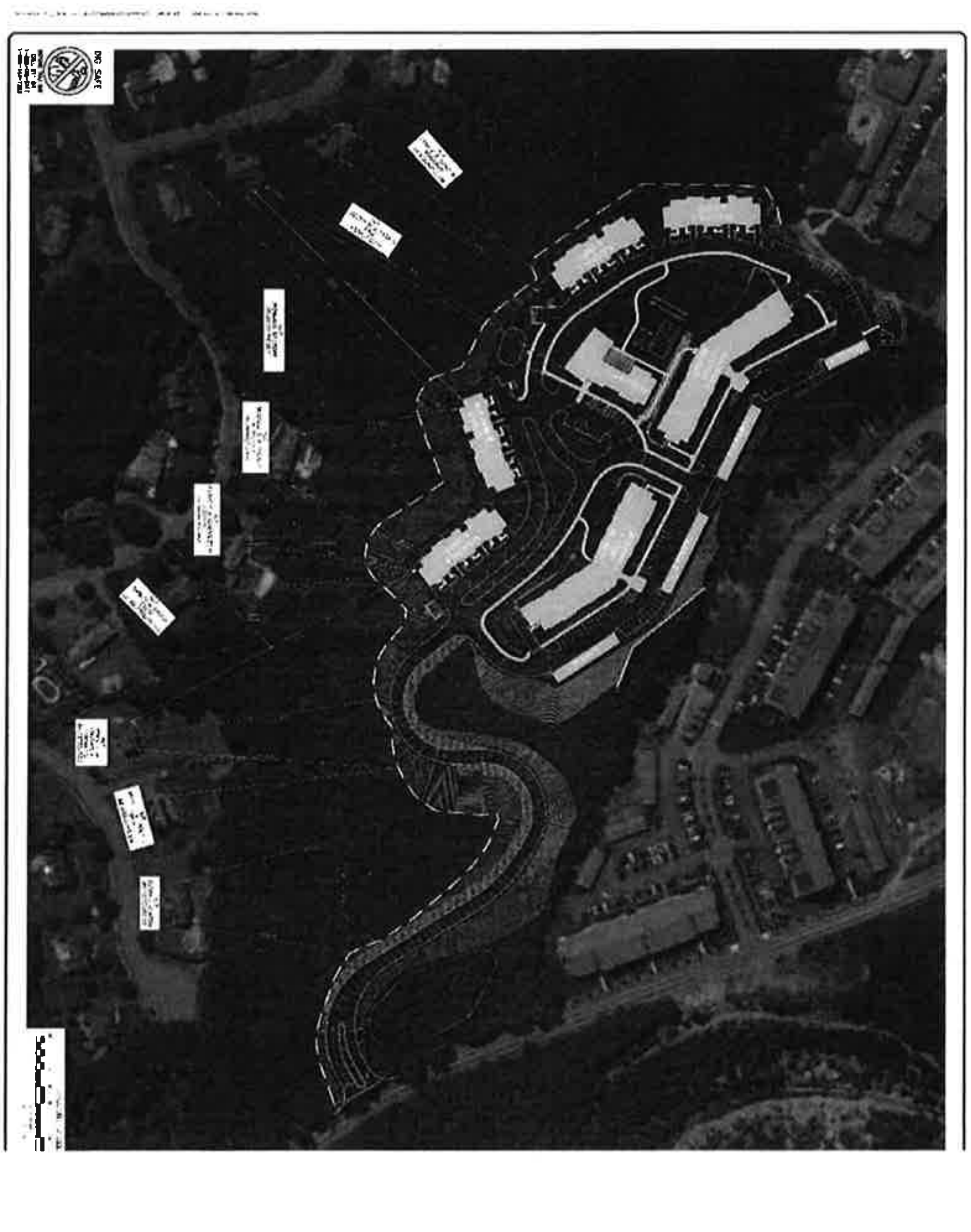

EXHIBIT E
NOTICE OF DEVELOPMENT AGREEMENT

First Amendment
To
Development Agreement

This First Amendment to Development Agreement ("First Amendment") is entered into this 22nd day of September, 2020 by and between the Town of Ashland, 101 Main Street, Ashland MA acting by and through its Board of Selectmen ("Town") and UA Senior Manager, LLC, a New York limited liability company and its successors and/or assigns located at 300 Jordan Road, New York, 12180 ("Developer"). The Town and the Developer may hereinafter be individually referred to as a "Party" and collectively, as the "Parties".

WHEREAS, Gabelry Developmment LLC, an affiliate of Developer, as Buyer entered into a Purchase and Sale Agreement with Ashland RTD Apartments LLC, as Seller on February 21, 2019 for the purchase and sale of the property located in the Rail Transit District, known as Lot 2A consisting of 37.99 acres +/- (the "Premises");

WHEREAS, in anticipation of the acquisition of the Premises, the Developer and the Town entered into a Development Agreement dated July 15, 2020 (the "Agreement") in connection with the development of the Premises into a senior residential facility to be known as "The Arbella at Ashland", subject to obtaining various approvals from the Town, including but not limited to, a Local Initiative Program Application ("LIP") and Comprehensive Permit under M.G.L. Chapter 40B (the "Project");

WHEREAS, the Premises is also subject to and encumbered by a certain Declaration of Development Restrictions and Development Agreement between Megunko Transit District, LLC and Ashland RTD Apartments LLC (collectively, the "Declarant") and the Town of Ashland dated August 18, 2015, which also incorporates certain terms of a Covenant Agreement dated June 20, 2000 and an Amendment to the Covenant Agreement dated September 24, 2015 (collectively, the "Megunko Development Agreement"), which provides for certain covenants, commitments and agreements between Megunko and the Town as well as payments to be made by Megunko to the Town in exchange for specifically described benefits that affect the Premises; and

WHEREAS, this First Amendment is to clarify the rights and responsibilities of the Parties as they may relate to the covenants, commitments and agreement set forth in the Megunko Development Agreement that affect the Premises.

NOW THEREFORE for good and valuable consideration, the receipt and legal sufficiency of which is hereby acknowledged and for the mutual promises set forth below, the Parties agree as follows:

1. The Town and the Developer agree and acknowledge that the Megunko Development Agreement shall remain in full force and effect as an encumbrance on the Premises, until such time

as one of the following occurs: (i) prior to conveyance of the Premises to Developer, the Declarant releases the Town from any and all obligations, covenants and restrictions the Town has or may have to the Declarant under the Megunko Development Agreement with respect to the Premises; or (ii) conveyance of the Premises by the Declarant to the Developer and the Developer releases, as successor in title to the Declarant, the Town from any and all obligations, covenants and restrictions the Town has or may under the Megunko Development Agreement with respect to the Premises. Upon termination of the Megunko Development Agreement, all obligations thereunder shall become null and void. Notwithstanding the foregoing, the Developer shall have no obligation to release the Town from any and all obligations, covenants and restrictions set forth above until receipt of all appropriate state and local permits and approvals have been received to develop the Project, with all appeal periods having expired or in the event of an appeal, the issuance of final judgment in favor of the Developer. Notwithstanding the foregoing, the Town shall have no obligation to release the Developer from any and all obligations, covenants and restrictions set forth above until receipt of all appropriate state and local permits and approvals have been received to develop the Project, with all appeal periods having expired or in the event of an appeal, the issuance of final judgment in favor of the Developer.

2. Upon the completion of 1(i) or 1(ii) above, then the Megunko Development Agreement shall then become null and void as it relates to the Premises and of no further recourse to either Party and both the Town and the Developer shall obtain any and all signatures necessary to release the Megunko Development Agreement a it pertains to the Premises as between the Parties .

3. Any notice hereunder shall be in writing and shall be deemed duly given if mailed by certified or registered mail, postage and registration charges paid, by overnight delivery service with receipt, or by hand delivery to the Town of Ashland and the Developer at the addresses set forth below:

To the Town:

Town of Ashland
101 Main Street, 1st Floor
Town Hall –Ashland, MA 01721
Attention: Town Manager

With a copy to:

Lisa L. Mead, Esquire
Mead, Talerman, & Costa, LLC

30 Green Street
Newburyport, MA 01950
978 463 7700
Lisa@mtclawyers.com

To Developer:
Michael J. Uccellini
UA Senior Manager, LLC
300 Jordan Road
Troy, New York 12180
m.uccellini@ugoc.com
Phone: 518-687-7305

With a copy to:

John R. Mineaux, Esquire
Roemer Wallens Gold & Mineaux LLP
13 Columbia Circle
Albany, NY 12203
JMineaux@rwgmlaw.com
Phone: (518) 265-6969

Robert C. Buckley, Esquire
Riemer Braunstein, LLP
100 Cambridge Street
Boston, MA 02114-4527
RBuckley@riemerlaw.com
Phone: 617-880-3537

4. It is the express intention of the Developer that each and every term, condition and provision hereof be fully enforceable and binding on the Premises. Should, however, any one or more of the provisions contained herein for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof, but each shall be construed as if such invalid, illegal or unenforceable provision had never been included.

5. This First Amendment shall be governed and constructed in accordance with the laws of the Commonwealth of Massachusetts. Nothing in this First Amendment shall affect the rights of the Town of Ashland, in the exercise of any of its powers under applicable law with respect to the proposed development of the Premises, including, but not limited, to the powers of the Ashland Zoning Board of Appeals as to the Comprehensive Permit or the Conservation Commission in its Notice of Intent, if applicable, process as regulated by the terms of G.L. c. 40B §§20-23.

6. After recording of this First Amendment, this Development Agreement can only be modified if such modification is in writing signed by the Developer and the Town.

7. If either the Developer or the Town shall default in the performance of any term, covenant or condition of this Development Agreement, which default shall continue for more than sixty (60) days after written notice to Developer or the Town, as applicable, (or if such default shall be reasonably expected to take more than one hundred twenty (120) days to cure or commercially reasonable time to cure if Developer is making diligent efforts to cure said default, said longer

period of time), either party shall have the right to: (i) formally place the other in default and pursue any and all available legal recourse, (ii) terminate this Development Agreement in which event the Development Agreement shall become null and void; (iii) withhold any approvals issued by the Town or benefits provided by the Developer, as applicable; or (iv) exercise any other remedy available at law or in equity, including commencing an action for specific performance. The prevailing party shall reimburse the opposing party its reasonable legal fees and other expenses in seeking enforcement hereof. Any and all amounts due hereunder and any obligations hereof of the Developer, if any, shall be considered a Municipal Charge and may be enforced pursuant to G.L. c. 40 § 57.

8. In the event Gabelry Developmment LLC and/or the Developer defaults under the Purchase and Sale Agreement with Ashland RTD Apartments LLC and/or is no longer the purchaser of the Property, then this Development Agreement and First Amendment shall be null and void and of no further force or effect.

9. Prior to the initiation of any court proceeding regarding the terms of this First Amendment or performance thereunder, the Town and the Developer agree that such disputes shall be first subject to nonbinding mediation, for a period not longer than sixty (60) days.

10. The Development Agreement as amended by this First Amendment is the entire agreement among the Parties with respect to the subject matter hereof and supersedes all prior and contemporaneous oral and written agreements and discussions.

IN WITNESS WHEREOF, this instrument is sealed and delivered as of this 22nd day of September 2020.

Town Manager,

[signature]

Developer
UA Senior Manager, LLC,

[signature]

Michael J. Uccellini, Manager

2637151.1

Appendix J

EVIDENCE OF SITE CONTROL

ALLEN & MAJOR ASSOCIATES, INC.

APPENDIX J

PURCHASE AND SALE AGREEMENT

1. **PARTIES TO THIS AGREEMENT**

   A. Seller - The Seller is: ASHLAND RTD APARTMENTS LLC, a Massachusetts limited liability company (the "Seller") with an address at: 62 Temple Drive, Alton Bay, NH 03810

   B. Purchaser – The Purchaser is GABELRY Development, LLC, a New York limited liability company (the "Purchaser") with an address at 300 Jordan Road, Troy, NY 12180. The Purchaser shall be allowed to assign this agreement to a special purpose entity, but Purchaser shall be fully liable hereunder.

2. **PROPERTY TO BE SOLD**

   The undeveloped property which the Seller is agreeing to sell and which the Purchaser is agreeing to purchase (the "Property") is known as;

   Parcel ID/Address: Lot 2A- Ashland Rail Transit District,
   MBTA Access Rd / Ashland, MA 01721
   .
   (The Property includes all the Seller's rights and privileges, if any, to all land, water, streets, and roads annexed to, and on all sides of the Property). The lot size of the Property to be conveyed is described as approximately (37.99) acres, subject to covenant to convey 20-24 acres to the Town of Ashland as open space. Notwithstanding anything to the contrary set forth herein, Purchaser's obligations hereunder are expressly conditioned on its ability to develop and operate a one hundred eighty (180) unit senior living facility laid out in its sole discretion within the area comprising the Property subsequent to the aforementioned conveyance to the Town of Ashland.

3. **ITEMS INCLUDED IN SALE**

   The items if now in or on said premises are represented to be owned by the Seller, free from all liens and encumbrances, and are included in the sale "as is," on the date of this offer.

4. **PURCHASE PRICE**

   The entire Purchase Price, less any deposits previously paid to the Seller, but including any money held in escrow for the benefit of the Seller pursuant hereto, shall be due and payable at the time the Property is conveyed (the "Closing") by wired bank funds, subject to customary adjustments and proration for such transactions. The law firm of Roemer Wallens Gold and Mineaux LLP, located at 13 Columbia Circle, Albany, New York 12203 (the "Escrow Agent"), shall hold in escrow the following amounts, to be paid over to the Seller at closing:

   $ 25,000 Deposit – made simultaneously with the execution hereof.

   $ 25,000 2nd Deposit – made at time the Purchaser receives all final permits and approvals (including appeals period) for the contemplated senior housing development.

Both deposits (collectively $50,000) shall become NON-Refundable upon the Purchaser receiving all Permits and Approvals and at the expiration of any Appeals Period.

ALL DEPOSITS SHALL CREDIT AGAINST THE PURCHASE PRICE AT CLOSING.

The Base Purchase Price is:

Three Million Five Hundred Thousand Dollars; ($ 3,500,000)

The Purchaser shall pay the Base purchase price as follows:

$50,000 deposit, as set forth above

$3,450,000 by wire transfer or certified check at closing.

$ 3,500,000 Total Price

5. CONTINGENCY

Purchaser understands and agrees that it will acquire the Property, but Seller understands and agrees that Purchaser presently intends to develop the Property to comprise up to a minimum of 150 units of age-restricted rental housing for independent Seniors desiring an active lifestyle including related clubhouse, support facilities, roadways and associated infrastructure, (the "Project") and that, accordingly;

a. Purchaser must promptly undertake adequate due diligence in order to determine whether to proceed with the transaction contemplated herein and Seller agrees that Purchaser shall have ninety (90) days (the "Due Diligence Period") which shall commence on the first day subsequent to a Town of Ashland meeting at which the required affirmative vote approves the re-zoning and any required subdivision of the Property to allow the Project.. The Purchaser shall have sole determination of the acceptability of the Town's re-zoning changes, and may terminate this Agreement at its sole discretion.

b. Accordingly, Seller agrees that within fifteen (15) days from the date hereof, Seller shall provide to Purchaser and/or Purchaser's consultants and attorneys the following information, documents and items pertaining to the Property in Seller's control and/or possession including, but not limited to: Property tax bills and receipts for the immediately-preceding two (2) years; information regarding any threatened or outstanding liens or litigation affecting or otherwise relating to or associated with the property; plans and specifications for the improvements located on the Property, if applicable; any back title abstracts, reports or policies; surveys and site plans; environmental studies and certifications; leases and contracts; engineering reports and any other documents pertaining to the Property.

c. The Purchaser may additionally conduct environmental investigations, examinations and tests (including, but not limited to, a Phase I environmental study) to determine the presence of any hazardous substances provided that Purchaser and its agent, contract parties and/or consultants shall return the

Property to its original condition subsequent to the completion of any such investigations or tests. The Purchaser and its agents, contract parties and consultants shall be granted free access to the Property. Purchaser agrees to indemnify and hold the Seller harmless from any and all claims for loss or damages by any of the Purchaser's agents, contract parties, or consultants on the Property unless such loss or damages are the result of negligence of the Seller or Seller's agents.

d. In the event Purchaser shall give written notice to the Seller before the expiration of the Due Diligence Period that Purchaser declines to acquire the Property as a result of its due diligence, Purchaser's obligations to acquire the Property and Seller's obligations to convey the Property pursuant to this Agreement shall be null, void, and no further force and effect. Any deposits paid to or for the benefit of Seller shall be immediately returned to the Purchaser and neither party shall have any further obligations to the other.

e. Purchaser shall have one (1) option to extend the Due Diligence Period by an additional thirty days (30) by providing Seller written notice prior to expiration of the current Due Diligence Period.

f. Purchaser shall have an Approval Period of 2 years from expiration of the Due Diligence Period in order to secure 1) all zoning approvals, customary municipal, environmental, market/feasibility studies and other required approvals; 2) the ability to connect to all necessary utilities and adequate public water & sewer utilities for the Project at the Property; 3) financing for the Project; and 4) satisfactory tax level for the project.

g. Purchaser shall have two options to extend the Approval Period by an additional thirty days (30) each by providing seller written notice prior to expiration of the current Approval Period.

h. The Purchaser shall prosecute such Due Diligence in good faith to complete in the shortest possible timeframe, and shall notify Seller immediately upon satisfaction thereof.

The Purchaser shall initiate the Zoning & Municipal Site Plan Approval process not later than immediately following the completion of the Due Diligence Period.

Purchaser shall keep Seller apprised of the progress and proceedings in connection with the municipal approval process.

The Purchaser shall initiate the processes necessary for it to satisfy the conditions set forth in paragraph 5(f) and elsewhere herein no later than immediately following the Due Diligence Period, and shall prosecute such processes diligently and in good faith, for the purpose of satisfying such conditions. For the purposes of this agreement, the "financing" and "acceptable financing" that are conditions to Purchaser's obligations hereunder shall mean construction and permanent financing by one or more banks, insurance companies or other recognized institutional lenders, in commercially reasonable amounts and upon commercially reasonable terms, considering the nature of the Project.

In the event that the contingencies cannot be satisfied Purchaser will advise Seller that this Agreement will be terminated, and all deposits shall be promptly refunded.

6. TITLE AND SURVEY

The abstract of title or any continuation thereof, or any title insurance policy shall be obtained at Purchaser's expense by Purchaser's selected Title Company. The Seller shall cooperate in providing any available abstract of title or title insurance policy information without cost to Seller. The Seller, at Seller's expense, shall provide the Purchaser with an ALTA Survey for the "Property to be sold"; also, any existing engineering, public utilities or topographical information for the "Property."

7. CONDITIONS OF PROPERTY

If there are any buildings on the Property they are sold "as is" without warranty as to condition, and the Purchaser agrees to take title to the buildings "as is" and in their present condition subject to reasonable use, wear, tear, and natural deterioration between the date hereof and the closing of title.

8. CONDITIONS AFFECTING TITLE

The Seller shall convey and the Purchaser shall accept the Property subject to all covenants, conditions, restrictions and easements of record and zoning and environmental laws so long as the Property is not in violation thereof and any of the foregoing does not prevent the intended use of the Property for the Project.

9. DEED

The Seller shall convey the Property to the Purchaser by standard Massachusetts Quitclaim Deed.

10. TAX AND OTHER ADJUSTMENTS

The following, if any, shall be apportioned so that the Purchaser and Seller are assuming the expenses of the Property and income from the Property as of the date of transfer of title:

a. Rents and security deposits. Seller shall assign to Purchaser all written leases and security deposits affecting the Property.
b. Taxes, sewer, water, rents, and condominium or association fees.
c. Prorated municipal assessment yearly installments

11. RIGHT OF INSPECTION AND ACCESS – Also see "CONTINGENCIES"

Purchaser and/or a representative shall be given access to the Property for any test or inspections. The Purchaser agrees to hold Seller harmless against any and all liabilities that may arise from said tests and inspections. In the event the Purchaser does not purchase the Property, the Purchaser agrees to restore the Property to its original condition. This Agreement is contingent upon a written determination(s), at Purchaser's expense, by a licensed architect or licensed engineer or by an agreed third party that the Property is free from any substantial structural, mechanical, and/or environmental defects. This contingency shall be deemed waived unless the Purchaser shall notify Seller, in writing, by personal service, certified or registered mail, return receipt requested, post marked prior to expiration of the Due Diligence Period of such substantial defect(s), and furthermore supplied a written copy of the inspections report. If the Purchaser so notifies, then this Agreement shall be deemed cancelled, null and void.

12. TRANSFER OF TITLE

Transfer of title is to be completed at closing of financing.

The Purchaser shall close and acquire the Property within thirty (30) days after all final permits and approvals and expiration of any related appeals period; provided, however, that the Purchaser shall have secured acceptable financing for the Project at that time. There shall be no additional extension for closing of financing beyond the agreed 2 year approval period and related extension options, as per section "CONTINGENCY" paragraph (5.f and 5.g) herein.

As of the Closing, Purchaser shall obtain at Purchaser's expense an ALTA Owner's Policy of Title Insurance, subject only to the exceptions previously approved in writing by the Purchaser, in the amount of the Purchase Price and issued by a title company selected by the Purchaser. Seller shall convey the Property free and clear of any existing mortgages currently encumbering the Property, at Seller's expense. All other closing costs for escrow, recording fees, etc., shall be allocated as is customary in Middlesex County. Purchaser shall pay all of Purchaser real estate broker's commissions.

13. REAL ESTATE BROKER

The Purchaser shall, at closing, pay a real estate commission directly to:
Powers Realty, Development & Consulting LLC – (Thom Powers)

Each party represents and warrants to the other that; with the exception of Powers Realty, Development & Consulting LLC – (Thom Powers) as per above:

(i) Neither party has an agreement with a broker or broker agent.
(ii) Neither he, nor it, nor any of its agents has directly or indirectly dealt with, been shown or otherwise consulted any other broker or broker agent thereof in connection with this transaction.
(iii) No real estate brokerage commission is due in connection with this transaction.

Each party hereby indemnifies and holds the other party harmless against any claim or loss (including attorney fees) which may be asserted against the other by reason of any claims or determinations in contraventions of the representations and warranties contained in this paragraph. The representations and warranties of this section shall survive Closing and the delivery of the deed to Purchaser.

14. NOTICES

All notices contemplated by the Agreement shall be in writing, delivered to the addressee at the address therefor set forth in this Agreement by overnight Federal Express or USPS Priority Mail no later than the required date.

If to Seller:

If by overnight Federal Express: Robert E. Gayner, 62 Temple Drive, Alton Bay, NH 03810
If by USPS Priority Mail: Robert E. Gayner, Box 300, Alton, NH 03809, with copies to:
Lee H. Kozol, Friedman & Atherton LLP, 31 St. James Ave, Ste 925, Boston, MA 02116
Maire B. Ryan, 65814 E. Desert Ridge Drive, Tucson, AZ 85739

If to Purchaser:

If by overnight Federal Express or by USPS Priority Mail: GABELRY Development, LLC, 300 Jordan Road, Troy, NY 12180, Attention: Michael J. Uccellini, with a copy to:
John R. Mineaux, Esq., Roemer Wallens Gold & Mineaux LLP, 13 Columbia Circle, Albany, NY 12203

15. CONFIDENTIALITY

Both parties agree that in all negotiation and interactions with the Town of Ashland that this Agreement and the Letter of Intent that preceded it shall remain confidential between Seller and Purchaser and not shared with The Town of Ashland.

Seller's Agreement with Purchaser should be separate and apart from Seller's and / or its affiliates' negotiations with The Town.

16. THE PURCHASE AND SALE AGREEMENT

This Agreement contains all agreements of the parties hereto and supersedes all previous oral or written agreements. This Agreement shall apply to and bind the legal representatives, successors and assigns of the respective parties. It may not be changed orally.

17. COUNTERPARTS

The Agreement may be executed in any number of counterparts, in original, facsimile or electronic (pdf) formats, each of which when executed and delivered shall constitute a duplicate original, but all counterparts together shall constitute a single agreement.

2/21/19
Dated:

Purchaser - GABELRY DEVELOPMENT, LLC
Michael J. Uccellini, Manager,
hereunder duly authorized

2/17/2019
Dated:

Seller – ASHLAND RTD APARTMENTS LLC
Robert E. Gayner, Manager,
hereunder duly authorized

2/27/2019
Dated:

Escrow Agent – ROEMER WALLENS GOLD & MINEAUX LLP
John R. Mineaux, Managing Partner
hereunder duly authorized

ASSIGNMENT AND ASSUMPTION OF CONTRACT FOR PURCHASE AND SALE OF REAL PROPERTY

GABELRY DEVELOPMENT, LLC, a New York limited liability company *("Assignor'),* being the Purchaser named in a certain Contract for Purchase and Sale of Real Property, dated as of February 17, 2019 (the *"Contract),* between ASHLAND RTD APARTMENTS, LLC, a Massachusetts limited liability company *("Seller),* and Assignor, hereby assigns and conveys to UA SENIOR MANAGER, LLC, a New York limited liability company *("Assignee"),* all of the right, title, interest and obligations of Assignor arising under the Contract.

In consideration of the foregoing assignment of the Contract, Assignee agrees to pay to Assignor the amount of TEN AND 00/100 DOLLARS ($10.00) and Assignee additionally hereby assumes and agrees to perform all of the obligations of Assignor under the Contract, and to hold Assignor harmless from any liability or claim arising from Assignee's breach of any obligation so assumed.

Seller shall be entitled to rely on this Assignment in closing with Assignee pursuant to the Contract.

IN WITNESS WHEREOF, Assignor and Assignee have executed and delivered this Assignment and Assumption of Contract for Purchase and Sale of Real Property as of 12th day of December, 2019.

ASSIGNOR:

GABELRY DEVELOPMENT, LLC

By: ______________________
Name: Michael J. Uccellini
Title: Manager

ASSIGNEE:

UA SENIOR MANAGER, LLC

By: ______________________
Name: Michael J. Uccellini
Title: Manager

Appendix K

TITLE COMMITMENT

ALLEN & MAJOR ASSOCIATES, INC.

A P P E N D I X K

Title Commitment to be provided at a later date.

Appendix L

DEED DOCUMENTS

ALLEN & MAJOR ASSOCIATES, INC.

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X

L

V s

2014 00067696
Bk: 63650 Pg: 314 Doc: DEED
Page: 1 of 2 05/23/2014 09:39 AM

Property Address: MBTA Access Road, Ashland, Massachusetts

DEED

MEGUNKO TRANSIT DISTRICT, LLC, a Massachusetts limited liability company, with its principal place of business located at 12 Standish Lane, Winchester, Massachusetts 01890

for consideration paid and in full consideration of one dollar ($1.00) Dollar grants to

ASHLAND RTD APARTMENTS LLC, a Massachusetts limited liability company with tis principal place of business at 12 Standish Lane, Winchester, Massachusetts 01890

with **Quitclaim Covenants**

Certain parcels of land situate in Ashland, Middlesex County, Massachusetts shown as Lot 1 containing 30.1226 ± acres, and Lot 2 containing 36.3098± acres on the plan entitled "Plan of Land in Ashland, MA" prepared for J.P.I Apartment Development, Inc. dated January 8, 2003 prepared by Hancock Survey Associates, Inc. and recorded as Plan 966 on July 28, 2006 at the Middlesex Registry of Deeds, Southern District.

Together with a legal right of access to and from West Union Street (Route 135) over the roadway identified as Parcels A-14, A-15, A-11, A-12, A-10, and A-9 as shown on a plan entitled "Land Acquisition Plan, Town of Ashland, Middlesex County" dated 08/09/00, recorded with said deeds as Plan 1139 (Sheets 1 and 2) of 2000, including the right to install utilities in said roadway and together with the benefit of access rights as set forth in Superior Court Stipulation dated March 10, 2004, a copy of which is recorded in Book 42346, Page 430 but subject to the terms set forth therein.

Together with the benefit of the Access Easement and Agreement between the Massachusetts Bay Transportation Authority and Megunko Transit District, LLC, dated July 18, 2007 and recorded in Book 49910, Page 118.

The Grantor hereby certifies that it has not elected to be treated as a corporation for federal income tax purposes.

For title, see Deed dated August 22, 2002 and recorded with Middlesex South Registry of Deeds in Book 36623, Page 52 and by Deed dated August 7, 2002 and recorded in Book 36623, Page

53 and by virtue of Land Court Decree (Withdrawal from Registered Land status) recorded in Book 37587, Page 162 and filed as Document No. 1247523

Executed as a sealed instrument this 21st day of May, 2014

MEGUNKO TRANSIT DISTRICT, LLC

By: ______________________
ROBERT E. GAYNER, Manager

COMMONWEALTH OF MASSACHUSETTS

Suffolk ss

On this 21 day of May, 2014, before me, the undersigned notary public, personally appeared Robert E. Gayner, Manager of Megunko Transit District, LLC, proved to me by satisfactory evidence of identification, being (check whichever applies): ☒ driver's license or other state or federal governmental document bearing a photographic image, □ oath or affirmation of a credible witness known to me who knows the above signatory, or □ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing to be signed voluntarily for its stated purpose as Manager as aforesaid

____

Notary Public
My Commission Expires:

ROBERT J. MORIARTY, JR.
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
September 28, 2018

Appendix M
DIVIDEND ENTITY STATUS

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M

LIMITED DIVIDEND ENTITY STATUS

The Applicant (US Senior Manager, LLC) will execute the Subsidizing Agency's (Mass Housing) Regulatory Agreement requiring that the Applicant's profits, cash flow, and distribution of returns will be limited as set forth in Chapter 40B and the regulations thereunder and as set forth under the Subsidizing Agency's equity and limited dividend policies.

Appendix N

DEVELOPMENT TEAM QUALIFICATIONS

ALLEN & MAJOR ASSOCIATES, INC.

A P P E N D I X N

THE UNITED GROUP OF COMPANIES

Company Overview

unitedgroup

THE WHOLE REAL ESTATE STORY

- STUDENT HOUSING
- SENIOR HOUSING
- MULTI-FAMILY HOUSING
- COMMERCIAL REAL ESTATE

SUBSTANCE MEETS STYLE

Professional without the pretense. Experienced beyond years.

United Group combines all the most-wanted traits you would expect from one of the industry's most competitive real estate development firms.

United Group

OF COMPANIES

The United Group of Companies, Inc., ("UGOC") headquartered in Troy, NY, is a nationally recognized, award winning Corporation with over 40 years of experience. United Group has become known for its successful development, acquisition, repositioning and property management for a variety of real estate assets including student housing, independent senior housing, multi-family rental housing, commercial offices and mixed use developments.

THE DEVELOPMENT TEAM
United Development Corp., spearheads all development activity in the following sectors: college student housing, independent lifestyle senior housing, multi-family housing, commercial and mixed-use.

THE MANAGEMENT TEAM
United Realty Management Corp., AMO® ("URMC") is responsible for marketing, leasing, and operating United's entire student, senior, and multifamily housing projects as well as the commercial and mixed-use projects.

THE FINANCE TEAM
The finance team spearheads all financing activity for the United Group of Companies. The finance team, together with Millennium Credit Markets ("MCM") and its principals have financed over $3 billion of real estate projects.

THE CONSTRUCTION TEAM
American Construction Co., ("ACC"), is responsible for the construction management of all United's real estate development projects.

THE ACQUISITIONS TEAM
The acquisitions team is responsible for land and building acquisitions and has acquired over $1 billion in real estate and other assets.

Principals in each asset have experience and varied backgrounds in management, development construction, finance, and leasing. United has developed multi-family properties from upstate New York to as far west as California and as far south as Florida with its senior and student property development initially focused in upstate New York. We have developed and managed over 3,800 beds of student housing with a current pipeline of 4,200 beds.

United's commercial team is responsible for over 1.3 million square feet, and has or has previously served the following tenants in its office buildings: New York State Office of Real Property Services, New York State Assembly, SUNY Office of Technology, Verizon/Idearc, Lockheed Martin, Advanced Micro Devices/ Global Foundries, and United States General Services Administration.

The United Group of Companies and its seasoned professionals have been developing, financing, constructing, acquiring, and managing income producing real estate for nearly four decades. The company has a long history in the multi-family and commercial real estate markets, and its staff has been recognized for many successes on a local, regional and national level. The firm has won many project awards, company awards, and individual awards for its work in the multi-family and commercial real estate market places.

United has garnered national and international awards such as Accredited Management Organization (AMO®) by the Institute of Real Estate Management (IREM®) for the 21st consecutive year as well as NAHB (National Association of Home Builders) International Gold and Silver Awards (2008, 2009) for marketing and design of housing. 2008 and 2009 BOMA (Business Owners and Managers Association Toby Awards for their two technology buildings United STEP I and 400 Jordan Road.

The company, led by Michael J. Uccellini, has developed over two billion dollars of successful real estate projects, acquired more than $500 million in properties, managed approximately 1.5 million square feet of commercial space and over 6,000 residential units.

STUDENT HOUSING EXPERIENCE

1 

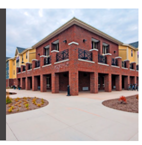
College Suites at Hudson Valley
Troy, NY
Hudson Valley Community College
268 Beds

2 

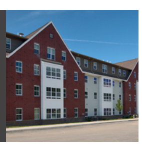
Fox Run at Fulton
Poughkeepsie, NY
Marist College
470 Beds

3 

College Suites at City Station
Troy, NY
Rensselaer Polytechnic Institute
341 Beds

4 

College Suites at Brockport
Brockport, NY
SUNY Brockport
401 Beds

5 

College Suites at Cortland
Cortland, NY
SUNY Cortland
361 Beds

6 

The Village College Suites at NCCC
Sanborn, NY
Niagara County Community College
309 Beds

7 

Finger Lakes College Suites
Canandaigua, NY
Finger Lakes Community College
356 Beds

8 

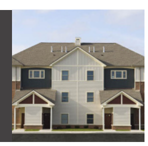
University Heights College Suites
Albany, NY
ACPHS, Albany Med, Sage
429 Beds

9 

Empire Commons
Albany, NY
SUNY Albany
1,196 Beds

10 

College Suites at Washington Square
Schenectady, NY
Schenectady County Community College
184 Beds

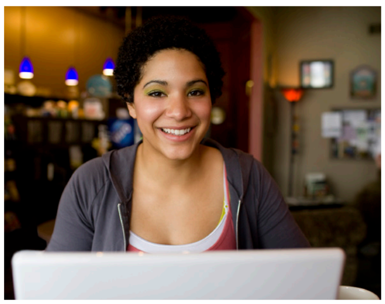
11 

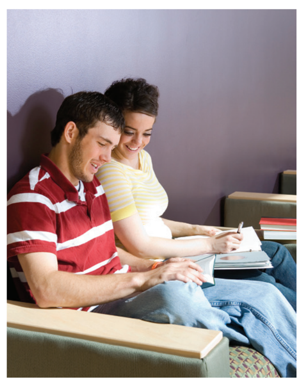
Park Point at RIT
Rochester, NY
Rochester Institute of Technology
900+ Beds

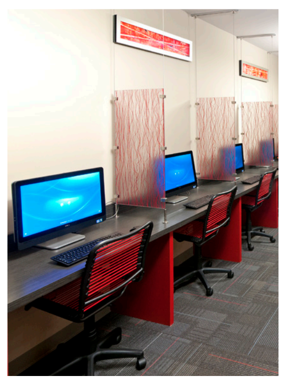
COLLEGE SUITES

THIS WAY *to the* Suite Life

Designed with today's student in mind, College Suites offers an atmosphere where residents can sit back and live, learn and relax. College Suites provides the convenience and quality of life they need to focus on balancing their academic & social life.







10 YEARS STUDENT HOUSING EXPERIENCE

- Development, design, financing, management
- Single source, fully integrated housing solution
- Established amenity & programming model
- Established design parameters which are both seasoned & proven
- Market specific flexibility
- Proprietary operation integration system between project & university

STUDENT HOUSING PROGRAM

As a fully integrated real estate development firm, United Group's student housing program is designed to benefit both retention and recruiting for educational institutions. At the United Group, we are committed to providing our University Clients with innovative housing solutions that offer a secure, quality living environment for their students and faculty, while enhancing the University's financial position. We provide our University Clients with innovative housing solutions incorporating state-of-the-art technology and amenities allowing students to live, learn, and relax.

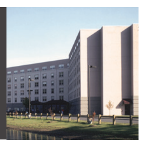
SENIOR HOUSING EXPERIENCE

1


The Alloro at University Groves
Sarasota, FL
183 Apartments (Coming soon)

2


Arcadia Gardens
Palm Beach Gardens, FL
220 Apartments (Coming soon)

3


The Beltrone Living Center
Colonie, NY
248 Apartments

4

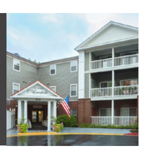

Campo Felice
Fort Myers, FL
323 Apartments

5

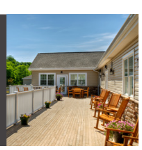

Diamond Oaks Village
Bonita Springs, NY
160 Apartments

6


Diamond Rock Terrace
Lansingburgh, NY
117 Apartments

7


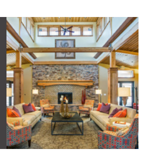
Gardens of Annapolis
Annapolis, MD
106 Apartments

8


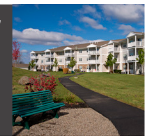
Glenmont Abbey Village
Glenmont, NY
148 Apartments

9


The Greenwood
Lake Placid, NY
122 Apartments

10


The Grove at Stapleton
Denver, CO
150 Apartments

11


Hearthstone Village
Latham, NY
144 Apartments

12

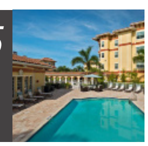

The Lodge at BridgeMill
Canton, GA
150 Apartments

13

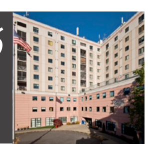

Mechanicville Mid-Rise
Mechanicville, NY
101 Apartments

14

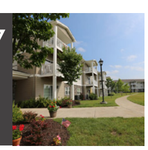

Monument Square
Troy, NY
94 Apartments

15


Sandalwood Village
Naples, FL
163 Apartments

16


Schaffer Heights
Schenectady, NY
118 Apartments

17


Schuyler Commons
Utica, NY
144 Apartments

18


The Sovana at Stuart
Stuart, FL
182 Apartments *(Coming soon)*

19


The Wallkill Living Center
Middletown, NY
136 Apartments

SENIOR HOUSING EXCELLENCE

United Group has extensive experience in the Independent Senior market. From tax advantage to market rate communities, United Group and its development and management affiliates are well versed in the specific needs of the senior population. Communities are financed, developed, and managed with long-term viability from a financial and livability standpoint. Extensive, value added programs, like the SUN® Program, allow for an enhanced quality of life for the resident as well as continued financial profitability from high occupancy levels.

SUN PROGRAM

All of our Independent Senior Apartment Communities offer residents access to the United Group's Signature SUN® Program (Senior Umbrella Network). The SUN® Program provides an array of services and amenities and is designed to foster and support independent living. The SUN® Program is a seven-pronged model that addresses the needs and wants of seniors in the following areas:

- Health & Wellness
- Finance, Legal, & Administrative Services
- Education & Lifelong Learning
- Fun & Recreation
- Convenience & Economics
- Friendship & Community
- Safety & Security

MULTI-FAMILY HOUSING EXPERIENCE

1 

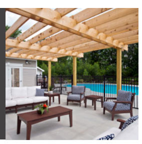
City Station North
Troy, NY
66 Apartments *(Coming soon)*

2 

City Station South
Troy, NY
54 Apartments

3 

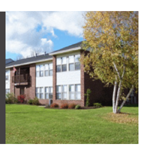
Constitution Court
Gouveneur, NY
117 Apartments

4 

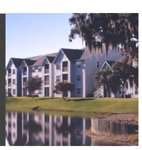
Deerfield Place
Utica, NY
156 Apartments and Townhomes

5 

Deer River Estates
Copenhagen, NY
75 Apartments

6 

Friends Settlement
Philadelphia, NY
150 Apartments

7 

The Gables
Kissimmee, FL
208 Apartments

8 

Gabriel Court
Watertown, NY
120 Apartments

9 

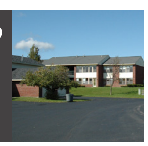
The Hamilton at Lakeside
Kissimmee, FL
108 Apartments (Coming soon)

10 

Huntington Heights
Watertown, NY
151 Apartments

11 

Lonsway Hill
Clayton, NY
100 Apartments

12 

Mountaineer Estates
Watertown, NY
224 Apartments

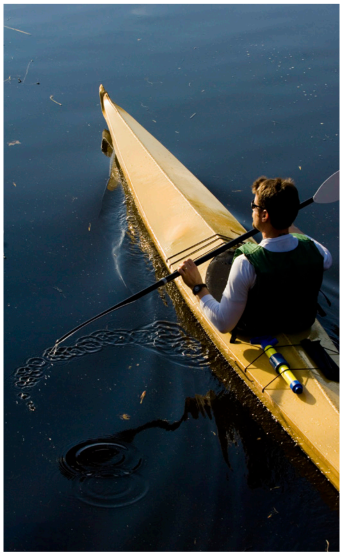
13 

Truscott Terrace
Watertown, NY
256 Apartments

35

YEARS

United Realty Management Corp., AMO® has been successfully managing a diverse portfolio of residential real estate for more than 35 years.



MULTI-FAMILY

With years of successfully developing family housing, The United Group finds there is an increasing demand for high-quality, family apartment homes in numerous markets throughout the country. The essential elements for a successful project include securing approvals, obtaining financing, efficient construction management, effective marketing, and ultimately identifying prime locations and strong property management. With its combined talents, The United Group is ideally positioned to capitalize on numerous market opportunities.

COMMERCIAL REAL ESTATE

1 

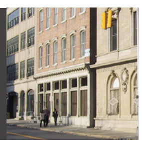
United STEP I
Malta, NY
Office Space, Light Manufacturing
105,000 Square Feet

2 

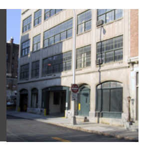
300 Jordan Road
Troy, NY
Office Space
35,000 Square Feet

3 

400 Jordan Road
Troy, NY
Office Space
100,000 Square Feet

4 

39 Columbia
Albany, NY
Office Space
60,000 Square Feet

5 

Kennedy Garage
Albany, NY
Parking, Office Space
62,132 Square Feet

6 

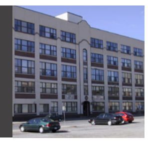
The Kenmore
Albany, NY
Office/Retail Space
91,872 Square Feet

7 

Urbach, Kahn & Werlin Building
Albany, NY
Office Space (Sold in 2007)
46,500 Square Feet

8 

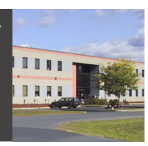
EOC Building
Troy, NY
Training Facility
65,831 Square Feet

9 

Union Associates
Albany, NY
Office Space
110,443 Square Feet

10 

Capital Repertory Theater/Garage
Albany, NY
Theater / Parking Garage
77,149 Square Feet

11 

New York State Assembly Building
Albany, NY
Office Space
78,280 Square Feet

COMMERCIAL

United Group has a variety of commercial real estate holdings. From Urban Rehabilitated space to high tech modern building design, our commercial portfolio has a diversity and depth that presents a broad range of alternatives for our clients. From the development of technical lab space to service oriented space in close proximity to targeted residential space, United Group has a depth of experience from finance to leasing that allows for successful development that serves the needs and requirements of our clients.






unitedgroup

Rensselaer Technology Park | 300 Jordan Road | Troy, NY 12180
PHONE 518.687.7300 | FAX 518.687.7330 | UGOC.COM

The United Group of Companies

Organization Chart

Michael J. Uccellini
President & CEO
100% Owner

The United Group of Companies
Development

Jeffrey Smetana
Executive Vice President

Tim Haskins
Vice President

Karen Schlederer
Vice President

Clay Decker
Senior Analyst

Patricia Sibilia
Project Manager

United Development Corp.
Construction Management

Thomas Uccellini
Executive Vice President

Jay Hopeck
Director - Const. Services

Micheline Moncur
Project Coordinator

Millennium Credit Markets
Finance

Mark Marasciullo
Chief Investment Officer

Keith Axelrod
Managing Dirctor - Finance

Thomas Uccellini, Jr.
Senior Managing Director

Kim Williams
Senior Vice President

United Plus Property Management, AMO®
Property Management

Jeff Arnold, CPM
Chief Operating Officer

Mike DiGiacomo, CPM
Vice President

Nancy O'Malley
Operations Manager

Pete Angus
Vice President - Marketing

Tracey Poissnat, CPA
Controller

The United Group is a mulit-faceted organization with diverse professional disciplines that provide focused expertise to each United Project with all professionals collaborating to identify optimal structures and best practices to achieve targeted results.

unitedgroup

PROFESSIONAL PROFILES

The United Group of Companies

Michael J. Uccellini

President and CEO

As President and CEO, of The United Group of Companies, Inc, Michael Uccellini oversees a full-service real estate company specializing in the development, finance, construction, acquisition and management of real estate. He has spearheaded over $2 billion in real estate development, acquisitions and financing transactions. Currently, Mr. Uccellini is directing the development, construction and financing of $350 million in senior, student, multifamily, commercial and mixed-use developments.

Mr. Uccellini directs a staff of over 300 professionals at The United Group of Companies, Inc. As Manager of United Plus Property Management, LLC AMO® and President of United Realty Management Corp. AMO®, Mr. Uccellini directs the asset and property management of a $700 million commercial and multi-family portfolio for the United Group and third-party clients, of nearly 6 million square feet.

Under Mr. Uccellini's guidance, The United Group has received numerous awards and accolades for Historic Redevelopment and Preservation (SHPO), the US Army Pentagon Awards for Military Housing Excellence, NAHB's 50+ Senior Housing 2008 Gold and Silver Achievement Awards for best marketing, NAHB 50+ 2009 Senior Housing Award (Silver) for best Clubhouse. Mr. Uccellini created United's prestigious SUN® Program that received United Group's first registered trademark, and earned a Silver LEED® Certification for the first 105,000 sf high tech office and light assembly manufacturing building in NYSERDA's Saratoga Technology and Energy Park (STEP). In addition, eight prestigious awards have been earned from NAHB. The NAHB awards are the industry's only national awards program that recognizes companies for superior building, design, marketing efforts, and lifestyle programs. In 2019, United was the Silver Award winner for Builder of the Year. In the same year, UPPM was named the AMO® of the Year by IREM.

Mr. Uccellini holds a Master's degree in Business Administration from Rensselaer Polytechnic Institute's Lally School of Management and Technology in Troy, New York. He holds a Bachelor of Arts degree in Managerial Economics from Union College in Schenectady, New York. He is also a graduate of Deerfield Academy. In addition, Mr. Uccellini is active with a variety of community and national organizations. He is a Trustee of St. Gregory's School for Boys, Loudonville, New York, and a Board Member of the Center for Economic Growth, Albany, New York. Mr. Uccellini is a CPM®, COS® and is a past Chair of IREM National's FHAB and LPP National Committees as well as current Chapter President. He is also a member of several Real Estate related organizations (IREM, BOMA, ICSC, US Green Building Council, AUSA, ACUHO-I, NAR, NAHB and others.)

PROFESIONAL PROFILES

Jeffrey Smetana

Executive Vice President of Development

Jeff has over thirty-years of experience in real estate development, construction, property management, finance and accounting, including new development and acquisition of deals totaling over $600 million with $400 million in financing. His work has included multi-family, student housing, senior housing, mixed use and commercial projects encompassing diverse forms of financing including conventional, tax-exempt, various tax credit programs and a variety of equity structures.

At United Group, Jeff is responsible for all phases of project development, including opportunity assessment, planning, entitlements, design development, financial modeling, construction budgeting, project management and construction and permanent financing.

Jeff has a Masters Degree in Accounting from the State University of New York at Albany and a BS in Economics from the State University of New York at Oneonta.

He previously worked as a certified public accountant for Ernst & Young.

Tim Haskins

Vice President

Timothy R. Haskins is responsible for managing all phases of project development, including site selection, design development, municipal approvals, code review, cost analysis and construction management of new projects.

Tim's experience includes over 30 years in engineering, construction, and real estate development, in a variety of product lines including student housing, senior housing, multi-family residential housing, office buildings and manufacturing facilities.

Tim has served as project manager for the development of more than $180 million in projects located in New York, Massachusetts, Georgia, and Florida.

Prior to working with United Group, Tim served as General Manager of Earth Alliance of Saratoga, Director of Regulatory Affairs and Special Projects for Emsig Manufacturing Corp., and Production Manager/Plant Engineer for Universal Medical Instruments. In addition, Tim has served over eight years in the United States Navy as a Reactor Operator and Electronics Technician.

Tim is a graduate of the US Naval Nuclear Power School in and has had extensive training in electronics, mechanical systems, materials, heat transfer and fluid flow, nuclear science, math and physics.

Tim also has held licenses to sell real estate and insurance in the state of New York.

Karen Schlederer

Vice President of Development Services

As Vice President of Development Services, Karen serves as a senior member of the management team. She is an integral part of the development and finance division and has been a dedicated professional since joining United Group in 1998. During her tenure, Karen has held a variety of positions ranging from administration to property management.

Karen currently represents the development and finance division in development-related activities for new business and ensures internal systems and guidelines are executed to optimize the effectiveness of each team. She is responsible for ensuring that the development and finance divisions are focused, productive, and achieving United Group's desired outcomes for performance. Karen is also responsible for due diligence efforts associated with loan applications and refinancing efforts, and facilitates and expedites loan closings to ensure banking requirements are met.

Karen has participated in the development and management of over 6,000 apartments and financing in excess of $625 million of real estate-related transactions; including the use of taxable and tax-exempt structures and conventional mortgages.

Karen holds an Associate of Applied Science degree from Endicott College.

Clay Decker

Senior Financial Analysis

As Senior Financial Analyst, Clay is responsible for the underwriting all United projects. This entails incorporating and communicating all development costs, debt financing, operating revenues and expenses along with Investor returns. Clay works closely with the Development, Finance and Operation teams to ensure accurate modeling and forecasting of each development deal.

Clay worked previously as Senior Financial Analyst for Cushman & Wakefield providing underwriting and analysis to assess alternatives, optimize deal structures and deliver detailed cash and accounting metrics associated with proposed transactions including the new lease accounting rules.

Clay began his career at State Street Bank in the Investment Services division overseeing day-to-day functions across multiple funds. He joined the Global Real Estate group as a Business Analyst working a global corporate real estate portfolio of 7.5M SF across 23 countries and 84 properties. As part of the GRE group, Clay was responsible for the market, demographic, economic and geographical information used to develop portfolio and transaction strategies. He was promoted to Assistant Vice President where he managed the analytics teams responsible for measurement, monitoring and reporting of the key performance metrics for the global real estate portfolio.

Clay earned a Bachelor of Science in Economics, State University of New York at Albany.

United Development Corp.

United Development is an affiliated company of The United Group of Companies and provides construction expertise and support services for all United projects, including assistance with site planning, architectural design, engineering, cost estimating, value engineering, contract negotiations and construction management. UDC performs regular site visits to all United projects under construction, manages construction issues and provides detailed reports to the owners.

Thomas Uccellini, Sr

Executive Vice President Construction

Thomas H. Uccellini has led our development team for more than 15 years and focused on development and construction management for over 30. He has made his mark primarily in senior and student communities: his portfolio includes nearly 1.7 million of square feet of student housing (estimated development value $236 million) and 1.4 million square feet of senior housing ($155 million). He also has substantial experience in the development of office buildings and laboratory facilities.

In his capacity as Executive Vice President, Tom oversees every phase of our residential and commercial projects, including site selection, design development, municipal approvals, code review, cost analysis, and construction management. Before joining United Development Corp., he owned and operated a private general contracting company for over 20 years.

Tom is a graduate of Worcester Polytechnic Institute in Worcester, Massachusetts, with a Bachelor of Science degree in Mechanical Engineering.

Jay Hopeck

Director of Construction Services

Jay joined United Group in 2019, with a diverse background in architectural design, project management, preconstruction services, business development, and community relationships and construction management services. After serving as a United States Marine, Jay began working in Rochester for an international architectural and engineering firm before returning to Albany where he has worked for the largest construction, architectural and development firms in the Capital Region.

At United Group, Jay leads simultaneous specialized construction projects throughout the East Coast, ensuring owner's goals and expectations are met by delivering superior products on time and within budget. Jay's education and experience directing construction operations, utilizing his architectural, construction, and development skills has recognized him as a well-respected, multi-faceted leader in the industry.

United Plus Property Management, AMO®

Jeff Arnold

Chief Operating Officer

AS COO of United Property Plus Management, AMO® Jeff has direct responsibility and oversight of the management and marketing divisions. He provides best practices and direction of operations across all of the property management portfolios, including student, senior and multifamily housing, commercial and mixed use. Jeff leads a team of over 125 employees and is passionate about their and United's success.

Jeff brings to United over 25 years experience in all facets of property management. Formerly from Houston, Texas, he played an essential role in starting up Asset Plus Corp's student division, Asset Campus Housing, growing the company from just over 1,000 beds to 22,000 beds. Jeff also was SVP of Operations and co-founder of a startup company, Innovative Housing Solutions, for four years. During his tenure, he led all operations, grew the firm to over 5,500 beds and assisted in closing just over $115 million in acquisitions and new development. The organization made a 18%+ NOI growth year-over-year for their investors and clients in just two years.

Jeff earned his Bachelor's Degree in Business Management from Stephen F. Austin University. He is an Accredited Residential Manager (ARM®) and holds a license to conduct real estate transactions.

Michael DiGiacomo

Vice President – Multi-Family Housing

As Vice President of Senior and Student Housing, Mike DiGiacomo oversees corporate operations and asset management of United's senior portfolio and student portfolio in addition to direct supervision of lease-up initiatives at independent senior living communities in Florida and Colorado.

Prior to his current position, Mike was a Regional Manager overseeing the management and operations of United's student housing portfolio, which consists of 1,554 beds and four senior housing properties containing 578 apartments. Mike managed a team of more than 25 employees and also had responsibilities for two local commercial properties. He had previously been an Operations Manager and Property Manager at several United properties. Before joining United, he was a Property Manager for Gross and Cohen LLC, where he directed site operations for off-campus student housing properties in New York and Kentucky.

Mike earned an Associate's degree from Fulton Montgomery Community College and a Bachelor of Science in Liberal Studies from Excelsior College.

PROFESIONAL PROFILES

Pete Angus

Vice President - Marketing

Pete Angus leads sales and marketing for United's senior, student and multi-family portfolios, and is responsible for driving demand and maximizing occupancy.

Pete brings over 15 years of marketing leadership to United and deep experience in leveraging technology to accelerate growth.

Prior to joining United, Pete held positions in sales and marketing leadership with both start-up and publicly traded organizations, driving results for brands that include General Motors, AT&T, Valassis and Lockheed Martin.

Pete holds a Bachelor's degree from the State University of New York at Oswego.

Joanne DiMarco

Director of Sales & Leasing

Joanne is responsible for residential and commercial leasing initiatives across the country.

Her career began in the hospitality industry, where she was "Disney born and Marriott raised." Prior to joining the United Group, Joanne was Strategic Sales Manager for Cars.com. She was part of an elite team intently focused on the ever-changing strategic initiatives of the company. Joanne also previously served as Executive Vice President and Corporate Real Estate Broker for Select Sotherby's International Realty.

Joanne is a graduate of Paul Smith's College with a degree in Hospitality Management.

Millennium Credit Markets, LLC

Millennium Credit Markets, LLC is the finance affiliate of the United Group based in New York City and assists in arranging debt and equity for United Group projects.

Mark Marasciullo

Chief Investment Officer

Mark Marasciullo is a 25-year veteran of the real estate business. Over the course of his career he has consummated in excess of $7.5B worth of real estate transactions, across all major asset classes. He has advised numerous institutional clients, private equity firms and hedge funds on their commercial real estate investments, and has been a featured columnist on The Business Insider.

Mark has started numerous companies, including New Canaan Partners, which he started in 2006 with seed capital from Guggenheim Partners. Most recently, Mark served as the Chief Financial Officer at Greenpointe Holdings, one of Florida's largest, privately held residential development concerns. In addition to his entrepreneurial endeavors, Mark has garnered significant institutional experience. He was a Senior Managing Director of National Investor Accounts and the International Capital Group at JLL. As a senior member of National Investor Accounts team, he covered JLL's largest institutional investor clients. As a senior member of International Capital group, Mark worked with US based investors to export their capital to Europe, while simultaneously importing Asian & Middle Eastern capital to the US. Prior to working at JLL Mark was a Vice President at EastdilSecured in NYC. Mark started his career as a leasing broker at Spaulding & Slye in Washington, DC.

Keith Axelrod

Managing Director

As Managing Director in the finance division of United Group, Keith networks with various individuals including CPA's, financial advisors, investment bankers, lenders, financial institutions, attorneys, medical doctors, health care professionals, business owners, management directors and other real estate related individuals.

Keith presents United Group's future plans and pipeline of projects to interested individuals in real estate investment and financing. Keith has been with the United Group since 2010.

Prior to joining United, Keith owned and operated a marketing and communications firm for more than 35 years. He is President of the Mid Hudson Road Runners Club and Race Director of The Dutchess County Classic.

Keith holds a Bachelor of Science degree in communications from Charter Oak State College.

Thomas Uccellini, Jr

Senior Managing Director

As Director of Business Development + Commercial Leasing, Tom is responsible for sourcing, negotiating, and closing all lease and sales transactions for office and retail space in United Group's commercial portfolio, consisting of approximately 750,000 square feet. Additionally, Tom is actively seeking acquisition opportunities that fit United Group's profile.

Prior to his current position, Tom worked with a small team within United Group's finance division that sourced over $100 million in debt, equity and mezzanine financing. Since 2001, Tom has been involved in every aspect of United's development process from site selection through construction. Under the construction management arm he oversaw two senior housing development projects with a total value of $30 million and two student housing projects totaling $75 million that included 1200 beds at the State University at Albany. He then transitioned into development where he completed an $80 million, 60-acre, 254-unit intergenerational community from site selection through construction.

Tom earned a B.S. in Business Management and Technology from Rensselaer Polytechnic Institute and is a Licensed Real Estate Salesperson in the state of New York. He currently sits on the board of trustees for the Saratoga Senior Center. He is a two-time New York State Greco-Roman wrestling champ as well as a two-time All American.

Kim Williams

Senior Vice President of Finance

As Senior Vice President of Finance, Kim is a senior member of the management team and an integral part of the finance division, having been a dedicated professional since joining United Group in 1987.

Kim currently represents the finance division in development-related activities for new business and ensures internal systems and guidelines are executed to optimize the effectiveness of each team. She is responsible for ensuring that the development and finance divisions are focused, productive, and achieving United Group's desired outcomes for performance. Kim is also responsible for due diligence efforts associated with loan applications and refinancing efforts, and facilitates and expedites loan closings to ensure banking requirements are met. She oversees also our Investor Relations department that administers all investor activity including accurate processing of investor transactions

Kim has participated in the development and management of over 4,500 apartments and financing in excess of $350 million of real estate-related transactions; including the use of taxable and tax-exempt structures and conventional mortgages.

Kim holds an AAS in Business from the State University of New York at Cobleskill. She is active in a variety of community service organizations and has served on several boards in various capacities, including the Capital Region Center for Arts in Education operating as Treasurer and President.

The Alloro at University Groves

The Alloro at University Groves project is a new 183 unit senior market rate rental community located in Sarasota, Florida. This unique living experience will be the premier choice for the area's active senior population who are ready to transition to a simpler, maintenance free, community-based active lifestyle. The primary market area will be the City of Sarasota and Sarasota and Manatee Counties.

Location: Sarasota, FL

Building Mix:
3 buildings | 183 apartments + 15,210 SF clubhouse

United Group Scope:
- Construction Management
- Owner
- Developer
- Past Property Manager

unitedgroup

Arcadia Gardens

Arcadia Gardens is a new 220 unit senior market rate rental community located in Palm Beach Gardens, Florida. This unique living experience will be the premier choice for the area's active senior population who are ready to transition to a simpler, maintenance free, community based active lifestyle. The primary market area will be the City of Palm Beach Gardens.

Location: Palm Beach Gardens, FL

Building Mix:
3 buildings | 220 apartments + 15,210 SF clubhouse

United Group Scope:

- Construction Management
- Owner
- Developer
- Past Property Manager

unitedgroup

City Station North

City Station North is the fourth phase of the City Station neighborhood in downtown Troy, NY. This will be a mixed-use property, with multi-family apartments and 40,000 SF of commercial office space.

Location: Troy, NY

Building Mix:
Approximately 40,000 SF commercial office space with 66 multi-family apartments

United Group Scope:

- Construction Management
- Owner
- Developer
- Past Property Manager

The Hamilton at Lakeside

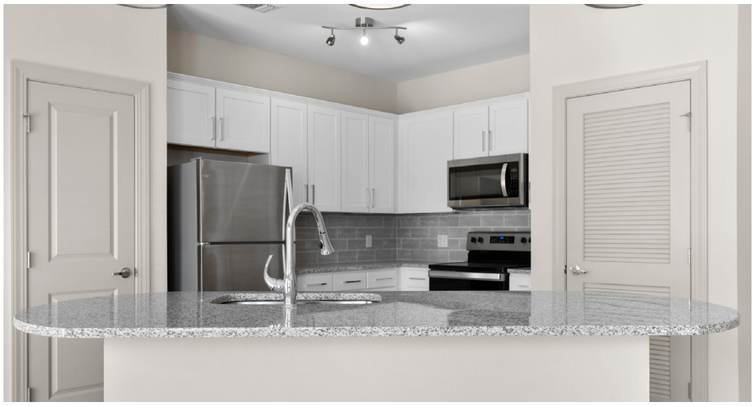
The Hamilton at Lakeside, located in Kissimmee, FL, will offer brand-new apartments with smart home technology, as well as a central clubhouse, outdoor patio and pool, and multiple athletic amenities.

Location: Kissimmee, FL

Building Mix:
2 buildings | 108 apartments + 4,971 SF clubhouse

United Group Scope:

- Construction Management
- Owner
- Developer
- Past Property Manager



The Sovana at Stuart

The Sovana at Stuart is a new 182 unit senior market rate rental community located in Stuart, Florida. This unique living experience, will be the premier choice for the area's active senior population who are ready to transition to a simpler, maintenance free, community based active lifestyle. The primary market area will be the Cities of Stuart, Port St. Lucie, the Town of Jensen Beach, as well as other parts of Martin County.

Location: Stuart, FL

Building Mix:
4 buildings | 182 apartments + 8,472 SF clubhouse

United Group Scope:
- Construction Management
- Owner
- Developer
- Past Property Manager

Robert C. Buckley, Esquire, Senior Partner

Riemer & Braunstein LLP

www.riemerlaw.com

Specializes in land use planning, commercial real estate law, and environmental law. Experience in developing comprehensive zoning initiatives for mixed-use development projects and expertise in environmental issues, including wetlands and Brownfield sites. Represented clients on the permitting of numerous Affordable Housing Projects and Comprehensive Permit Projects throughout Massachusetts including most recently:

- The Reserve at Corporate Center, Burlington, Massachusetts
- Tremont Residences, Burlington, Massachusetts
- Belmont Residences, Burlington, Massachusetts
- The Residences at Old Concord Road, Billerica, Massachusetts

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Riemer & Braunstein LLP
40B Project Experience

The Residences at Pier 44
Scituate, Massachusetts
24 for sale units

Kimball Woods
Burlington, Massachusetts
250 unit rental development

Villages at Pinehurst
Billerica, Massachusetts
60 for sale/townhouse development

Old Concord Road
Billerica, Massachusetts
244 unit rental development

Minuteman Village
Arlington, Massachusetts
18 for sale/townhouse development

Weston Woods
Central Street, Franklin
280 rental unit development

The Reserve at Burlington
Burlington, Massachusetts
270 unit rental development

19 Coolidge Hill Residences
Watertown, Massachusetts
113 unit rental development

ALLEN & MAJOR
ASSOCIATES, INC.

Summary of Qualifications
Multi-Family/Residential

allenmajor.com

Table of Contents

FIRM QUALIFICATIONS

About A&M

Allen & Major Associates, Inc. (A&M) is a multi-disciplinary firm specializing in civil engineering, land surveying, environmental consulting, and landscape architecture. Established in 1973, A&M has three offices that provide services throughout the Northeast. The firm is overseen by Principals, Timothy J. Williams, PE, and Robert P. Clarke, PLA, ASLA.

The A&M team has extensive knowledge in planning, designing, and permitting throughout New England. We understand the need to have projects completed on time and on budget, while still maintaining a high level of quality to our clients. With over 40 dedicated engineers, landscape architects, land surveyors, and support specialists, our team brings a wide range of expertise that comes from decades of service and experience within the following industries:

- **Academic & Student Housing**
- **Commercial & Industrial**
- **Healthcare**
- **Hospitality & Entertainment**
- **Master Planning & Landscape Architecture**
- **Multi-Family Residential**
- **Public, Municipal & Government**
- **Retail & Mixed-Use**
- **Senior Housing & Assisted Living**
- **Sports & Recreation**

Our goal with each project is to provide you with technically sound advice and practical design solutions that go beyond your expectations without exceeding your budget. It is our commitment of offering consistent, responsive, and reliable service that has kept A&M in business for nearly five decades.

Civil Engineering

Allen & Major Associates, Inc. (A&M) offers civil engineering design and project management for site development and infrastructure projects within both the public and private sectors. We offer services for the built environment from conceptual design, to design development, through construction completion. At A&M, our goal is to provide our clients with a single source for all of their project design and development needs.

A&M's Civil Engineering Services include:

- **Construction Consultation**
- **Due Diligence & Feasibility Studies**
- **Federal, State & Local Permitting**
- **Grading & Drainage Design**
- **Master Planning**
- **Peer Review Services**
- **Parking & Roadway Design**
- **Septic Design**
- **Site Development & Re-Development**
- **Soil Evaluations**
- **Utility Design Services**

A&M's professional engineering team has the experience and capability to help our clients see their visions come to life. A&M strives to provide innovative and technically sound development solutions while preserving our role as environmental stewards. We are proud members of the U.S. Green Building Council and support sustainable construction, Best Management Practices, and renovation initiatives.

Environmental Consulting

Environmental services are crucial for the successful development of a project, while at the same time protecting our human and natural environment. A&M knows that environmental compliance can be the biggest challenge to any project and having a thorough and complete understanding of the ever changing regulations and requirements is the most valuable tool to a successful project. A&M applies an interdisciplinary team approach to the design of a project while stressing the avoidance and minimization of adverse impacts to the environment. This approach has allowed A&M to establish and maintain excellent working relationships with resource and permitting agencies, while also saving our clients critical time and money.

A&M's Environmental Consulting Services include:

- **Chapter 91 Applications**
- **FEMA Elevation Certificates and Letter of Map Amendments**
- **Local, State, and Federal Permitting**
- **Massachusetts Endangered Species Act (MESA) Filings**
- **Massachusetts Environmental Policy Act (MEPA) Filings**
- **Massachusetts Natural Heritage & Endangered Species (NHESP) Review**
- **National Pollutant Discharge Elimination Systems (NPDES) Filings**
- **Stormwater Pollution Prevention Plans (SWPPP)**
- **Wetland Replication Design**
- **Wetland Delineation**

Land Surveying

Allen & Major Associates, Inc. (A&M)'s Land Surveying Division offers comprehensive land surveying services to meet the needs of our various clients. With Land Surveyors licensed in Connecticut, Massachusetts, New Hampshire, and Rhode Island, five survey field crews, and in-house project managers and support specialists, our team has the resources available to effectively provide land surveying and consulting services to our clients for a successful project completion.

Our hands on approach to each project is what drives the success of A&M's Land Surveying Division and gives our clients the reassurance and guidance necessary to successfully begin their construction project, obtain project financing, or simply understand their property boundaries. We can assist you at each stage in the process, providing the following services to meet various project needs:

- **ALTA/NSPS Land Title Surveys**
- **As-Built Surveys**
- **AutoCAD Services**
- **Construction Layout**
- **Existing Conditions & Topographic Surveys**
- **FEMA Flood Certification**
- **Interior Building Survey for Fit-up or Expansion**
- **Property Line Surveys**
- **Roadway & Right-of-Way Surveys**
- **Site Planning**
- **Subdivision & Condominium Surveys**
- **Utility Location Surveys & Layout**
- **Zoning Board & Variance Support**

Landscape Architecture

Landscape architecture encompasses all elements of the design, restoration, and preservation of outdoor spaces. Our projects range from small urban parcels to large scale projects within both the public and private sectors. A&M integrates the power of the aesthetic with our civil engineering sensibilities giving us the ability to shape and reshape the physical environment to meet the ever changing needs of the communities in which we live.

While many projects that we undertake are strictly about landscape design, A&M's landscape architecture team applies its artistic and technical design standards to enhance almost all of the designs that A&M produces. By partnering our landscape architecture division with our civil engineering division we are able to provide planning, design, preservation, and rehabilitation of the natural and built environments within both urban and rural settings. Through our team approach, all of our projects are not only technically sound, but aesthetically beautiful.

A&M's Landscape Architecture Services include:

- **Accessible Design**
- **Athletic Field Design**
- **Healing Gardens**
- **Multi-Modal Transportation**
- **Native Plant Landscapes**
- **Neighborhood Development & Planning**
- **Pedestrian Connectivity**
- **Rain Gardens & Bioretention**
- **Site Planning**
- **Streetscape Design**
- **Sustainable/Native Landscape Design**
- **Wetland Replication & Mitigation**

Why A&M?

Why choose the A&M team for your next project?

With nearly five decades of industry experience throughout New England, A&M employs a team of professionals with a proven level of expertise that our clients can trust. This is demonstrated through the number of high-profile clients, public agencies, and small businesses that have repeatedly entrusted the A&M team to handle their project needs.

Commitment to Quality

We understand that each project is unique. That's why we approach every site knowing that one design does not fit all. With each project we will provide technical expertise, creative planning, and innovative design solutions to meet your specific needs. We pride ourselves in our ability to take your vision and bring it to life with a design that goes beyond your expectations.

Exceptional Service

We focus on the details, both large and small, so that you don't have to. Whether we are the lead engineer or providing consultant services, our team of professionals is here to assist in the overall success of your project. What does that mean for you? We will coordinate directly with the development team, regulatory agencies, and others as necessary to ensure all design elements remain on-track for the approval and completion of your project; taking the guess work out of the next steps in the process.

REPRESENTATIVE PROJECTS

Project Profile

PROJECT STATS

Wood Partners

Multi-Family Residential

261 Units/SF

Completed in 2020

ALTA Clara at the Fells

Stoneham, MA

Allen & Major Associates, Inc. provided land survey, civil engineering and landscape architecture design and construction support for this multi-family development located adjacent to the Middlesex Fells Reservation. The project included the following:

- Three (3) buildings, 261 total units, a club house, and 6 garages.
- All runoff from the site is captured and treated by structural Best Management Practices (BMPs) including two (2) underground infiltration systems with a combined storage capacity of 63k c.f.
- Permitting began back in 2010 but did not move forward until 2016. The project was sold and value engineered over the following 2 years until a shovel was finally put in the ground around May of 2018 and completed in the fall of 2020.
- Landscape elements included:
  - » Zero entrance pool, with associated cabana outbuilding featuring gas grills, outdoor kitchen area & restrooms
  - » Extensive hardscape including undulating stacked stone walls, stamped and stained concrete, and pavers for visual texture
  - » Firepit lounge area for extending the seasons
  - » Full variety of site furnishings
  - » Dog park area for pet friendly community
  - » Extensive plantings including trees, evergreens, and native perennials, raised planters, and earthen berms for noise reduction
  - » Walking paths including connection to hiking trails in the Middlesex Fells Reservation

Project Profile

PROJECT STATS

Fairfield Residential

Multi-Family/Residential

298 Units
65,609 SF

Completed in 2018

Mave Apartments

Stoneham, Massachusetts

Allen & Major Associates, Inc. in partnership with Fairfield Residential has provided full site design, engineering, land survey, local permitting, and construction services for this multi-family residential project in both Stoneham and Winchester, Massachusetts.

- Known as the former A.W. Chesterton site, the 16 acre parcel consisted of wooded uplands, wooded wetland pockets, ledge outcrops, crumbling pavement areas, and a vacant 65,609± SF building.
- The site redevelopment consists of two 4-story residential buildings containing a total of 298 housing units, a four-level parking garage providing approximately 337 parking spaces, at-grade site parking for approximately 206 spaces, and a planted earthen berm for buffering to the adjacent neighborhood.
- A&M designed a stormwater management system which was an enhancement over the limited stormwater systems in place which allowed unmitigated stormwater to discharge to the existing woods and wetlands.
- The proposed stormwater systems reduced peak flows, promote stormwater infiltration, and provided improved treatment of stormwater quality that is a benefit to the site and adjacent wetland resources. Additional site improvements include the creation of additional wetland resource areas on-site. Through a coordinated team approach, the project is an example of how thoughtful site design and planning can allow for productive re-use of a site.

Project Profile

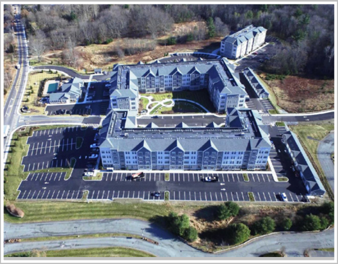
PROJECT STATS

Wood Partners

Multi-Family/Residential
40B Development

20 Acres
280 Units

Completed in 2018



The Westerly at Forge Park

Franklin, Massachusetts

In partnership with Wood Partners and CUBE 3 Studio, Allen & Major Associates, Inc. provided land surveying and civil engineering services for this 280-unit multi-family development situated in Franklin, Massachusetts The overall project consists of three 4-story buildings with 457 parking spaces, two parking garages, a bus shelter, a clubhouse, and a children's play area.

- Stormwater solutions consisted of eight separate underground infiltration chamber systems, porous pavement sections, grass pavers and porous concrete pavers. The hardscape also served as an aesthetic feature within the landscape.
- Permits successfully acquired for this project include a Comprehensive Permit by the Zoning Board of Appeals, Notice of Intent by the Conservation Commission, MassDOT Access Permit, and a General Construction Permit.
- A&M worked with the Franklin Historical commission to provide an assessment of an on-site deteriorated structures relative to the rich history of Franklin and its place in the life of Benjamin Franklin. While the structure could not be salvaged, the design team worked with the Town to provide a historical monument and granite bounded landscaping that will continue to identify the significance of the property in the history of the Town. The marker is a collaborative design exercise between the Historical Commission, the Building Inspector, the owner and the project team.

Project Profile

PROJECT STATS

Wood Partners

Multi-Family/Residential

182 Units

Completed in 2016

The Washingtons (2 & 37/47)

Melrose, Massachusetts

Allen & Major Associates, Inc., in partnership with Wood Partners, provided land surveying, engineering design, and permitting services for the luxury apartment community featuring one-, two- and three-bedroom residences across two new buildings located steps from the Oak Grove MBTA Orange Line station in Melrose, Massachusetts.

- 2 Washington Street was completed in 2015, is comprised of 94 residences, and features ground-floor retail space home to a physical therapy facility. Across the street at 37/47 Washington Street, completed in 2016, are 88 residences.
- A total of 17 residences at The Washingtons are designated affordable, including nine at 2 Washington Street and eight at 37/47 Washington Street.
- Amenities include a 24-hour fitness center, a communal roof deck with sweeping views, a club room featuring a genius bar, outdoor grills, a fire pit, a pool and on-site parking.
- The Washingtons is located just three train stations from Assembly Row and six stations from Downtown Boston, as well as a short drive from Interstate 93, Downtown Boston, Cambridge and Burlington.

Project Profile

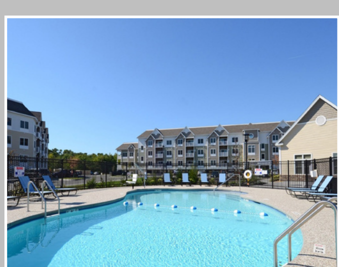
PROJECT STATS

Fulcrum Associates, Inc.

Multi-Family/Residential

210 Units

Completed in 2016



Tidewater at Salisbury

Salisbury, Massachusetts

Allen & Major Associates, Inc., in partnership with Fulcrum Associates, Inc., provided land surveying, civil engineering, and structural engineering services for the Tidewater at Salisbury development, situated on an abandoned go-cart track in Salisbury, MA.

- The development features 4-residential buildings with a total of 210-units, a clubhouse, and an in-ground pool.
- Each building consists of 3-wood framed floors supported by a steel and concrete framed first floor “podium” over a below-grade parking garage.
- The foundations for the buildings, pool, and site structures feature conventional reinforced concrete elements supported by grouted and ungrouted ram aggregate piers drilled through the unsuitable soils.
- Civil site design and permitting included a Fill Permit Application with the Salisbury Board of Selectman, MassDOT State Highway Access Permit Application, and a National Pollution Discharge Elimination Systems Construction General Permit.
- A&M provided construction administration services throughout the duration of the project.

Project Profile

PROJECT STATS

Greystar

Multi-Family
& Mixed-Use

282 Units
5.29 Acres

Completed in 2019

Elan Union Market

Watertown, Massachusetts

Allen & Major Associates, Inc., in partnership with Greystar, provided land surveying, environmental consulting, and civil engineering services for Elan Union Market, a mixed-use development situated at the corner of Arsenal and Irving Streets in Watertown, MA.

- Elan Union Market continues the redevelopment of the Arsenal Street corridor and brings increased housing types and affordable housing to Watertown.
- The site features 282 apartment units, 11,000 SF of resident amenity space, 11,000 SF of retail space, and 465 parking spaces. The two buildings on-site are attached by an elegant, elevated glass walkway.
- Site amenities include clubrooms, a pool, gym, and plenty of open space throughout the site. Running along the complex is a new sidewalk and a 10-foot wide bicycle path, helping to link the Community Path to Watertown Square.
- Vehicle access into the site is provided via two drive aisles on Arsenal street, one of which is a signalized access drive, as well as access from Irving Street, which serves the west garage only.

Project Profile

PROJECT STATS

Wood Partners

Multi-Family/Residential

5.3 Acres
186 Units

Completed in 2014

Everly Apartments

Wakefield, Massachusetts

Allen & Major Associates, Inc., in partnership with Wood Partners and CUBE 3 Studio, providing land surveying, environmental consulting, civil engineering, and landscape architectural services for the redevelopment of a former industrial site into a 186-unit, multi-family development situated just off Exit 42 of I-95/Route 128 in Wakefield, Massachusetts.

- Site constraints included substantial wetland resource areas which profoundly minimized the development area. In order to meet the client's vision and avoid major impacts to the resource areas and the floodplain, the site was graded to elevate the building area using segmental block retaining walls. This allowed the wetlands, which surrounded the development area, to remain unaltered. While this approach allowed for creative wetland mitigation, it did not allow any room for stormwater detention, which was solved by instalingl a subsurface infiltration system below the ground level of the parking garage.
- The limited development area also restricted snow storage options. The problem was solved by installing a snow melt system below the access driveways to the parking garage. This technology, though seldom used for this type of project, was an ideal solution.
- The combination of this project's unique and innovative site design, coupled with its modern architecture and inviting landscape features, makes this project a welcome addition to the community.

Project Profile

PROJECT STATS

JPI

Multi-Family/Residential

244 Units

Completed in 2017

Paddock Estates at Boxborough

Boxborough, Massachusetts

Allen & Major Associates, Inc., in partnership with JPI and Sheskey Architects, provided civil engineering and landscape architectural services for Paddock Estates at Boxborough, formerly known as the Jefferson at Beaver Brook, in Boxborough, Massachusetts.

- The project features 11 buildings with 244 multi-family units, a clubhouse, pool, and numerous site amenities for residents, with on-site surface and covered parking.
- A&M's civil engineering division provided the design services for all site improvements, grading and drainage, and stormwater management. The design also features a fire pump house and pond, an on-site wastewater treatment plant, and a water treatment plant for on-site wells.
- Landscape architectural design amenities around the clubhouse include a heated pool, cabana with outdoor showers, and an outdoor bar. Nearby are a barbeque and dining area with a wooden pergola. Active recreational amenities include a basketball court, multiple fire pits, children's playground, winding walking paths connecting the campus, a dog park, and bocce court.
- Plantings throughout the site were carefully selected and placed to enhance the setting.

Project Profile

PROJECT STATS

Simpson Housing, LLLP
Heitman, LLC

Urban Revitalization
Multi-Family & Mixed-Use

286-Units with 17,000 SF of Retail on Ground Level

Completed in 2014

The Victor by Windsor

Boston, Massachusetts

Allen & Major Associates, Inc. (A&M) provided land surveying and civil engineering services as part of an urban revitalization project within the Bulfinch Triangle area of Boston, Massachusetts.

- Located on Beverly Street, The Victor boasts 286 apartments, including 56 penthouse apartments and 17,000 SF of retail space.
- The parcel was formerly occupied by the elevated portion of the Central Artery (I-93).
  - As part of the Boston Big Dig Project, the Central Artery was relocated into a tunnel under the subject parcel and runs parallel with the existing tunnel of the MBTA Green Line, with The Victor straddling both tunnels.
- A&M's Civil Division coordinated the relocation of a 30-inch water main operated by the Boston Water & Sewer Commission, which served as part of the main transmission system for portions of Boston.
- Design components included sidewalk and lighting improvements and site infrastructure engineering for ADA accessibility, sewer collection systems, and telecommunications layout.
- Land survey services included the preparation of existing conditions and easement plans to allow the proposed building to bear on the newly constructed Central Artery Tunnel, as well as layout for footings and foundation walls of the proposed building, and layout for site utilities, as well as the preparation of final as-built plans.

TEAM
BIOS

Timothy J. Williams, PE

Principal

100 Commerce Way
Woburn, MA 01801

(781) 305-9416

(781) 589-0363

twilliams@allenmajor.com

EXPERIENCE

A&M - 15 Years
Overall - 30 Years

EDUCATION

1993, B.S., Civil Engineering, Central Connectict State University

REGISTRATIONS

Professional Engineer —
CT (PEN.0021386)
ME (PE14158)
MA (43119)
NH (12916)

allenmajor.com

Team Role: Principal-in-Charge

Tim Williams serves as a Principal at Allen & Major Associates, Inc. With over 30 years of experience, his extensive background includes planning, design, permitting, and construction document preparation for numerous public and private sector projects. His background also includes specification writing, quantity cost estimation, field studies and investigations, and analysis, as well as construction oversight services. Recognized for his expertise and ability, Tim has managed the design efforts for some of the largest and most significant projects within the firm's history. Throughout the duration of each project, Tim will be responsible for the overall delivery of professional service provided by Allen & Major Associates, Inc. He will provide support to the A&M team, oversee quality control on all deliverables to the development team, and will represent the project team at any meetings as requested.

PROJECT EXPERIENCE

Residential

- Everly Apartments - Wakefield, MA
- Mave Apartments - Stoneham, MA
- Residences on the Charles - Watertown, MA

Commercial

- Legacy Place - Dedham, MA
- Woburn Foreign Motors - Woburn, MA
- Woburn Landing - Woburn, MA

Institutional

- Brightview at Canton - Canton, MA
- Lahey Hospital & Medical Center - Burlington, MA
- Winchester Hospital - Winchester, MA

Public/Municipal

- Boston Planning & Development Agency
- Cambridge Housing Authority
- Department of Conservation & Recreation
- Department of Housing & Community Development

Specialty

- Logan ConRAC - Boston, MA
- MGM Springfield - Springfield, MA

ALLEN & MAJOR ASSOCIATES, INC.

Philip L. Cordeiro, PE

Lakeville Branch Manager

10 Main Street
Lakeville, MA 02347

(508) 923-1010 Ext. 3730

(508) 509-5222

pcordeiro@allenmajor.com

EXPERIENCE

A&M - 19 Years
Overall - 19 Years

EDUCATION

2000, B.S., Civil Engineering, University of Massachusetts, Dartmouth

REGISTRATIONS

Professional Engineer —
- CT (PEN.0026532)
- MA (47083)
- PA (PE083852)
- RI (PE.0008972)

Certifications —
- MA Soil Evaluator (SE2786)
- MA Title 5 System Inspector (SI4419)

allenmajor.com

Team Role: Project Manager

Philip (Phil) Cordeiro serves as a Senior Civil Project Manager at Allen & Major Associates, Inc. He has a wide range of project experience in municipal, residential, corporate, industrial, and retail development. Phil's diverse background in civil engineering includes site engineering, drainage design, hydrology and hydraulic analysis, water resources, stormwater and sewer design. This provides a full range of civil engineering knowledge and expertise within the design process. Phil has indispensable hands on field experience, having managed construction administration tasks for many projects to date and because of this is able to anticipate and work through site challenges.

PROJECT EXPERIENCE

Residential
- Ashland Rail Transit Residential Development - Ashland, MA
- Blueberry Estates - Lakeville, MA
- Fruit Sever Apartments - Worcester, MA
- Noquochoke Village - Westport, MA
- Residences at the Hendries Building - Milton, MA
- The Oasis at Plymouth - Plymouth, MA
- The Westerly at Village Forge - Franklin, MA

Commercial/Mixed-Use
- BJ's Regional Distribution Center - Uxbridge, MA
- The Center at Innovation Drive - Tewksbury, MA
- The Chocolate Factory - Mansfield, MA
- The Point - Littleton, MA

Senior Living/Healthcare
- All American Assisted Living - Wareham, MA
- Oak Point - Middleborough, MA

Public/Municipal
- Office of the Massachusetts Attorney General - Various Locations
- Peer Review Services - East & West Bridgewater, MA

Specialty
- AbbVie Bioresearch Center - Worcester, MA
- Thayer Sports Center - Braintree, MA
- Wellesley Country Club - Wellesley, MA
- Wellesley Sports Center - Wellesley, MA

ALLEN & MAJOR ASSOCIATES, INC.

Paul G. Matos, PE, PLS

Project Manager

10 Main Street
Lakeville, MA 02347

(508) 923-1010 Ext. 3735

(781) 457-7987

pmatos@allenmajor.com

EXPERIENCE

A&M - 5 Years
Overall - 23 Years

EDUCATION

1996, B.S., Civil Engineering, University of Massachusetts, Dartmouth

2018, Professional Land Surveying Certificate Program, Wentworth Institute of Technology

REGISTRATIONS

Professional Engineer —

MA (52850)
NH (15103)
RI (PE.0011939)

Professional Land Surveyor

MA (55454)

Certifications —

MA Soil Evaluator (SE1511)
MA Title 5 System Inspector (SI3733)

allenmajor.com

Team Role: Project Manager

Paul Matos serves as a Project Manager within the Civil Engineering Division at Allen & Major Associates, Inc. Paul's extensive experience includes conducting zoning analysis and preparation of site development plans to include layout, erosion control, drainage, grading, and utilities. Paul's sustainable approach to drainage analysis, and the subsequent design of stormwater management systems, makes him a valuable member of the development team. Additionally, Paul provides construction administration services, which includes shop drawing approvals, pay requisitions, and preparation of responses to RFI's. He conducts site inspections to observe and verify conformance with the approved plans and specifications. Paul is responsible for preparing various reports, such as feasibility, drainage, impact statements, and SWPPP, applications, letters, construction documents, specifications, cost estimates, quantity takeoffs, and client proposals.

PROJECT EXPERIENCE

Residential

- Alta Union House - Framingham, MA
- Noquochoke Village - Westport, MA
- The Oasis at Plymouth - Plymouth, MA
- The Westerly at Village Forge - Franklin, MA

Commercial/Mixed-Use

- Fairfield Inn - Plymouth, MA
- Homewood Suites - Needham, MA
- Smithfield Plaza - Smithfield, RI
- Southcoast Market Place - Fall River, MA
- The Chocolate Factory - Mansfield, MA

Senior Living/Healthcare

- All American Assisted Living - Wareham, MA

Public/Municipal

- Herring Cove Beach - Provincetown, MA
- Muddy Brook Wildlife Management Area - Hardwick, MA

Specialty

- BASF Facility - Plainville, MA
- Boston Scientific - Conventry, RI
- Thayer Sports Center - Braintree, MA
- Wellesley Sports Center - Wellesley, MA

Additional Experience

Allen & Major Associates, Inc. (A&M)'s recent multi-family and residential experience also includes:

• 135 Wells Avenue – Newton, MA	300 Units
• 35 Rosebrook – Wareham, MA	65 Units
• 75 Armory Avenue – Jamaica Plain, MA	39 Units
• Broadstone Bare Cove – Hingham, MA	244 Units
• Cranberry Manor – Wareham, MA	64 Units
• Cushing Village – Belmont, MA	142 Units
• Elan Union Market Apartments – Watertown, MA	146 Units
• Everly Apartments – Wakefield, MA	186 Units
• Granite Knoll Condominiums – Wakefield, MA	34 Units
• Harvard Mills – Wakefield, MA	184 Units
• Independence Place – Cranston, RI	196 Units
• Jack Flats – Melrose, MA	273 Units
• Jackson Gardens – Cambridge, MA	45 Units
• L.B. Johnson Apartments – Cambridge, MA	117 Units
• Langwood Commons – Stoneham, MA	550 Units
• Lincoln Way – Cambridge, MA	59 Units
• Lumiere Apartments – Medford, MA	163 Units
• Mallory Ridge Apartment Homes – Bloomfield, CT	78 Units
• Modera Natick Center – Natick, MA	150 Units
• Noquochoke Village – Westport, MA	50 Units
• Princeton at Westford – Westford, MA	250 Units
• Quinn 35 – Shrewsbury, MA	250 Units
• Riverbend on the Charles – Watertown, MA	170 Units

Additional Experience

• Rolling Green – Andover, MA	224 Units
• Rumney Flats – Revere, MA	147 Units
• Salem Place Condominium – Woburn, MA	100 Units
• Shadowbrook Condominium – Milford, MA	360 Units
• Sphere Luxury Apartments – Medford, MA	42 Units
• Stonegate Condominium – Stoneham, MA	11 Units
• Summit Village – Reading, MA	132 Units
• Talia Apartments – Marlborough, MA	225 Units
• Taj Estates – Stoughton, MA	180 Units
• The Aberdeen – Brighton, MA	40 Units
• The Commons at Walpole Station – Walpole, MA	192 Units
• The Chocolate Factory – Mansfield, MA	130 Units
• The Exchange Street Apartments – Malden, MA	210 Units
• The Meadows at Marlborough – Marlborough, MA	290 Units
• The Melnea Residences Apartments – Roxbury, MA	50 Units
• The Residences at Great Pond – Randolph, MA	234 Units
• The Slate at Andover Apartments – Andover, MA	198 Units
• The Washingtons – Melrose, MA	364 Units
• The Westerly at Forge Park – Franklin, MA	280 Units
• Traders Village – Salem, MA	212 Units
• Villas at Old Concord – Billerica, MA	324 Units
• Washington Crossing – Woburn, MA	205 Units
• Windsor Station Apartments – Windsor, CT	130 Units
• Woburn Heights – Woburn, MA	168 Units
• Woodview at Legacy Farms – Hopkinton, MA	240 Units

CUBE3

architecture | interiors | planning

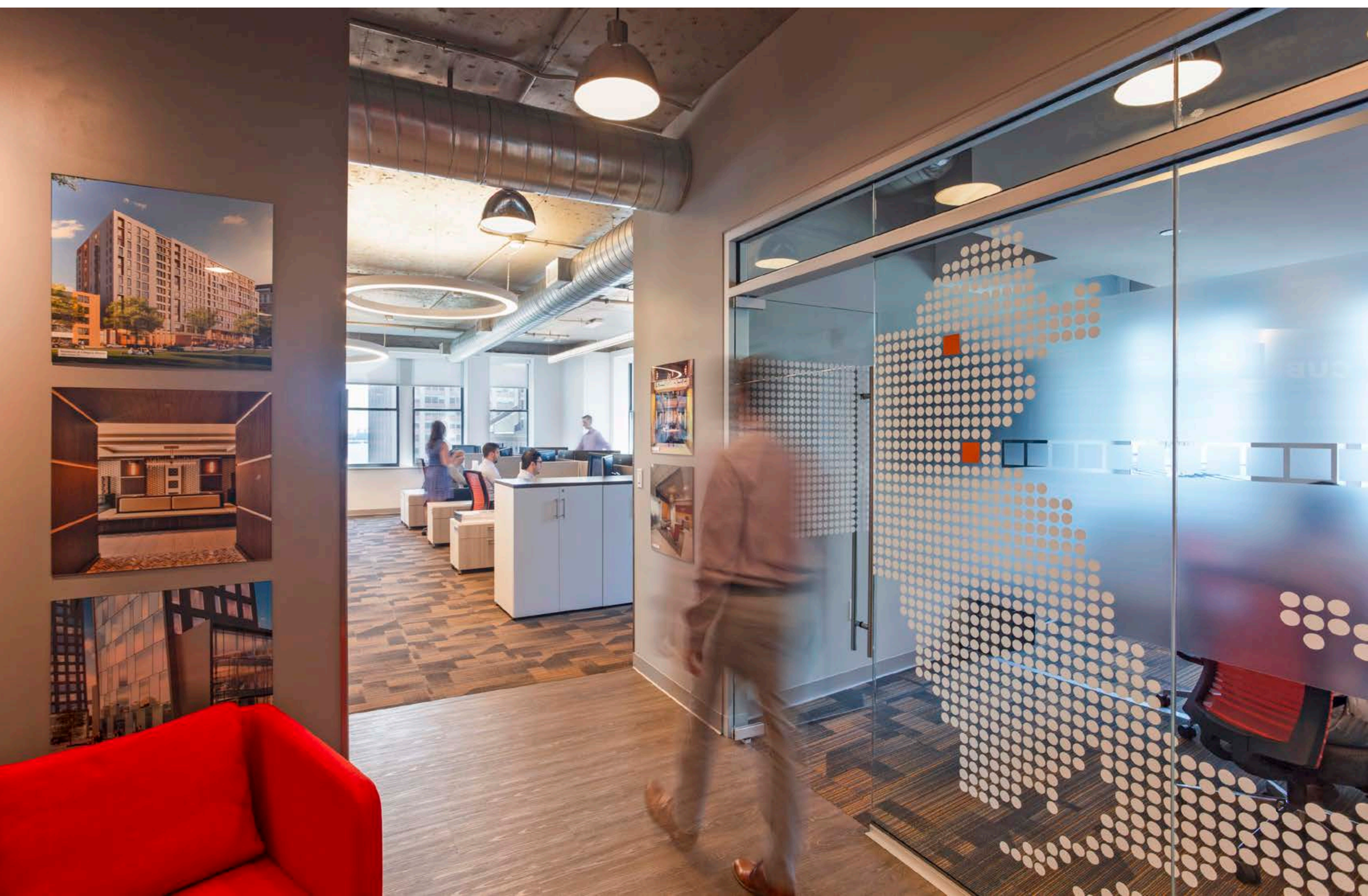
SELECT PROJECT EXPERIENCE: 40B, AFFORDABLE & HUD

lawrence | boston | miami

ARCHITECTURE
INTERIORS
PLANNING

OUR MISSION

At **CUBE 3**, our mission is to provide the best design experience and value for the unique needs of each of our clients. We recognize that every project is different, and strive to meet the challenges presented with a creative and thoughtful "can-do" approach. Our enthusiasm for your vision, unparalleled responsiveness, and daily, hands-on involvement from Principals have enabled us to create some of the most successful relationships in the industry – and build a reputation for innovation, reliability and integrity.



Lawrence, MA

Boston, MA

Miami, FL

COMPANY PHILOSOPHY & HISTORY

Established in 2003, **CUBE 3** quickly became one of the fastest growing companies in the construction industry. Today, we are well-known nationally as a design industry and innovation leader, providing thoughtful, individualized solutions for a wide range of **architectural**, **interior design** and **planning** challenges.

Headquartered in Lawrence, MA, with additional offices established in Boston, MA and Miami, FL, our work can be seen in over 26 states across the country. Listed as a top 500 global firm by ENR and ranked by Inc. 500 \ 5000 for five consecutive years, we have a history of working with only the strongest development teams on diverse projects including mixed-use and campus masterplanning, health care, retail, residential and corporate office space.

With over 135 employees and 125 Design Professionals, **CUBE 3** has the combined experience that allows us to be committed to our clients, and dedicated to delivering creative, intelligent design and unparalleled service to them. Our energetic, innovative team ensures that we deliver the best design value and overall working experience—from the first meeting to the project finish.

CUBE 3 is proud that as a firm with nearly 20 years of experience we have no pending, current or former legal factors that affect our ability to perform all the work outlined.

VALUE ADD SERVICES

Ready to go NOW!
Cost effective design
Out of the box thinking
No-ego approach
Efficient collaboration
Real time decision making
Well-coordinated
Tech savvy
Attention to detail
Proven reputation
Team with 100+ years of experience
Industry leading design firm
Local office - National reach
We'll design your vision
Transparent communication
Accurate Documentation
Aggressive design fees
Low DCO issuances
$1B in annual construction starts
Demonstrated collaborator

OUR SERVICES

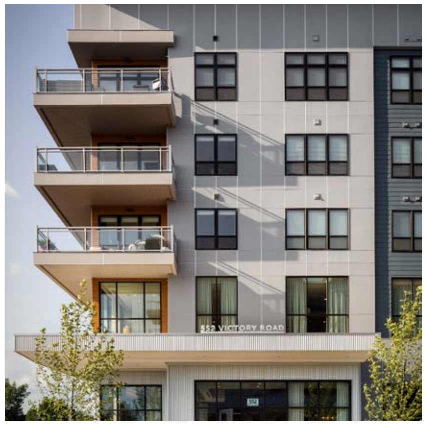
Architectural Design
Code Review and Analysis
Comparative Site Analysis
Conceptual Planning
Fit Plans
Furniture Selection
Graphic & Signage Design
Interior Design
LEED Certification
Masterplanning
Presentation Graphics
Programming
Urban Design
Virtual Reality
Visioning
Web Development
Workplace Standards
3D and Animation

OUR DESIGN SECTORS

Academic
Corporate / Workplace
Entitlements Approvals
Healthcare
Lab & Life Sciences
Master Planning
Mixed Use
Multi-Family / Residential
Retail
Sports & Fitness
Student Housing
Transit Oriented Development
Urban Planning

ACADEMIC

8,000 beds built,
70,000 beds designed,
17 M sf master planned



RESIDENTIAL

Over **28,000** units built,
80,000 units planned,
21.6 M sf master planned

RETAIL & HOSPITALITY

7.6 M sf of design or
construction team experience

WORKPLACE

Over **8.6 M sf** of
ground up construction,
2.5 M sf of workplace interiors

HEALTHCARE

1.8 M sf of facilities
designed or completed

SPORTS & FITNESS

25 + sports & fitness
projects designed and built

OUR PROCEDURES

Revit, 3D and VR throughout all phases of project delivery In-house Design Group drawing review engaged throughout all phases of the project Independent in-house QA/QC Committee which conducts drawing reviews and addresses code issues Third party code and building envelope review checks Bi-weekly site visits to project that construction is being completed in accordance with Construction Document

QUALITY OF DESIGN AND DOCUMENTATION

Full integrated project management process with oversight of documentation and design Consistent, dedicated design and documentation from start to finish In-house quality management program that provides independent, third party documentation reviews In-house design review program that ensures ongoing design excellence and consistency from SD - CA phases.

QUALITY OF CONSTRUCTION

Continuity with design team and process Seamless construction administration documentation with General Contractor via electronic database Construction management team is embedded with design team through the process ensuring continuity Construction document review at each stage of design + early CM coordination and interaction

LAB & LIFE SCIENCES

1.2M sf of facilities
designed or completed

National design firm, headquartered in Lawrence, MA with offices in Boston, MA and Miami, FL

C3

ARCHITECTURE

Innovative thinking, design creativity, and uncompromising attention to detail allow us to create buildings and interior spaces that have lasting value. Our highly evolved process leads to design solutions that improve quality of life and are firmly grounded in economic reality. We work with developers to create a unique brand reflective of the project goals and appropriate for the context of each individual project and client.

INTERIORS

With a focus on providing distinctive, high-quality and cost-conscious spaces, our team designs interiors spaces and experiences through an inclusive process that starts with you. Each interior space reflects a specific design concept developed by the client and CUBE 3 team collaboratively. This open design practice allows us to respond directly to your goals, communicating clearly every step of the way to thoughtfully develop unique, timeless design solutions for each project.

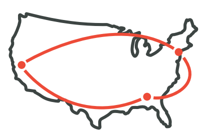
PLANNING

Effectively shaping the future development of our cities, towns, and communities requires the ability to define clear goals, so that solutions not only enrich the quality of life, but also provide far reaching social and economic benefits. Wide range of experience including downtown center master planning, academic campus, corporate campus, healthcare campus, and neighborhood development.

2019 ARCHITECTURAL RECORD
TOP 300

Classified by Architectural Record as one of the Top 300 Architectural Firms in the world. Coming in at #147 for 2019

#1
Architectural Firm in Boston
BOSTON REAL ESTATE TIMES



Over 20 companies licensed in 27 US states with active projects in 16 states

#1
Multi Family Design Firms in N.E.
ENR

85% of our portfolio meets industry sustainability rating. 20 of our staff is LEED accredited.

#12
Largest Firms in N.E.
BOSTON BUSINESS JOURNAL

SELECT PROJECT EXPERIENCE 40B, AFFORDABLE & HUD MULTIFAMILY

CUBE 3 SELECT PROJECT EXPERIENCE 40B, AFFORDABLE & HUD MULTIFAMILY

BROADSTONE BARE COVE
Hingham, MA

164 LEXINGTON ROAD
Billerica, MA

MODERA HOPKINTON
Hopkinton, MA

THE WATSON
Quincy, MA - Winner of the Jack Kemp Excellence in Affordable and Workforce Housing Awards 2019
140 units I 143,143 sf

134 BABCOCK STREET
Brookline, MA
45 units I 34,255 sf

45 MARION
Brookline, MA
64 units I 66,960 sf

THE RESERVE AT BURLINGTON
Burlington, MA
270 units I 460,000 sf

EMERY FLATS
Woburn, MA
200 units I 223,634 sf

455 HARVARD AVE
Brookline, MA
17 units I 19,545 sf

MODERA HOPKINTON
Hopkinton, MA
242 units I 262,084 sf

SLV BRIDGEWATER
Bridgewater, MA
58 units I 54,442 sf

MAIN STREET
Medway, MA
190 units I 230,500 sf

THE RESIDENCES AT LAKESHORE
Bridgewater, MA
300 units I 244,122 sf

341 SECOND AVE
Waltham, MA
195 units I 181,025 sf

29 WALL STREET
Foxboro, MA
50 units I 65,220 sf

MILLIS RESIDENTIAL DEVELOPMENT
Millis, MA
200 units

164 LEXINGTON ROAD
Billerica, MA
200 units

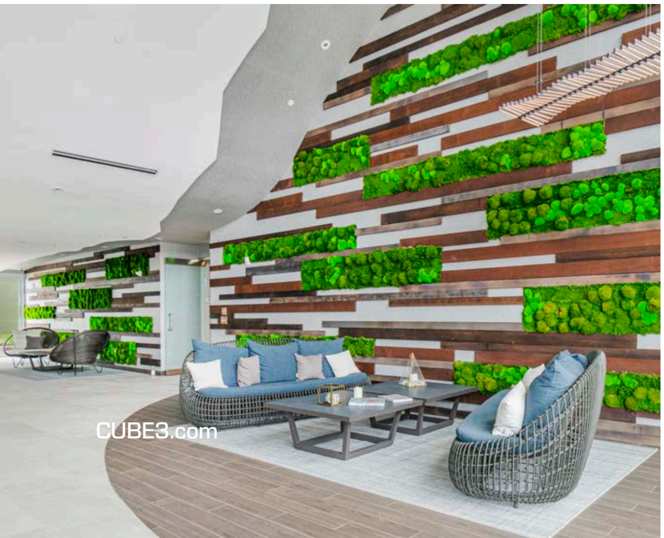
BROADSTONE BARE COVE
Hingham, MA
220 units

500 HARVARD AVE
Brookline, MA
30 Units I 24,848 sf

THE WATSON
Quincy, MA

45 MARION
Brookline, MA

EMERY FLATS
Woburn, MA



CUBE3.com

THE RESERVE AT BURLINGTON
Burlington, MA

C3

Appendix O

CERTIFIED ABUTTER LIST

APPENDIX O

October 13, 2020

To The Zoning Board Of Appeals
0 Memorial Drive
Ashland RTD Apartments LLC
Abutters To Map 13 Parcel 154

PARCEL ID	PARCEL LOCATION	OWNER NAME 1	OWNER NAME 2	MAILING ADDRESS	CITY/TOWN	STATE	ZIP
12-155-00-000	16 RAMBLEWOOD DR	HARDY ERIN E	JOHN A HARDY	16 RAMBLEWOOD DR	ASHLAND	MA	01721
12-163-00-000	0 RAMBLEWOOD DR	OWNER UNKNOWN		101 MAIN ST	ASHLAND	MA	01721
12-190-00-000	106 HIGH ST	SAYED AMY E	WALEED SAYED	106 HIGH ST	ASHLAND	MA	01721
13-022-00-000	0 VALLEY RD	NORFOLK FREDERICK J JR	REGINA M NORFOLK	65 HIGH ST	ASHLAND	MA	01721
13-023-00-000	29 HIGH ST	GARCIA LOUISE M		29 HIGH ST	ASHLAND	MA	01721
13-024-00-000	65 HIGH ST	NORFOLK FREDERICK J JR	REGINA M NORFOLK	65 HIGH ST	ASHLAND	MA	01721
13-118-00-000	0 HIGH ST	MASS BAY TRANSPORTATION AUTHORITY	(MBTA)	TEN PARK PLAZA	BOSTON	MA	02116
13-138-00-000	0 MBTA ACCESS RD	TOWN OF ASHLAND		101 MAIN ST	ASHLAND	MA	01721
13-152-00-000	1 CIRRUS DR	ASHLAND TRANSIT APARTMENTS OWNER LLC		ONE CAMPANELLI DR	BRAINTREE	MA	02184
13-154-00-000	0 MBTA ACCESS RD	ASHLAND RTD APARTMENTS LLC		12 STANDISH LN	WINCHESTER	MA	01890
13-155-00-000	0 HIGH ST REAR	GROVER MARK R		120 HIGH ST	ASHLAND	MA	01721
13-156-00-000	7 BALDWIN CIRCLE	MCDONALD JOSEPH III & REBECCA	HAKANSSON DIANA	7 BALDWIN CIRCLE	ASHLAND	MA	01721
13-157-00-000	11 BALDWIN CIRCLE	GRUSZKA CHRISTOPHER G	CHERYL A GRUSZKA	11 BALDWIN CIRCLE	ASHLAND	MA	01721
13-159-00-000	98 HIGH ST	STEEVES FREDERICK J	JANICE M STEEVES	98 HIGH ST	ASHLAND	MA	01721
13-160-00-000	0 HIGH ST	MORRISETTE R & HARTMANN L &	TRUSTEES OF THE MORRISETTE REALTY TR	34 HIGH ST	ASHLAND	MA	01721
13-161-00-000	0 HIGH ST	MORRISETTE R & HARTMANN L &	TRUSTEES OF THE MORRISETTE REALTY TR	34 HIGH ST	ASHLAND	MA	01721
13-162-00-000	0 HIGH ST	MORRISETTE R & HARTMANN L &	TRUSTEES OF THE MORRISETTE REALTY TR	34 HIGH ST	ASHLAND	MA	01721
13-163-00-000	34 HIGH ST	MORRISETTE R & HARTMANN L &	TRUSTEES OF THE MORRISETTE REALTY TR	34 HIGH ST	ASHLAND	MA	01721
13-164-00-000	30 HIGH ST	KLUG BRIAN K	JENNIFER L KLUG	30 HIGH ST	ASHLAND	MA	01721
13-165-00-000	26 HIGH ST	WALBRIDGE LINDA	BRUCE WALBRIDGE	26 HIGH ST	ASHLAND	MA	01721
19-043-00-000	16 RUSSET HILL RD	WILKINSON ALYSE B	PAUL K WILKINSON	16 RUSSET HILL RD	ASHLAND	MA	01721
19-044-00-000	20 RUSSET HILL RD	KRUMHOLZ DAVID B & COHEN-KRUMHOLZ	TRUSTEES 20 RUSSET HILL ROAD NOMIN	20 RUSSET HILL RD	ASHLAND	MA	01721
19-045-00-000	24 RUSSET HILL RD	FOGAREN PETER B	TERESA FOGAREN	24 RUSSET HILL RD	ASHLAND	MA	01721
19-046-00-000	28 RUSSET HILL RD	SCHULMAN LYNN E	DAVID W SCHULMAN	28 RUSSET HILL RD	ASHLAND	MA	01721
19-047-00-000	32 RUSSET HILL RD	BRIGGS JOSEPH	KERRY BRIGGS	32 RUSSET HILL RD	ASHLAND	MA	01721
19-048-00-000	38 WILBUR DR	TASCIONE RICHARD L	ELIZABETH G TASCIONE	38 WILBUR DR	ASHLAND	MA	01721
19-049-00-000	42 WILBUR DR	RICHMOND DEV. CORP.		P.O. BOX 539	ASHLAND	MA	01721
19-050-00-000	46 WILBUR DR	MELTZER MITCHELL S	THERESA M MELTZER	46 WILBUR DR	ASHLAND	MA	01721
19-051-00-000	50 WILBUR DR	POTTHOFF PETER P	M ELIZABETH POTTHOFF	50 WILBUR DR	ASHLAND	MA	01721
19-052-00-000	54 WILBUR DR	DALY DAVID	DEBORAH DALY	54 WILBUR DR	ASHLAND	MA	01721
19-053-00-000	58 WILBUR DR	FERNANDEZ JOEL W	SIRUR FIONA M	58 WILBUR DR	ASHLAND	MA	01721
19-054-00-000	62 WILBUR DR	KUANG WO XI	JANE KUANG	62 WILBUR DR	ASHLAND	MA	01721
19-055-00-000	15 LORRAINE DR	BRAGA ANDREA M	KASPRZYK JACOB P	15 LORRAINE DR	ASHLAND	MA	01721
19-056-00-000	11 LORRAINE DR	TERRY MARC L	TRACY S TERRY	11 LORRAINE DR	ASHLAND	MA	01721
19-057-00-000	7 LORRAINE DR	ALMEIDA SUSAN J		7 LORRAINE DR	ASHLAND	MA	01721
19-060-00-000	87 WEST UNION ST	TOWN OF ASHLAND	MIDDLE SCHOOL	101 MAIN ST	ASHLAND	MA	01721
19-140-00-000	79 PENNOCK RD	MORRISSEY MICHAEL	MARIBETH MORRISSEY	79 PENNOCK RD	ASHLAND	MA	01721
19-141-00-000	80 PENNOCK RD	WILSON BENNET W & ALLISON L	TRUSTESS PENNOCK ROAD REALTY TRU	80 PENNOCK RD	ASHLAND	MA	01721
19-150-00-000	18 LORRAINE DR	SHEEHAN TERRENCE	PATRICIA BUSCH SHEEHAN	18 LORRAINE DR	ASHLAND	MA	01721
19-151-00-000	12 LORRAINE DR	VARSHAVER YEVGENY	MARINA VARCHAVER	12 LORRAINE DR	ASHLAND	MA	01721
19-152-00-000	8 LORRAINE DR	ROMANO SCOTT J	LAPAGLIA LAUREN	8 LORRAINE DR	ASHLAND	MA	01721
19-153-00-000	4 LORRAINE DR	MAILLET ALAN J	JULIANE R MAILLET	4 LORRAINE DR	ASHLAND	MA	01721
19-197-00-000	41 WILBUR DR	DANA PETER H	TEIBER VIRGINIA S	41 WILBUR DR	ASHLAND	MA	01721
19-198-00-000	49 WILBUR DR	DZIUBECK THOMAS R	DAWNA J DZIUBECK	49 WILBUR DR	ASHLAND	MA	01721
19-199-00-000	53 WILBUR DR	CHIN PETER Y & PATRICE P	TRUSTEES 53 WILBUR DRIVE REALTY TR	53 WILBUR DR	ASHLAND	MA	01721

October 13, 2020

To The Zoning Board Of Appeals
0 Memorial Drive
Ashland RTD Apartments LLC
Abutters To Map 13 Parcel 154

PARCEL ID	PARCEL LOCATION	OWNER NAME 1	OWNER NAME 2	MAILING ADDRESS	CITY/TOWN	STATE	ZIP
13-176-00-000	160 MEGUNKO RD	MEGUNKO TRANSIT DISTRICT LLC		PO BOX 300	ALTON	NH	03809
13-177-00-000	0 MBTA ACCESS RD	MEGUNKO TRANSIT DISTRICT LLC		PO BOX 300	ALTON	NH	03809
13-178-00-000	0 MBTA ACCESS RD	METROWEST Y.M.C.A.		280 OLD CONNECTICUT PATH	FRAMINGHAM	MA	01701

The above reflects the latest information available on our recrds.

Richard E. Ball, M.A.A.
Director of Assessing

10/11/2020
Date

48 parcels/abutters

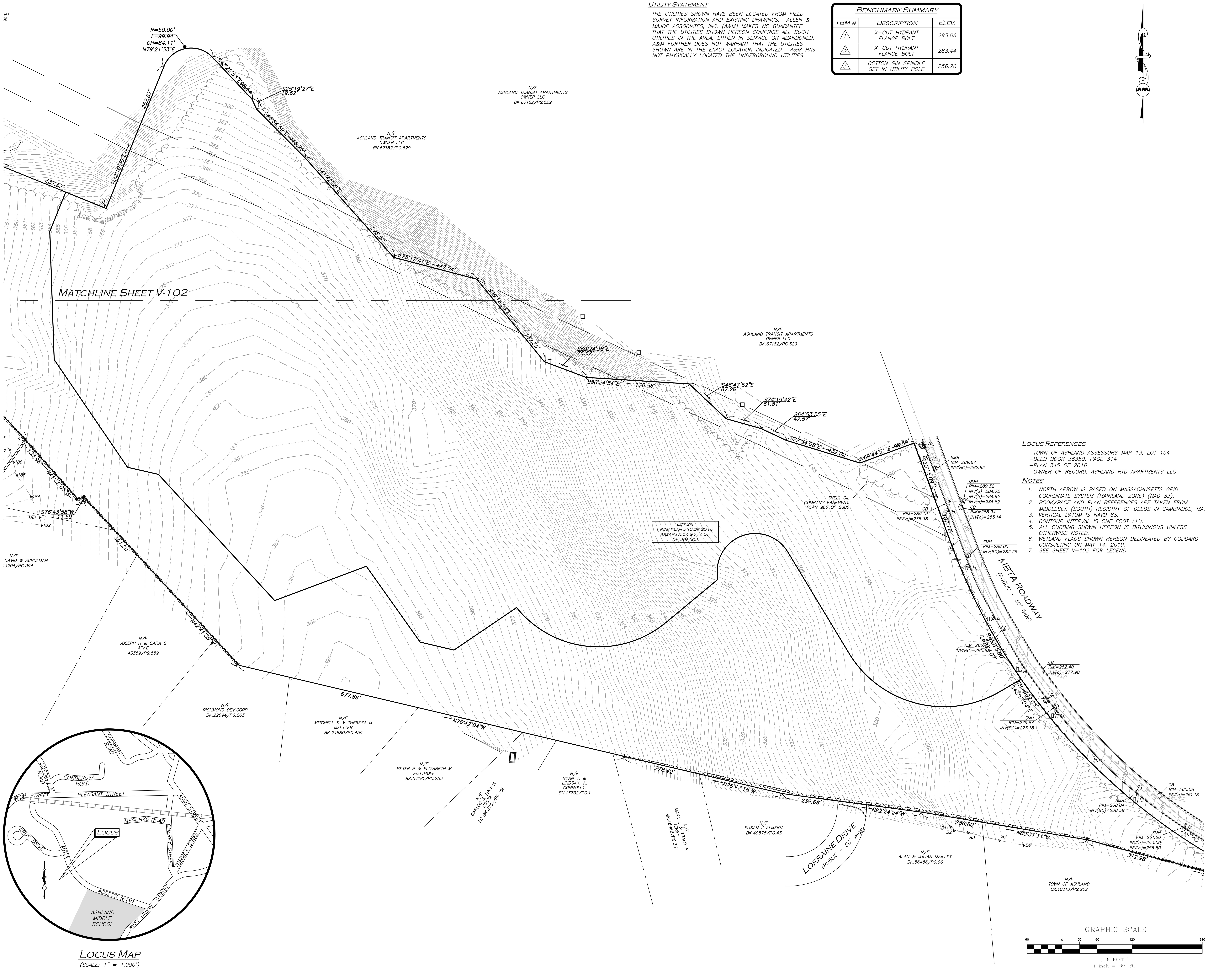
Appendix P

SITE DEVELOPMENT DRAWINGS

ALLEN & MAJOR ASSOCIATES, INC.

A
P
P
E
N
D
I
X

P



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.

BENCHMARK SUMMARY

TBM #	DESCRIPTION	ELEV.
1	X-CUT HYDRANT FLANGE BOLT	293.06
2	X-CUT HYDRANT FLANGE BOLT	283.44
3	COTTON GIN SPINDLE SET IN UTILITY POLE	256.76

LOCUS REFERENCES

- TOWN OF ASHLAND ASSESSORS MAP 13, LOT 154
- DEED BOOK 36350, PAGE 314
- PLAN 345 OF 2016
- OWNER OF RECORD: ASHLAND RTD APARTMENTS LLC

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 BITUMINOUS UNLESS OTHERWISE NOTED.
6. WETLAND FLAGS SHOWN HEREON DELINEATED BY GODDARD CONSULTING ON MAY 14, 2019.
7. SEE SHEET V-102 FOR LEGEND.

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issuance:

PERMIT / GMP Coordination Set

NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
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project number:	19021.00

drawing revisions:

No.	Description	Date

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DRAFT

drawing name:

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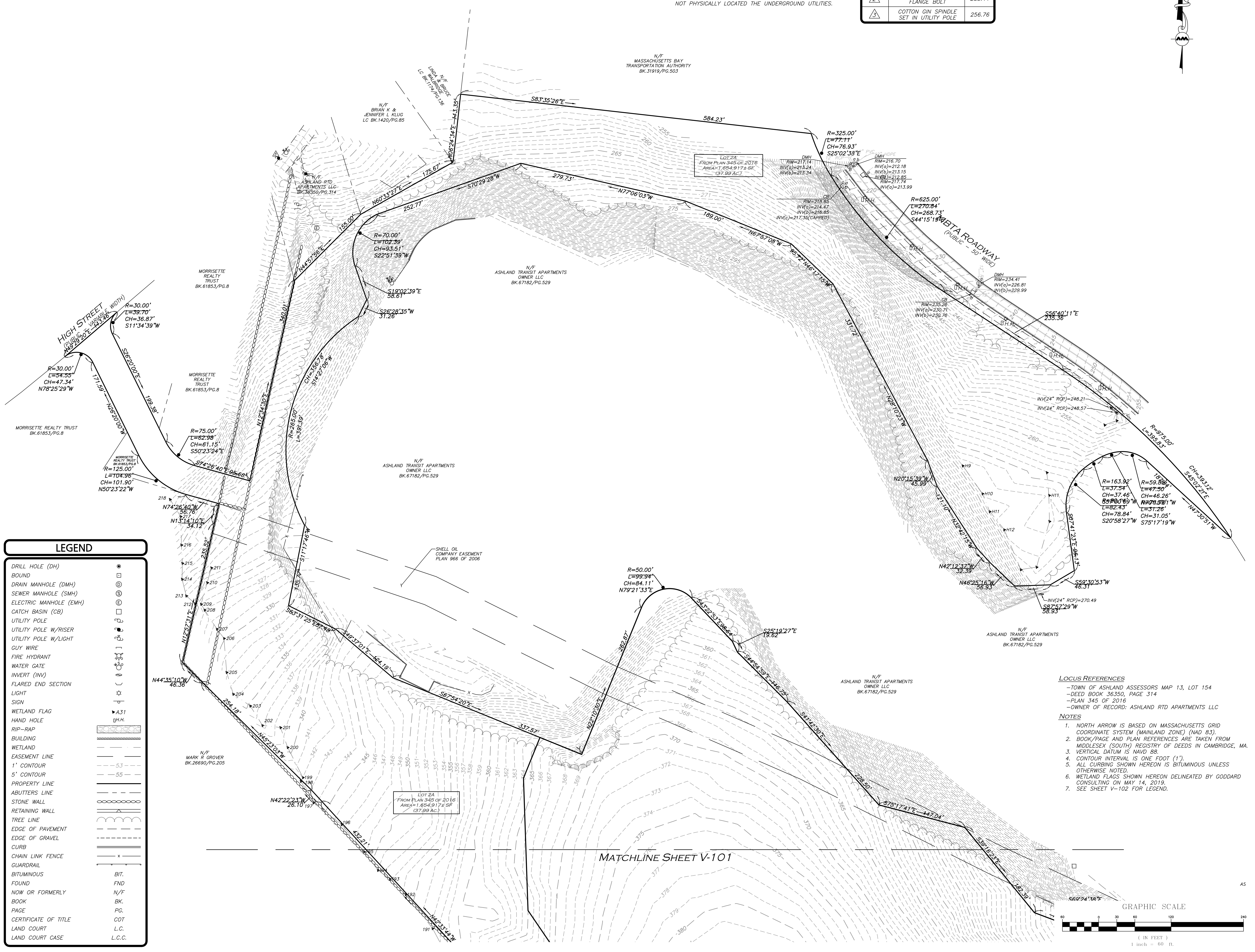

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LEGEND

DRILL HOLE (DH)	
BOUND	
DRAIN MANHOLE (DMH)	
SEWER MANHOLE (SMH)	
ELECTRIC MANHOLE (EMH)	
CATCH BASIN (CB)	
UTILITY POLE	
UTILITY POLE W/RISER	
UTILITY POLE W/LIGHT	
GUY WIRE	
FIRE HYDRANT	
WATER GATE	
INVERT (INV)	
FLARED END SECTION	
LIGHT	
SIGN	
WETLAND FLAG	A31
HAND HOLE	H.H.
RIP–RAP	
BUILDING	
WETLAND	
EASEMENT LINE	
1' CONTOUR	53
5' CONTOUR	55
PROPERTY LINE	
ABUTTERS LINE	
STONE WALL	
RETAINING WALL	
TREE LINE	
EDGE OF PAVEMENT	
EDGE OF GRAVEL	
CURB	
CHAIN LINK FENCE	x
GUARDRAIL	
BITUMINOUS	BIT.
FOUND	FND
NOW OR FORMERLY	N/F
BOOK	BK.
PAGE	PG.
CERTIFICATE OF TITLE	COT
LAND COURT	L.C.
LAND COURT CASE	L.C.C.

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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 RAIL TRANSIT DISTRICT (RTD) A, E, & F.
3. OVERALL LOT SIZE: 17.98± ACRES. LOT SIZE IS BASED ON COMPLETION OF AN APPROVAL NOT REQUIRED PLAN.
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 ACCESSIBLY COMPLIANT 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 TOWN 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 ZONING BOARD OF APPEALS.
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. 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. ALL GRADING OPERATIONS SHALL BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANIES.
3. 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.
4. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE STABILIZED AS SOON AS POSSIBLE UPON COMPLETION OF CONSTRUCTION WORK IN THE AREA.
5. 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.
6. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF EXISTING STRUCTURES INCLUDING REMOVAL OF ANY EXISTING UTILITIES SERVING THE STRUCTURE PER DEMOLITION PLAN.
7. 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.
8. 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.
9. ALL STORM PIPES ENTERING STRUCTURES SHALL BE GROUTED TO ENSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
10. ALL STORM DRAIN MANHOLES SHALL HAVE TRAFFIC BEARING RING & COVERS & SHALL BE LABELED "DRAIN".
11. 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.
12. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
13. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES STEEPER THAN 3H:1V.
14. ALL DRAINAGE SYSTEM COMPONENTS SHALL CONFORM TO LOCAL REQUIREMENTS.
15. THE AREA DIRECTLY BELOW THE SUBSURFACE RECHARGE FIELD SHALL BE KEPT FREE OF COMPACTION OR HEAVY CONSTRUCTION VEHICLES. THE BOTTOM SHALL BE SCARIFIED PRIOR TO PLACEMENT OF STONE.

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, EXCEPT WHERE IMPRACTICAL TO DO SO.
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.
19. CONTRACTOR TO PROVIDE 1" CONDUIT TO ALL SITE LIGHTING IN AN ECONOMICALLY APPROPRIATE FASHION.

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

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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.

EROSION & SEDIMENTATION CONTROL NOTES (CONTINUED):

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. INITIATE STABILIZATION OF EXPOSED AREAS IMMEDIATELY IF CONSTRUCTION WORK TEMPORARILY OR PERMANENTLY CEASES.
29. 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.
30. 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.
31. ALL SEDIMENT TRACKED ONTO ROADWAYS MUST BE REMOVED AT END OF EACH WORK DAY.
32. 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.
33. 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.
34. 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:

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:

1. INLET PROTECTION DEVICES AND BARRIERS SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING, OR DETERIORATION.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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:

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.

THE EROSION CONTROL PLAN WILL BE IMPLEMENTED TO:

A. TREAT EROSION AS SOON AS POSSIBLE AFTER DISTURBANCE.

B. PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION AREA AND ENTERING THE RECEIVING WATERS.

C. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE EROSION.

D. ONLY DISTURB, CLEAR, OR GRADE AREAS NECESSARY FOR CONSTRUCTION.

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consultant information:

issuance: PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

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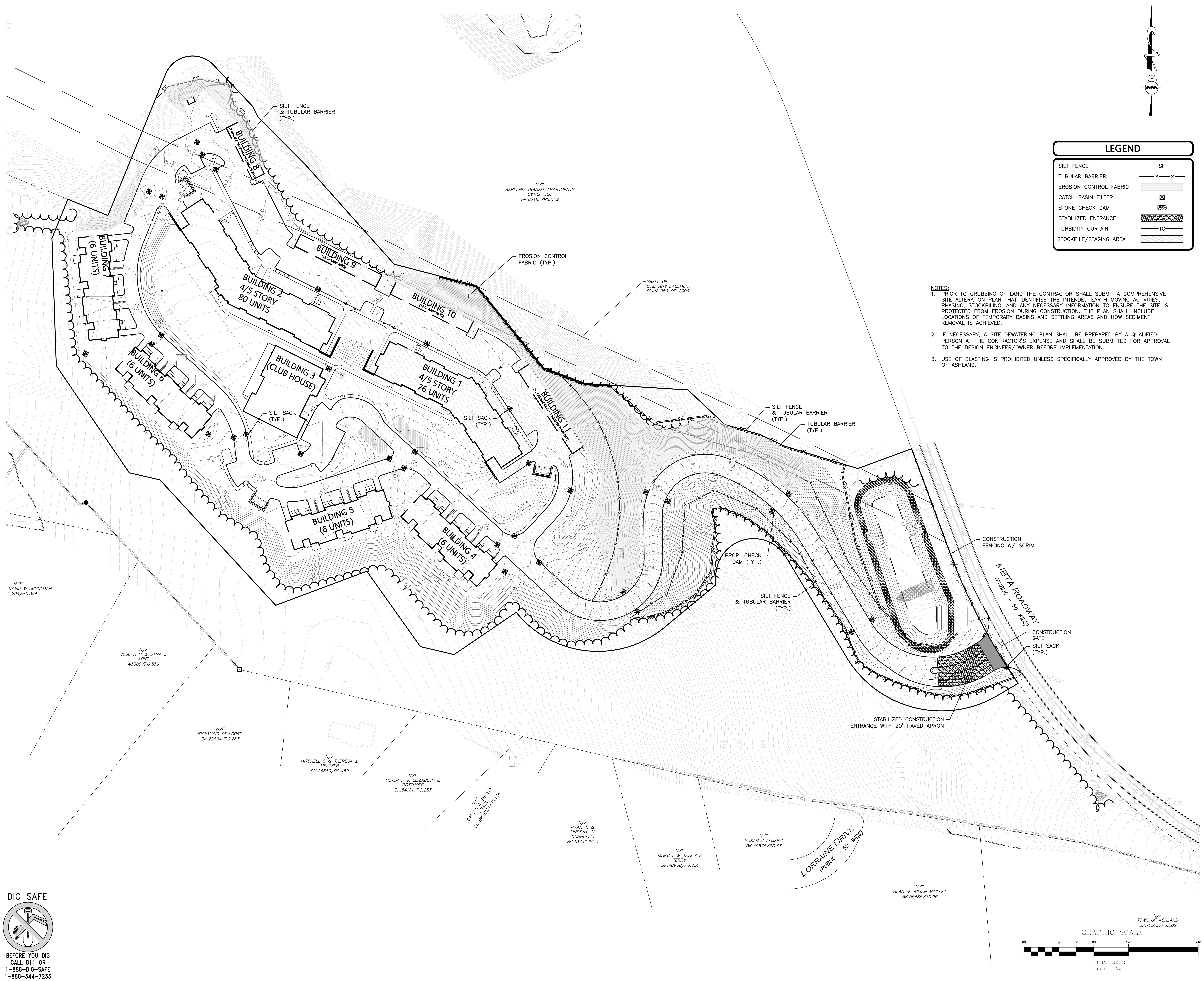

LEGEND

SILT FENCE	——SF——
TUBULAR BARRIER	——x——x——
EROSION CONTROL FABRIC	
CATCH BASIN FILTER	
STONE CHECK DAM	
STABILIZED ENTRANCE	
TURBIDITY CURTAIN	——TC——
STOCKPILE/STAGING AREA	

NOTES:

1. PRIOR TO GRUBBING OF LAND THE CONTRACTOR SHALL SUBMIT A COMPREHENSIVE SITE ALTERATION PLAN THAT IDENTIFIES THE INTENDED EARTH MOVING ACTIVITIES, PHASING, STOCKPILING, AND ANY NECESSARY INFORMATION TO ENSURE THE SITE IS PROTECTED FROM EROSION DURING CONSTRUCTION. THE PLAN SHALL INCLUDE LOCATIONS OF TEMPORARY BASINS AND SETTLING AREAS AND HOW SEDIMENT REMOVAL IS ACHIEVED.
2. IF NECESSARY, A SITE DEWATERING PLAN SHALL BE PREPARED BY A QUALIFIED PERSON AT THE CONTRACTOR'S EXPENSE AND SHALL BE SUBMITTED FOR APPROVAL TO THE DESIGN ENGINEER/OWNER BEFORE IMPLEMENTATION.
3. USE OF BLASTING IS PROHIBITED UNLESS SPECIFICALLY APPROVED BY THE TOWN OF ASHLAND.

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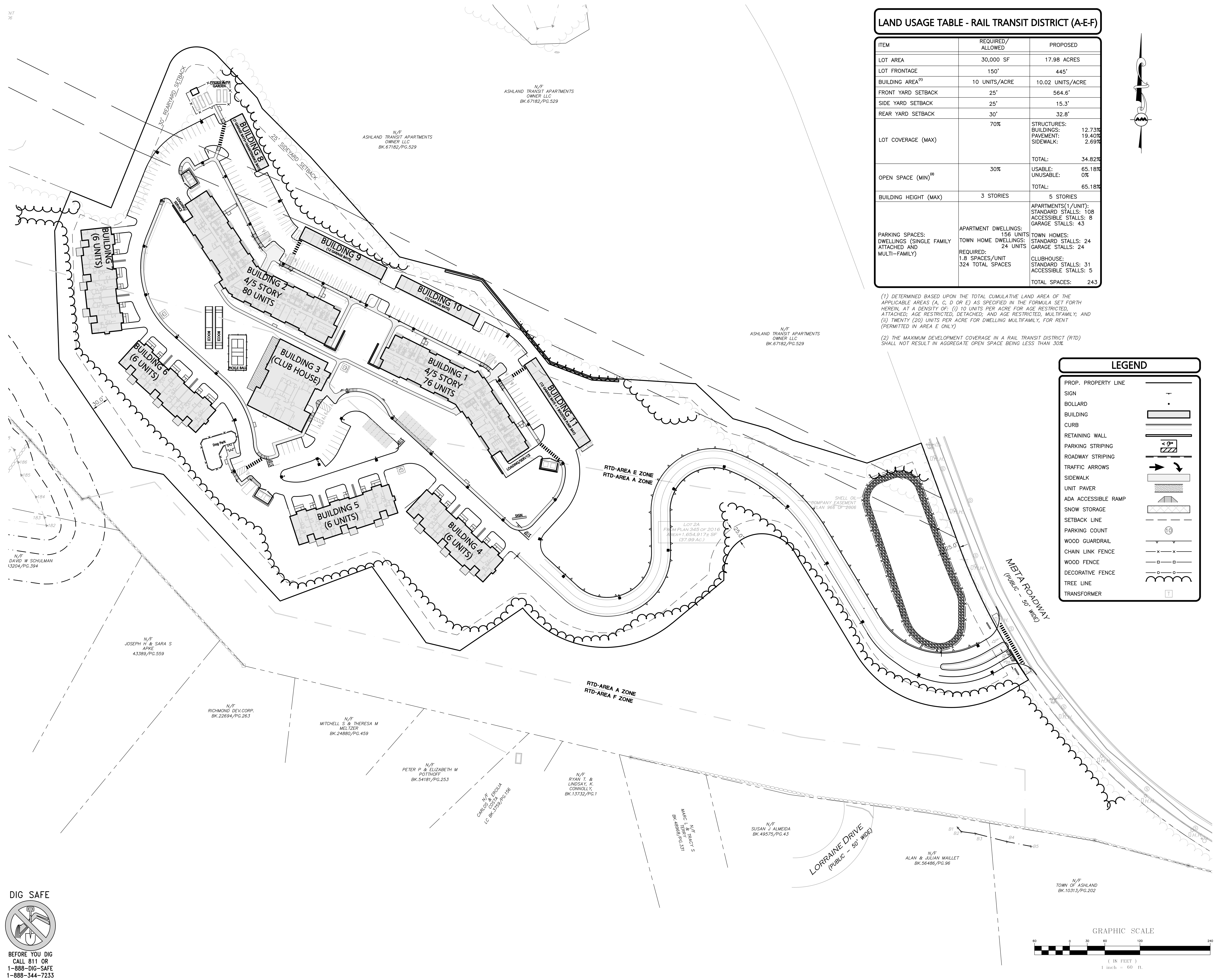

LAND USAGE TABLE - RAIL TRANSIT DISTRICT (A-E-F)

ITEM	REQUIRED/ ALLOWED	PROPOSED
LOT AREA	30,000 SF	17.98 ACRES
LOT FRONTAGE	150'	445'
BUILDING AREA(1)	10 UNITS/ACRE	10.02 UNITS/ACRE
FRONT YARD SETBACK	25'	564.6'
SIDE YARD SETBACK	25'	15.3'
REAR YARD SETBACK	30'	32.8'
LOT COVERAGE (MAX)	70%	STRUCTURES: BUILDINGS: 12.73% PAVEMENT: 19.40% SIDEWALK: 2.69% TOTAL: 34.82%
OPEN SPACE (MIN)(2)	30%	USABLE: 65.18% UNUSABLE: 0% TOTAL: 65.18%
BUILDING HEIGHT (MAX)	3 STORIES	5 STORIES
PARKING SPACES: DWELLINGS (SINGLE FAMILY ATTACHED AND MULTI-FAMILY)	APARTMENT DWELLINGS: 156 UNITS TOWN HOME DWELLINGS: 24 UNITS REQUIRED: 1.8 SPACES/UNIT 324 TOTAL SPACES	APARTMENTS(1/UNIT): STANDARD STALLS: 108 ACCESSIBLE STALLS: 8 GARAGE STALLS: 43 TOWN HOMES: STANDARD STALLS: 24 GARAGE STALLS: 24 CLUBHOUSE: STANDARD STALLS: 31 ACCESSIBLE STALLS: 5 TOTAL SPACES: 243

(1) DETERMINED BASED UPON THE TOTAL CUMULATIVE LAND AREA OF THE APPLICABLE AREAS (A, C, D OR E) AS SPECIFIED IN THE FORMULA SET FORTH HEREIN, AT A DENSITY OF: (i) 10 UNITS PER ACRE FOR AGE RESTRICTED, ATTACHED; AGE RESTRICTED, DETACHED; AND AGE RESTRICTED, MULTIFAMILY; AND (ii) TWENTY (20) UNITS PER ACRE FOR DWELLING MULTIFAMILY, FOR RENT (PERMITTED IN AREA E ONLY)

(2) THE MAXIMUM DEVELOPMENT COVERAGE IN A RAIL TRANSIT DISTRICT (RTD) SHALL NOT RESULT IN AGGREGATE OPEN SPACE BEING LESS THAN 30%.

LEGEND

- PROP. PROPERTY LINE
- SIGN
- BOLLARD
- BUILDING
- CURB
- RETAINING WALL
- PARKING STRIPING
- ROADWAY STRIPING
- TRAFFIC ARROWS
- SIDEWALK
- UNIT PAVER
- ADA ACCESSIBLE RAMP
- SNOW STORAGE
- SETBACK LINE
- PARKING COUNT
- WOOD GUARDRAIL
- CHAIN LINK FENCE
- WOOD FENCE
- DECORATIVE FENCE
- TREE LINE
- TRANSFORMER

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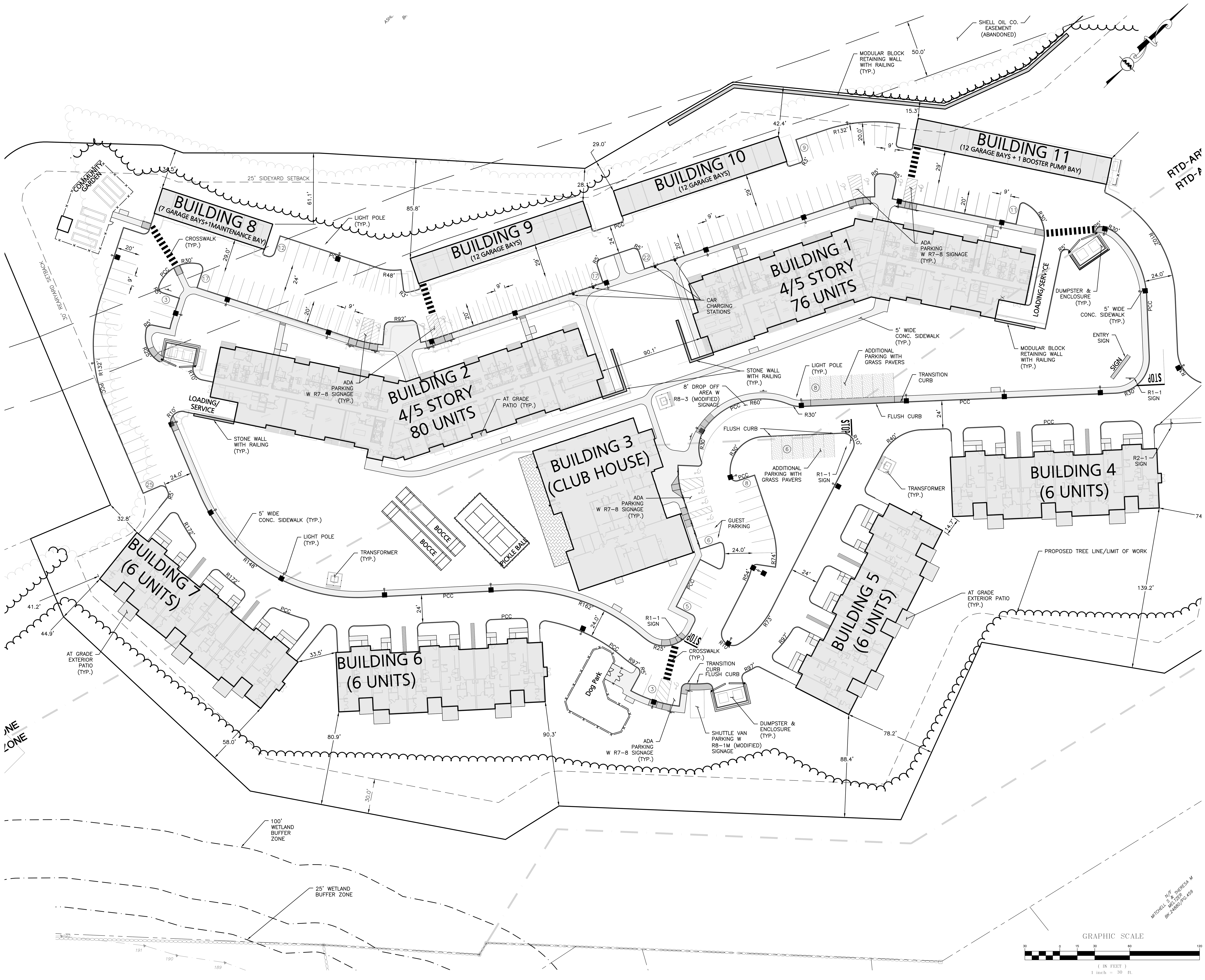

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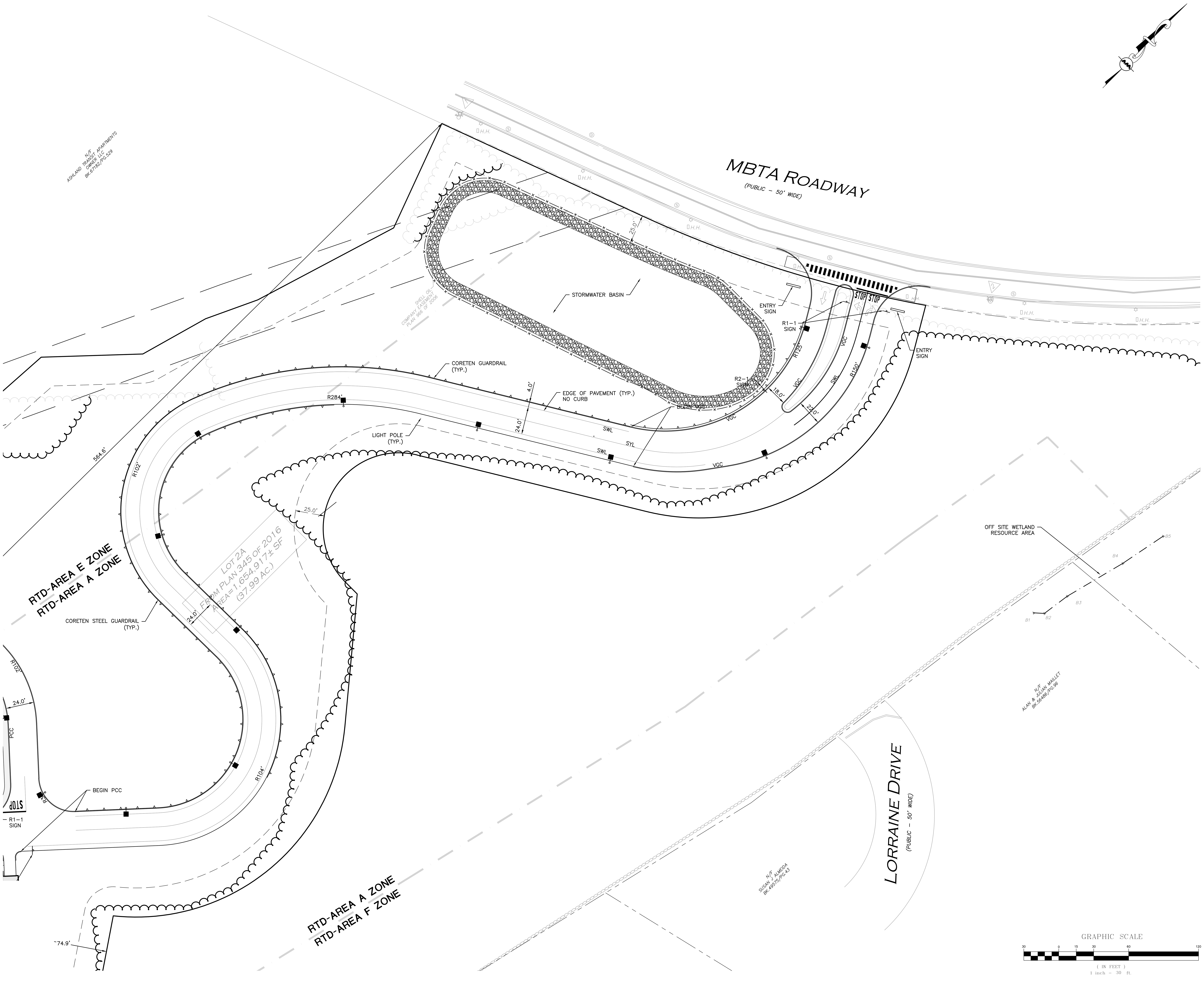

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LAYOUT & MATERIALS PLAN

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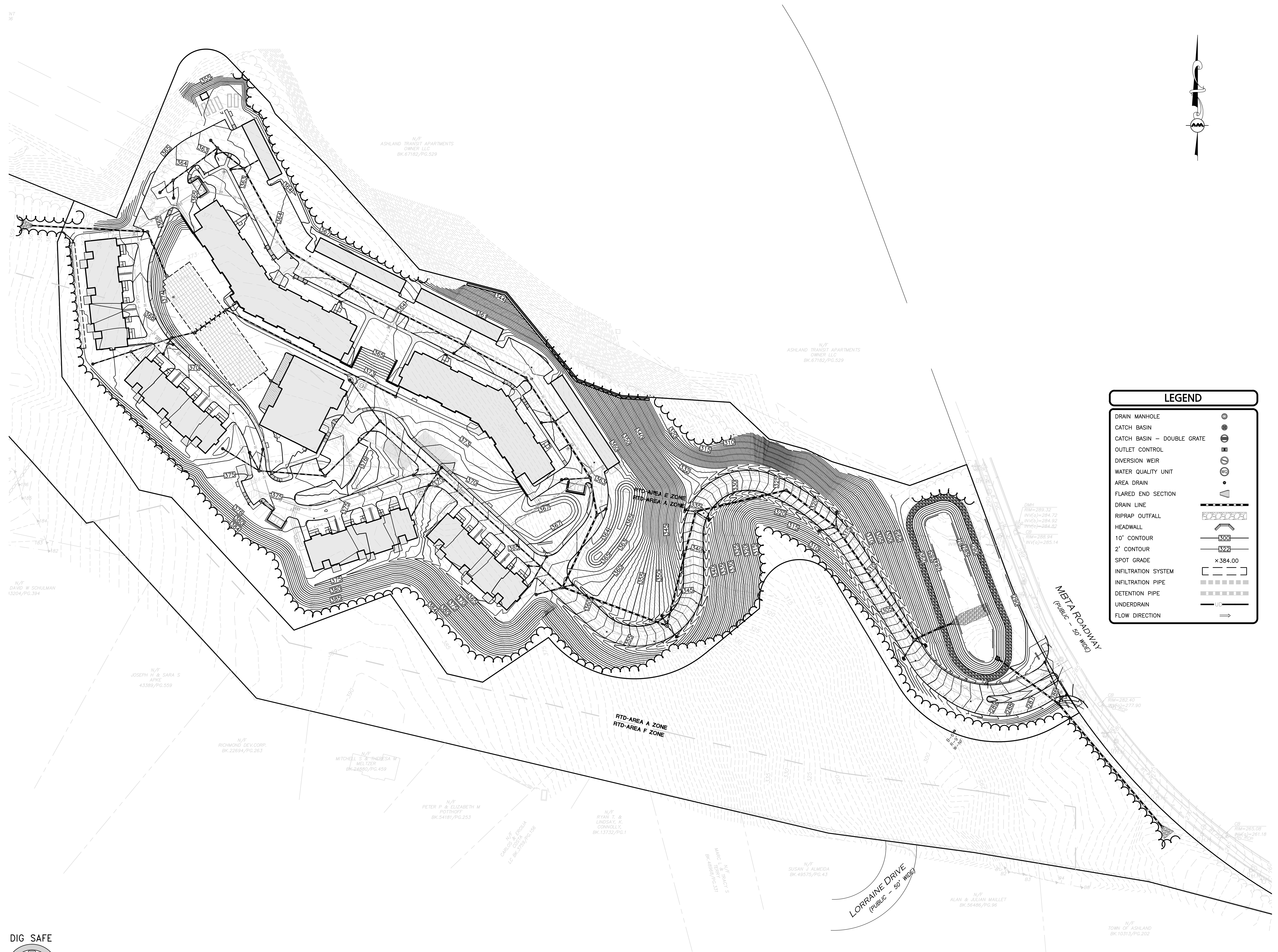

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GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

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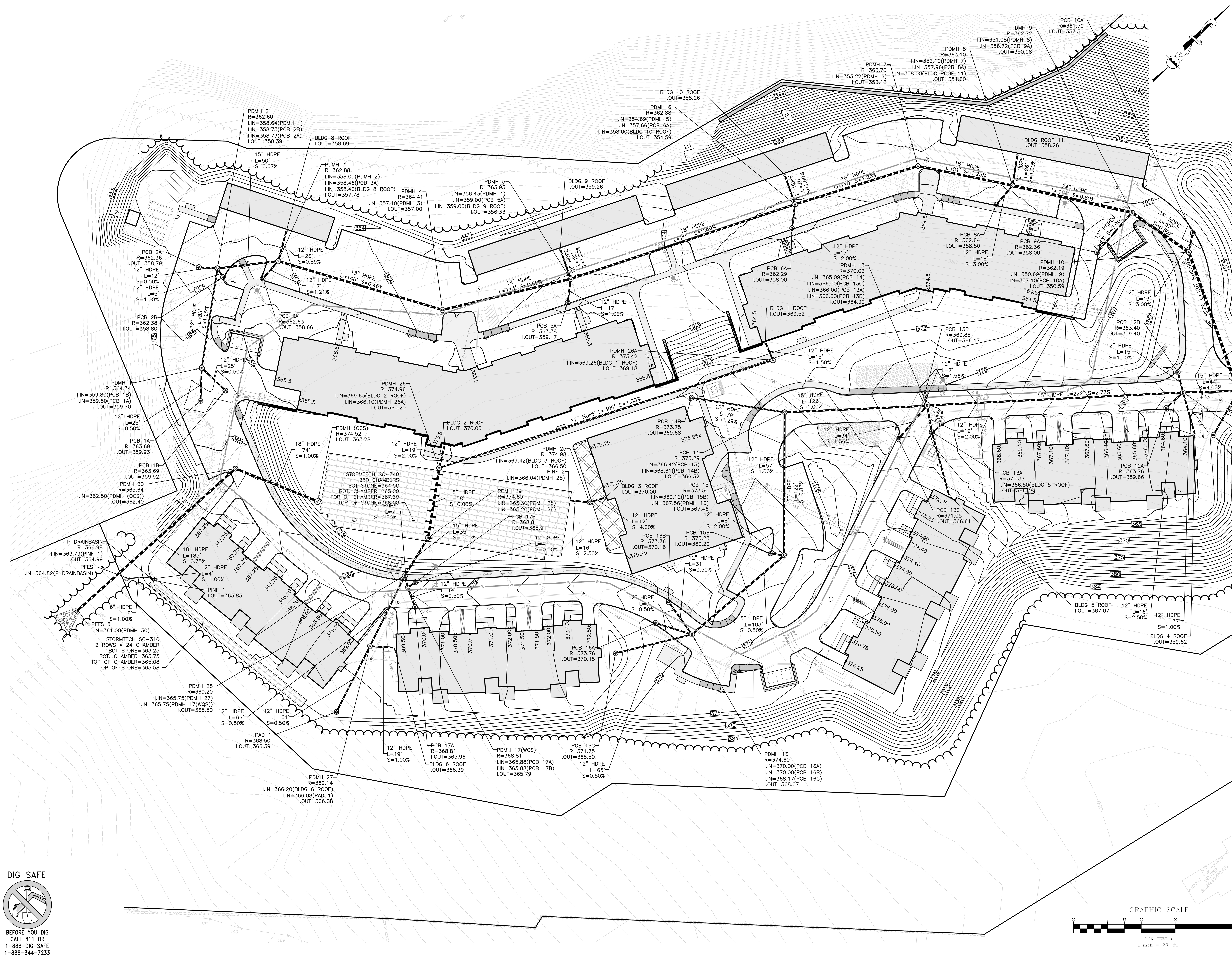
drawing name:
GRADING &
DRAINAGE
PLAN

drawing number:
C-105



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MBTA Access Road
Ashland, MA 01721

client information:
U A Senior
Manager LLC

Rensselaer
Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
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Coordination Set

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CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	1" = 30'
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration:

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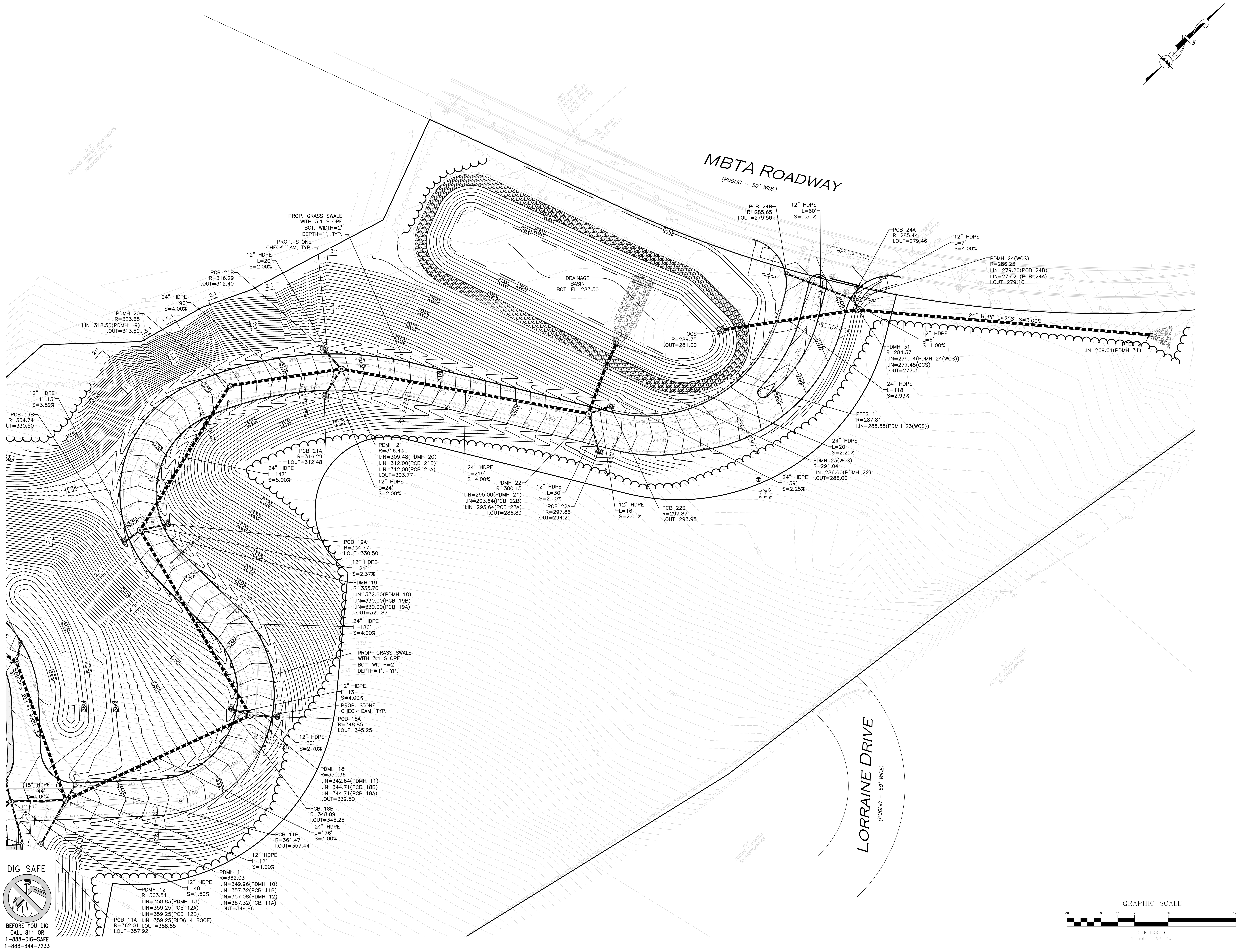
drawing name:
GRADING & DRAINAGE PLAN

drawing number:
C-106



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drawing name:
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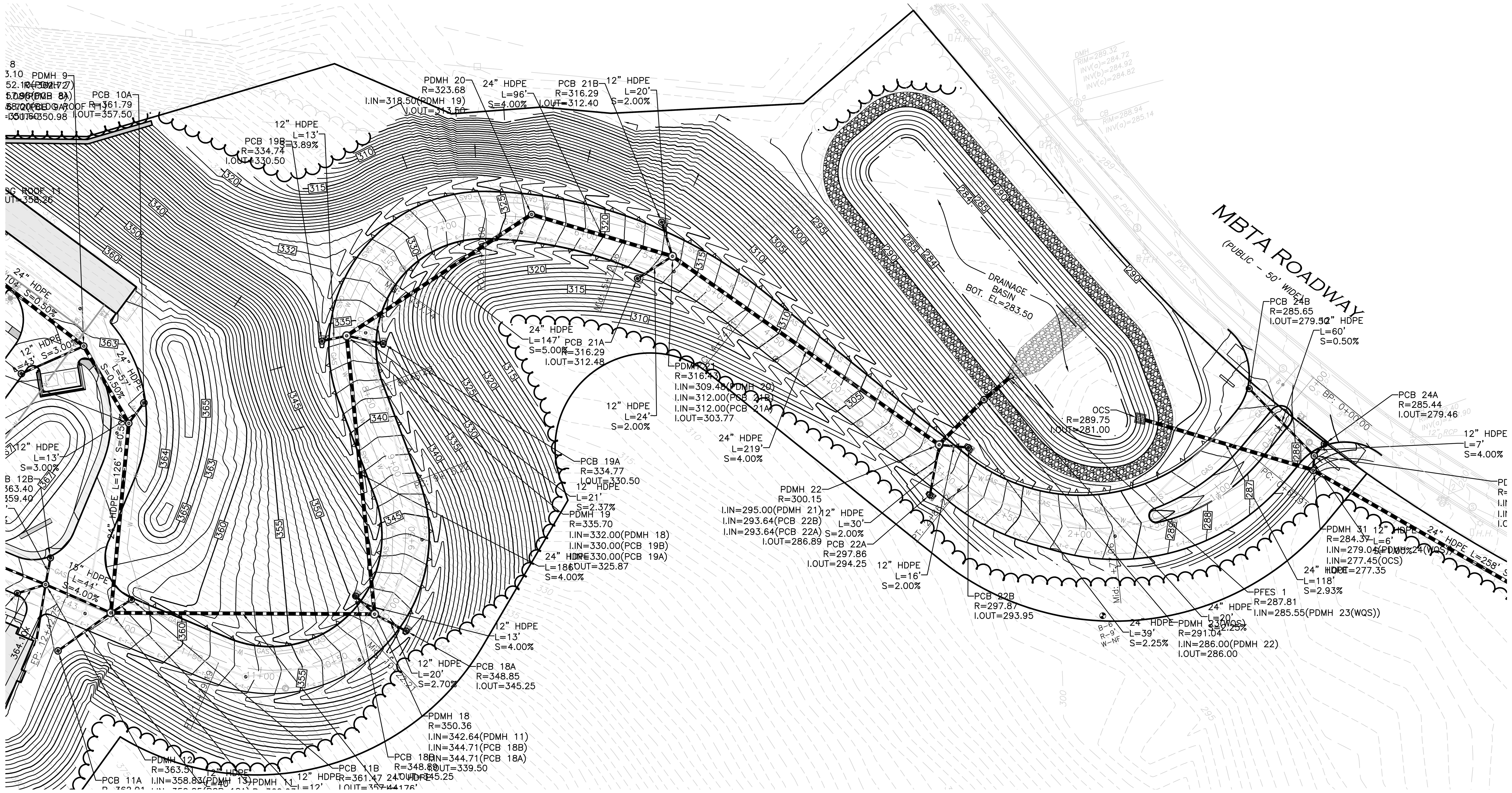
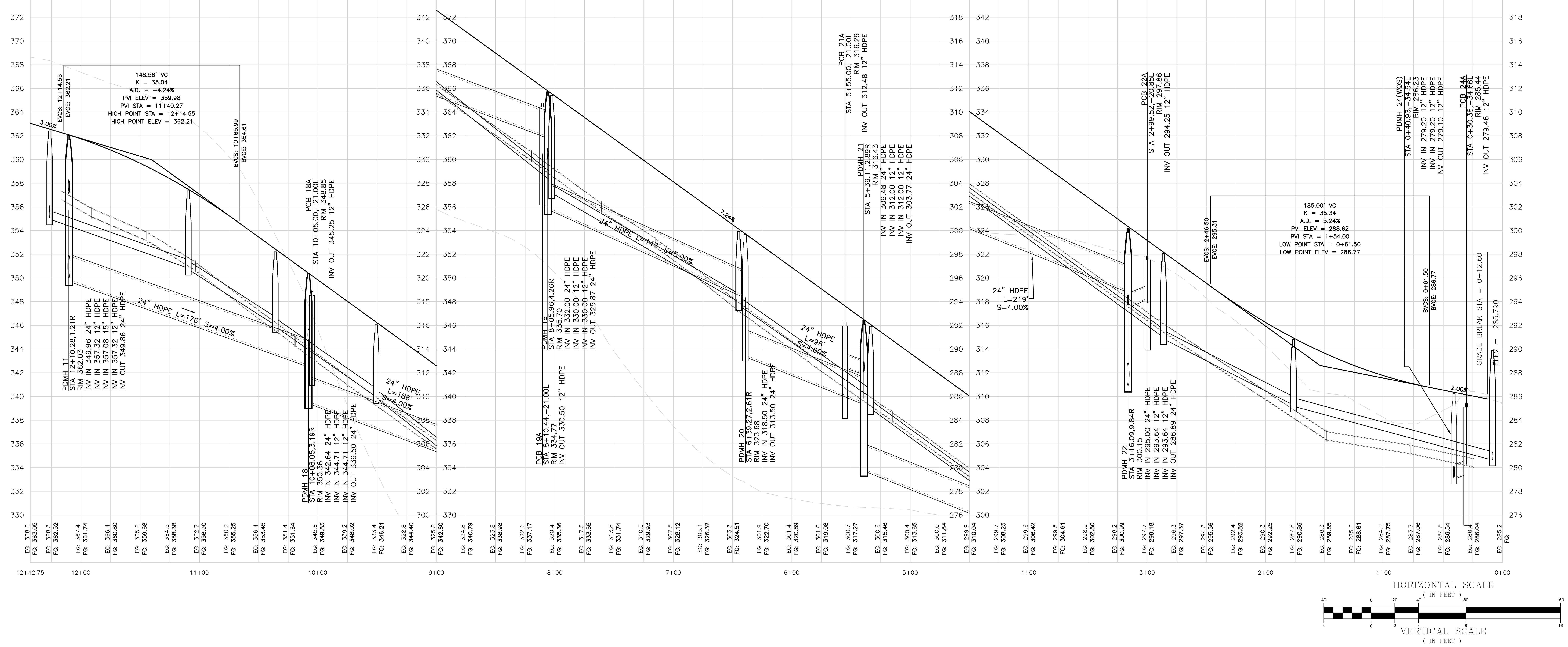
DRAINAGE
PLAN

drawing number:
C-107





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drawing name:

PROFILE PLAN

drawing number:

C-108

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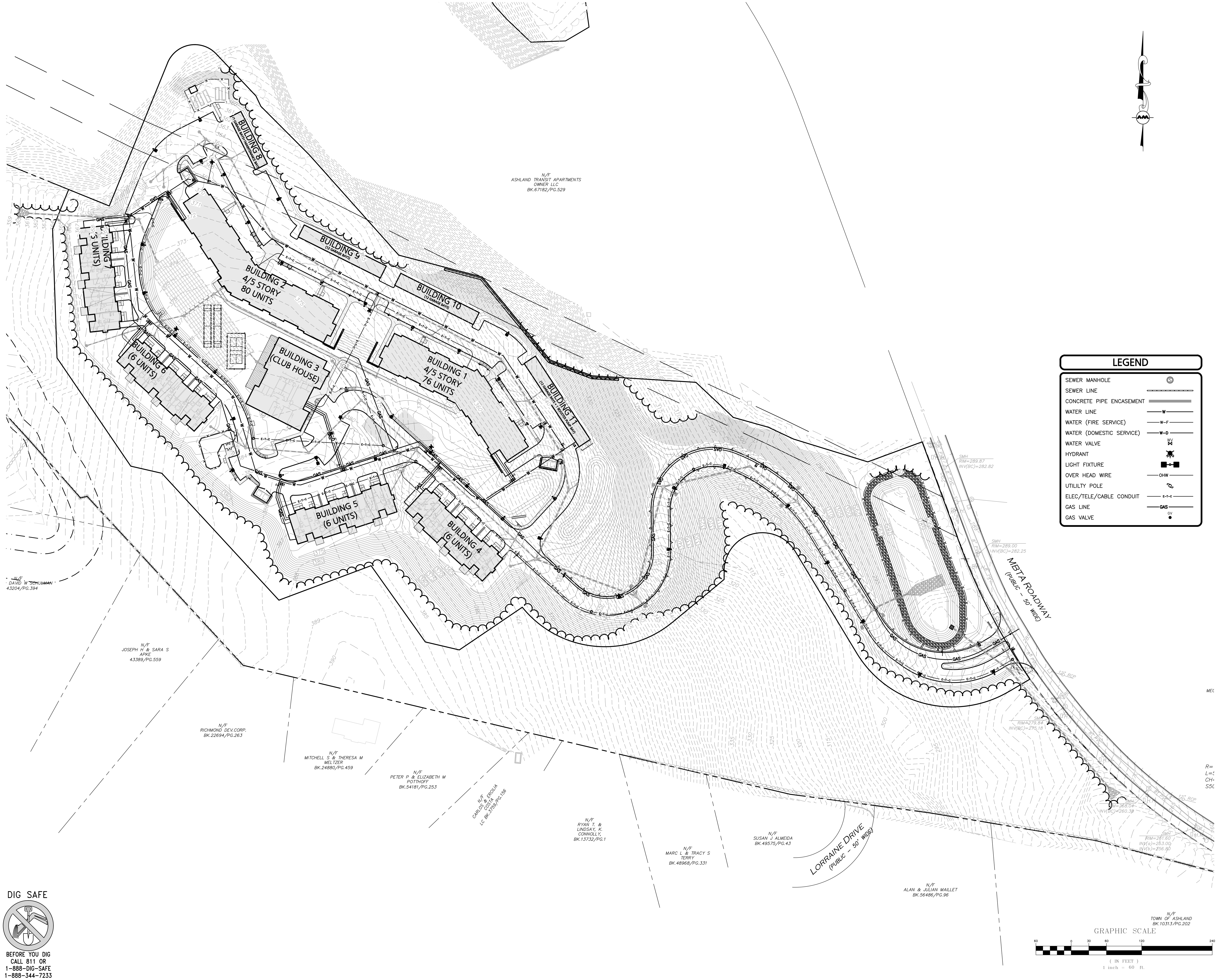

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OVERALL
UTILITIES
PLAN

drawing number:

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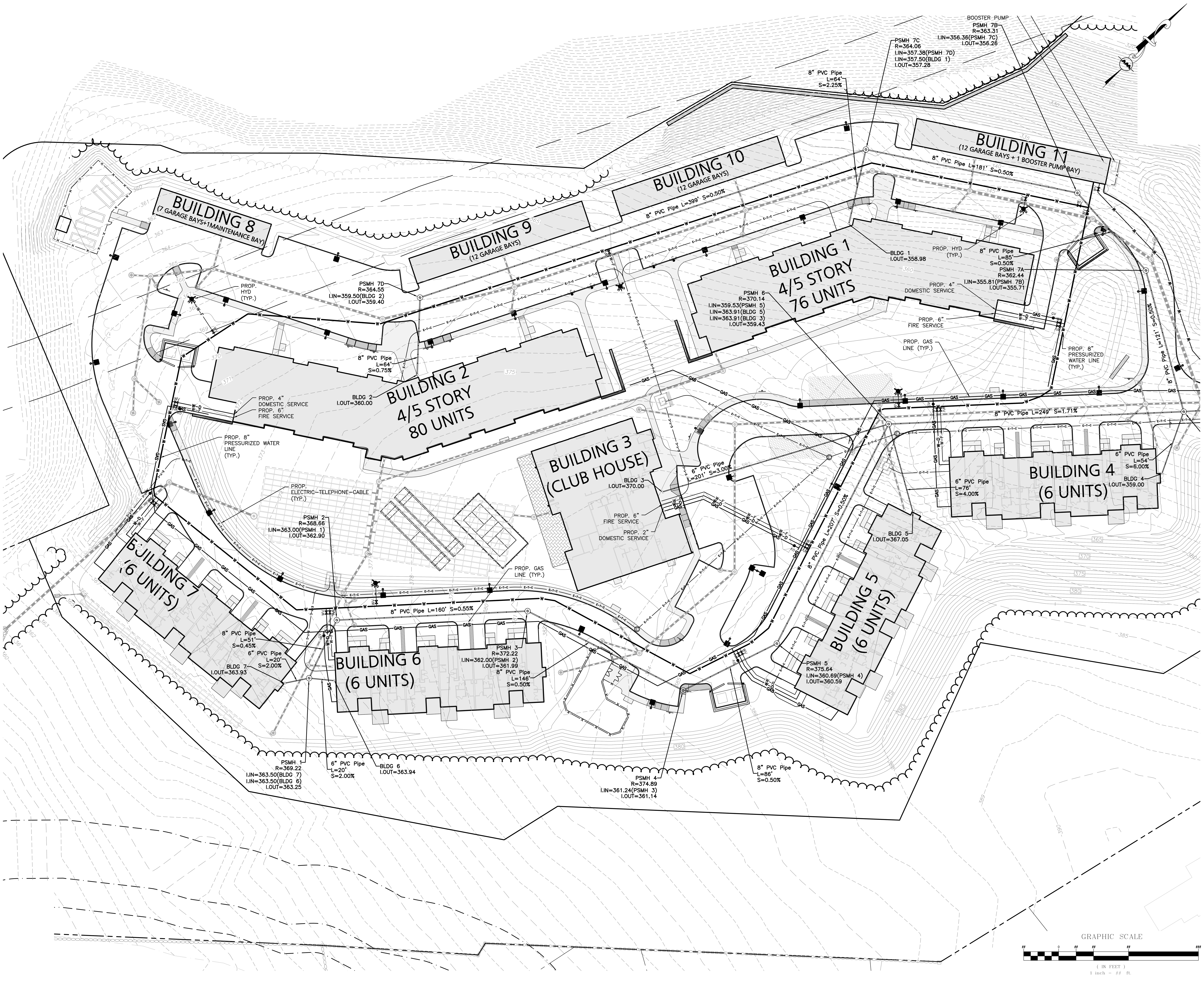

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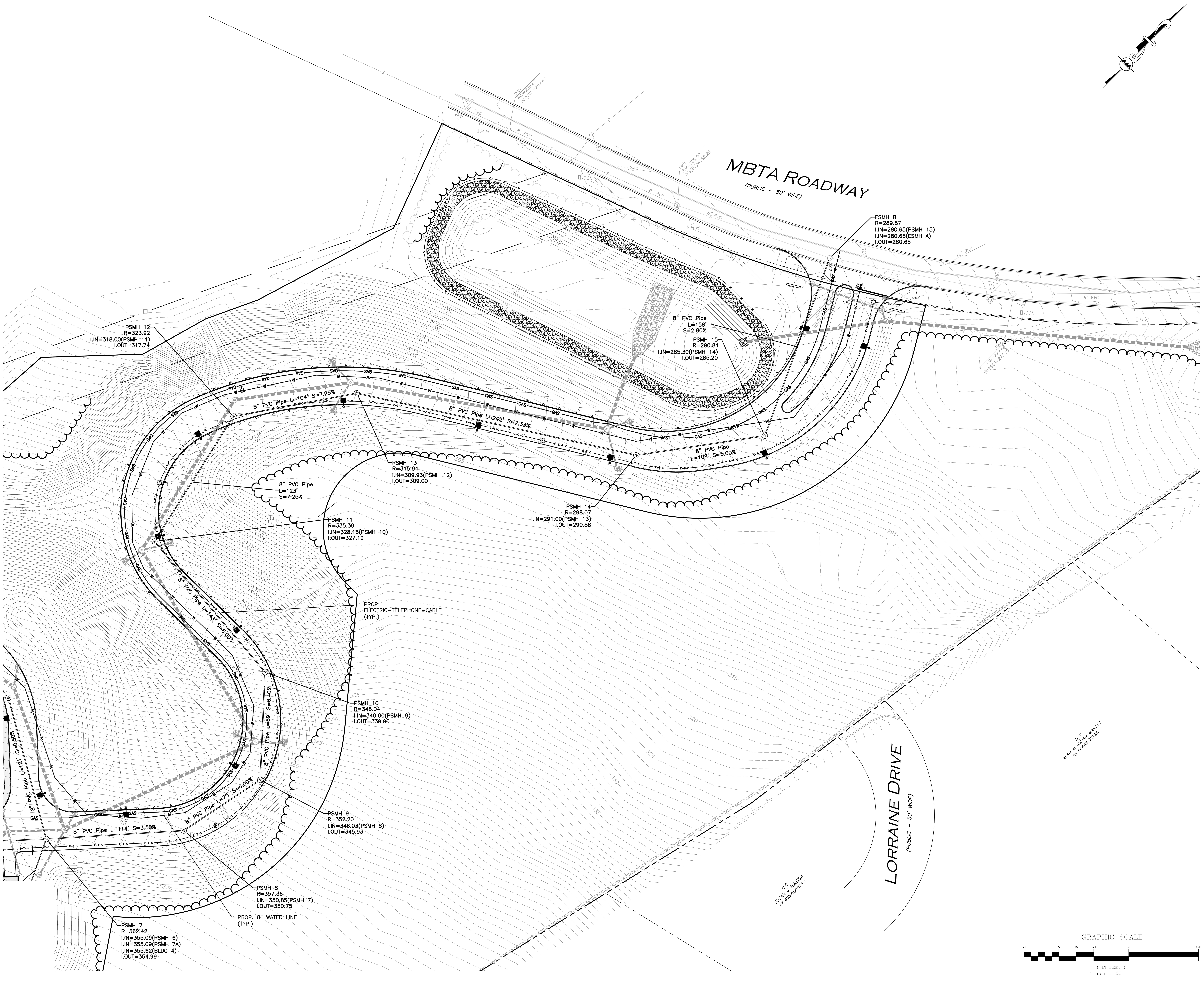
UTILITIES PLAN

drawing number:
C-110



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UTILITIES
PLAN

drawing number:

C-111

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

NOTES:

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2. 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.
3. 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.
4. QUANTITY SHOWN IN LUMINIARE SCHEDULE TABLE DENOTES NUMBER OF FIXTURE HEADS. REFER TO PLAN FOR POLES WITH DOUBLE FIXTURES.
5. MOUNTING HEIGHTS:
   5.1. A MOUNTING HEIGHT OF 12'-6" CONSIST OF A 12' POLE WITH A 6" REVEAL ON THE CONCRETE LIGHT POLE BASE;
   5.2. A MOUNTING HEIGHT OF 14'-6" CONSIST OF A 12' POLE WITH A 2'-6" REVEAL ON THE CONCRETE LIGHT POLE BASE;
   5.3. A MOUNTING HEIGHT OF 20'-6" CONSIST OF A 18' POLE WITH A 6" REVEAL ON THE CONCRETE LIGHT POLE BASE.

SPECIFICATIONS

24.56"
624 mm
3"
76 mm
7.5"
191 mm
18.44"
468 mm
EPA
Side View
.64
14"
356 mm
EPA
Front View
.37

Weight: 21.5 lbs / 9.75 kg

PARKING/SITE LIGHT FIXTURE

KIM LIGHTING, ALTITUDE 2.0 - ALT1

GENERAL PHOTOMETRIC SCHEDULE

AVERAGE FOOT-CANDLES	1.33
MAXIMUM FOOT-CANDLES	16.8
MINIMUM FOOT-CANDLES	0.0

LUMINAIRE SCHEDULE

CALLOUT	SYMBOL	DESCRIPTION	MOUNTING	NOTE 1	TOTAL LUMENS	LAMP DEPRECIATION	QUANTITY
Alt 2		KIM LIGHTING, ALTITUDE 2.0 Type II ALT1-54L-155-4k7-2	POLE	Mounting Height Varies, See Plan	17310	0.9	12
Alt 4W		KIM LIGHTING, ALTITUDE 2.0 Type IV Wide ALT1-54L-155-4k7-4W	POLE	Mounting Height Varies, See Plan	17299	0.9	33

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GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

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drawing date:	04 SEPTEMBER 2020
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drawing name:
PHOTO-
METRICS
PLAN

drawing number:
C-112

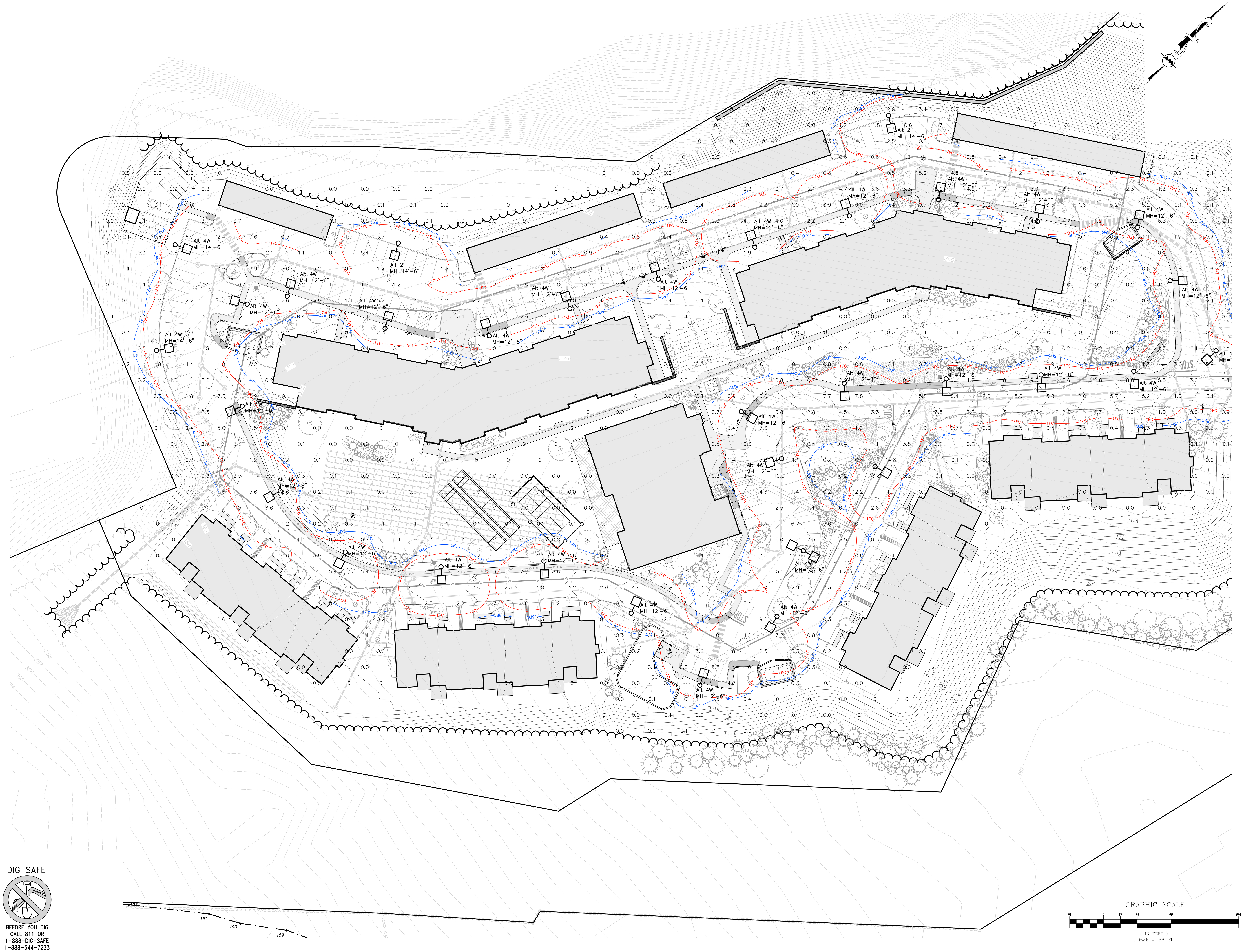

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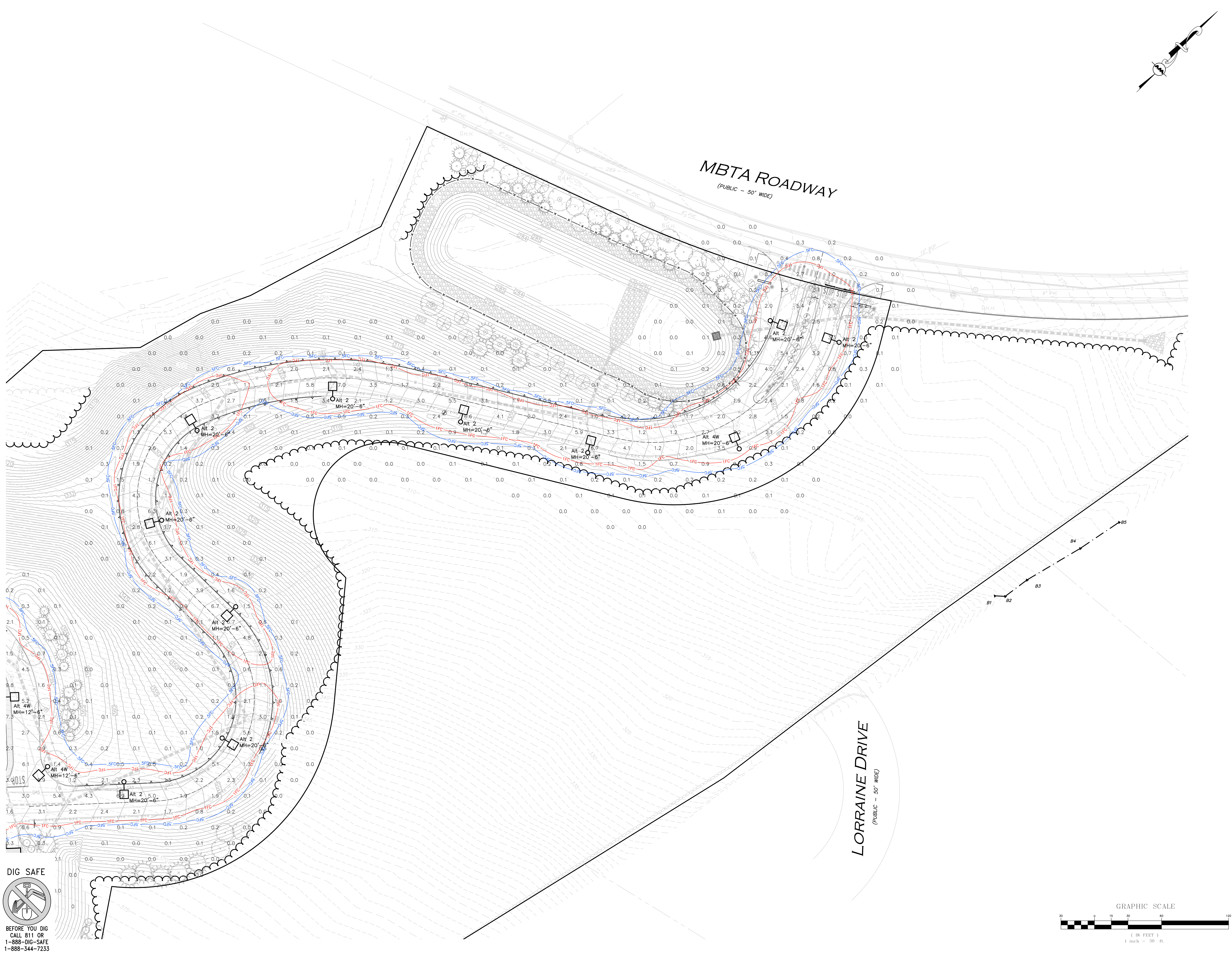
PHOTO-METRICS PLAN

drawing number:

C-113



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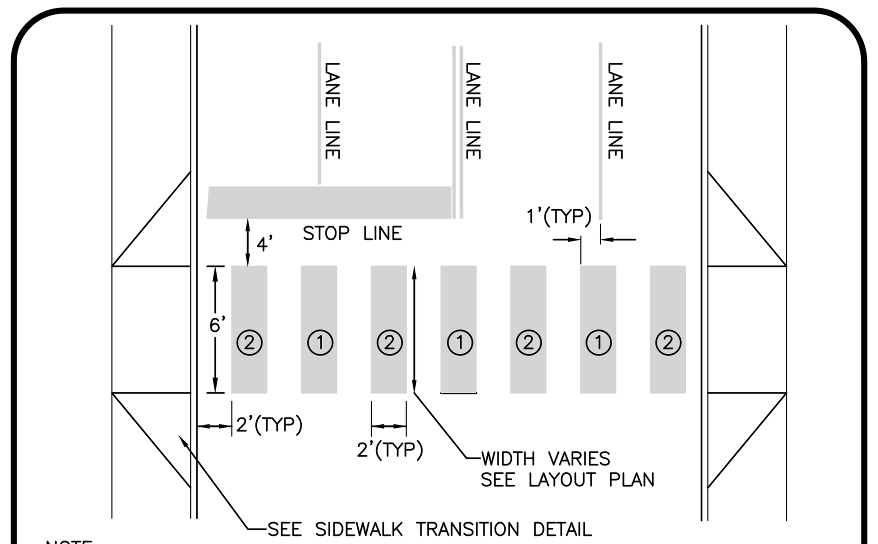
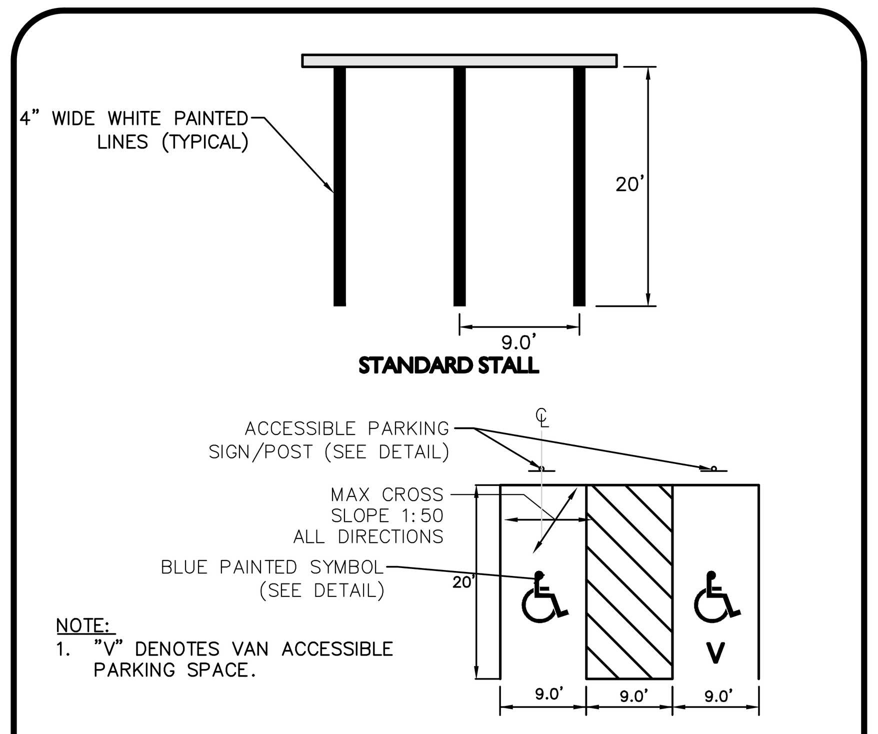


NOTE:

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.
3. TO BE HIGH VISIBLITY & RETRO REFLECTIVE EPOXY MATERIAL.
4. CROSSWALKS AT MAJOR INTERSECTIONS TO BE 10' WIDE.

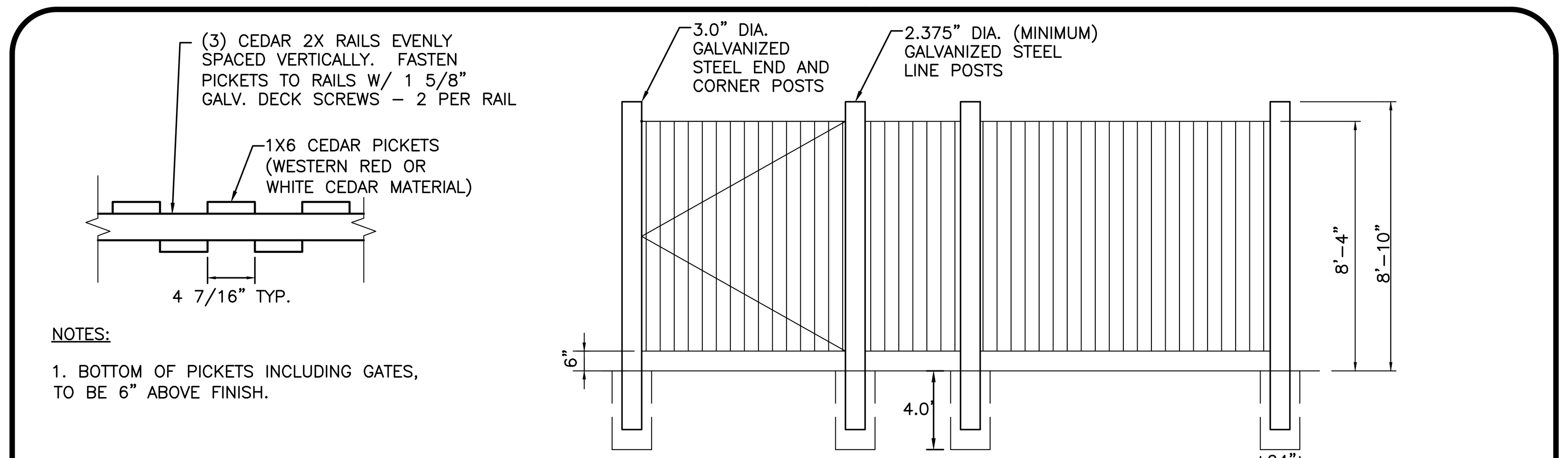
CROSSWALK STRIPING 18
NOT TO SCALE



NOTE:
1. "V" DENOTES VAN ACCESSIBLE PARKING SPACE.

ADA STANDARD AND VAN ACCESSIBLE PARKING SPACE

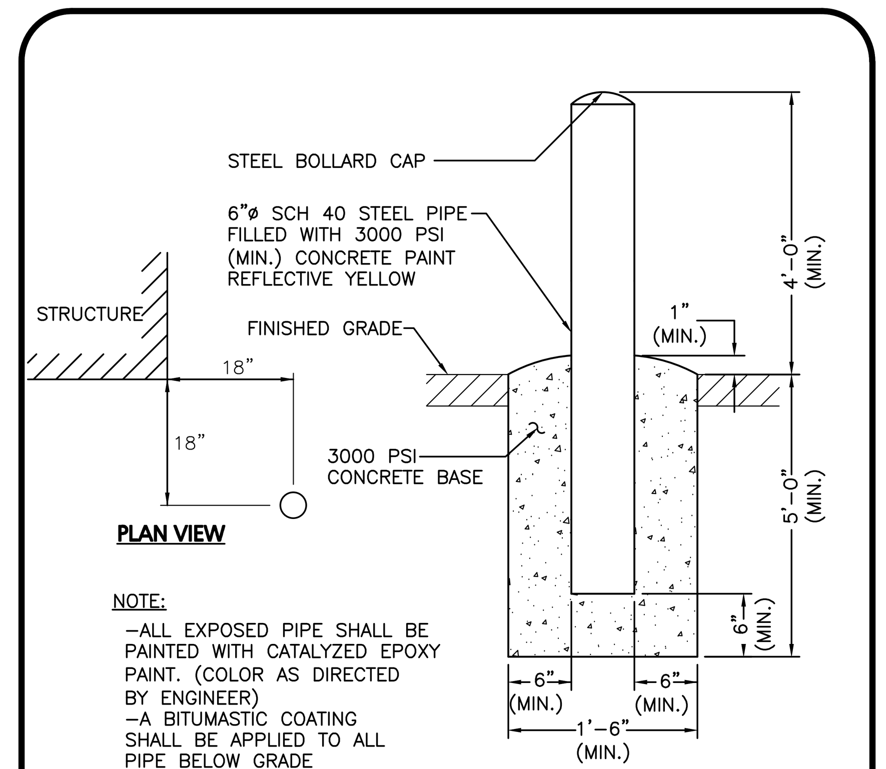
ADA AND STANDARD PARKING STRIPING 17
NOT TO SCALE



NOTES:
1. BOTTOM OF PICKETS INCLUDING GATES, TO BE 6" ABOVE FINISH.

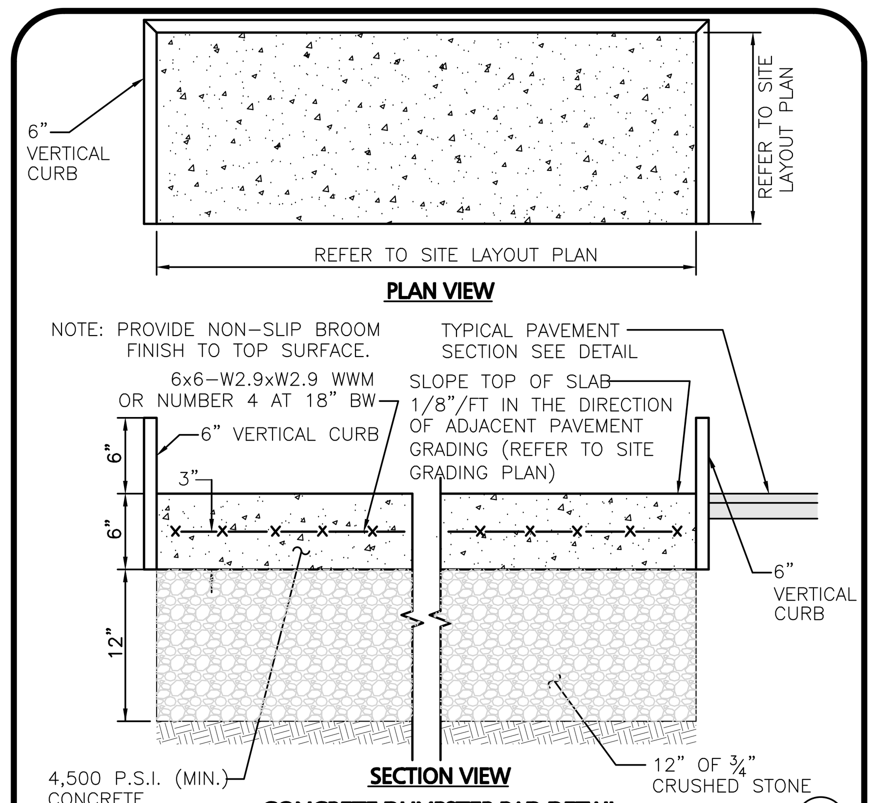
SPECIFICATION:
1. CEDAR FENCE: WESTERN RED CEDAR OR WHITE CEDAR WITH BAND SAWN TEXTURED SURFACE.
2. POSTS: GALVANIZED STEEL POSTS, CONCEALED ON THE SHOW SIDE (FACING NEIGHBORS) BY A WOOD BOARD/PICKET. PROVIDE ASTM A-90 ZINC COATING, TYPE I. LINE POSTS SHALL BE MIN. 2.375" (NOM. O.D.). CORNER AND TERMINAL POSTS SHALL BE MIN. 6.0" (NOM. O.D.).
3. RAILS: GRADE: STANDARD OR BETTER PER NLGA 122B, C, WCLIB 122B, C AND WWPA 40.11.
4. BOARDS: GRADE: CUSTOM KNOTTY PER WRCLA.
5. SEALER: OLYMPIC MAXIMUM CLEAR WATERPROOFING SEALANT OR APPROVED EQUAL.

SHADOW BOX FENCE AT DUMPSTER AREA 16
NOT TO SCALE

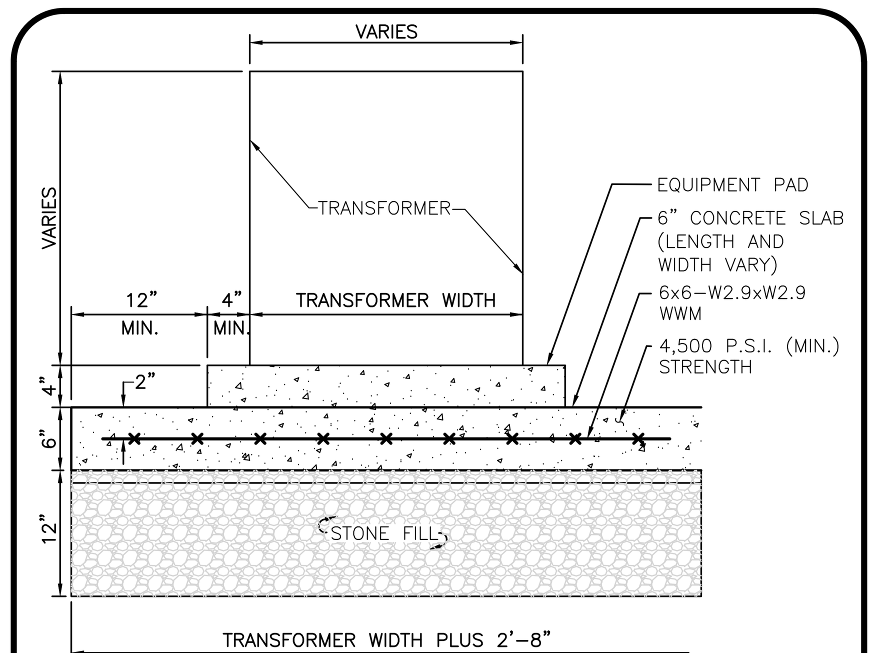


NOTE:
-ALL EXPOSED PIPE SHALL BE PAINTED WITH CATALYZED EPOXY PAINT. (COLOR AS DIRECTED BY ENGINEER)
-A BITUMASTIC COATING SHALL BE APPLIED TO ALL PIPE BELOW GRADE

FIXED BOLLARD 15
NOT TO SCALE

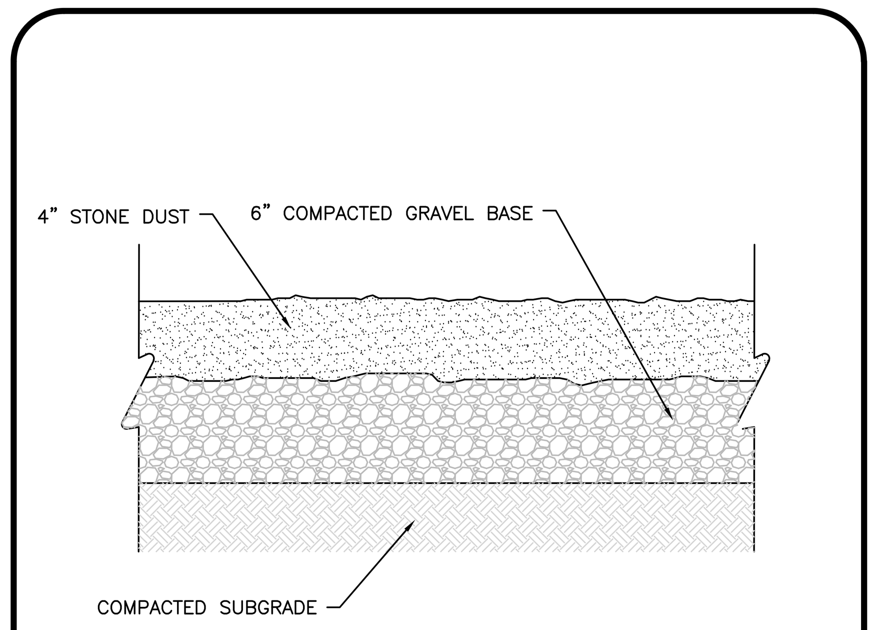


CONCRETE DUMPSTER PAD DETAIL 14
NOT TO SCALE

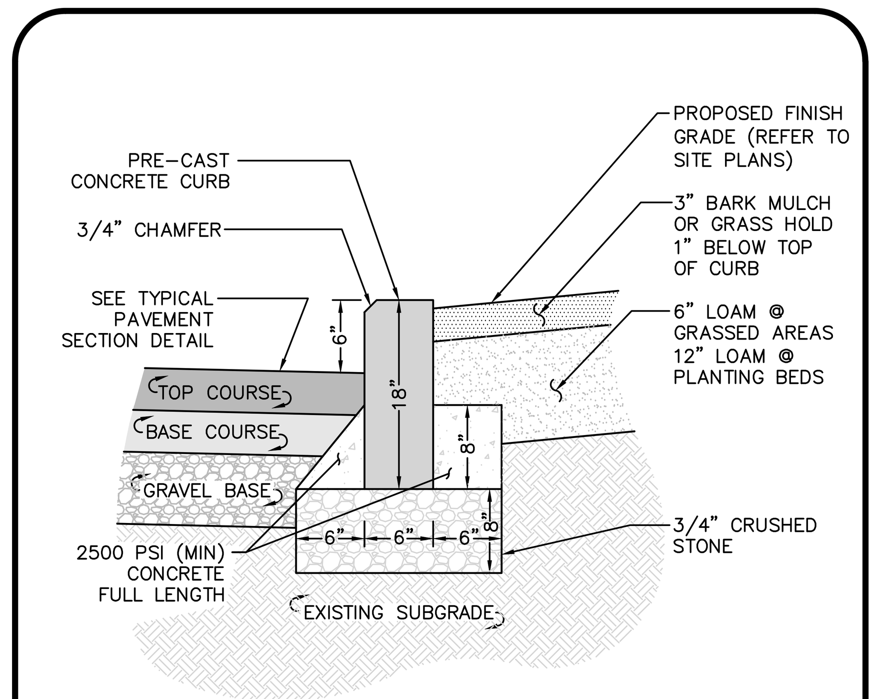


NOTES:
1. REFERENCE MECHANICAL/ELECTRICAL ENGINEER'S PLANS FOR ANY PIPE, CONDUIT AND GROUND WIRE LOCATIONS.
2. CONCRETE PAD AND BOLLARDS SHALL BE INSTALLED PER UTILITY PROVIDER REQUIREMENTS.

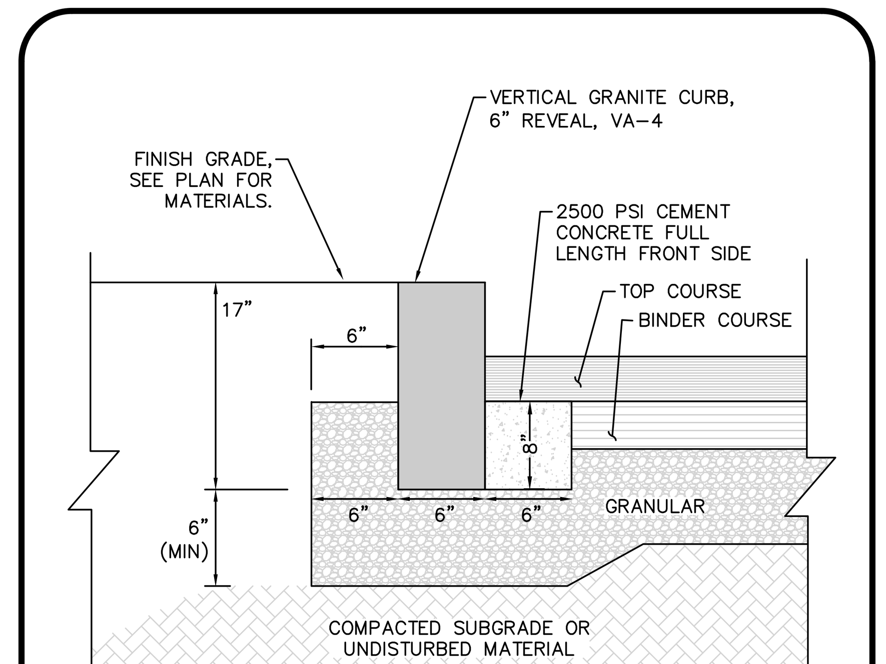
TRANSFORMER PAD DETAIL 13
NOT TO SCALE



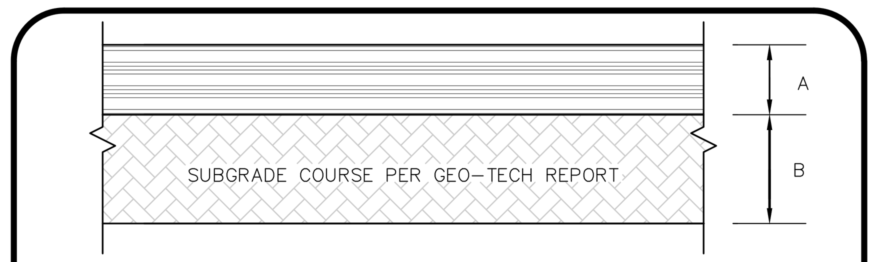
DOG PARK SURFACE 12
NOT TO SCALE



PRECAST CONCRETE CURB 11
NOT TO SCALE



VERTICAL GRANITE CURB 10
NOT TO SCALE

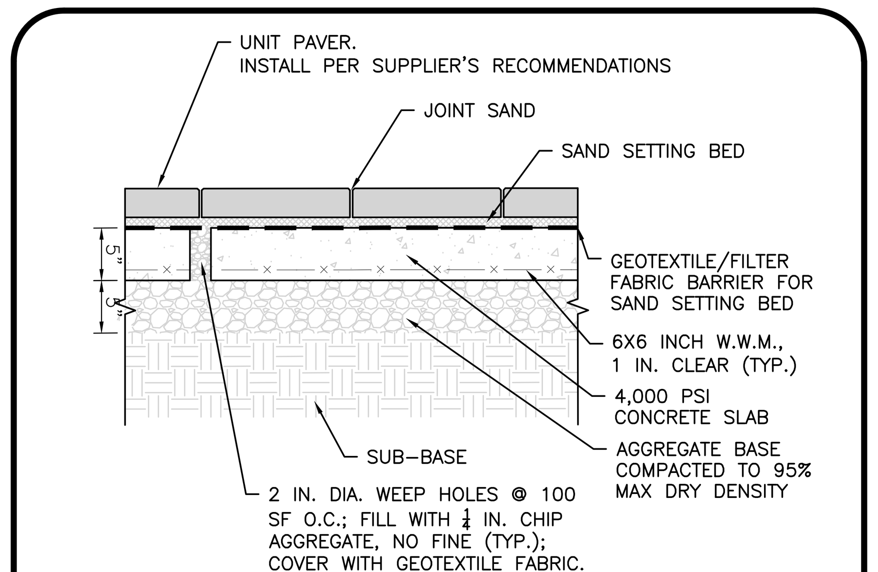


NOTES:
1. SURFACE COURSE, BASE, AND SUBGRADE SHALL BE PER GEOTECHNICAL ENGINEER'S RECOMMENDATIONS FOR LOCAL SOILS OR DRAINAGE CONDITIONS AND/OR METHODS.
2. SUBGRADE SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY (AS DETERMINED BY ASTM D1557).
3. COORDINATE PAVEMENT DETAIL WITH GEOTECHNICAL ENGINEER.

STANDARD DUTY PAVING
A= 1.5" ASPHALT CONCRETE - SURFACE COURSE (M.3.11.0, TABLE A, TOP COURSE)
2.5" ASPHALT CONCRETE - BINDER COURSE (M.3.11.0, TABLE A, BINDER COURSE)

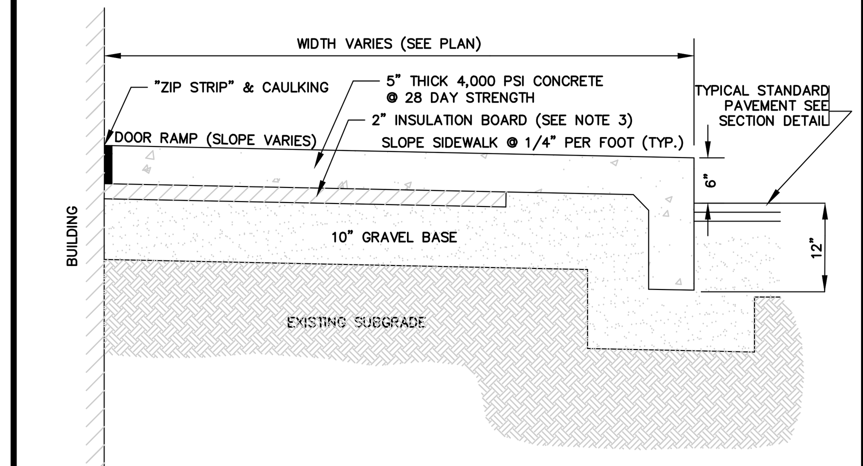
B= 12" SUBBASE COURSE (MASSDOT 1.03.0, TYPE B)

STANDARD DUTY BITUMINOUS PAVEMENT 9
NOT TO SCALE



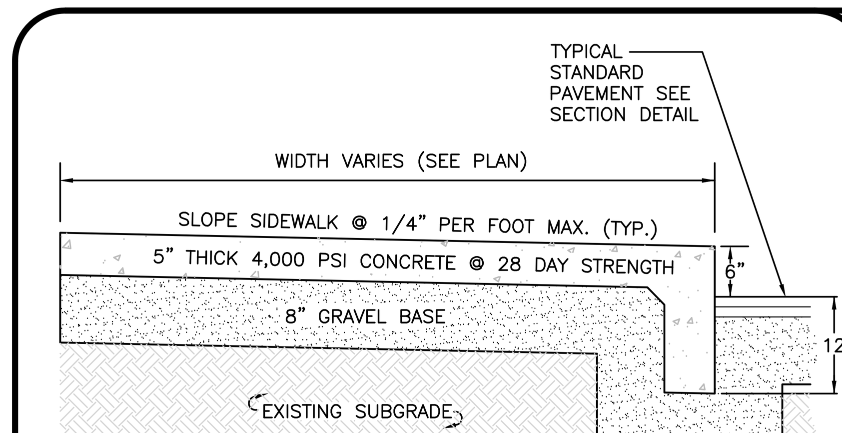
NOTES:
1. PAVER COLOR TO BE SELECTED BY OWNER AND ARCHITECT. PROVIDE SAMPLES AND SHOP DRAWINGS OF PAVERS TO OWNER FOR APPROVAL PRIOR TO ORDER.
2. SWEEP & REFILL RG+ POLYMERIC SAND, (COLOR TO BE APPROVED BY OWNER) AS AVAILABLE FROM TECHNISEAL, (1-800-465-7325) INTO HAND TIGHT JOINTS. REPEAT AS NECESSARY TO FILL. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
3. PROTECT GRANITE PAVER SURFACE WITH URETHANE SCUFF PAD DURING COMPACTION.

UNIT PAVERS 8
NOT TO SCALE



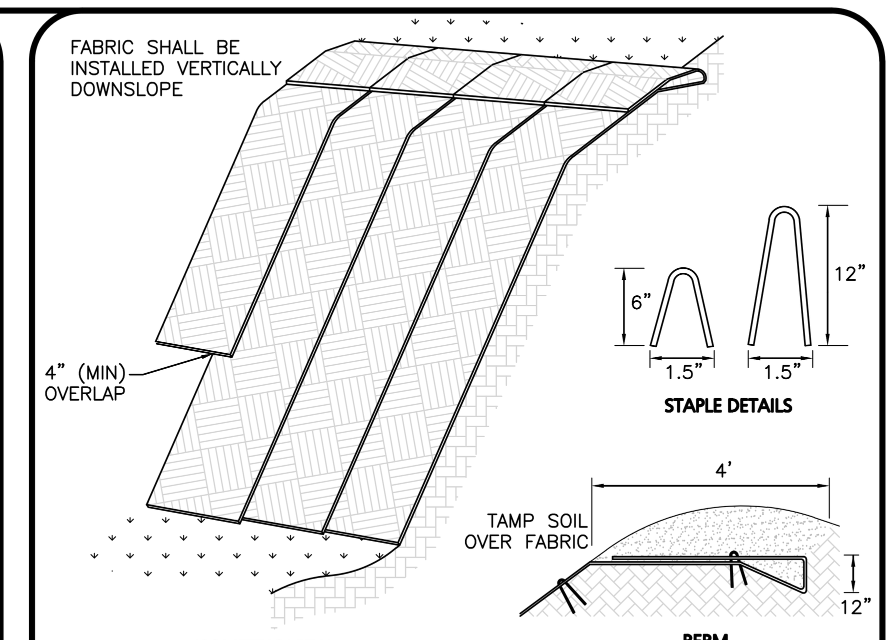
NOTES:
1. SIDEWALK TO HAVE TOOLED JOINTS IN A 5' x 5' (TYP.) GRID WITH EXPANSION JOINTS 15' ON CENTER AND PREMOLDED FILLER.
2. TOOLED JOINT 6" FROM FACE OF CURB
3. 2" RIGID EXTRUDED STYROFOAM NONEXPANDABLE INSULATION BOARD LIGHT BLUE IN COLOR. BOARD TO BE PLACED IN 2-2'x8' SECTIONS CENTERED ON AND EXTENDING 4' PERPENDICULAR FROM DOOR.
4. SEE PLAN FOR ELEVATIONS AT DOORS AND CURB

CONCRETE SIDEWALK @ DOOR 7
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

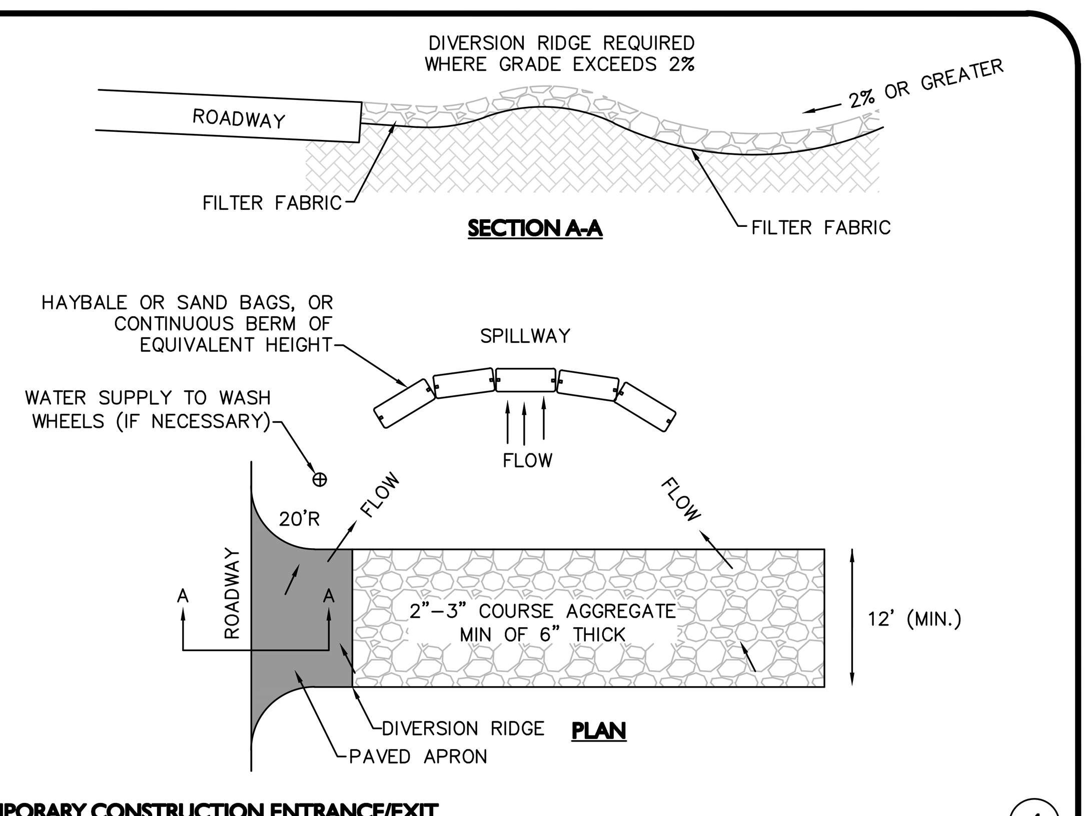
CONCRETE SIDEWALK 6
NOT TO SCALE



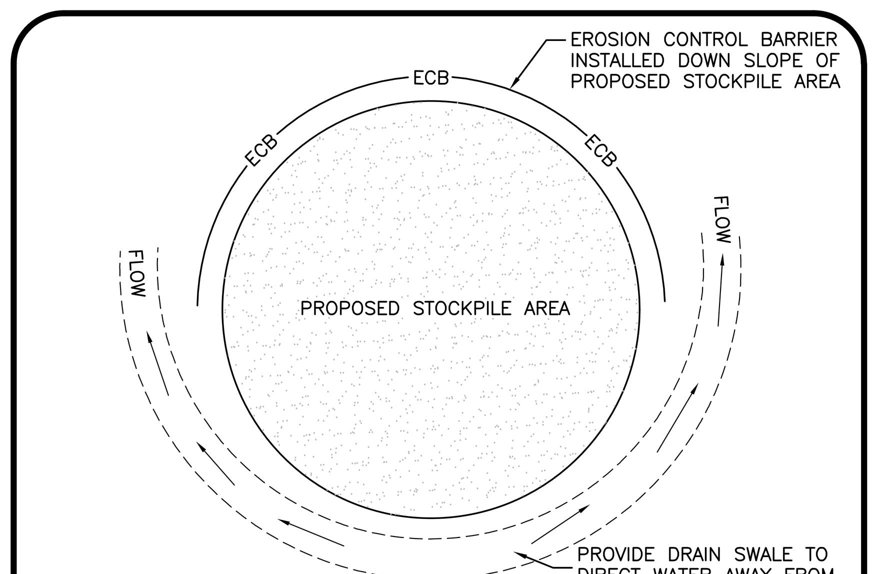
NOTE:
1. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. FABRIC SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING FABRIC.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
4. CHOOSE MATERIAL BASED ON SLOPE, SOILS, AND APPLICATION.

EROSION CONTROL FABRIC 5
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.
5. PAVE FIRST 20' OF CONSTRUCTION ENTRANCE.

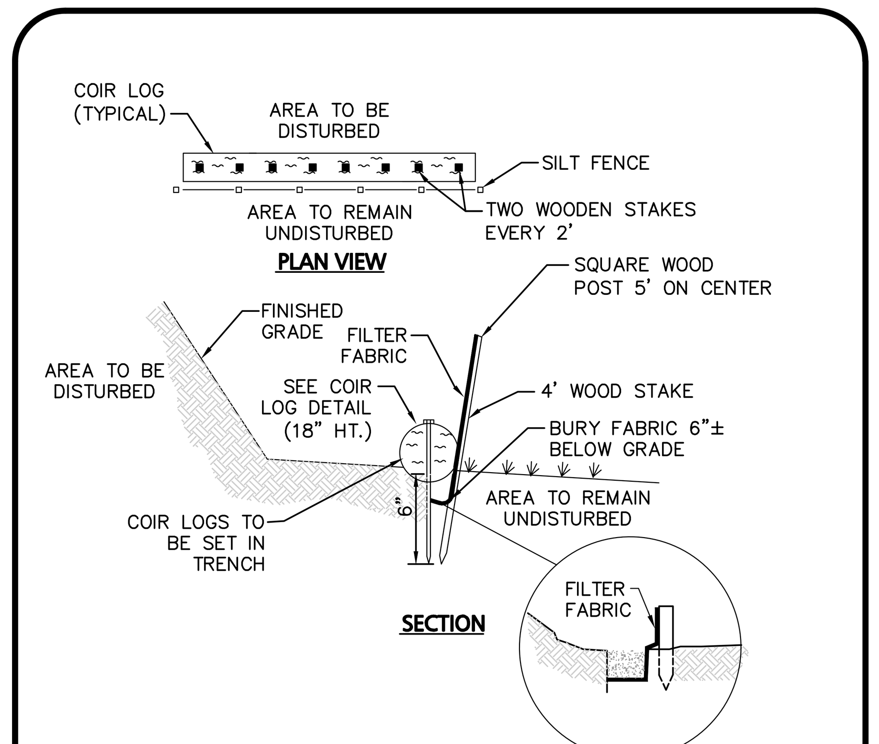


TEMPORARY CONSTRUCTION ENTRANCE/EXIT 4
NOT TO SCALE

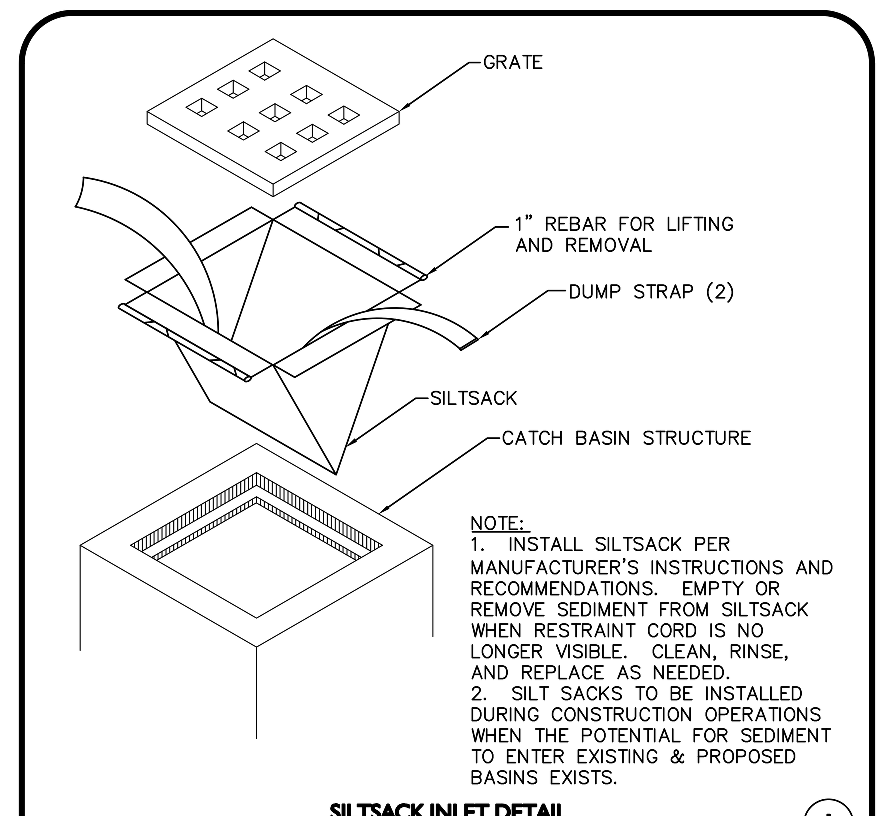


NOTES:
1. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR LESS THAN 90 DAYS SHALL BE COVERED WITH STRAW AND MULCH (AT 100LBS/1,000 SF), OR WITH AN ANCHORED TARP WITHIN 7 DAYS OR PRIOR TO ANY RAINFALL.
2. SOIL AND FILL STOCKPILES EXPECTED TO REMAIN IN PLACE FOR 90 DAYS OR MORE SHALL BE SEEDED 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 3
NOT TO SCALE



SILT FENCE AND COIR LOG 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 1
NOT TO SCALE

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PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	AS SHOWN
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

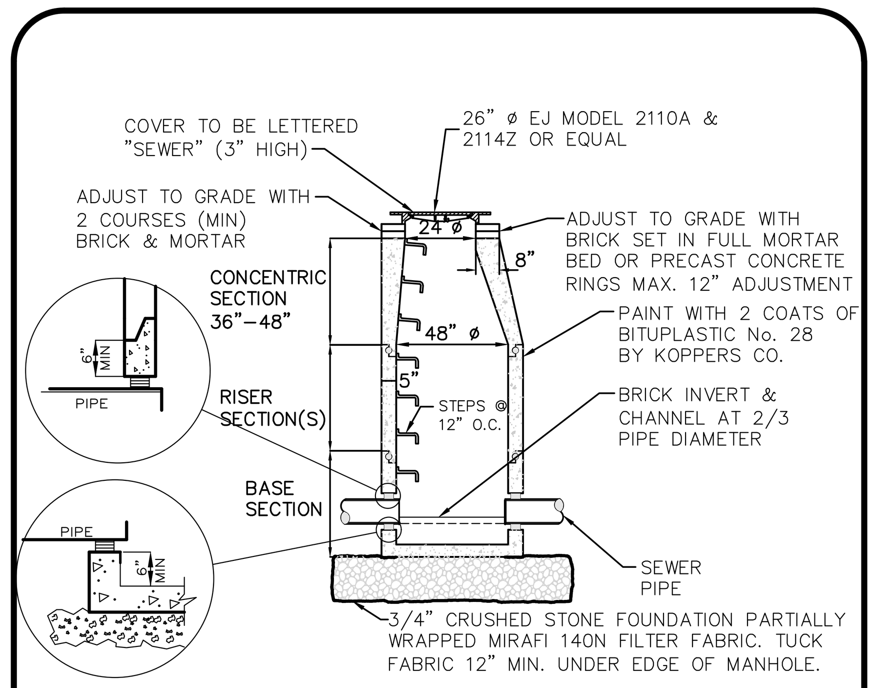
drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
DETAILS

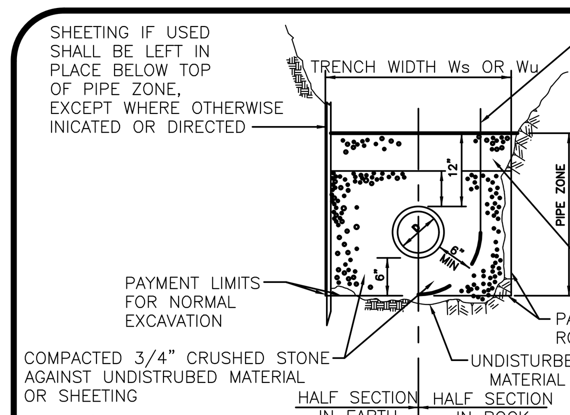
drawing number:
C-501



NOTES:

1. ALL INSIDE DROPS (IF NEEDED) REQUIRE A 5' DIAMETER

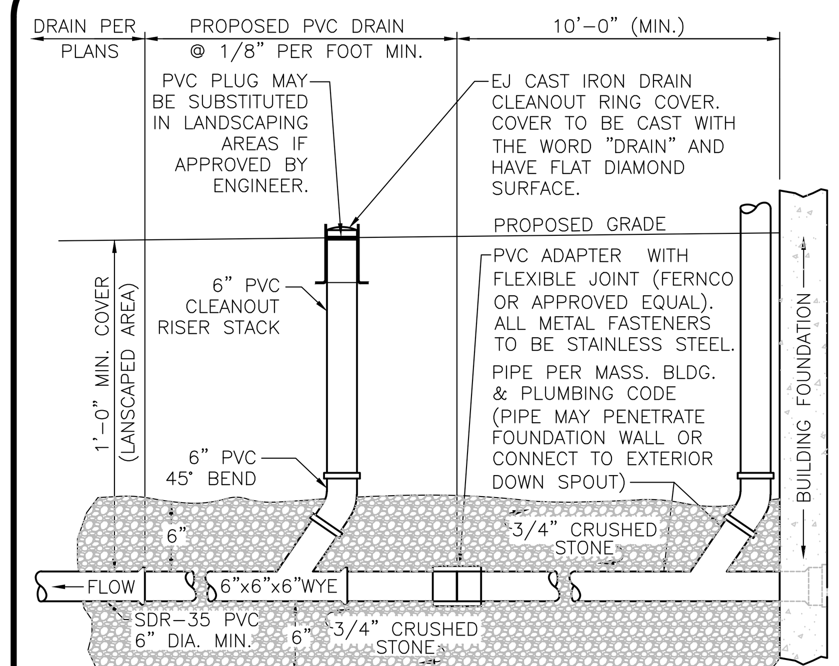
PRECAST CONCRETE SEWER MANHOLE (17)
NOT TO SCALE



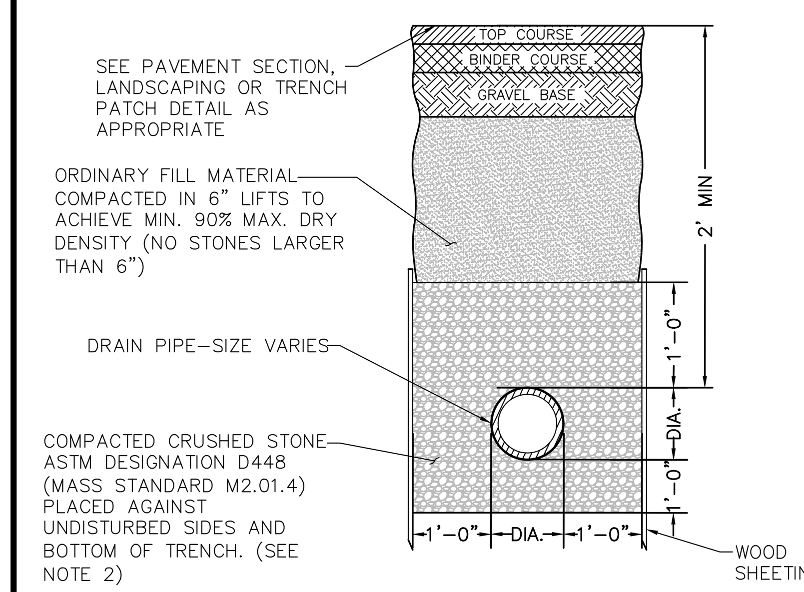
NOTES:

1. TRENCH BACKFILL TO BE USED WITHIN THE RIGHT-OF-WAY SHALL CONSIST OF EITHER GRAVEL BORROW MEETING MHD SPECIFICATION M1.03.0, TYPE "B" OR PROCESSED GRAVEL BORROW FOR SUBBASE MEETING MHD SPECIFICATION M1.03.1.
2. WHEE THE REMOVAL OF 100 SQUARE FEET OR LESS OF ASPHALT IS REQUIRED WITHIN THE RIGHT OF WAY, THEN THE TRENCH BACKFILL MATERIAL SHALL CONSIST OF CONTROLLED DENSITY FILL MEETING MHD SPECIFICATION M4.08.0, TYPE "1E" OR "2E".
3. TRENCH BACKFILL MATERIAL TO BE USED OF THE RIGHT-OF-WAY MAY CONSIST OF MATERIAL GENERATED DURING EXCAVATIONS PROVIDED ALL STONES GREATER THAN 4" ARE REMOVED PRIOR TO PLACEMENT AND COMPACTION
4. GRANULAR TRENCH BACKFILL MATERIAL USED WITHIN THE RIGHT-OF-WAY SHALL BE PLACED IN MAXIMUM 6" LIFTS AND MECHANICALLYCOMPACTED TO A MINIMUM OF 95% OF THE MATERIAL'S MAXIMUM DRY DENSITY AND TO 90% ELSEWHERE AS DETERMINED BY ASTM D 1557.

SEWER TRENCH (16)
NOT TO SCALE



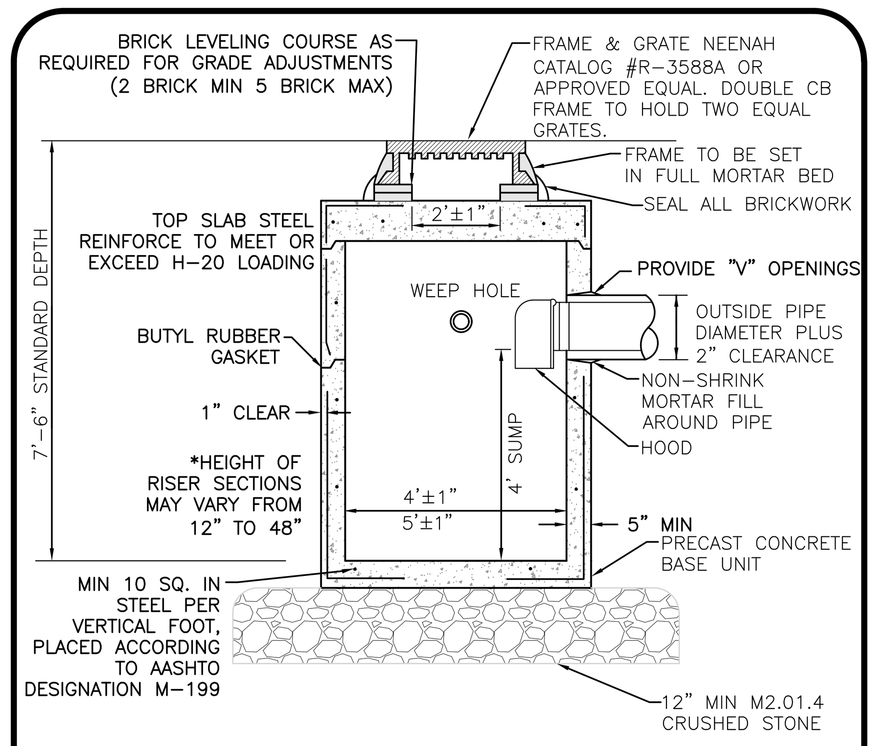
ROOF DRAIN (15)
NOT TO SCALE



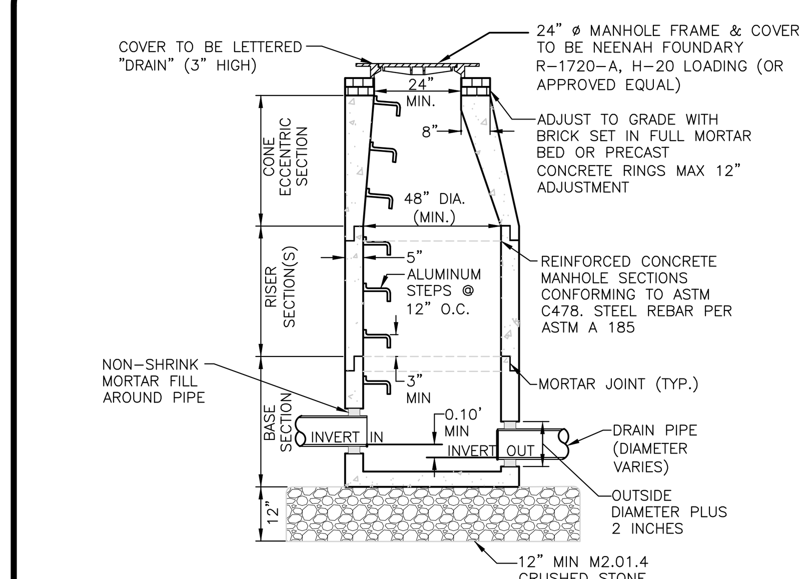
NOTES:

1. SHEETING, WHEN REQUIRED, TO BE CUT OFF AT LEAST 5' BELOW STREET AND A MINIMUM OF 1' ABOVE TOP OF PIPE. WOOD SHEETING DRIVEN BELOW MID–DIAMETER OF THE PIPE SHALL BE LEFT IN PLACE. STEEL SHEETING DRIVEN BELOW MID–DIAMETER MAY BE WITHDRAWN IF APPROVED IN WRITING BY THE ENGINEER. FOR PVC PIPE ALL SHEETING DRIVEN BELOW MID–DIAMETER SHALL BE LEFT IN PLACE.
2. WHEN APPROVED BY THE ENGINEER FOR PIPES OTHER THAN PVC, SELECTED GRAVEL FILL MATERIAL MAY BE USED FROM MID–DIAMETER OF PIPE TO 12" ABOVE TOP OF PIPE. NO STONES LARGER THAN 2" IN ANY DIMENSION WILL BE PERMITTED IN THIS AREA – MASSDOT MATERIAL STANDARD M1.03.0 TYPE C.
3. PROVIDE AT LEAST ONE IMPERVIOUS DAM IN GRAVEL BEDDING BETWEEN EACH MANHOLE WHERE DIRECTED, OR EVERY 300 FT, WHICHEVER IS LESS.
4. BEDDING MATERIAL FOR PVC PIPE SHALL MEET THE REQUIREMENTS OF ASTM D2321 CLASS I OR CLASS II EMBEDMENT MATERIALS.

DRAINAGE TRENCH (14)
NOT TO SCALE

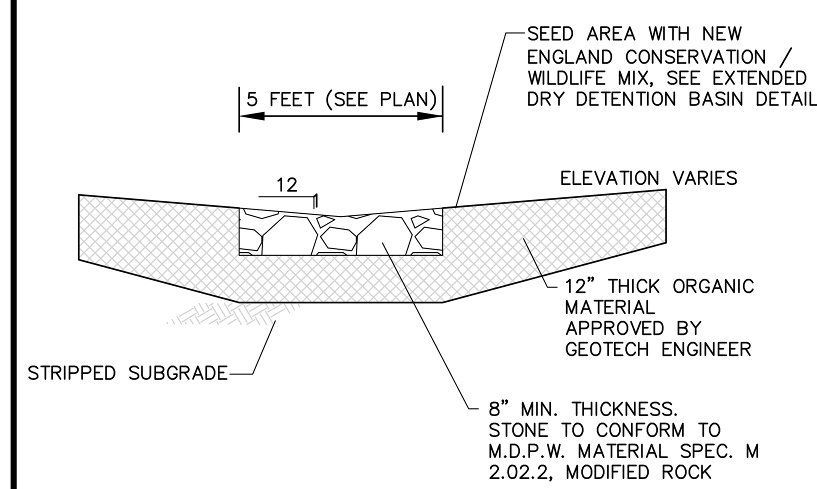


CATCH BASIN (13)
NOT TO SCALE

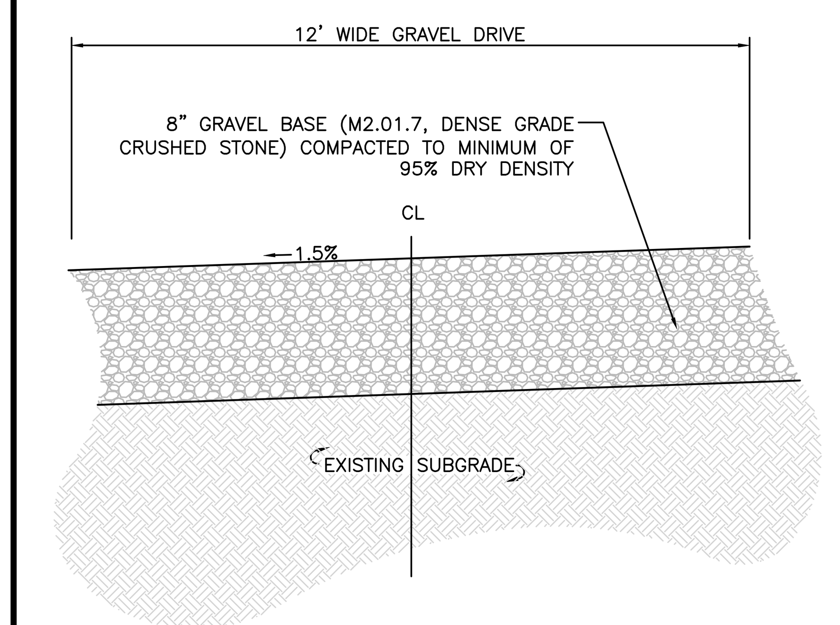


NOTE:
1. THE MANHOLE, INCLUDING ALL COMPONENT PARTS, SHALL HAVE ADEQUATE SPACE AND STRENGTH QUALITIES CONSIDERED NECESSARY FOR THE INTENDED SERVICE. SPACE REQUIREMENT AND CONFIGURATIONS SHALL BE AS SHOWN ON THE DRAWING. THE COMPLETE STRUCTURE SHALL BE OF SUCH MATERIAL AND QUALITY AS TO WITHSTAND (H–20 LOADING) WITHOUT FAILURE. VERTICAL FOOT OF MANHOLE.

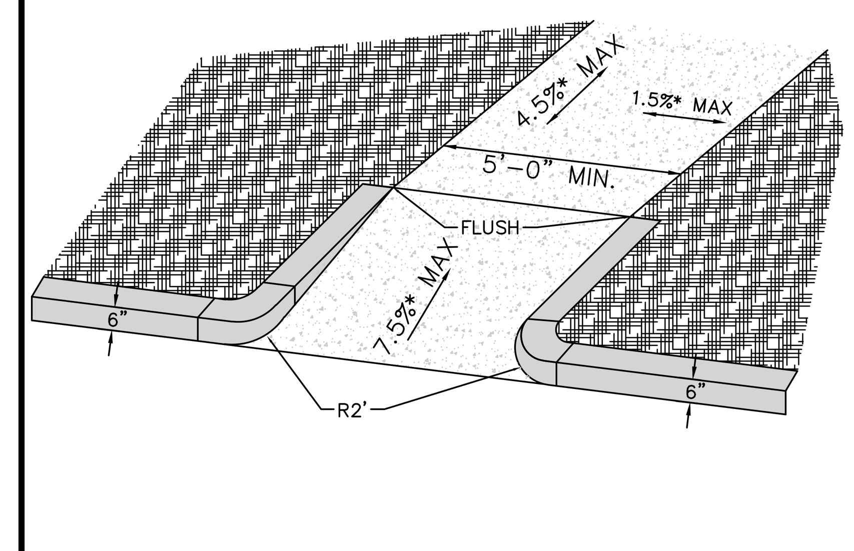
PRECAST DRAIN MANHOLE (12)
NOT TO SCALE



BASIN MODIFIED ROCK FILL RIPRAP CHANNEL (11)
NOT TO SCALE

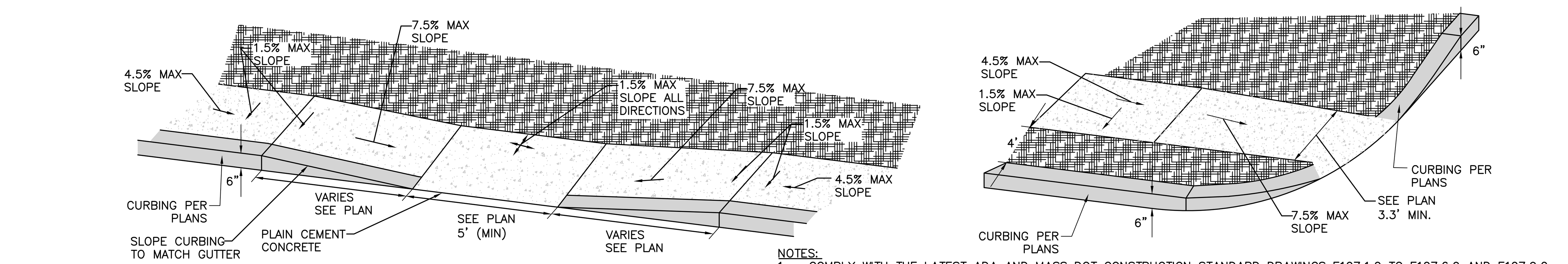


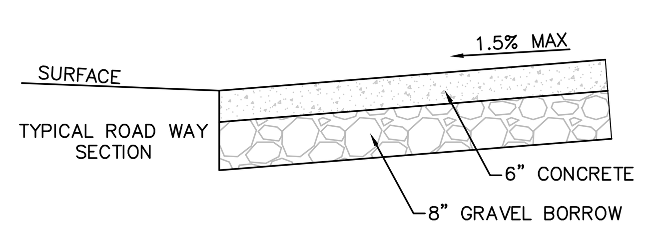
GRAVEL BASIN ACCESS DRIVE (10)
NOT TO SCALE



NOTES:
1. * = TOLERANCE FOR CONSTRUCTION ±0.5%

ADA RAMP (A) (9)
NOT TO SCALE

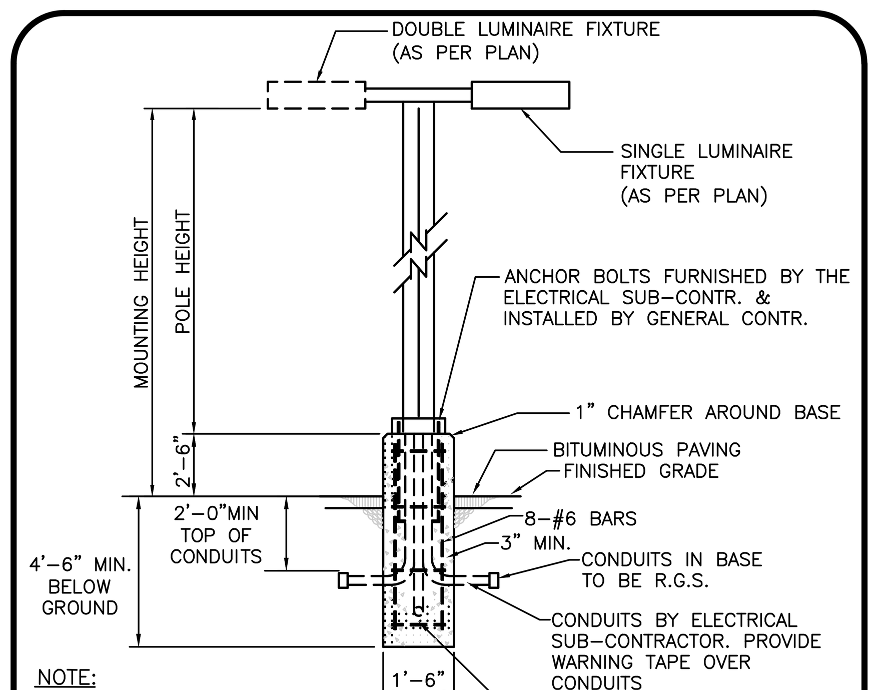




SECTION VIEW

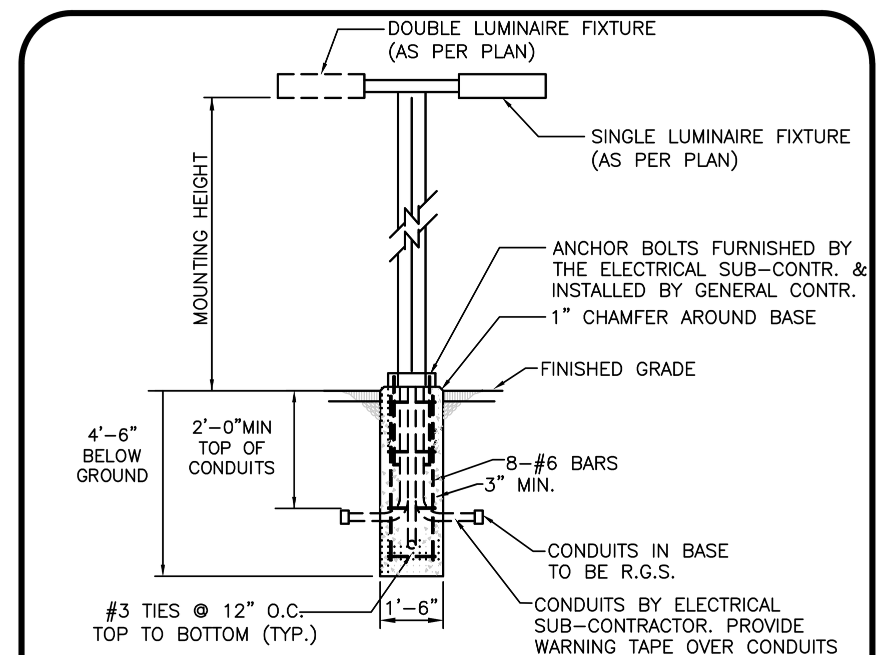
NOTES:
1. COMPLY WITH THE LATEST ADA AND MASS DOT CONSTRUCTION STANDARD DRAWINGS E107.1.0 TO E107.6.9 AND E107.9.0
2. THE DIMENSIONS SHOWN AT ROADWAY EDGE ARE FIXED DISTANCES.
3. RAMP CROSS SECTION TO BE THE SAME AS ADJACENT SIDEWALK; I.E. DEPTH OF SURFACE AND FOUNDATION.
4. PORTLAND CEMENT CONCRETE RAMPS ARE TO BE TEXTURED BY BROOMING IN A DIRECTION PARALLEL TO THE LENGTH OF THE RAMP.
5. IN NO CASE ARE THE RAMPS TO BE PLACED BEHIND THE STOP LINE.
6. 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.

ACCESSIBLE RAMP & CURB TRANSITION (8)
NOT TO SCALE



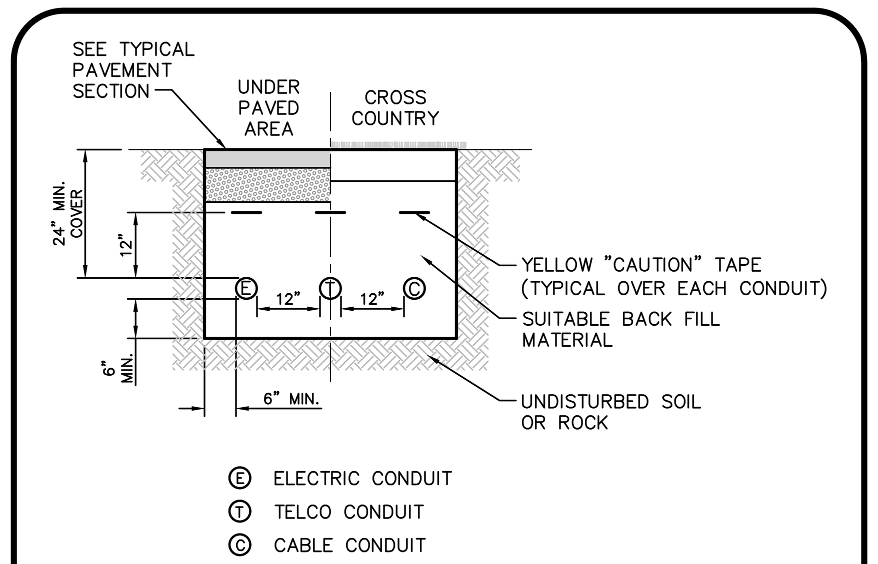
NOTE:
SIZE AND FOOTING FOR BASES TO BE VERIFIED BY STRUCTURAL ENGINEER.

RAISED LIGHT POLE BASE (7)
NOT TO SCALE



NOTE:
SIZE AND FOOTING FOR BASES TO BE VERIFIED BY STRUCTURAL ENGINEER.

FLUSH LIGHT POLE BASE (6)
NOT TO SCALE



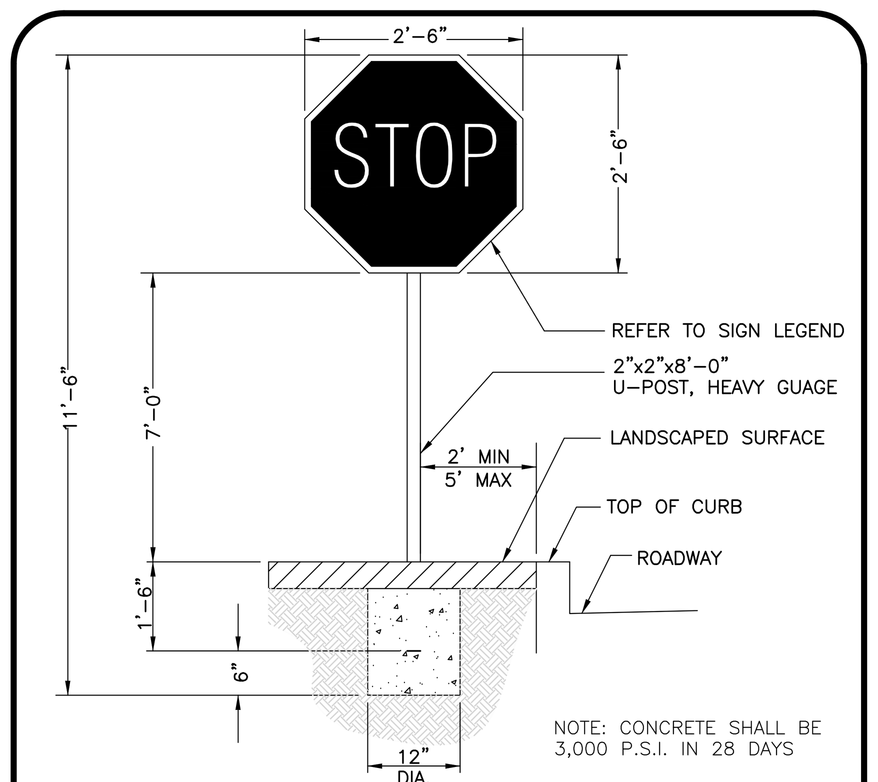
NOTES:
1. SCHEDULE 80 PVC CONDUIT REQUIRED UNDER ROAD AND DRIVEWAY SURFACES.
2. ALL UTILITY INSTALLATION REQUIREMENTS, SEPARATIONS, AND CONDUIT SIZES TO BE VERIFIED WITH EACH UTILITY COMPANY PRIOR TO INSTALLATION OF ANY UNDERGROUND UTILITY CONDUIT.
3. SEE SITE ELECTRICAL PLAN FOR SPECIFIC DETAILS

BURIED CONDUIT DETAIL (5)
NOT TO SCALE

DESC.	SIGN	SIZE	MOUNTING HEIGHT	DESCRIPTION	REFLECTORIZED
R1–1	STOP	30"x30"	7' – 0"	WHITE ON RED	YES
R7–8		12"x20"	7' – 0"	WHITE ON BLUE	YES
R7–8 (MODIFIED)		12"x20"	7' – 0"	WHITE ON BLUE	YES
R2–1	SPEED LIMIT 15	24"x30"	7' – 0"	BLACK ON WHITE	YES
R8–3 (MODIFIED)	DROP OFF ZONE	12"x18"	7' – 0"	RED ON WHITE	YES
R8–1M (MODIFIED)	NO PARKING SHUTTLE ONLY	12"x18"	7' – 0"	RED ON WHITE	YES

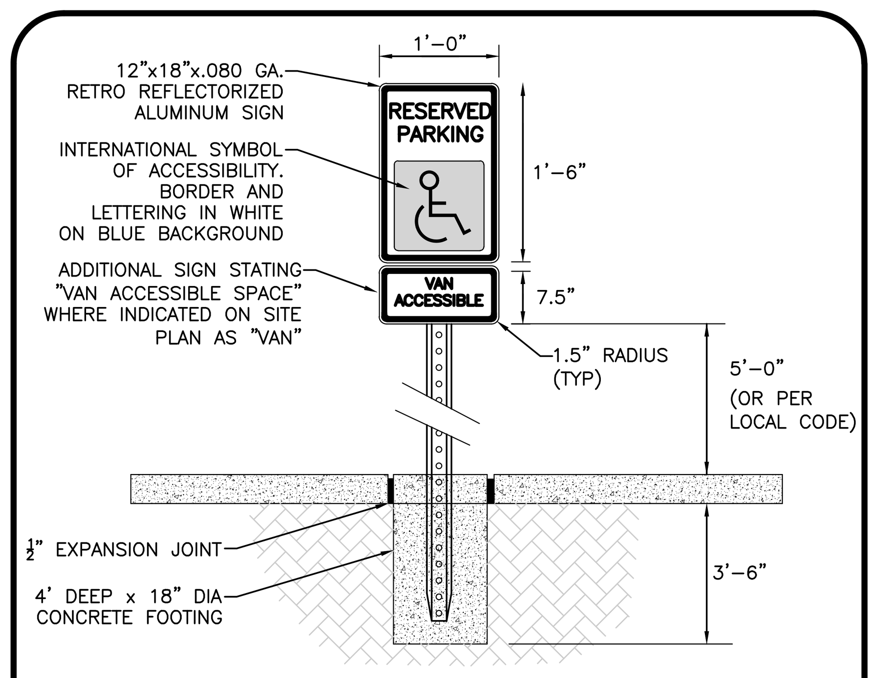
1. TRAFFIC AND SAFETY SIGNAGE SHALL COMPLY WITH MUTCD STANDARDS.

SIGN TABLE (4)
NOT TO SCALE



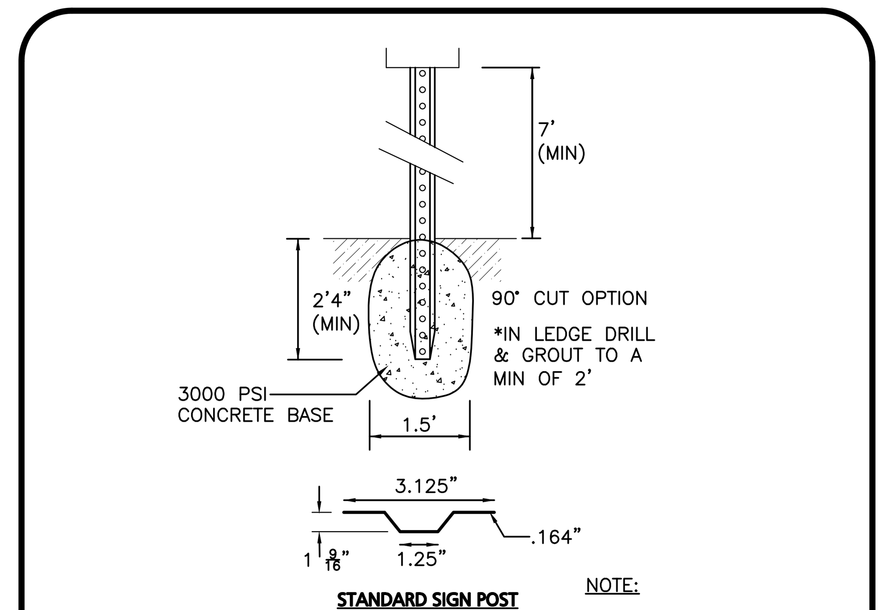
NOTE: CONCRETE SHALL BE 3,000 P.S.I. IN 28 DAYS

STOP SIGN DETAIL (3)
NOT TO SCALE



NOTES:
1. SPECIFIC CODE SHALL BE REFERENCED FOR LOCAL AND STATE REQUIREMENTS.
2. PROVIDE (1) SIGN PER ADA SPACE. SEE SITE PLAN FOR EXACT LOCATION.
3. EXPANSION JOINT MATERIAL NOT REQUIRED WITH FLEXIBLE PAVEMENT.

ADA ACCESSIBLE PARKING SIGN (2)
NOT TO SCALE



STANDARD SIGN POST
NOT TO SCALE

NOTE:
1. HEAVY DUTY GUAGE

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.

SIGN POST DETAIL (1)
NOT TO SCALE

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issuance: PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	AS SHOWN
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration: DRAFT

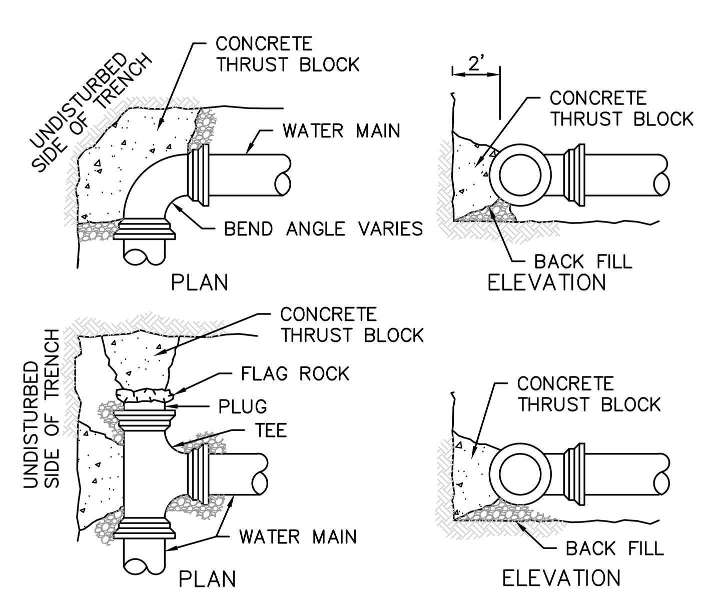
drawing name: DETAILS

drawing number: C-502

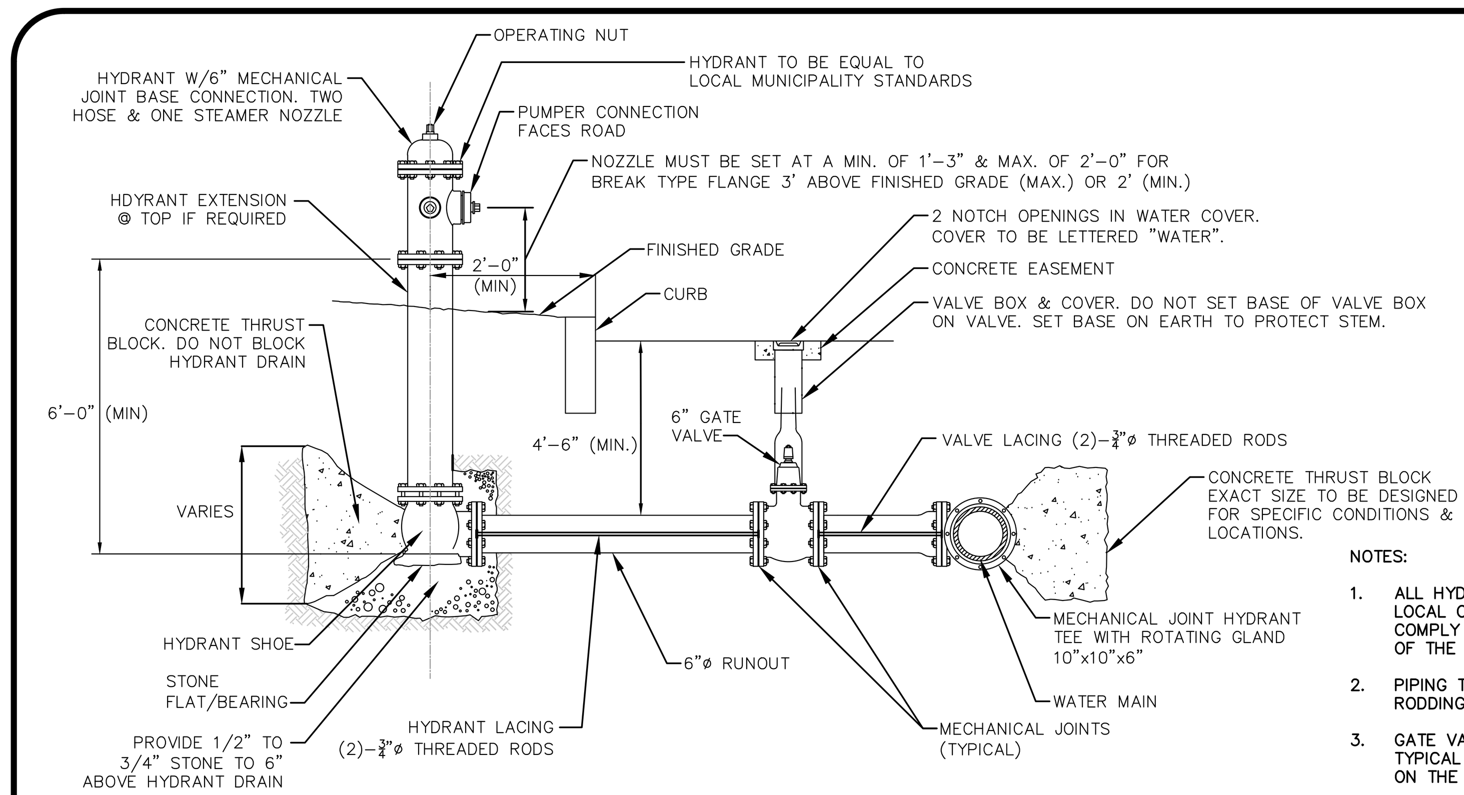
MINIMUM THRUST BLOCK BEARING AREAS				
PIPE DIAMETER	90° BEND (SQ. FT.)	45° BEND (SQ. FT.)	22.5° BEND (SQ. FT.)	TEES, PLUGS, CAPS & HYDRANTS (SQ.FT.)
6"	5	3	3	4
8"	9	6	3	9
10"	13	7	4	12
12"	20	10	5	16

NOTES:
1. ALL WATER MAIN FITTINGS, BENDS, TEES, PLUGS ETC. SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. SIZE OF CONCRETE THRUST BLOCKS SHALL BE AS NOTED BELOW.
4. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
5. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
6. THE BELOW PREDICATED ON A WATER PRESSURE OF 225 PSI AND A SOIL RESISTANCE OF 2000 PSF (TILL). FOR OTHER SOILS THE VALUES IN THE ABOVE TABLE SHALL BE MULTIPLIED BY:

SOFT CLAY	4
SAND	2
SAND & GRAVEL	1.33
SHALE	0.4

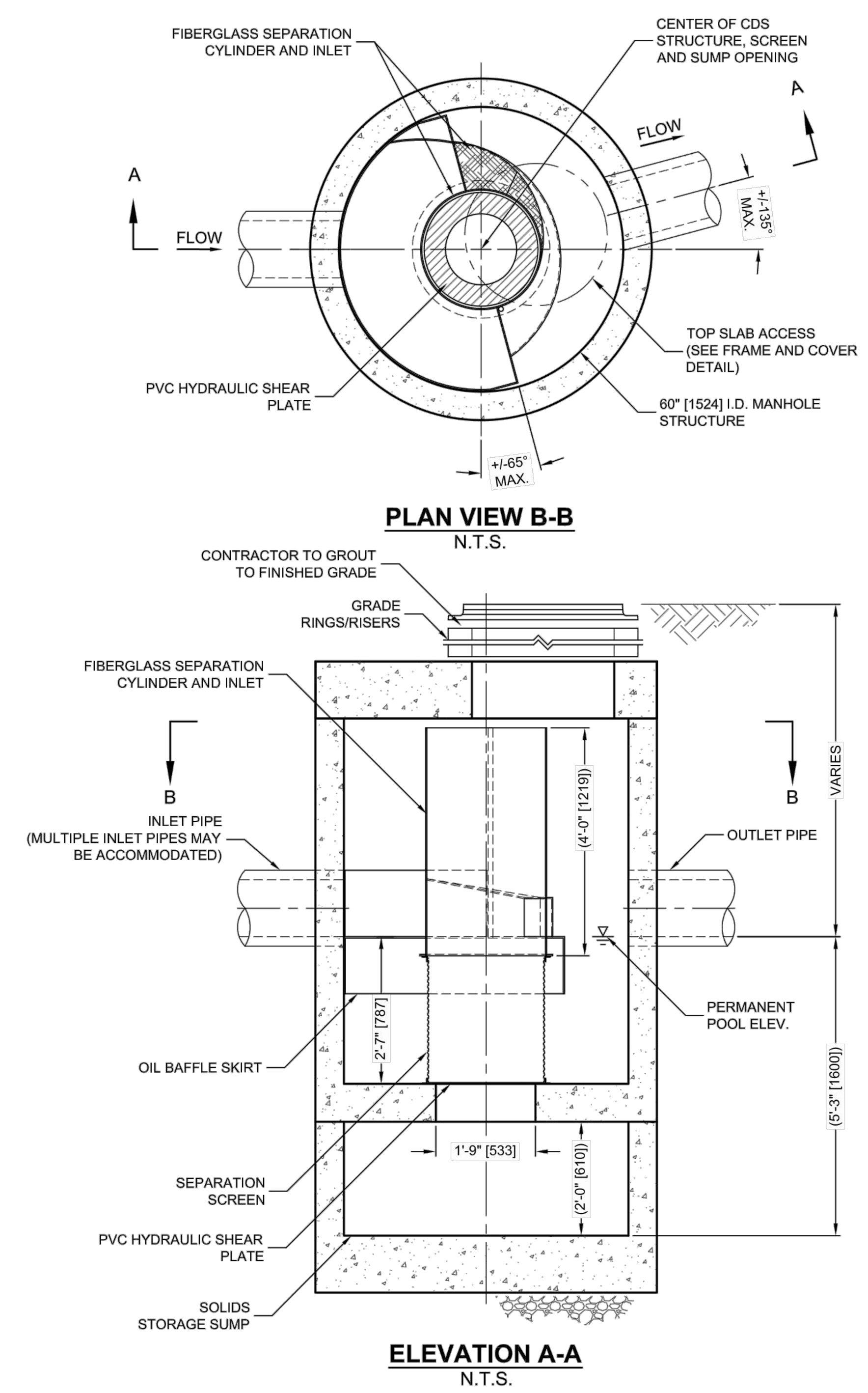


THRUST BLOCK DETAIL
NOT TO SCALE
11



NOTES:
1. ALL HYDRANTS, VALVES AND LOCAL CONNECTIONS SHALL COMPLY WITH THE SPECIFICATIONS OF THE LOCAL MUNICIPALITY.
2. PIPING TO BE RESTRAINED WITH RODDING OR RETAINING GLANDS.
3. GATE VALVE INSTALLATION IS TYPICAL FOR ALL GATES SHOWN ON THE DRAWINGS.

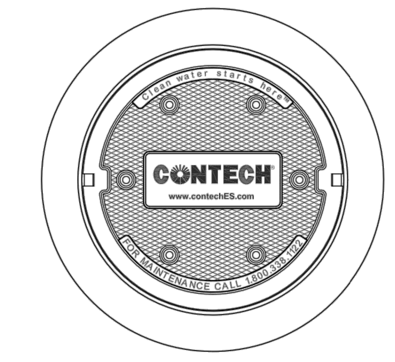
FIRE HYDRANT CONNECTION
NOT TO SCALE
10



CDS2020-5-C DESIGN NOTES

THE STANDARD CDS2020-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



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

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

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

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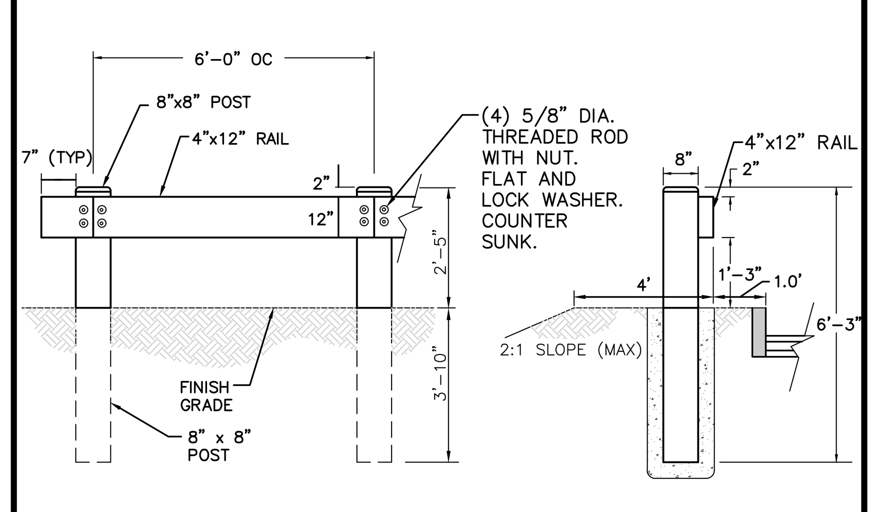
CDS2020-5-C
INLINE CDS
STANDARD DETAIL

WATER QUALITY STRUCTURE - CDS 2020-5-C
NOT TO SCALE
9

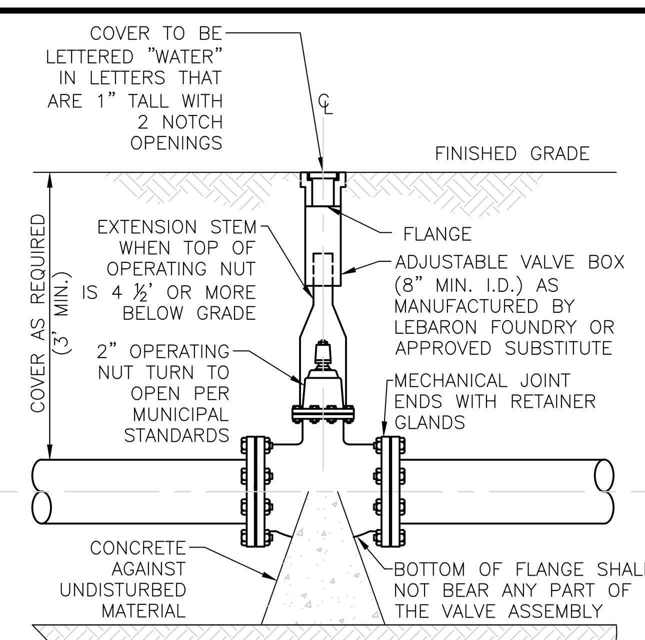


FRONT ELEVATION

TYPICAL SECTION AT CURB

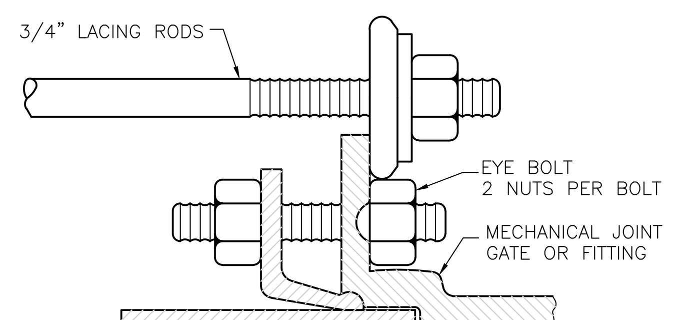
NOTES:
1. ALL TIMBER STOCK TO BE PRESSURE TREATED.
2. ALL HARDWARE TO BE GALVANIZED STEEL.

WOOD BEAM GUARDRAIL
NOT TO SCALE
8



NOTE:
1.) CONTRACTOR MAY USE ANCHOR TEES AT HIS OPTION.
2.) HYDRANTS AND VALVES TO OPERATE PER MUNICIPAL STANDARDS

GATE VALVE
NOT TO SCALE
7

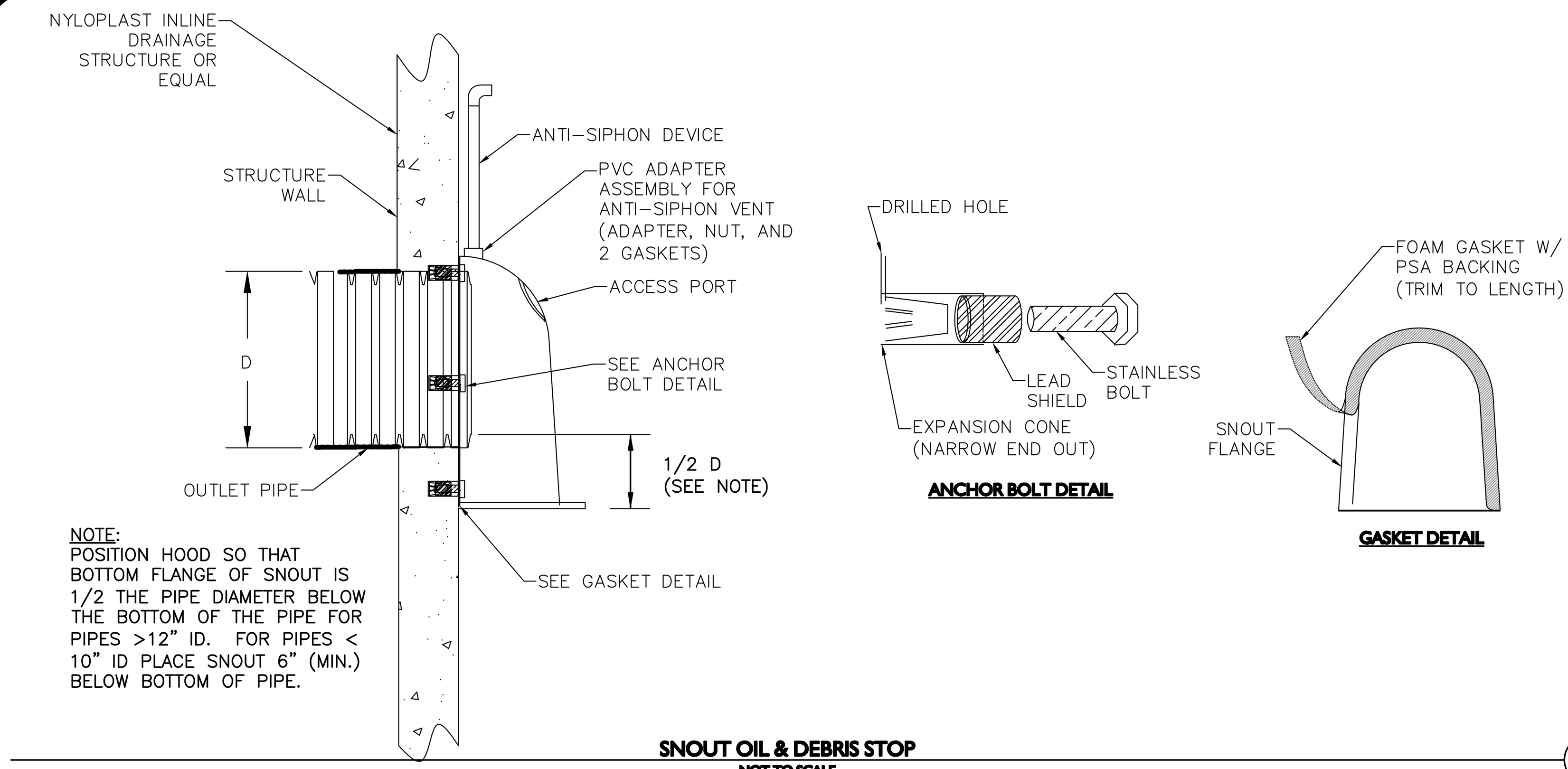


PIPE SIZE	No. LACING RODS
4", 6" & 8"	2 - 3/4" *
10" & 12"	4 - 3/4" *
16"	4 - 3/4" *
20"	6 - 3/4" *

* STANDARD LENGTHS ARE 6' & 10'. COUPLINGS MAY BE USED FOR LONGER LENGTHS.

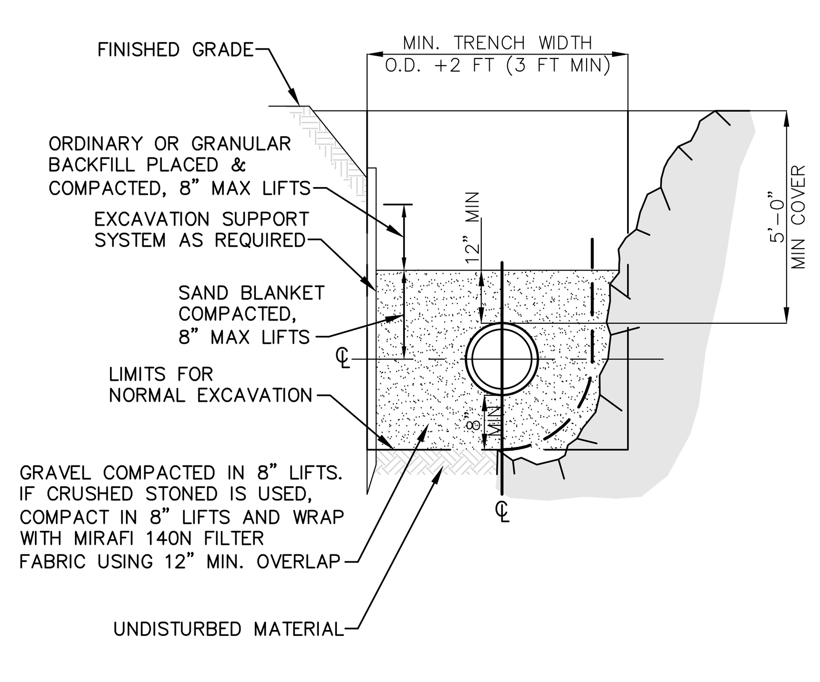
NOTES:
1. NUMBER OF LACING RODS IS BASED ON MAXIMUM PRESSURE OF 125 P.S.I. IN MAIN.
2. EYE-BOLTS AND LACING RODS ARE TO BE FABRICATED FROM A-36 STEEL.
3. STEEL LACING RODS SHALL HAVE A YIELD STRESS OF NOT LESS THAN 36,000 P.S.I.
4. EYE-BOLTS SHALL HAVE A MINIMUM TENSILE STRENGTH OF 7,000 LBS. EACH.

MECHANICAL JOINT LACING DETAIL
NOT TO SCALE
6



NOTE:
POSITION HOOD SO THAT BOTTOM FLANGE OF SNOUT IS 1/2 THE PIPE DIAMETER BELOW THE BOTTOM OF THE PIPE FOR PIPES >12" ID. FOR PIPES < 10" ID PLACE SNOUT 6" (MIN.) BELOW BOTTOM OF PIPE.

SNOUT OIL & DEBRIS STOP
NOT TO SCALE
5

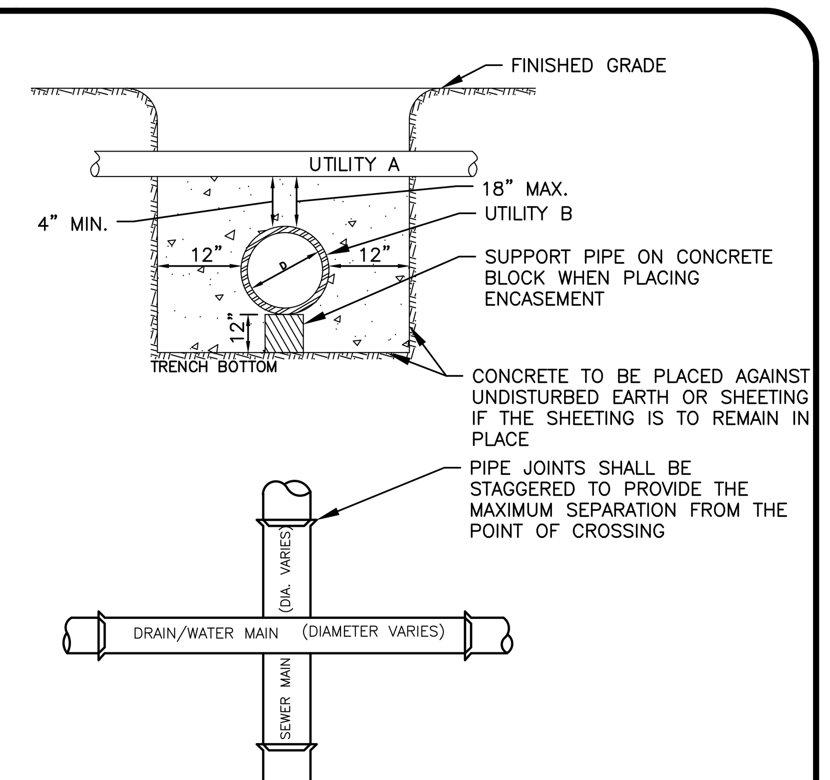


WATER TRENCH SECTION
NOT TO SCALE
4

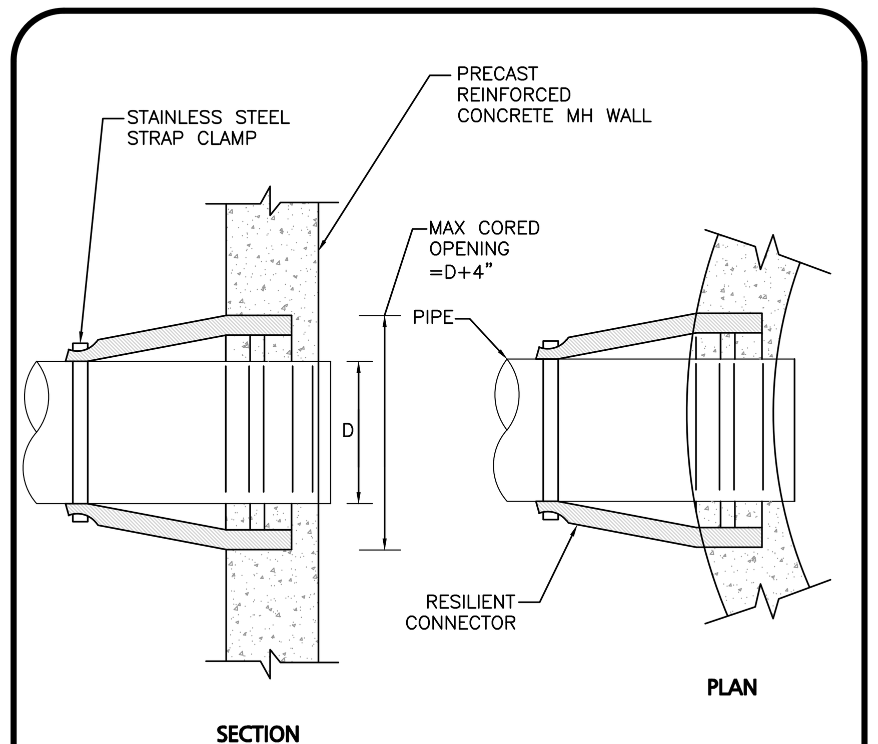
NOTES:

WHENEVER CONDITIONS PREVENT A LATERAL SEPARATION OF 10 FEET BETWEEN A SEWER MAIN AND A WATER/DRAIN MAIN:

1. THE WATER/DRAIN MAIN SHALL BE LAID IN A SEPARATE TRENCH AND THE DIFFERENCE IN ELEVATION BETWEEN THE WATER/DRAIN MAIN AND THE SEWER MAIN SHALL BE AT LEAST 18 INCHES.
2. THE PIPE CROSSING SHALL OCCUR AS CLOSE TO 90° AS PRACTICABLE.
3. THE PIPE JOINTS SHALL BE STAGGERED TO PROVIDE THE MAXIMUM SEPARATION FROM THE POINT OF CROSSING.
4. THE CROSSING SHALL BE ENCASED IN CONCRETE FOR THE ENTIRE WIDTH OF THE TRENCH AND FOR A DISTANCE OF 10 LINEAR FEET CENTERED ON THE CROSSING.
5. UTILITIES A AND B CAN BE EITHER NEW OR EXISTING.
6. WHEN ONE UTILITY IS A SANITARY SEWER. IT IS PREFERABLE TO BE POSITIONED AS SHOWN FOR UTILITY B.
7. ENCASEMENT EXTENDS 10'-0" ON EACH SIDE OF THE CENTERLINE OF UTILITY A.
8. PIPE MUST BE BRACED VERTICALLY AND HORIZONTALLY TO PREVENT FLOATATION DURING PLACEMENT OF CONCRETE.

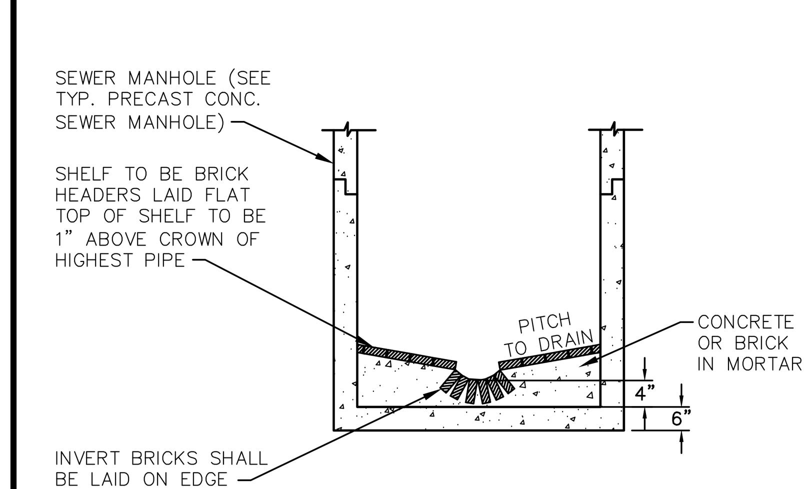


SEWER, WATER/DRAIN CROSSING DETAIL
NOT TO SCALE
3



WATERTIGHT RESILIENT CONNECTION TO SEWER MANHOLES
NOT TO SCALE
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 FLOW THROUGH CHANNEL.



NOTE:
INVERT & SHELF TO BE PLACED AFTER LEAKAGE TEST

TYPICAL BRICK INVERT SECTION FOR SEWER MANHOLES
NOT TO SCALE
1

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issuance:
PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	AS SHOWN
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

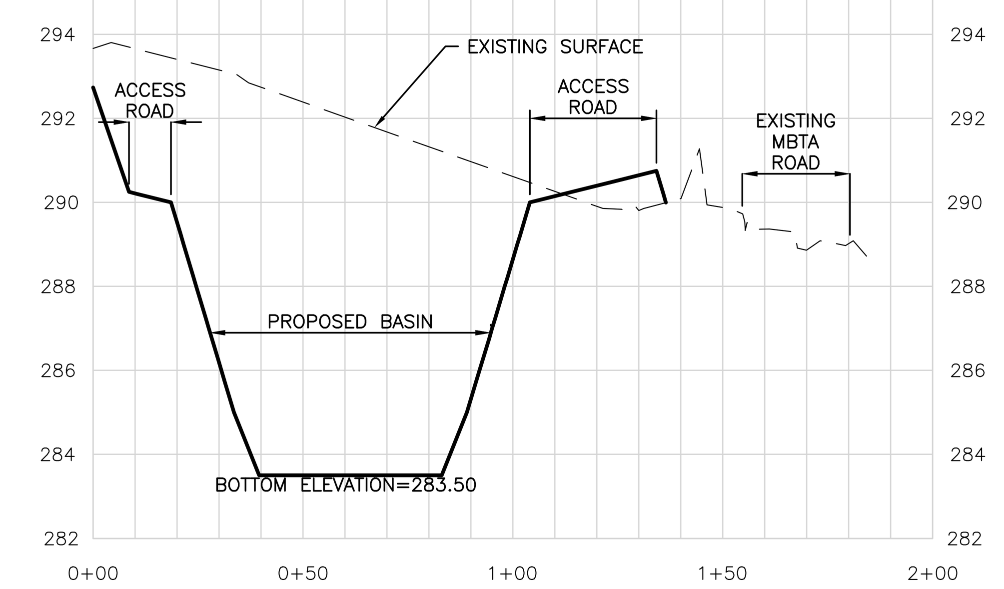
drawing revisions:

No.	Description	Date

registration:
DRAFT

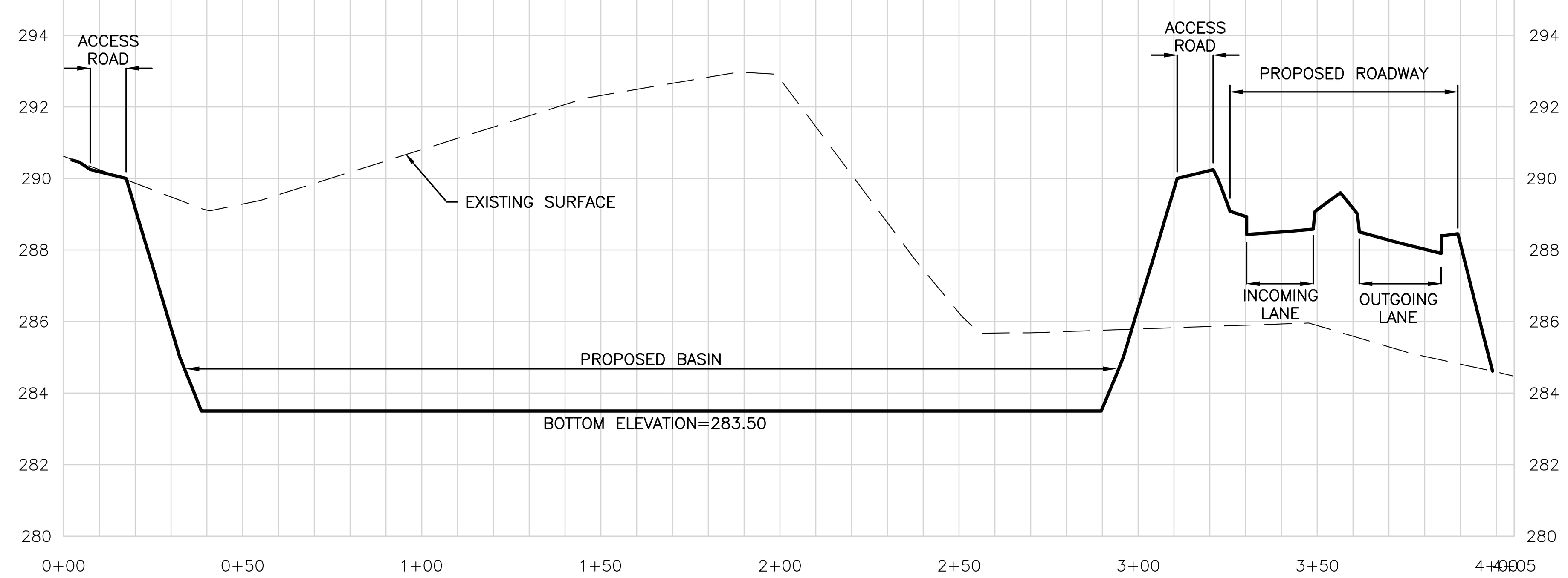
drawing name:
DETAILS

drawing number:
C-503



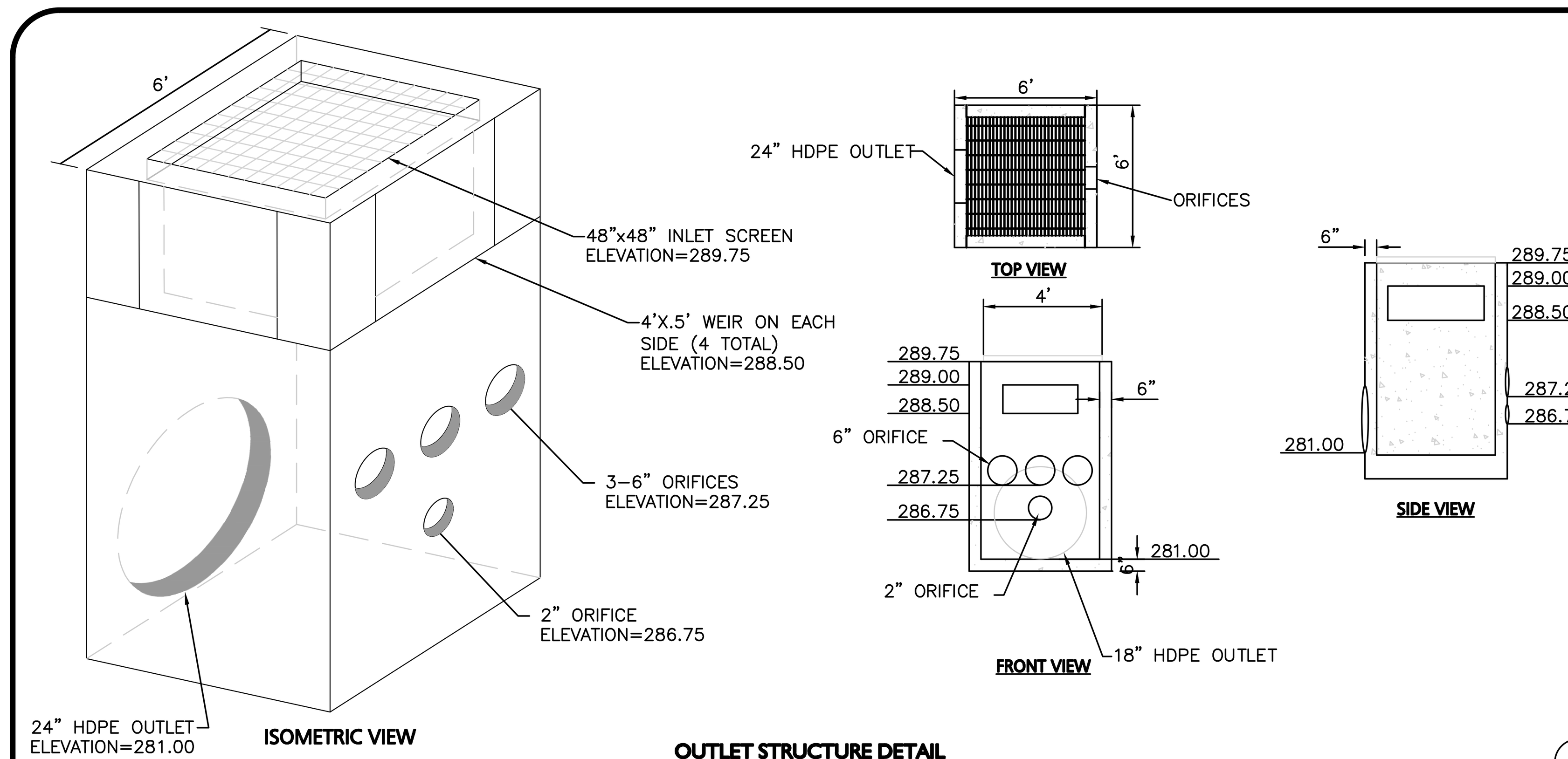
PROPOSED BASIN PROFILE
HORIZONTAL SCALE: 1"=30' - VERTICAL SCALE: 1"=3'

7



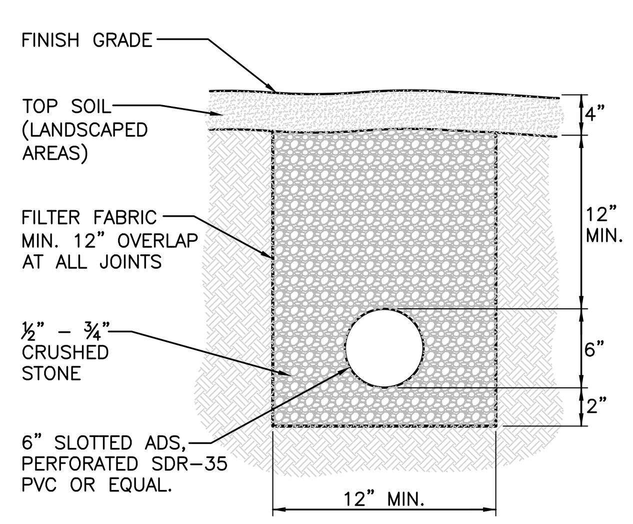
PROPOSED BASIN PROFILE
HORIZONTAL SCALE: 1"=30' - VERTICAL SCALE:1"=3'

6



OUTLET STRUCTURE DETAIL
NOT TO SCALE

5



1. FILTER FABRIC TO BE MODEL MIRAFI 140N OR APPROVED ALTERNATE.
2. UNDERDRAIN TO BE LAID AT A MINIMUM SLOPE OF 0.5%.

UNDERDRAIN DETAIL
NOT TO SCALE

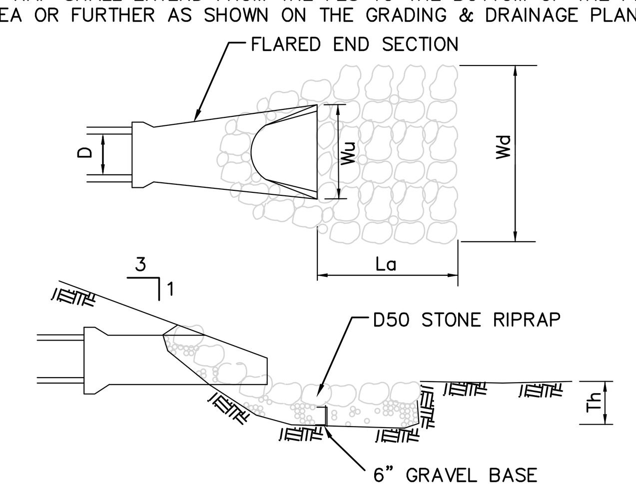
4

RIPRAP SIZING CHART

FES#	D	Q100	La	Wu	Wd	Th	D50
1							
2							
3							
4							

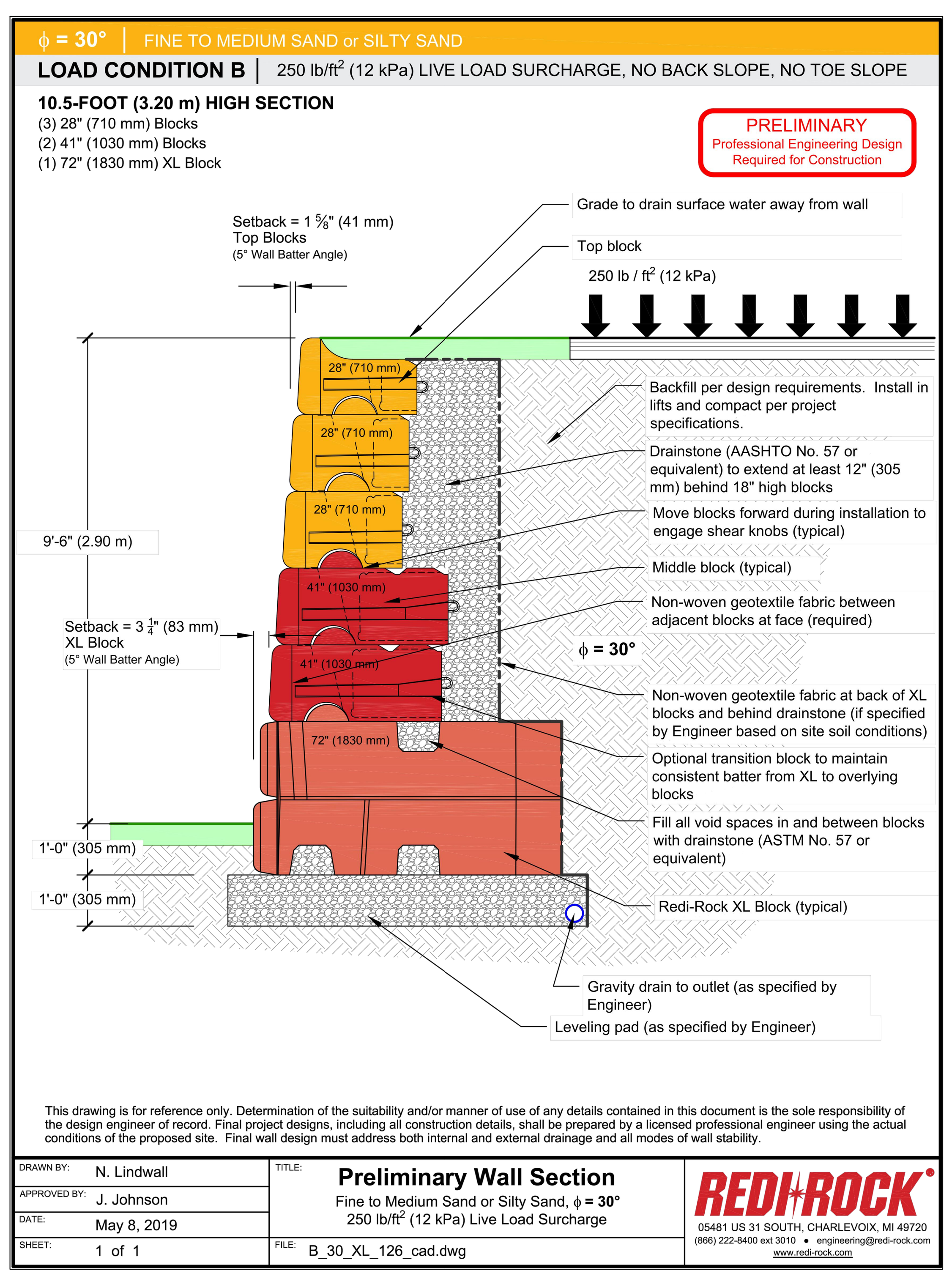
T.B.D

RIP RAP SHALL EXTEND FROM THE FES TO THE BOTTOM OF THE PROPOSED AREA OR FURTHER AS SHOWN ON THE GRADING & DRAINAGE PLAN.



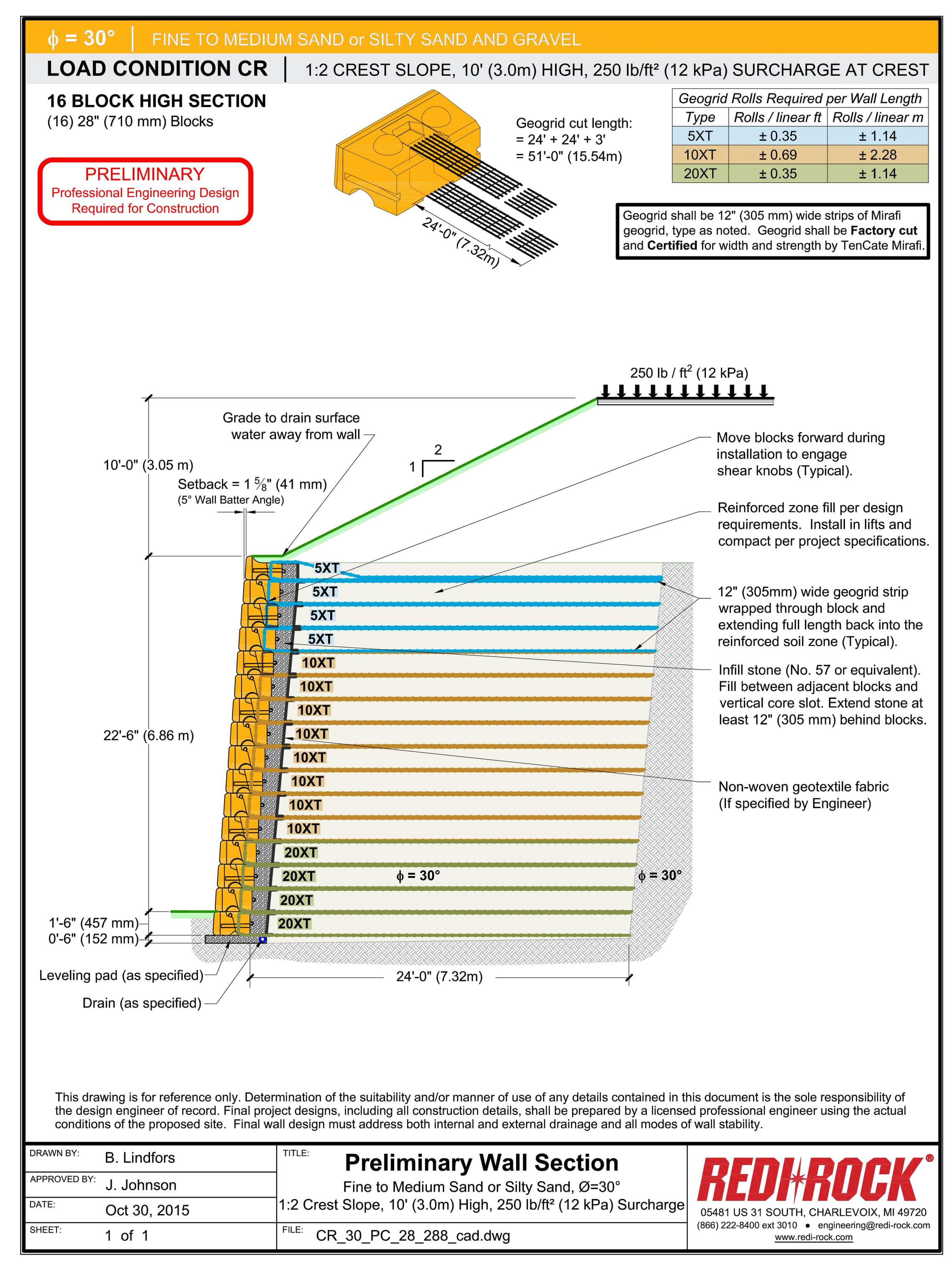
FLARED END SECTION WITH RIP RAP DISSIPATER
NOT TO SCALE

3



PRELIMINARY WALL SECTION DETAIL (I)
NOT TO SCALE

2



PRELIMINARY WALL SECTION DETAIL (I)
NOT TO SCALE

1

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C-504

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC–740, SC–310, OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS.
3. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
4. 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.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG–TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

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IMPORTANT – NOTES FOR THE BIDDING AND INSTALLATION OF THE SC–310/SC–740 SYSTEM

1. STORMTECH SC–310 & SC–740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE–CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC–310 & 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 SUB–GRADE.
- 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–310 & 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–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.

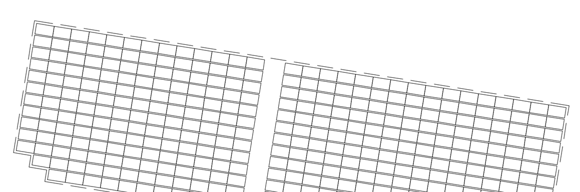
GENERAL NOTES (5)
NOT TO SCALE

PROPOSED LAYOUT

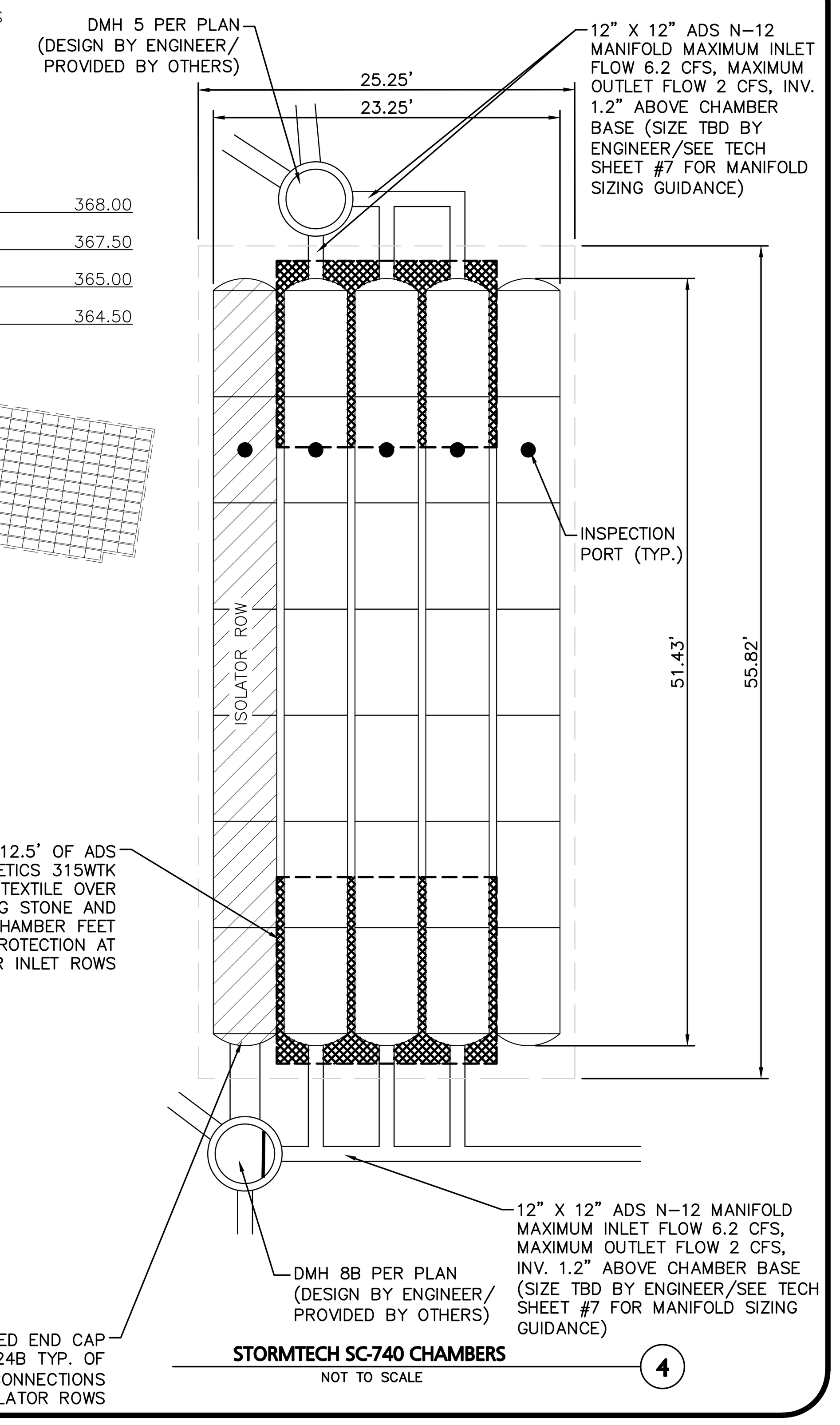
(360) STORMTECH SC–740 CHAMBERS
(26) STORMTECH SC–740 END CAPS
INSTALLED WITH 6" COVER STONE, 6" BASE STONE, 40% STONE VOID
AREA OF SYSTEM: 13,544 FT²
PERIMETER OF SYSTEM: 560 FT

PROPOSED ELEVATIONS

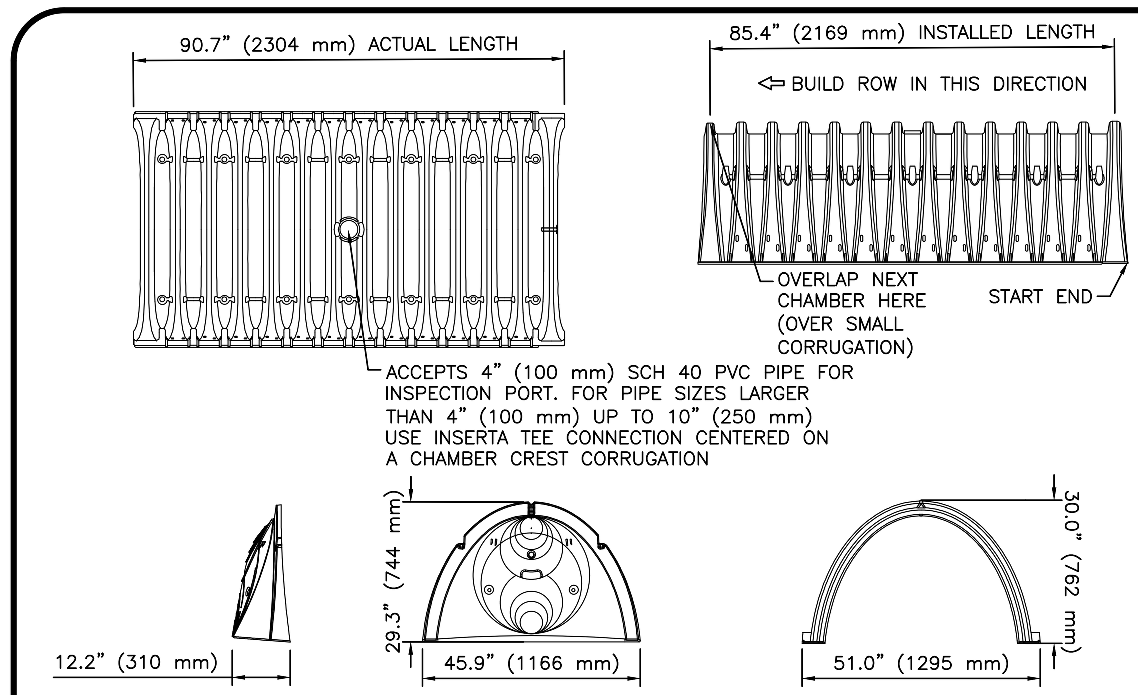
TOP OF STONE:	368.00
TOP OF CHAMBER:	367.50
BOTTOM OF CHAMBER:	365.00
BOTTOM OF STONE:	364.50



SYSTEM LAYOUT
NTS



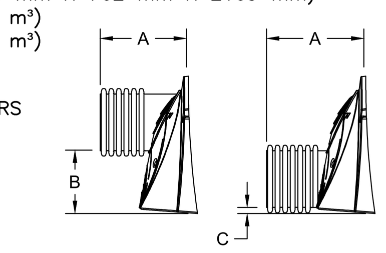
STORMTECH SC-740 CHAMBERS (4)
NOT TO SCALE



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



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	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B			---	0.5" (13 mm)
SC740EPE08T	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B			---	0.6" (15 mm)
SC740EPE10T	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B			---	0.7" (18 mm)
SC740EPE12T	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B			---	1.2" (30 mm)
SC740EPE15T	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B			---	1.3" (33 mm)
SC740EPE18T	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B			---	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.

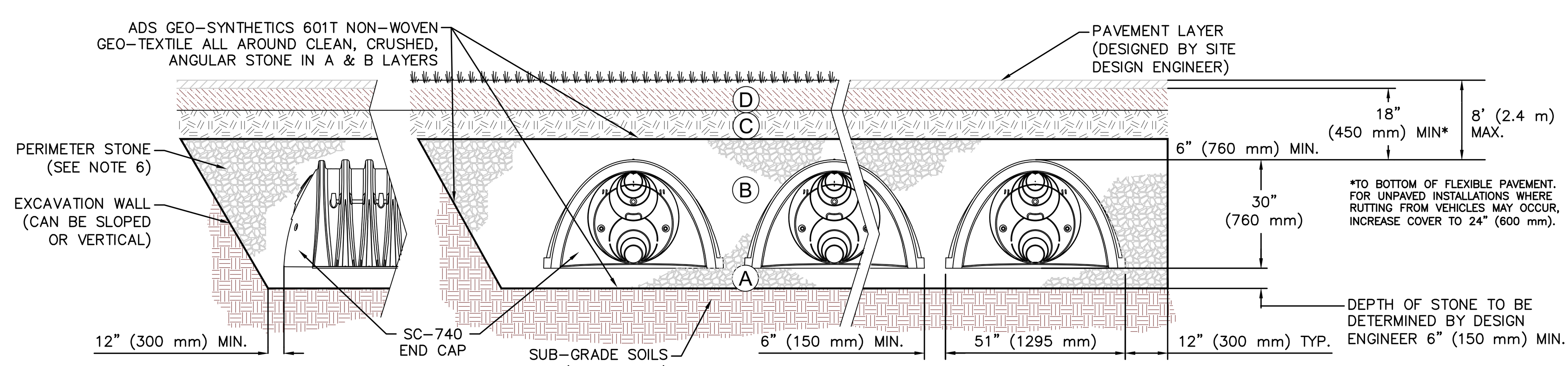
* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N–12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

SC-740 TECHNICAL SPECIFICATION (3)
NOT TO SCALE

	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 SUB–BASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUB–GRADE 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 SUB–BASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL–GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUB–BASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145¹ A–1, A–2–4, A–3 OR AASHTO M43¹ 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, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4–2 INCH (20–50 mm)	AASHTO M43¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUB–GRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4–2 INCH (20–50 mm)	AASHTO M43¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ² ³

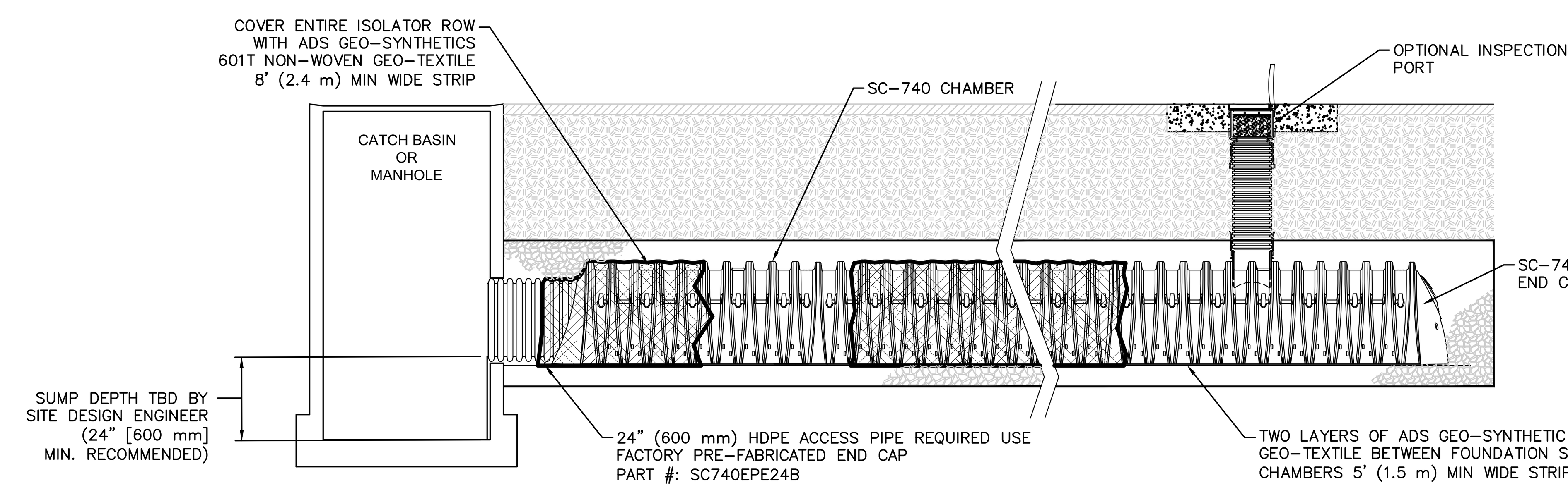
PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN 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.



NOTES:

1. SC–740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) 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. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUB–GRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUB–BASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS (2)
NOT TO SCALE



INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW 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 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 ROWS
- B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
- B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW 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.

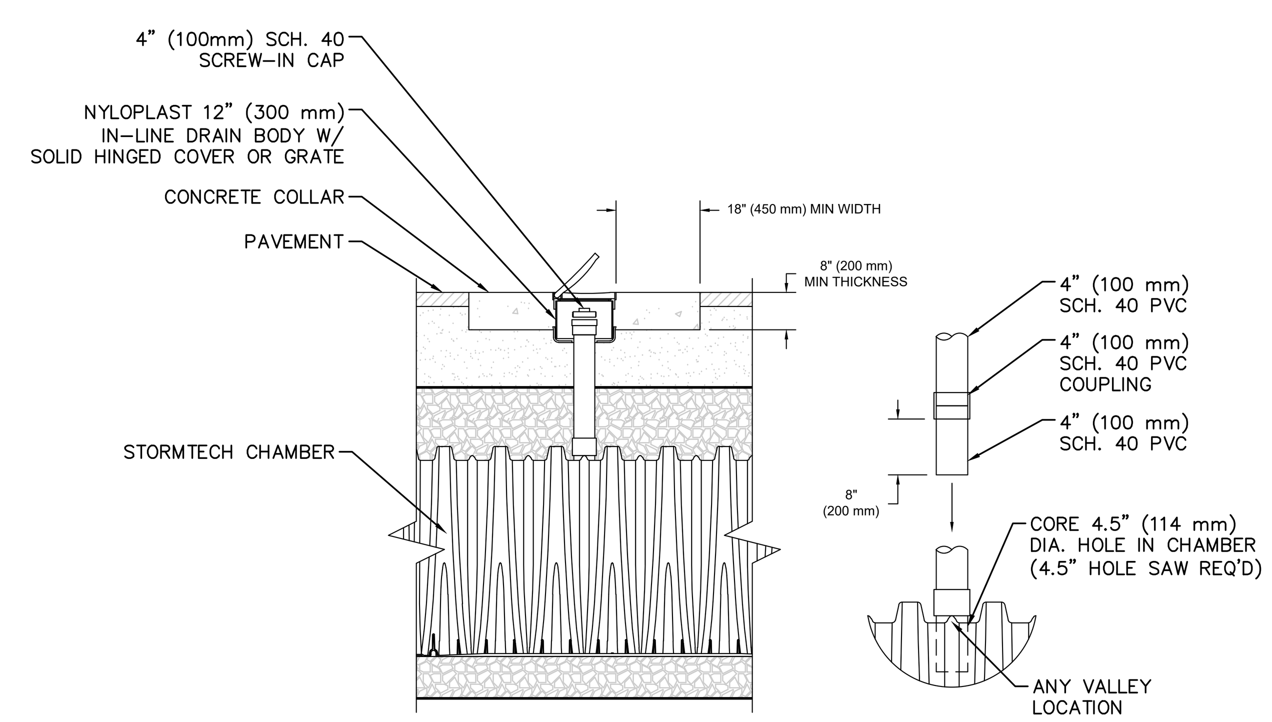
STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

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.



NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

CONNECTION DETAIL
NTS

SC-740 ISOLATOR ROW DETAIL (1)
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4. 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.
5. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
6. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
7. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES 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 AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG–TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT – NOTES FOR THE BIDDING AND INSTALLATION OF THE SC–310/SC–740 SYSTEM

1. STORMTECH SC–310 & SC–740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE–CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC–310 & SC–740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC–310/SC–740/SC–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 SUB–GRADE.
- 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–310 & 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–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.

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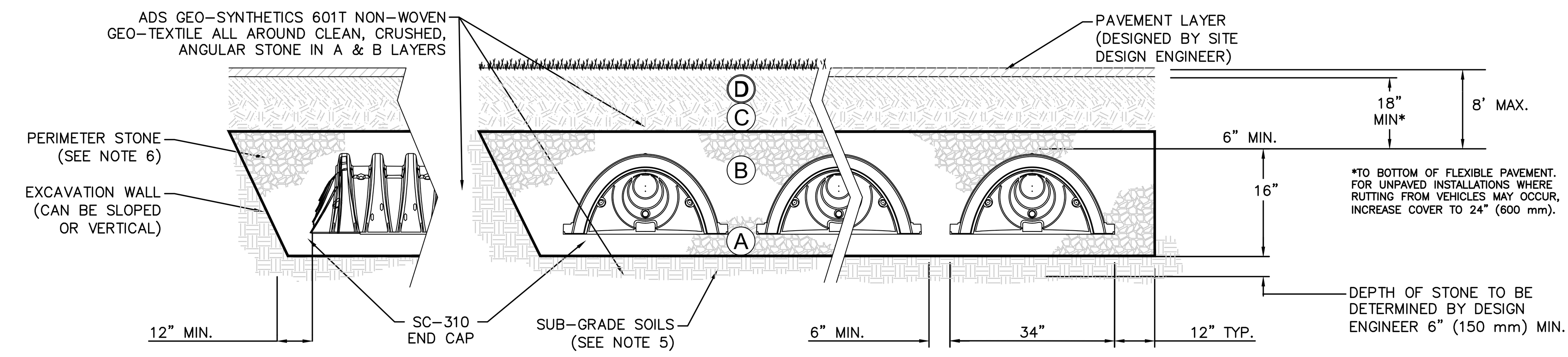
GENERAL NOTES (4)
NOT TO SCALE

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 SUB–BASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUB–GRADE 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 SUB–BASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL–GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUB–BASE 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, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4–2 INCH (20–50 mm)	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUB–GRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4–2 INCH (20–50 mm)	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.



NOTES:

1. SC–310 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) 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. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
5. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUB–GRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
6. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
7. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUB–BASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS (3)
NOT TO SCALE

PROPOSED LAYOUT

(48) STORMTECH SC–310 CHAMBERS
(4) STORMTECH SC–310 END CAPS
INSTALLED WITH 6" COVER STONE,
6" BASE STONE, 40% STONE VOID
AREA OF SYSTEM: 1,412 FT^2
PERIMETER OF SYSTEM: 362 FT

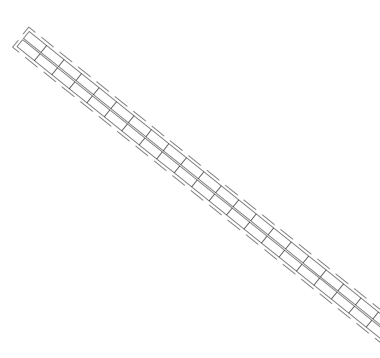
PROPOSED UIS#2 ELEVATIONS

TOP OF STONE:365.58

TOP OF CHAMBERS:365.08

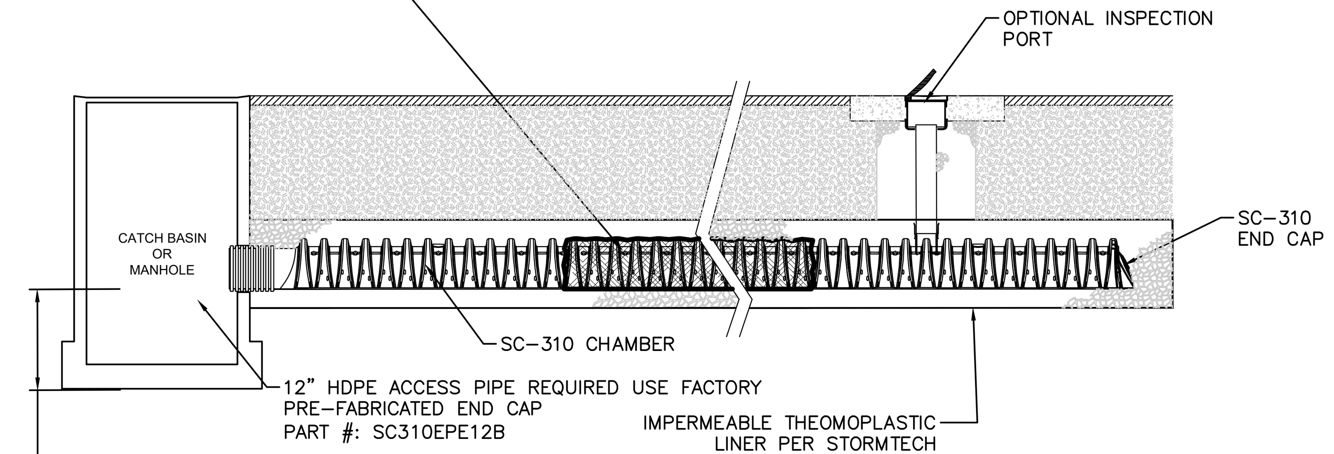
BOTTOM OF CHAMBERS:363.75

BOTTOM OF STONE:363.25

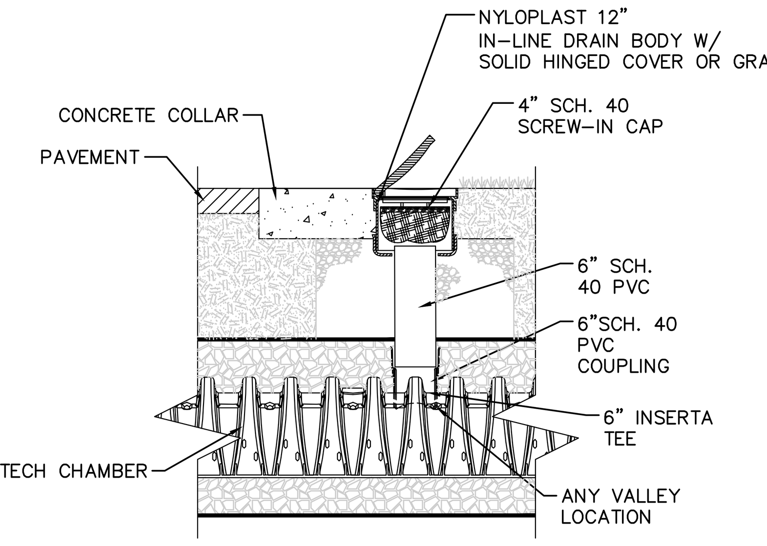


SYSTEM LAYOUT
NTS

STORMTECH SC-310 CHAMBERS (2)
NOT TO SCALE



STORMTECH ISOLATOR ROW*



NOTES:
1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY
2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

CONNECTION DETAIL
NTS

ISOLATOR ROW & INSPECTION PORT (1)
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INSPECTION PORT DETAIL

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Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
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key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	AS SHOWN
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

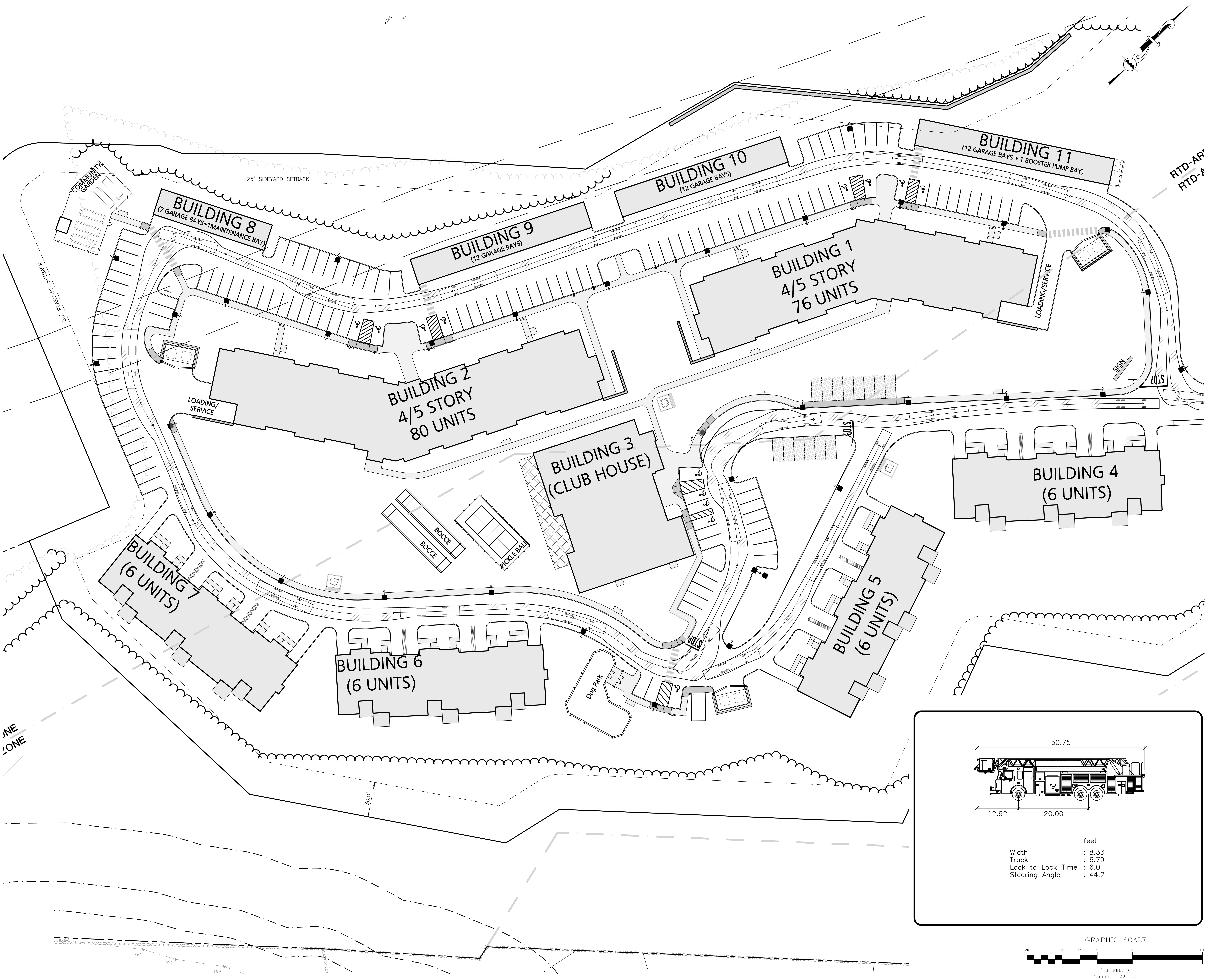
drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
DETAILS

drawing number:
C-506



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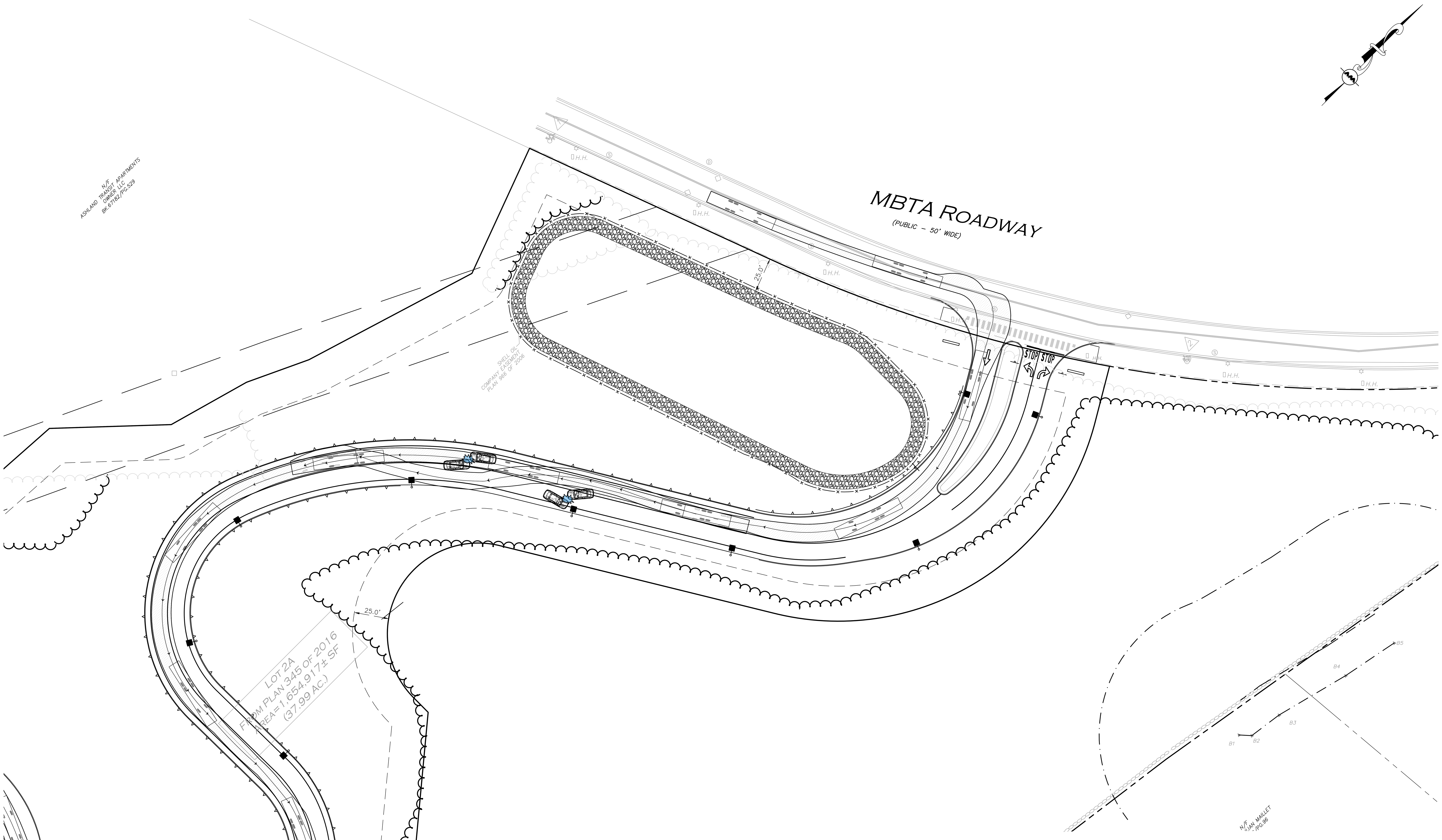
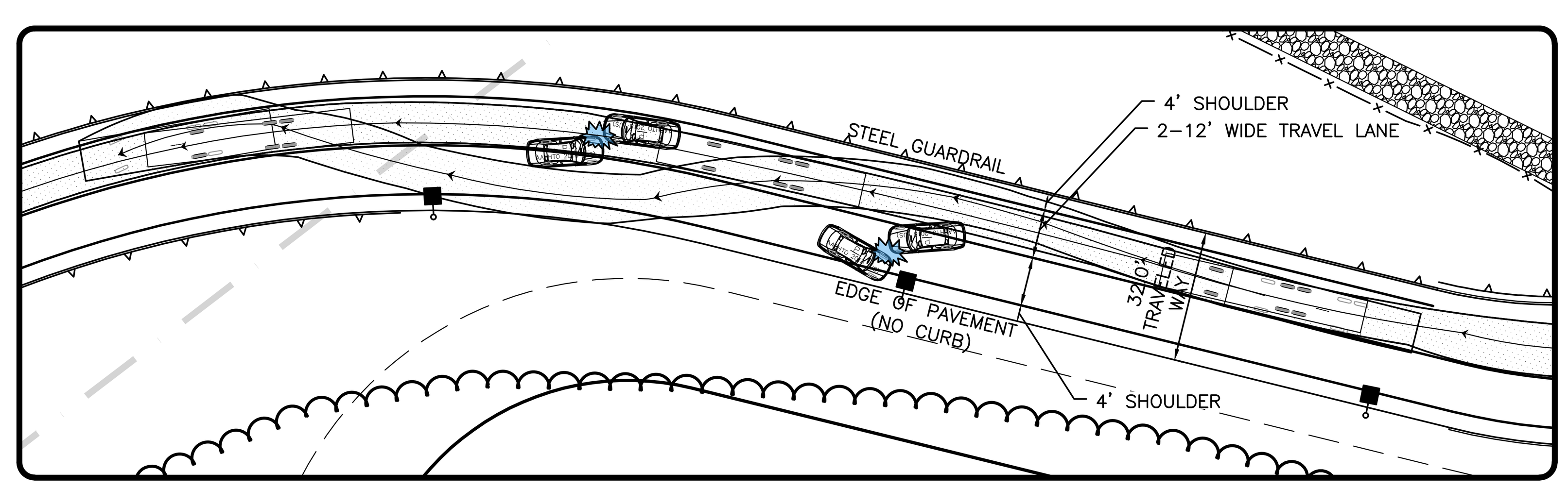
DRAFT

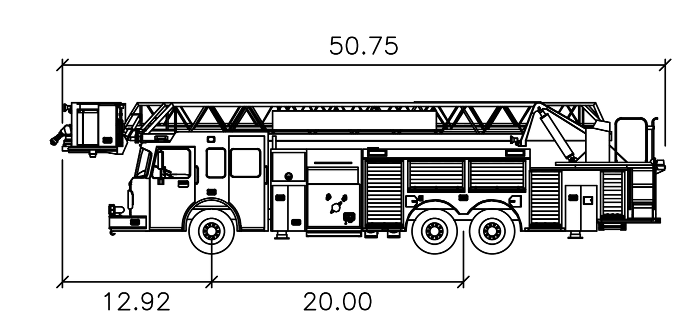
drawing name:
VEHICLE
MOVEMENT
PLAN

drawing number:
C-601





EMERGENCY VEHICLE BYPASS OF COLLISION (TYP)
SCALE: 1"=30'



feet
Width : 8.33
Track : 6.79
Lock to Lock Time : 6.0
Steering Angle : 44.2

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GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

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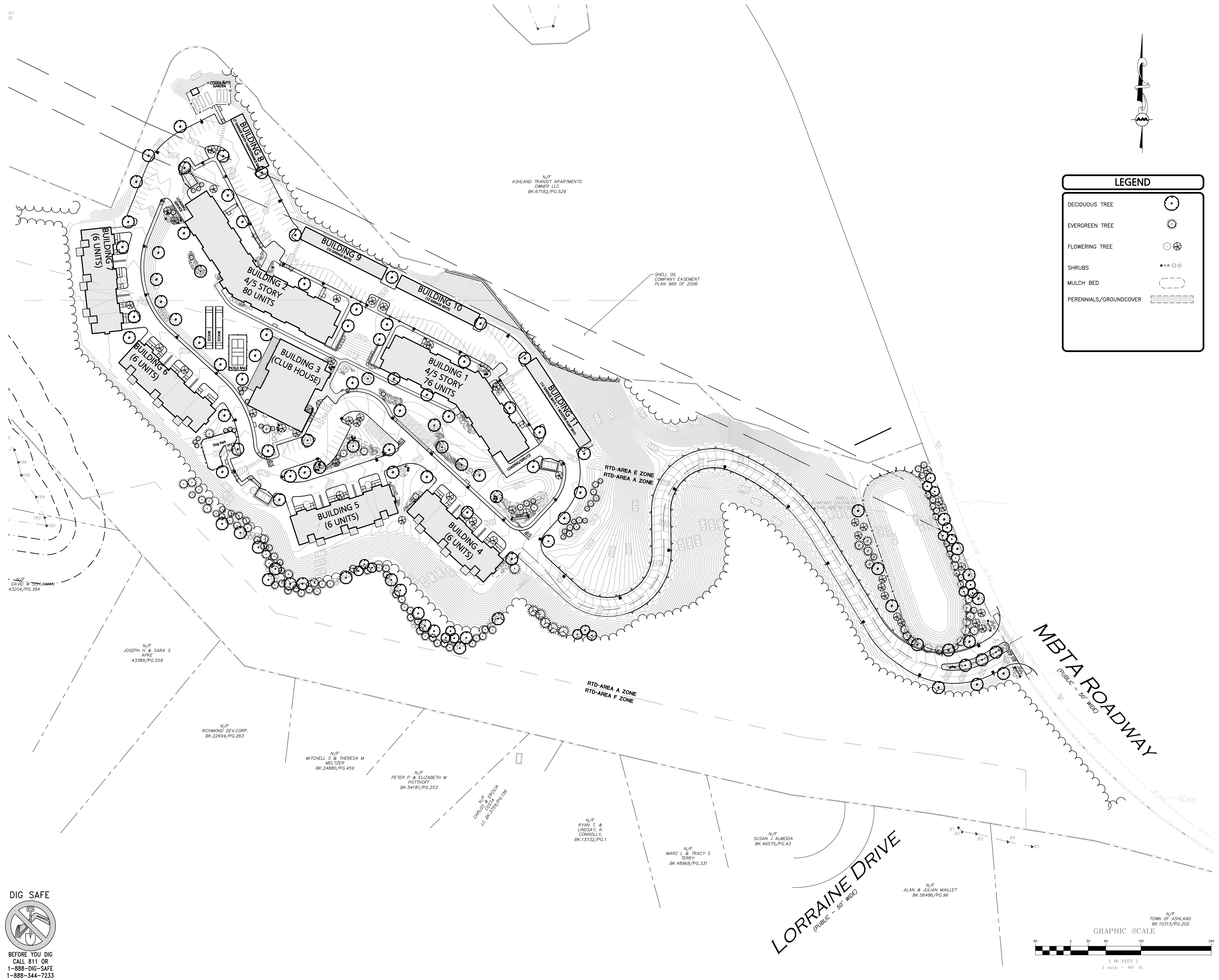
drawing name:
VEHICLE
MOVEMENT
PLAN

drawing number:
C-602



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OVERALL
LANDSCAPE
PLAN

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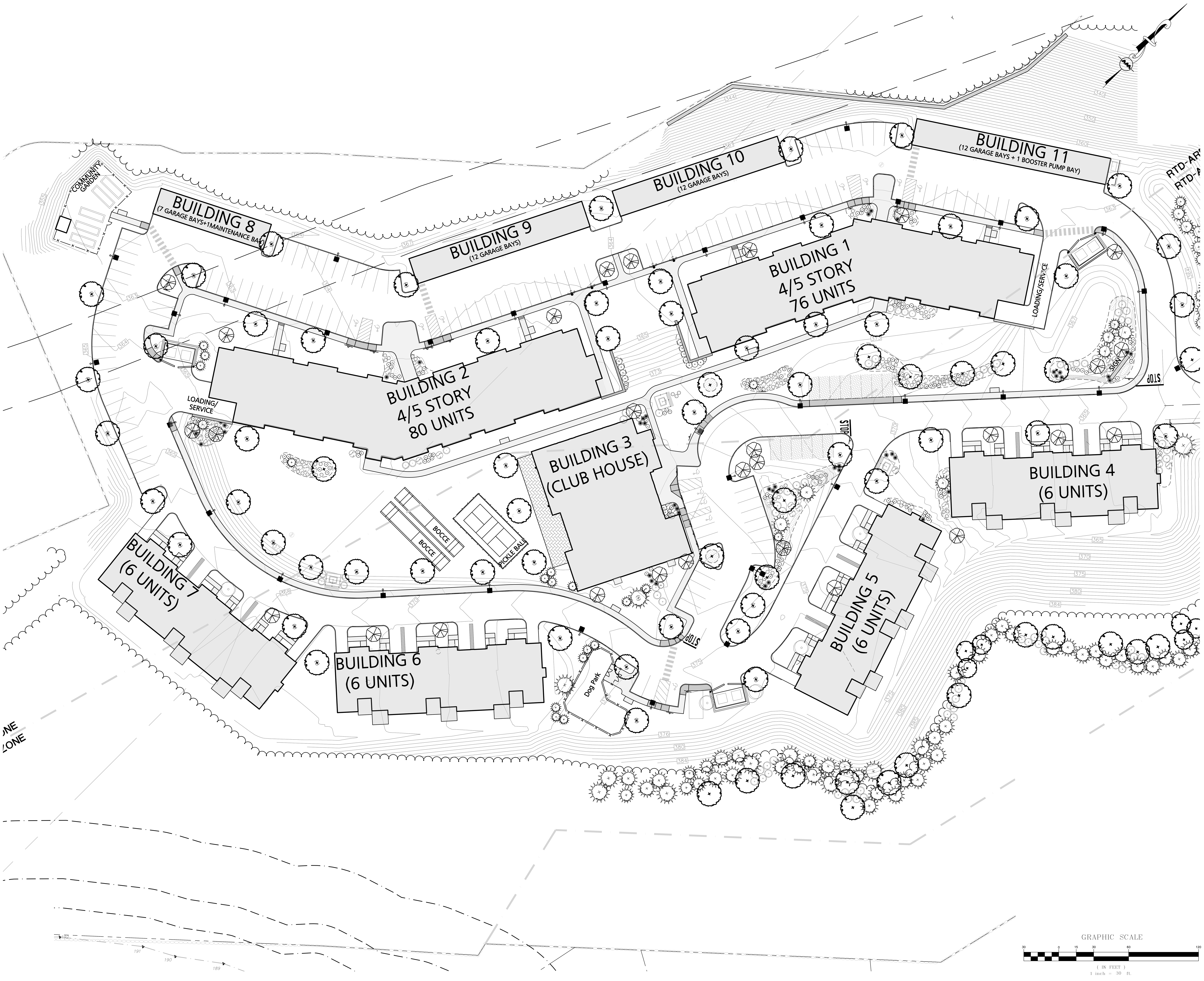
L-101



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project number:	19021.00

drawing revisions:

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registration:

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drawing name:
LANDSCAPE
PLAN

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

drawing number:
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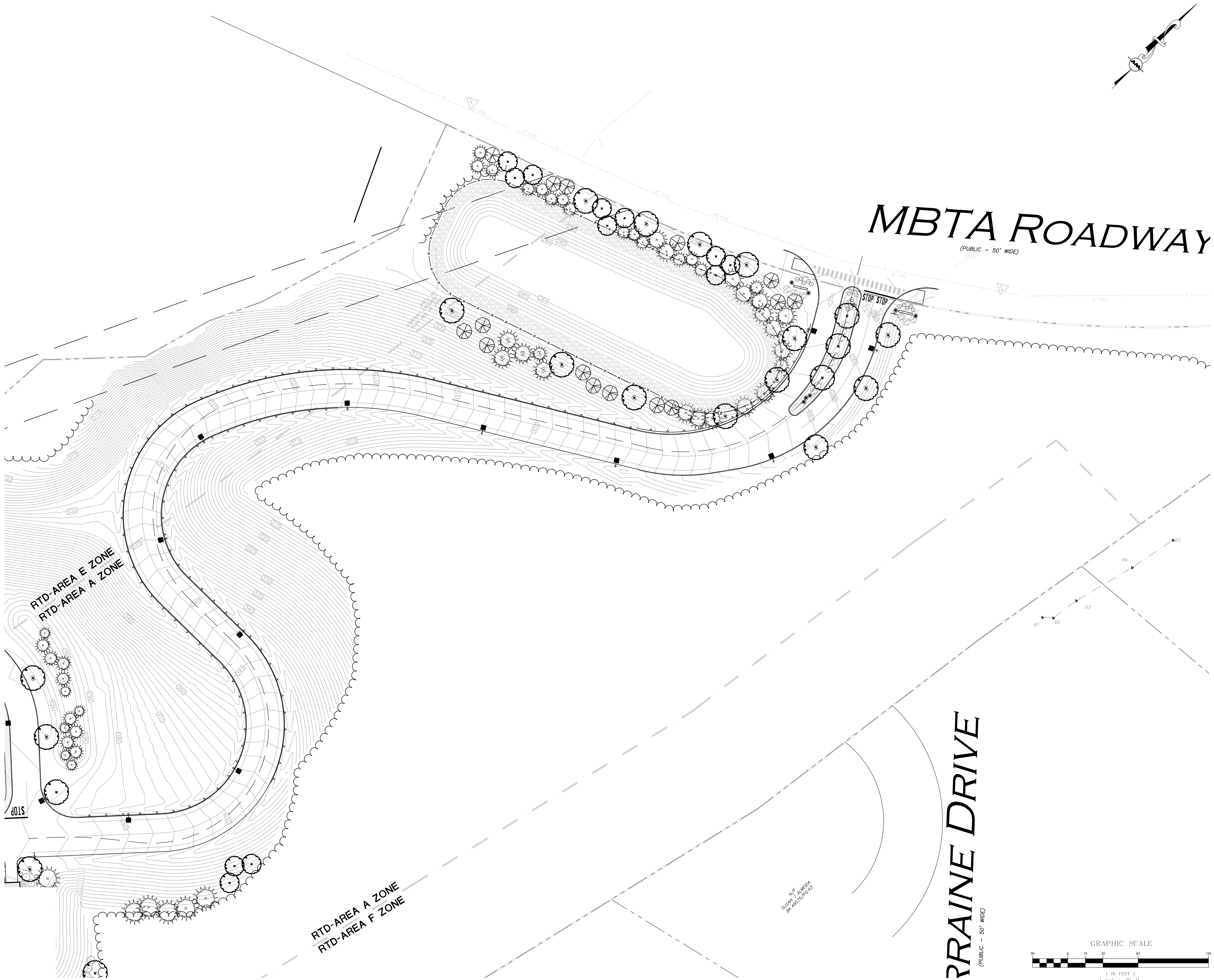

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project number: 19021.00

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No.	Description	Date

registration:

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drawing name:

LANDSCAPE
PLAN

drawing number:

L-103

Appendix Q

Preliminary Architectural Plans

Allen & Major Associates, Inc.

A P P E N D I X Q

FIRE RESISTANCE RATINGS OF STRUCTURAL ELEMENTS — MIN. HOURS REQUIRED

FIRE RESISTANCE RATING ELEMENT:	IIIA	VB
PRIMARY STRUCTURAL FRAME	1 HOURS	0 HOURS
LOADBEARING INTERIOR WALL	1 HOURS	0 HOURS
LOADBEARING EXTERIOR WALL	2 HOUR	0 HOURS
	(SEE A-021 FOR WALLS REQUIRING 2-HR INT/EXT RATING)	
NON-LOADBEARING WALL	0 HOURS	0 HOURS
FLOOR CONSTRUCTION, EXCEPTION:	1 HOURS	0 HOURS
FLOOR CONSTRUCTION BETWEEN UNITS	1 HOUR (1/2 HOUR REQ'D)	DOES NOT APPLY
ROOF CONSTRUCTION	1 HOURS	0 HOURS
CORRIDOR WALLS	1 HOUR (1/2 HOUR REQ'D)	DOES NOT APPLY
DWELLING UNIT SEPARATION WALLS	1 HOUR (1/2 HOUR REQ'D)	DOES NOT APPLY

NOTE: SEE FIRE FIRE RATING DIAGRAMS AND FIRE SEPARATION DISTANCE DIAGRAMS ON A-010, A-011 AND A-012, FOR REQUIRED RESISTANCE RATINGS BASED ON BOTH CONSTRUCTION TYPE AND FIRE SEPARATION DISTANCES

FIRE PROTECTION / LIFE SAFETY

AUTOMATIC SPRINKLER SYSTEM PER NFPA 13
STANDPIPES IN ALL EGRESS STAIRS, EXTEND TO HIGHEST FLOOR LEVEL AT STAIR W/ ROOF HATCH
WATER PRESSURE TESTED MAY/2015 INSUFFICIENT FOR SPRINKLER SYSTEM, FIRE PUMP SHALL BE REQUIRED
SEPARATE DRY SPRINKLER SYSTEMS SERVING THE GARAGE LEVEL
FIRE ALARM SYSTEM PROVIDED
SINGLE OR MULTIPLE STATION SMOKE DETECTORS WITHIN DWELLING UNITS
CO DETECTION SYSTEM INCLUDED IN MECHANICALLY VENTILATED GARAGE
CO DETECTION REQUIRED AT ALL UNITS (MSBC SECTION 916.0 & 527 CMR)
FIRE EXTINGUISHERS PROVIDED WITHIN MAX. TRAVEL DISTANCE AS INDICATED ON FIRE RATING DIAGRAMS, SEE A-010 SERIES SHEETS

MEANS OF EGRESS

BUILDING 1

FLOOR		GSF		SF/OCC.		OCCUPANT LOAD	PROVIDED EGRESS CAPACITY (# OCC.)
FIRST FLOOR		**17,637**				**281**	720 (2 - 36" DOORS - 1 - 72" DOOR)
	Residential	*10,360*	*GSF /*	*200*	*=*	*52*	
	Amenity	*3,238*	*NET /*	*15*	*=*	*216*	
	Storage	*4,039*	*GSF /*	*300*	*=*	*13*	
SECOND FLOOR		**17,648**				**124**	653 (2 - 44" STAIRS - 1 72" DOOR)
	Residential	*16,984*	*GSF /*	*200*	*=*	*85*	
	Amenity	*587*	*NET /*	*15*	*=*	*39*	
	Storage	*77*	*GSF /*	*300*	*=*	*0*	
THIRD FLOOR		**17,608**				**122**	293 (2 - 44" STAIRS)
	Residential	*16,985*	*GSF /*	*200*	*=*	*85*	
	Amenity	*546*	*NET /*	*15*	*=*	*36*	
	Storage	*77*	*GSF /*	*300*	*=*	*0*	
FOURTH FLOOR		**17,608**				**88**	293 (2 - 44" STAIRS)
	Residential	*17,353*	*GSF /*	*200*	*=*	*87*	
	Amenity	*0*	*NET /*	*15*	*=*	*0*	
	Storage	*255*	*GSF /*	*300*	*=*	*1*	
FIFTH FLOOR		**17,608**				**101**	293 (2 - 44" STAIRS)
	Residential	*17,318*	*GSF /*	*200*	*=*	*87*	
	Amenity	*213*	*NET /*	*15*	*=*	*14*	
	Storage	*77*	*GSF /*	*300*	*=*	*0*	

BUILDING 2

FLOOR		GSF		SF/OCC.		OCCUPANT LOAD	PROVIDED EGRESS CAPACITY (# OCC.)
FIRST FLOOR		**20,229**				**400**	720 (2 - 36" DOORS - 1 - 72" DOOR)
	Residential	*11,040*	*GSF /*	*200*	*=*	*55*	
	Amenity	*3,443*	*NET /*	*15*	*=*	*230*	
	Storage	*5,746*	*GSF /*	*50*	*=*	*115*	
SECOND FLOOR		**20,242**				**154**	653 (2 - 44" STAIRS - 1 72" DOOR)
	Residential	*19,325*	*GSF /*	*200*	*=*	*97*	
	Amenity	*845*	*NET /*	*15*	*=*	*56*	
	Storage	*72*	*GSF /*	*50*	*=*	*1*	
THIRD FLOOR		**19,934**				**127**	293 (2 - 44" STAIRS)
	Residential	*19,434*	*GSF /*	*200*	*=*	*97*	
	Amenity	*428*	*NET /*	*15*	*=*	*29*	
	Storage	*72*	*GSF /*	*50*	*=*	*1*	
FOURTH FLOOR		**19,934**				**104**	293 (2 - 44" STAIRS)
	Residential	*19,649*	*GSF /*	*200*	*=*	*98*	
	Amenity	*0*	*NET /*	*15*	*=*	*0*	
	Storage	*285*	*GSF /*	*50*	*=*	*6*	
FIFTH FLOOR		**19,934**				**153**	293 (2 - 44" STAIRS)
	Residential	*19,017*	*GSF /*	*200*	*=*	*95*	
	Amenity	*845*	*NET /*	*15*	*=*	*56*	
	Storage	*72*	*GSF /*	*50*	*=*	*1*	

BUILDING 3

FLOOR		GSF		SF/OCC.		OCCUPANT LOAD	PROVIDED EGRESS CAPACITY (# OCC.)
FIRST FLOOR		**12,098**				**601**	1080 (2 - 36" DOORS - 2 - 72" DOOR)
	Pool	*1,468*	*GSF /*	*50*	*=*	*29*	
	Business	*757*	*GSF /*	*100*	*=*	*8*	
	Assembly	*8,024*	*NET /*	*15*	*=*	*535*	
	Fitness	*1,359*	*GSF /*	*50*	*=*	*27*	
	Storage/MEP	*490*	*GSF /*	*300*	*=*	*2*	

EGRESS WIDTH
STAIRWAYS: 0.3" / PERSON
DOORS, RAMPS & CORRIDORS: 0.2"/PERSON
ALL STAIRS ARE 44" MIN AND CORRIDORS 60" MIN.

AREA OF REFUGE
HORIZONTAL EGRESS REQUIRES: 3 SF /PERSON

NUMBER OF EXITS
GARAGE LEVELS ARE REQUIRED TO HAVE 2 EXITS - 2 ARE PROVIDED
EACH RESIDENTIAL LEVEL MUST BE PROVIDED A MINIMUM OF 2 EXITS - 3 ARE PROVIDED

BUILDING CODE SUMMARY

USE / OCCUPANCY

OCCUPANCY:	A-3	ASSEMBLY (LOBBY, RESIDENTIAL AMENITY, POOL, FITNESS CENETER)
	B	BUSINESS (LEASING OFFICE)
	R-2	RESIDENTIAL (RESIDENTIAL DWELLING UNITS)
	S-2	STORAGE (MEP SPACES & TENANT STORAGE)
	U	MISCELLANEOUS (PRIVATE GARAGES)

BUILDING CODE: 780 CMR MASSACHUSETTS STATE BUILDING CODE (MSBC) - 9TH EDITION (OCTOBER 2017)
MSBC IS AN AMENDED VERSION OF 2015 IBC.

OTHER APPLICABLE CODES:
STRUCTURAL REQUIREMENTS: CH. 16 OF IBC (MSBC AMENDS CH. 16)
780 CMR: MASS. STATE BUILDING CODE, 9TH EDITION
527 CMR: MASS. FIRE PREVENTION REGULATIONS (NFPA-1-2015, ADOPTED (JANUARY 2018)
248 CMR: MASS. FUEL GAS AND PLUMBING CODE (MARCH 2017)
524 CMR: MASS. ELEVATOR REGULATIONS (MAY 2016)
521 CMR: MASS. ARCHITECTURAL ACCESS BOARD (JANUARY 2006)
AMERICANS WITH DISABILITIES ACT GUIDELINES (ADA)- (SEPTEMBER 2010) WHERE MORE RESTRICTIVE THAN MAAB
INTERNATIONAL MECHANICAL CODE (IMC, 2015) AS AMENDED BY MSBC
NATIONAL ELEC. CODE AS ADOPTED AND AMENDED BY 527 CMR CH. 12 (NFPA 70, 2017 EDITION)
FEDERAL FAIR HOUSING ACT COMPLIANCE - DESIGN MANUAL IS SELECTED "SAFE HARBOR"
THE MASS. STRETCH ENERGY CODE (20% MORE EFFICIENT THAN IECC REQ.) HAS BEEN ADOPTED BY ASHLAND (AMENDED VERSION OF 2018, IECC)

CONSTRUCTION TYPE / GENERAL BUILDING LIMITATIONS

CONSTRUCTION TYPE - BUILDING 1 (510.2): IIIA - COMBUSTIBLE, PROTECTED (RESIDENTIAL)
ALLOWABLE BUILDING HEIGHT (TABLE 510.2, 504.3, 504.4): 5 STORIES / 85'-0" (AS MODIFIED)
PROPOSED BUILDING HEIGHT: 5 STORIES/ 55'-3"
NOTE 1: HEIGHT SHALL BE MEASURED FROM THE AVERAGE GRADE PLANE (369.5') TO THE HIGHEST ROOF FRAMING (424.75')

CONSTRUCTION TYPE - BUILDING 2 (510.2): IIIA - COMBUSTIBLE, PROTECTED
ALLOWABLE BUILDING HEIGHT (TABLE 510.2, 504.3, 504.4): 5 STORIES / 85'-0" (AS MODIFIED)
PROPOSED BUILDING HEIGHT: 5 STORIES/ 55'-3"
NOTE 1: HEIGHT SHALL BE MEASURED FROM THE AVERAGE GRADE PLANE (370.5') TO THE HIGHEST ROOF FRAMING (437')

CONSTRUCTION TYPE - BUILDING 3 (510.2): VB - COMBUSTIBLE, UNPROTECTED (ASSEMBLY)
ALLOWABLE BUILDING HEIGHT (TABLE 510.2, 504.3, 504.4): 2 STORIES / 60'-0" (AS MODIFIED)
PROPOSED BUILDING HEIGHT: 1 STORIES/ 29'-9"
NOTE 1: HEIGHT SHALL BE MEASURED FROM THE AVERAGE GRADE PLANE (0') TO THE HIGHEST ROOF FRAMING (29'-9")

CONSTRUCTION TYPE - GARAGE 8, 9, 10, 11 (510.2): VB - COMBUSTIBLE, UNPROTECTED (MISCELLANEOUS)
ALLOWABLE BUILDING HEIGHT (TABLE 510.2, 504.3, 504.4): 1 STORIES / 40'-0" (AS MODIFIED)
PROPOSED BUILDING HEIGHT: 1 STORIES/ 16'-10"
NOTE 1: HEIGHT SHALL BE MEASURED FROM THE AVERAGE GRADE PLANE (0') TO THE HIGHEST ROOF FRAMING (16'-10")

PROPOSED AREA LIMITATIONS: SEE AREA MODIFICATIONS BELOW

HEIGHT, AREA AND CONSTRUCTION TYPE MODIFICATION

HEIGHT MODIFICATIONS: 780 CMR 504.0
INCREASE FOR AUTOMATIC SPRINKLER SYSTEM: 1 STORY 20 FEET

BUIDLING 1 & 2

AREA MODIFICATIONS - BUILDING (CMR 506):	ALLOWED IIIA GROUP S-2	GROUP A-3	GROUP R-2	PROPOSED
A. ALLOWABLE FLOOR AREA BEFORE MODIFICATIONS	39,000 SF	14,000 SF	24,000 SF	
B. ALLOWABLE TOTAL FLOOR AREA =	117,000 SF	42,000 SF	72,000 SF	
C. ALLOWABLE TOTAL FLOOR AREA (506.4): 72,000 X 3 =			216,000 SF	
D. ALLOWABLE TOTAL FLOOR AREA / FLOOR: 216,000 / 5 =			43,200 SF	
PROPOSED FLOOR AREA (BUILDING 1) =				17,648 SF TYP.
PROPOSED FLOOR AREA (BUILDING 2) =				20,242 SF TYP.

BUIDLING 3

AREA MODIFICATIONS - BUILDING (CMR 506):	ALLOWED VB Group A-3	PROPOSED
A. ALLOWABLE FLOOR AREA BEFORE MODIFICATIONS	6000 SF	
B. ALLOWABLE TOTAL FLOOR AREA =	24,000 SF	
PROPOSED FLOOR AREA (BUILDING 3) =		12,098 SF

BUIDING 8, 9, 10, 11

AREA MODIFICATIONS - BUILDING (CMR 506):	ALLOWED VB Group U	PROPOSED
A. ALLOWABLE FLOOR AREA BEFORE MODIFICATIONS	5,500 SF	
B. ALLOWABLE TOTAL FLOOR AREA =	16,500 SF	
PROPOSED FLOOR AREA (BUILDING 8) =		3,873 SF TYP.
PROPOSED FLOOR AREA (BUILDING 9, 10) =		3,322 SF TYP.
PROPOSED FLOOR AREA (BUILDING 11) =		1,848 SF TYP.

BUIDLING 1

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	S-2 RATIO	A-3 RATIO	R-2 RATIO	SUM
1ST	4,039 / 117,000 = 0.035	3,238 / 42,000 = 0.077	10,360 / 72,000 = 0.144	0.256
2ND	77 / 117,000 = 0.0006	587 / 42,000 = 0.014	16,984 / 72,000 = 0.236	0.251
3RD	77 / 117,000 = 0.0006	546 / 42,000 = 0.013	16,985 / 72,000 = 0.236	0.250
4TH	255 / 117,000 = 0.002	0 / 42,000 = 0.000	17,353 / 72,000 = 0.241	0.243
5TH	77 / 117,000 = 0.0006	179 / 42,000 = 0.004	17,352 / 72,000 = 0.241	0.246
			TOTAL:	1.25 > 3

BUIDLING 2

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	S-2 RATIO	A-3 RATIO	R-2 RATIO	SUM
1ST	5746 / 117,000 = 0.049	3,443 / 42,000 = 0.082	11,040 / 72,000 = 0.153	0.284
2ND	72 / 117,000 = 0.0006	845 / 42,000 = 0.020	19,325 / 72,000 = 0.268	0.289
3RD	72 / 117,000 = 0.0006	428 / 42,000 = 0.010	19,434 / 72,000 = 0.270	0.280
4TH	285 / 117,000 = 0.002	0 / 42,000 = 0.000	19,649 / 72,000 = 0.272	0.274
5TH	72 / 117,000 = 0.0006	213 / 42,000 = 0.005	19,017 / 72,000 = 0.264	0.270
			TOTAL:	1.40 > 3

BUIDLING 3

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	S-2 RATIO	A-3 RATIO	B RATIO	SUM
1ST	490 / 40,500 = .012	10,851 / 18,000 = .602	757 / 27,000 = .028	0.642
			TOTAL:	0.642 > 3

BUIDLING 8

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	U RATIO			SUM
1ST	3,873 / 16,500 = .235			0.235
			TOTAL:	0.235 > 1

BUIDLING 9 AND 10

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	U RATIO			SUM
1ST	3,322 / 16,500 = .201			0.201
			TOTAL:	0.201 > 1

BUIDLING 11

ALLOWABLE AREA OF SEPARATED OCCUPANCIES (508.4.2 & 506.2)

FLOOR	U RATIO			SUM
1ST	1848 / 16,500 = .112			0.112
			TOTAL:	0.112 > 1

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issuance: PERMIT / GMP Coordination Set
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drawing name: Code Summary

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UNIT MIX AND BUILDING SUMMARY

8/7/2020

UNITED GROUP - ARBELLA AT ASHLAND

Senior Housing - Apartments, Townhouses, Garages & Clubhouse

CUBE3

BUILDING 1

UNIT TYPE	DESCRIPTION	BEDS/UNIT	UNIT NRSF	1ST FLOOR # OF UNITS	2ND FLOOR # OF UNITS	3RD FLOOR # OF UNITS	4TH FLOOR # OF UNITS	5TH FLOOR # OF UNITS	TOTAL UNITS	TOTAL BEDS	TOTAL NRSF	MIX (UNITS)	MIX (BEDS)
A1	1 BED / 1 BATH	1	714	4	11	10	10	10	45	45	32,130	59.21%	45.45%
A1-G2	1 BED / 1 BATH	1	714	1	0	1	0	0	2	2	1,428	2.63%	2.02%
A1A	1 BED / 1 BATH	1	815	0	0	0	1	1	2	2	1,630	2.63%	2.02%
A3	1 BED / 2 BATH	1	931	0	1	1	1	0	3	3	2,793	3.95%	3.03%
A3-G2	1 BED / 2 BATH	1	931	0	0	0	0	1	1	1	931	1.32%	1.01%
A4	1 BED / 1 BATH	1	1,107	0	0	0	0	0	0	0	0	0.00%	0.00%
									53	**53**		**69.74%**	**53.54%**
B1	2 BED / 2 BATH	2	1,121	1	1	1	1	1	5	10	5,605	6.58%	10.10%
B1-G2	2 BED / 2 BATH	2	1,121	0	1	0	0	0	1	2	1,121	1.32%	2.02%
B1A	2 BED / 2 BATH	2	1,245	0	0	1	0	0	1	2	1,245	1.32%	2.02%
B1B	2 BED / 2 BATH	2	1,250	0	0	0	1	1	2	4	2,500	2.63%	4.04%
B2	2 BED / 2 BATH	2	1,125	2	2	2	2	2	10	20	11,250	13.16%	20.20%
B2-G2	2 BED / 2 BATH	2	1,125	0	0	0	0	0	0	0	0	0.00%	0.00%
B3	2 BED / 2 BATH	2	1,264	0	1	1	1	1	4	8	5,056	5.26%	8.08%
									23	**46**		**30.26%**	**46.46%**
TOTALS			864	8	17	17	17	17	76	99	65,689	100.00%	100.00%

BUILDING 2

UNIT TYPE	DESCRIPTION	BEDS/UNIT	UNIT NRSF	1ST FLOOR # OF UNITS	2ND FLOOR # OF UNITS	3RD FLOOR # OF UNITS	4TH FLOOR # OF UNITS	5TH FLOOR # OF UNITS	TOTAL UNITS	TOTAL BEDS	TOTAL NRSF	MIX (UNITS)	MIX (BEDS)
A1	1 BED / 1 BATH	1	714	4	9	9	8	9	39	39	27,846	48.75%	33.91%
A1-G2	1 BED / 1 BATH	1	714	0	1	0	1	0	2	2	1,428	2.50%	1.74%
A1A	1 BED / 1 BATH	1	815	0	0	0	0	0	0	0	0	0.00%	0.00%
A3	1 BED / 2 BATH	1	931	0	0	0	0	0	0	0	0	0.00%	0.00%
A3-G2	1 BED / 2 BATH	1	931	0	0	0	0	0	0	0	0	0.00%	0.00%
A4	1 BED / 1 BATH	1	1,107	0	1	1	1	1	4	4	4,428	5.00%	3.48%
									45	**45**		**56.25%**	**39.13%**
B1	2 BED / 2 BATH	2	1,121	1	4	3	3	2	13	26	14,573	16.25%	22.61%
B1-G2	2 BED / 2 BATH	2	1,121	1	0	0	0	1	2	4	2,242	2.50%	3.48%
B1A	2 BED / 2 BATH	2	1,245	0	0	1	1	1	3	6	3,735	3.75%	5.22%
B1B	2 BED / 2 BATH	2	1,250	0	0	0	0	0	0	0	0	0.00%	0.00%
B2	2 BED / 2 BATH	2	1,125	2	2	2	3	3	12	24	13,500	15.00%	20.87%
B2-G2	2 BED / 2 BATH	2	1,125	0	0	1	0	0	1	2	1,125	1.25%	1.74%
B3	2 BED / 2 BATH	2	1,264	0	1	1	1	1	4	8	5,056	5.00%	6.96%
									35	**70**		**43.75%**	**60.87%**
TOTALS			924	8	18	18	18	18	80	115	73,933	100.00%	100.00%

TOWNHOUSE BUILDING 4, 5, 6, 7

UNIT TYPE	DESCRIPTION	BEDS/UNIT	UNIT NRSF	1ST FLOOR # OF UNITS	2ND FLOOR # OF UNITS	3RD FLOOR # OF UNITS	4TH FLOOR # OF UNITS	5TH FLOOR # OF UNITS	TOTAL UNITS	TOTAL BEDS	TOTAL NRSF	MIX (UNITS)	MIX (BEDS)
TH A	2 BED / 2 BATH	2	2,189	3	0	0	0	0	3	6	6,567	50.00%	50.00%
TH B	2 BED / 2 BATH	2	2,010	2	0	0	0	0	2	4	4,020	33.33%	33.33%
TH C	2 BED / 2 BATH	2	2,163	1	0	0	0	0	1	2	2,163	16.67%	16.67%
TOTALS (SINGLE BUILDING)			2,125	6	0	0	0	0	6	12	12,750	100.00%	100.00%
TOWNHOUSE UNITS TOTALS (BUILDING 4, 5, 6, 7)									**24**	**48**	**51,000**		

PROJECT GRAND TOTALS	1,132	180	262	203,740	
PROJECT UNITS GRAND TOTALS - 1 BEDS		**98**	**98**		**54.44%**
PROJECT UNITS GRAND TOTALS - 2 BEDS		**82**	**164**		**45.56%**
PROJECT STORAGE RENTAL NSRF				**13,118**	

PARKING

GARAGE SPACES (STANDARD)	**41**	TOWNHOUSE SURFACE SPACES	**24**	CLUBHOUSE SPACES	**18**
GARAGE SPACES (ACCESSIBLE)	**2**	TOWNHOUSE GARAGE SPACES	**24**	CLUBHOUSE SPACES (ACCESSIBLE)	**4**
TOTAL GARAGE SPACES	**43**	TOTAL TOWNHOUSE SPACES	**48**	TOTAL CLUBHOUSE SPACES	**22**
GARAGE PARKING RATIO (SPACES/UNIT)	**0.24**	GARAGE PARKING RATIO (SPACES/UNIT)	**2.00**		
				TOTAL PROJECT PARKING SPACES	**226**
SURFACE SPACES (STANDARD)	**105**				
SURFACE SPACES (ACCESSIBLE)	**8**				
TOTAL SURFACE SPACES	**113**				
SURFACE PARKING RATIO (SPACES/UNIT)	**0.63**				
TOTAL RESIDENTIAL PARKING SPACES	**156**				
TOTAL RESIDENTIAL PARKING RATIO (SPACES/UNIT)	**0.87**				

BUILDING 1 GSF	GSF
1ST FLOOR	**17,637**
2ND FLOOR	**17,648**
3RD FLOOR	**17,608**
4TH FLOOR	**17,608**
5TH FLOOR	**17,608**
TOTAL BUILDING GSF	**88,109**

BUILDING 2 GSF	GSF
1ST FLOOR	**20,229**
2ND FLOOR	**20,242**
3RD FLOOR	**19,934**
4TH FLOOR	**19,934**
5TH FLOOR	**19,934**
TOTAL BUILDING GSF	**100,273**

CLUBHOUSE BUILDING 3 AMENITY	GSF
CLUBHOUSE AMENITY	**11,307**

TOWNHOUSE BLDG 4, 5, 6 & 7 GSF (SNGL BLDG)	GSF
1ST FLOOR	**8,903**
2ND FLOOR	**3,853**
TOTAL BUILDING GSF	**12,756**

GARAGE BLDG 8, 9, 10 & 11	GSF
GARAGE BUILDING 8	**3,873**
GARAGE BUILDING 9	**3,322**
GARAGE BUILDING 10	**3,322**
GARAGE BUILDING 11	**1,848**
TOTAL GARAGE GSF	**12,365**

BUILDING RESIDENTIAL	GSF
BUILDING 1	**88,109**
BUILDING 2	**100,273**
TOWNHOUSE BUILDING 4, 5, 6 & 7	**51,024**
TOTAL RESIDENTIAL GSF	**239,406**
RESIDENTIAL EFFIECIENCY	85%
RESIDENTIAL GSF / UNIT	**1,330**
CLUBHOUSE AMENITY	**11,307**
GARAGE BUILDING 8, 9, 10 & 11	**12,365**
TOTAL PROJECT GSF	**263,078**

HEARING IMPAIRED UNITS		
RATIO	REQUIRED	PROVIDED
2%	4	4

GROUP 2 UNITS		
UNIT TYPE	BUILDING NUMBER	UNIT NUMBERS
A1-G2	BUILDING 1 & 2	
A2-G2	BUILDING 2	
A3-G2	BUILDING 1	
B1-G2	BUILDING 1 & 2	
B2-G2	BUILDING 2	
RATIO	REQUIRED	PROVIDED
5%	9	9

AFFORDABLE UNITS		
RATIO	REQUIRED	PROVIDED
25%	45	45

RENTABLE STORAGE	NSRF
BUILDING 1	**6,186**
BUILDING 2	**6,932**

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consultant information:

issuance: PERMIT / GMP Coordination Set

NOT FOR CONSTRUCTION

key plan:

drawing information:	
drawing by:	AMD
drawing checked by:	AD
drawing scale:	
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
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No.	Description	Date

registration: DRAFT

drawing name: Unit Mix & Program

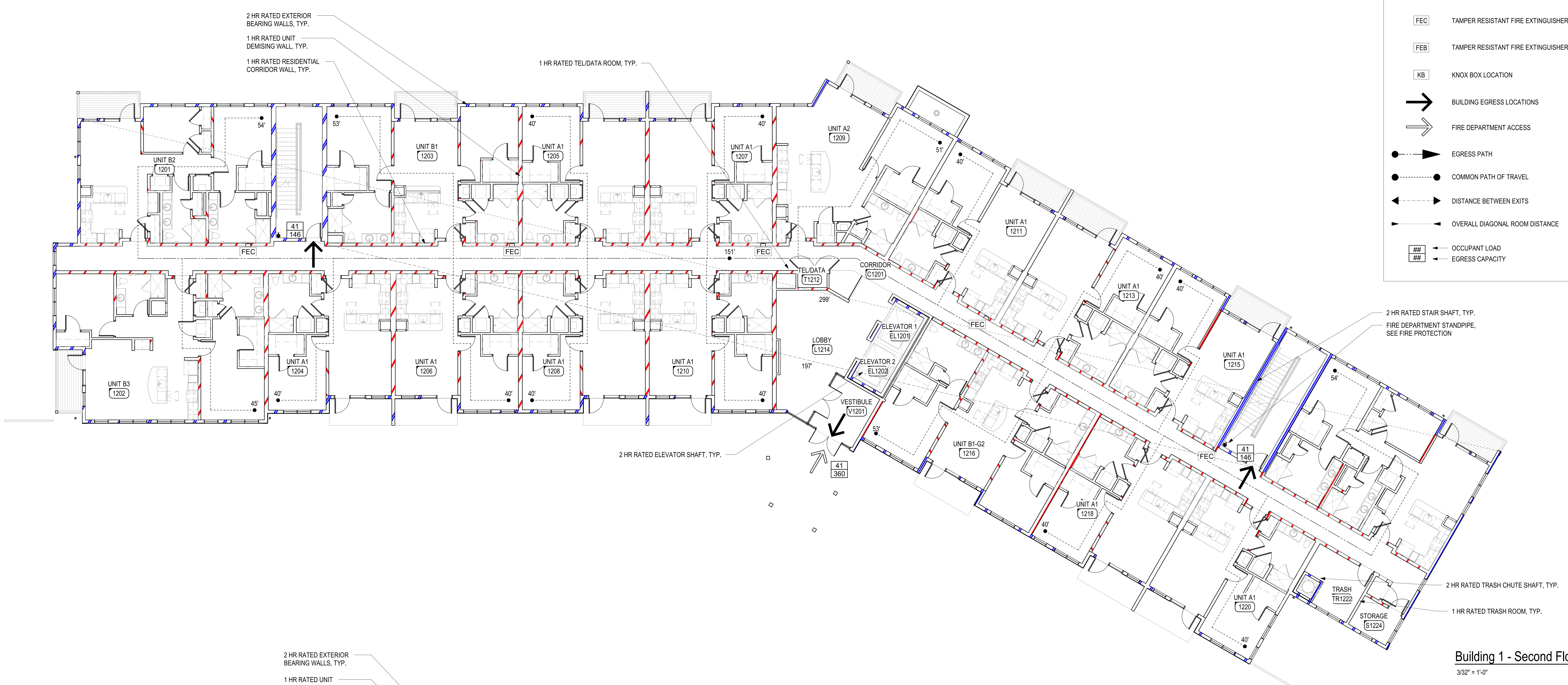
drawing number: A-009

LIFE SAFETY PLAN KEY

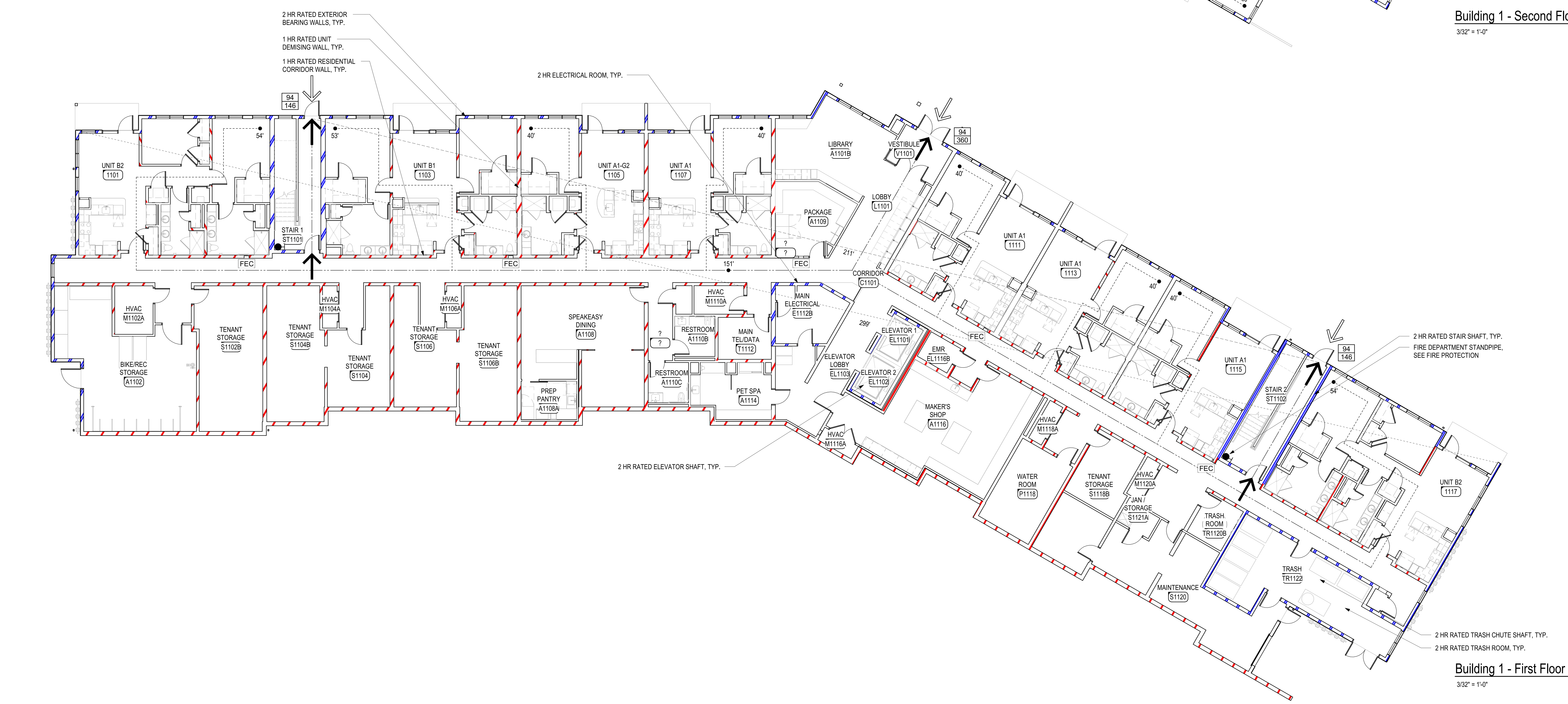
	1-HR WALL CONSTRUCTION (SEE WALL TYPES)
	2-HR WALL CONSTRUCTION (SEE WALL TYPES)
	FIRE DEPARTMENT STANDPIPE LOCATION
SPC	FIRE DEPARTMENT VALVE CABINET
FEC	TAMPER RESISTANT FIRE EXTINGUISHER CABINET
FEB	TAMPER RESISTANT FIRE EXTINGUISHER & BRACKET
KB	KNOX BOX LOCATION
	BUILDING EGRESS LOCATIONS
	FIRE DEPARTMENT ACCESS
	EGRESS PATH
	COMMON PATH OF TRAVEL
	DISTANCE BETWEEN EXITS
	OVERALL DIAGONAL ROOM DISTANCE
##	OCCUPANT LOAD
##	EGRESS CAPACITY

LIFE SAFETY PLAN NOTES

1. ALL EXTERIOR WOOD LOAD-BEARING WALLS, COLUMNS, AND BEAMS ARE REQUIRED TO BE 2-HR FIRE-RATED IN TYPE IIIA CONSTRUCTION. SEE FULL CODE REPORT IN SPECIFICATIONS. SEE CODE SUMMARY ON A-003.
2. ALL INTERIOR WOOD LOAD-BEARING WALLS, COLUMNS, AND BEAMS ARE REQUIRED TO BE 1-HR FIRE-RATED AS THEY SUPPORT A 1-HR FLOOR ABOVE. SEE CODE SUMMARY ON A-003.
3. THE ROOF IS REQUIRED TO BE 1-HR FIRE RATED.
4. FIRE EXTINGUISHERS ARE LOCATED FOR 75' MAXIMUM TRAVEL DISTANCE AT RESIDENTIAL CORRIDORS.
5. FLOORS AND CEILINGS OF 2-HR FIRE-RATED ROOMS TO HAVE 2-HR FIRE-RATED FLOOR/CEILING ASSEMBLY, MINIMUM. SEE A-023 FOR TYPICAL WOOD FRAME ASSEMBLIES.
6. ALL PENETRATIONS THROUGH RATED ASSEMBLIES ARE TO BE FIRE STOPPED WITH AN APPROVED, UL LISTED PRODUCT AND DETAIL TO MAINTAIN THE RATING OF THE PENETRATED ASSEMBLY.
7. ALL STEEL COLUMNS AND BEAMS WITHIN TYPE IIIA CONSTRUCTION THAT ARE PART OF THE INTERNAL BEARING STRUCTURE (I.E. SUPPORT BEARING WALL AND/OR SECONDARY FRAMING MEMBERS) ARE TO HAVE INDIVIDUAL ENCASEMENT PROTECTION ON ALL SIDES TO ACHIEVE A 1-HR FIRE RATING.
8. ALL STEEL COLUMNS AND BEAMS WITHIN TYPE IIIA CONSTRUCTION THAT ARE PART OF THE EXTERNAL WALL BEARING STRUCTURE ARE TO HAVE INDIVIDUAL ENCASEMENT PROTECTION ON ALL SIDES TO ACHIEVE A 2-HR FIRE RATING.
9. THE IIIA BUILDING IS A FULLY SPRINKLERED BUILDING. ALL SPACES ARE TO BE SPRINKLERED WITH THE EXCEPTION OF THE ELEVATOR SHAFT AND MACHINE ROOM.
10. FIRE PROTECTION SUBCONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND ENGINEERING OF THE SPRINKLER SYSTEM INCLUDING ALL COMPONENTS, LOCATIONS, AND SYSTEM TYPES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
    A. ALL INTERIOR SPACES INCLUDING UNIT LIVING AREAS
    B. ALL CONCEALED SPACES IN EXCESS OF CODE REQUIRED MAXIMUM DIMENSIONS
    C. ALL CONCEALED PARAPET KICKERS, UNLESS KICKER SPACE IS FILLED WITH NON-COMBUSTIBLE INSULATION
    D. ALL ROOF TRUSS AND FLOOR TRUSS SPACES
    E. ALL BALCONIES, AT THE UNDERSIDE OF THE BALCONY BY MEANS OF A SIDEWALL DRY HEAD OFF OF THE UNIT WET SYSTEM
    F. ALL SUB-ELECTRIC ROOMS, MECHANICAL ROOMS, AND OTHER SERVICE OR UTILITY ROOMS
    G. ALL SHAFTS AND TRASH CHUTES



Building 1 - Second Floor Life Safety Plan
3/32" = 1'-0"
2
A-011



Building 1 - First Floor Life Safety Plan
3/32" = 1'-0"
1
A-011

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consultant information:

issuance:
PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	IJ
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

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No.	Description	Date

registration:

DRAFT

drawing name:
Building 1 - First & Second Floor Life Safety Plan

drawing number:
A-011

LIFE SAFETY PLAN KEY

	1-HR WALL CONSTRUCTION (SEE WALL TYPES)
	2-HR WALL CONSTRUCTION (SEE WALL TYPES)
	FIRE DEPARTMENT STANDPIPE LOCATION
SPC	FIRE DEPARTMENT VALVE CABINET
FEC	TAMPER RESISTANT FIRE EXTINGUISHER CABINET
FEB	TAMPER RESISTANT FIRE EXTINGUISHER & BRACKET
KB	KNOX BOX LOCATION
	BUILDING EGRESS LOCATIONS
	FIRE DEPARTMENT ACCESS
	EGRESS PATH
	COMMON PATH OF TRAVEL
	DISTANCE BETWEEN EXITS
	OVERALL DIAGONAL ROOM DISTANCE
##	OCCUPANT LOAD
##	EGRESS CAPACITY

LIFE SAFETY PLAN NOTES

1. ALL EXTERIOR WOOD LOAD-BEARING WALLS, COLUMNS, AND BEAMS ARE REQUIRED TO BE 2-HR FIRE-RATED IN TYPE IIIA CONSTRUCTION. SEE FULL CODE REPORT IN SPECIFICATIONS. SEE CODE SUMMARY ON A-003.
2. ALL INTERIOR WOOD LOAD-BEARING WALLS, COLUMNS, AND BEAMS ARE REQUIRED TO BE 1-HR FIRE-RATED AS THEY SUPPORT A 1-HR FLOOR ABOVE. SEE CODE SUMMARY ON A-003.
3. THE ROOF IS REQUIRED TO BE 1-HR FIRE RATED.
4. FIRE EXTINGUISHERS ARE LOCATED FOR 75' MAXIMUM TRAVEL DISTANCE AT RESIDENTIAL CORRIDORS.
5. FLOORS AND CEILINGS OF 2-HR FIRE-RATED ROOMS TO HAVE 2-HR FIRE-RATED FLOOR/CEILING ASSEMBLY, MINIMUM. SEE A-023 FOR TYPICAL WOOD FRAME ASSEMBLIES.
6. ALL PENETRATIONS THROUGH RATED ASSEMBLIES ARE TO BE FIRE STOPPED WITH AN APPROVED, UL LISTED PRODUCT AND DETAIL TO MAINTAIN THE RATING OF THE PENETRATED ASSEMBLY.
7. ALL STEEL COLUMNS AND BEAMS WITHIN TYPE IIIA CONSTRUCTION THAT ARE PART OF THE INTERNAL BEARING STRUCTURE (I.E. SUPPORT BEARING WALL AND/OR SECONDARY FRAMING MEMBERS) ARE TO HAVE INDIVIDUAL ENCASEMENT PROTECTION ON ALL SIDES TO ACHIEVE A 1-HR FIRE RATING.
8. ALL STEEL COLUMNS AND BEAMS WITHIN TYPE IIIA CONSTRUCTION THAT ARE PART OF THE EXTERNAL WALL BEARING STRUCTURE ARE TO HAVE INDIVIDUAL ENCASEMENT PROTECTION ON ALL SIDES TO ACHIEVE A 2-HR FIRE RATING.
9. THE IIIA BUILDING IS A FULLY SPRINKLERED BUILDING. ALL SPACES ARE TO BE SPRINKLERED WITH THE EXCEPTION OF THE ELEVATOR SHAFT AND MACHINE ROOM.
10. FIRE PROTECTION SUBCONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND ENGINEERING OF THE SPRINKLER SYSTEM INCLUDING ALL COMPONENTS, LOCATIONS, AND SYSTEM TYPES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
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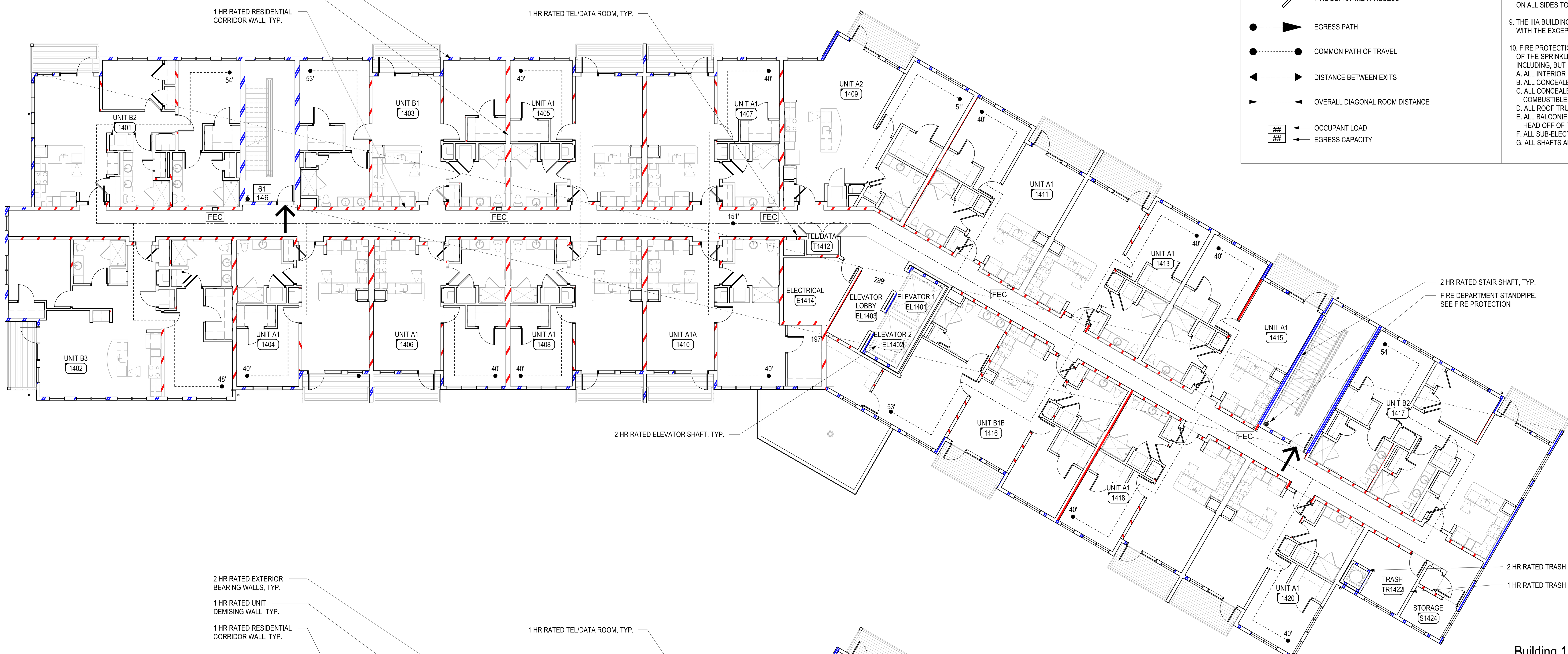
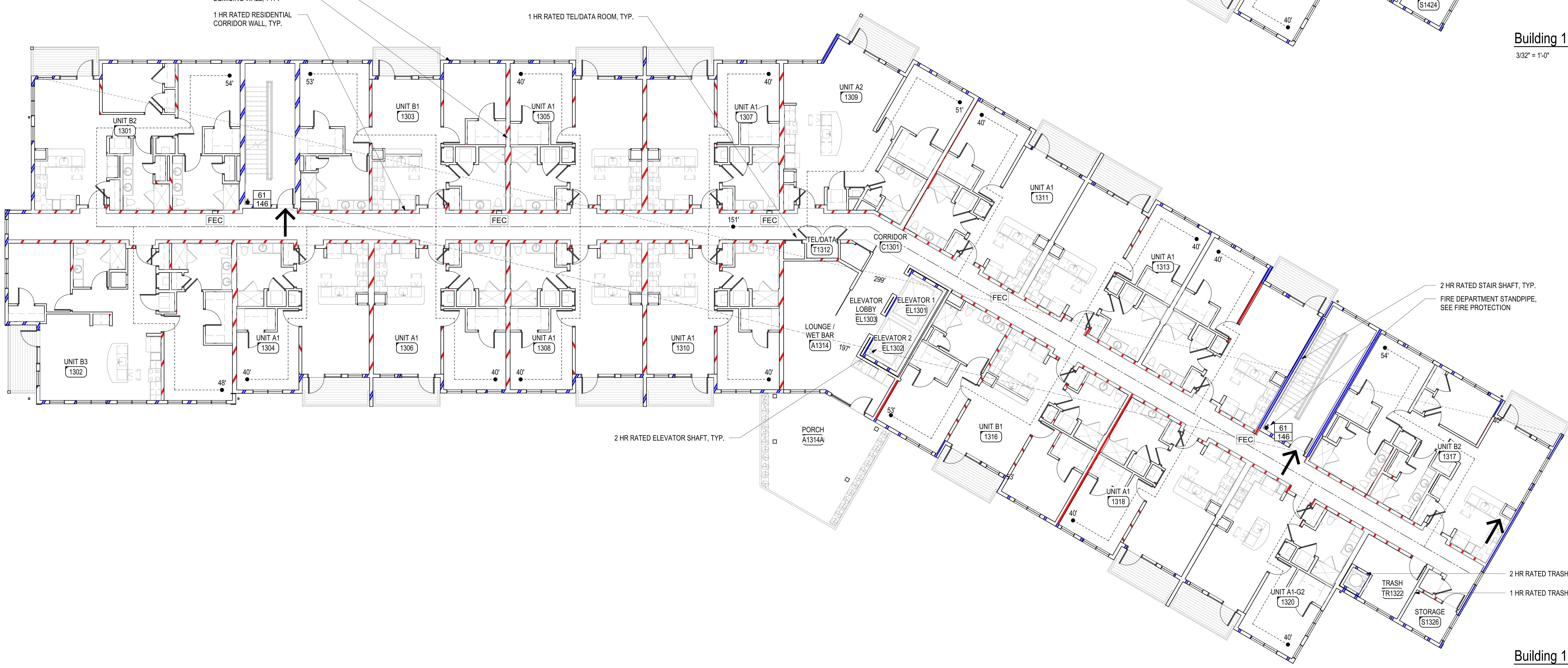
   B. ALL CONCEALED SPACES IN EXCESS OF CODE REQUIRED MAXIMUM DIMENSIONS
   C. ALL CONCEALED PARAPET KICKERS, UNLESS KICKER SPACE IS FILLED WITH NON-COMBUSTIBLE INSULATION
   D. ALL ROOF TRUSS AND FLOOR TRUSS SPACES
   E. ALL BALCONIES, AT THE UNDERSIDE OF THE BALCONY BY MEANS OF A SIDEWALL DRY HEAD OFF OF THE UNIT WET SYSTEM
   F. ALL SUB-ELECTRIC ROOMS, MECHANICAL ROOMS, AND OTHER SERVICE OR UTILITY ROOMS
   G. ALL SHAFTS AND TRASH CHUTES



Building 1 - Typical Floor Life Safety Plan — 2 / A-012

3/32" = 1'-0"



Building 1 - Third Floor Life Safety Plan — 1 / A-012

3/32" = 1'-0"

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consultant information:

issuance: PERMIT / GMP Coordination Set

NOT FOR CONSTRUCTION

key plan:

drawing information:

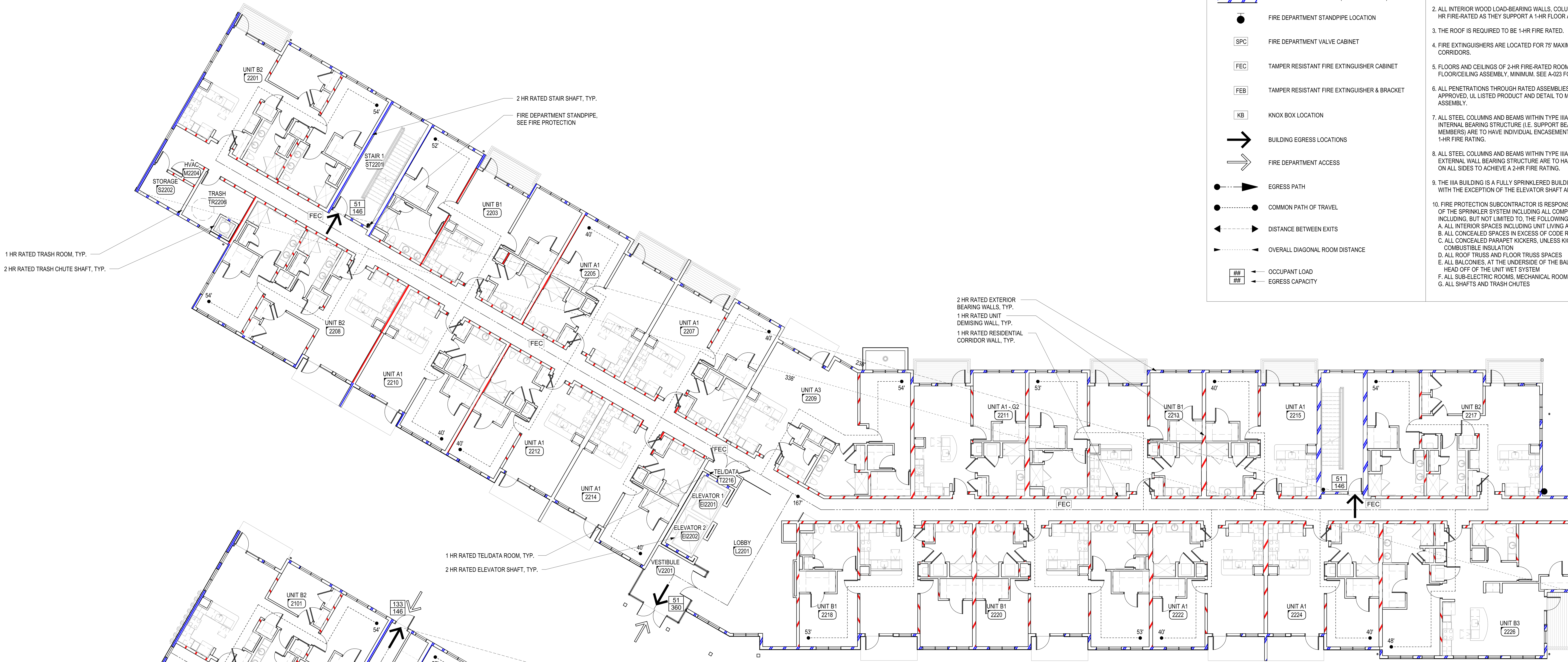
drawing by:	IJ
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration: DRAFT

drawing name: Building 1 - Third & Typical Floor Life Safety Plan

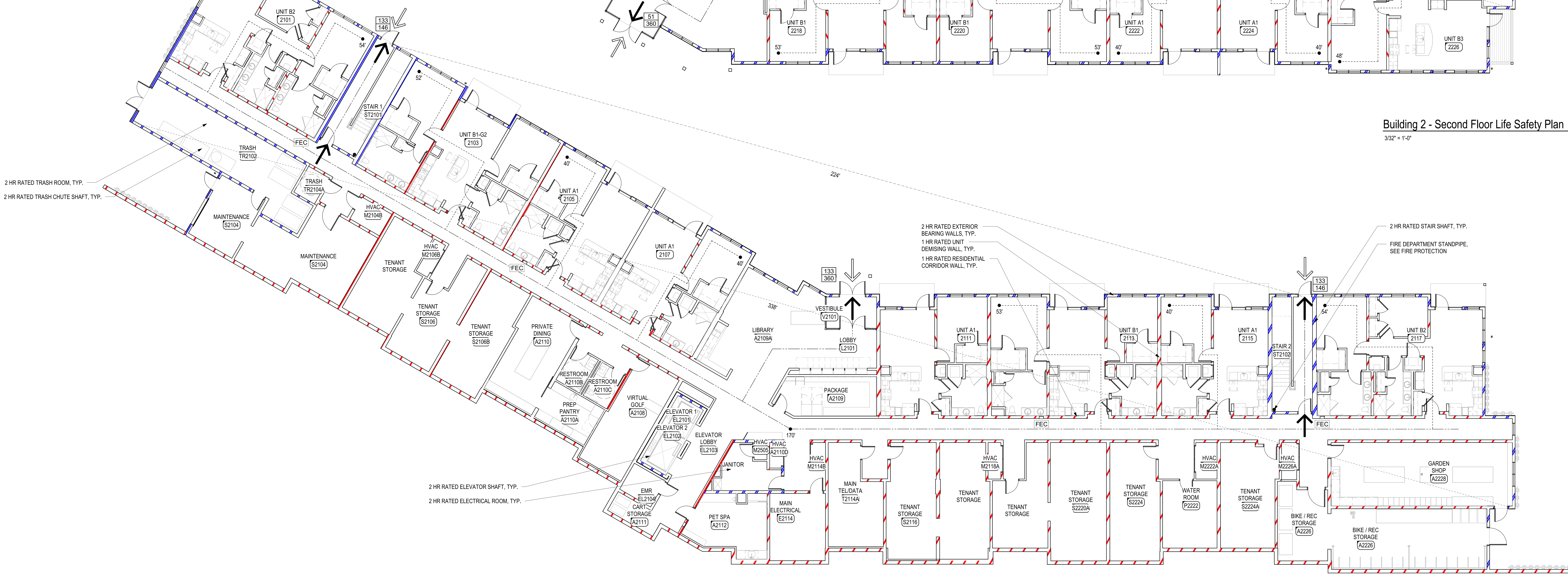
drawing number: A-012



Building 2 - Second Floor Life Safety Plan

3/32" = 1'-0"

2 A-013



Building 2 - First Floor Life Safety Plan

3/32" = 1'-0"

1 A-013

LIFE SAFETY PLAN KEY

	1-HR WALL CONSTRUCTION (SEE WALL TYPES)
	2-HR WALL CONSTRUCTION (SEE WALL TYPES)
	FIRE DEPARTMENT STANDPIPE LOCATION
SPC	FIRE DEPARTMENT VALVE CABINET
FEC	TAMPER RESISTANT FIRE EXTINGUISHER CABINET
FEB	TAMPER RESISTANT FIRE EXTINGUISHER & BRACKET
KB	KNOX BOX LOCATION
	BUILDING EGRESS LOCATIONS
	FIRE DEPARTMENT ACCESS
	EGRESS PATH
	COMMON PATH OF TRAVEL
	DISTANCE BETWEEN EXITS
	OVERALL DIAGONAL ROOM DISTANCE
##	OCCUPANT LOAD
##	EGRESS CAPACITY

LIFE SAFETY PLAN NOTES

1. ALL EXTERIOR WOOD LOAD-BEARING WALLS, COLUMNS, AND BEAMS ARE REQUIRED TO BE 2-HR FIRE-RATED IN TYPE IIIA CONSTRUCTION. SEE FULL CODE REPORT IN SPECIFICATIONS. SEE CODE SUMMARY ON A-003.
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3. THE ROOF IS REQUIRED TO BE 1-HR FIRE RATED.
4. FIRE EXTINGUISHERS ARE LOCATED FOR 75' MAXIMUM TRAVEL DISTANCE AT RESIDENTIAL CORRIDORS.
5. FLOORS AND CEILINGS OF 2-HR FIRE-RATED ROOMS TO HAVE 2-HR FIRE-RATED FLOOR/CEILING ASSEMBLY, MINIMUM. SEE A-023 FOR TYPICAL WOOD FRAME ASSEMBLIES.
6. ALL PENETRATIONS THROUGH RATED ASSEMBLIES ARE TO BE FIRE STOPPED WITH AN APPROVED, UL LISTED PRODUCT AND DETAIL TO MAINTAIN THE RATING OF THE PENETRATED ASSEMBLY.
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    - D. ALL ROOF TRUSS AND FLOOR TRUSS SPACES
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    - G. ALL SHAFTS AND TRASH CHUTES

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issuance:

PERMIT / GMP Coordination Set

NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	IJ
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:

DRAFT

drawing name:

Building 2 - First & Second Floor Life Safety Plan

drawing number:

A-013

LIFE SAFETY PLAN KEY	
(red hatched wall)	1-HR WALL CONSTRUCTION (SEE WALL TYPES)
(blue hatched wall)	2-HR WALL CONSTRUCTION (SEE WALL TYPES)
●	FIRE DEPARTMENT STANDPIPE LOCATION
SPC	FIRE DEPARTMENT VALVE CABINET
FEC	TAMPER RESISTANT FIRE EXTINGUISHER CABINET
FEB	TAMPER RESISTANT FIRE EXTINGUISHER & BRACKET
KB	KNOX BOX LOCATION
→	BUILDING EGRESS LOCATIONS
⇒	FIRE DEPARTMENT ACCESS
●-·-►	EGRESS PATH
●·····●	COMMON PATH OF TRAVEL
◄- - -►	DISTANCE BETWEEN EXITS
►·····◄	OVERALL DIAGONAL ROOM DISTANCE
## / ##	OCCUPANT LOAD / EGRESS CAPACITY

LIFE SAFETY PLAN NOTES

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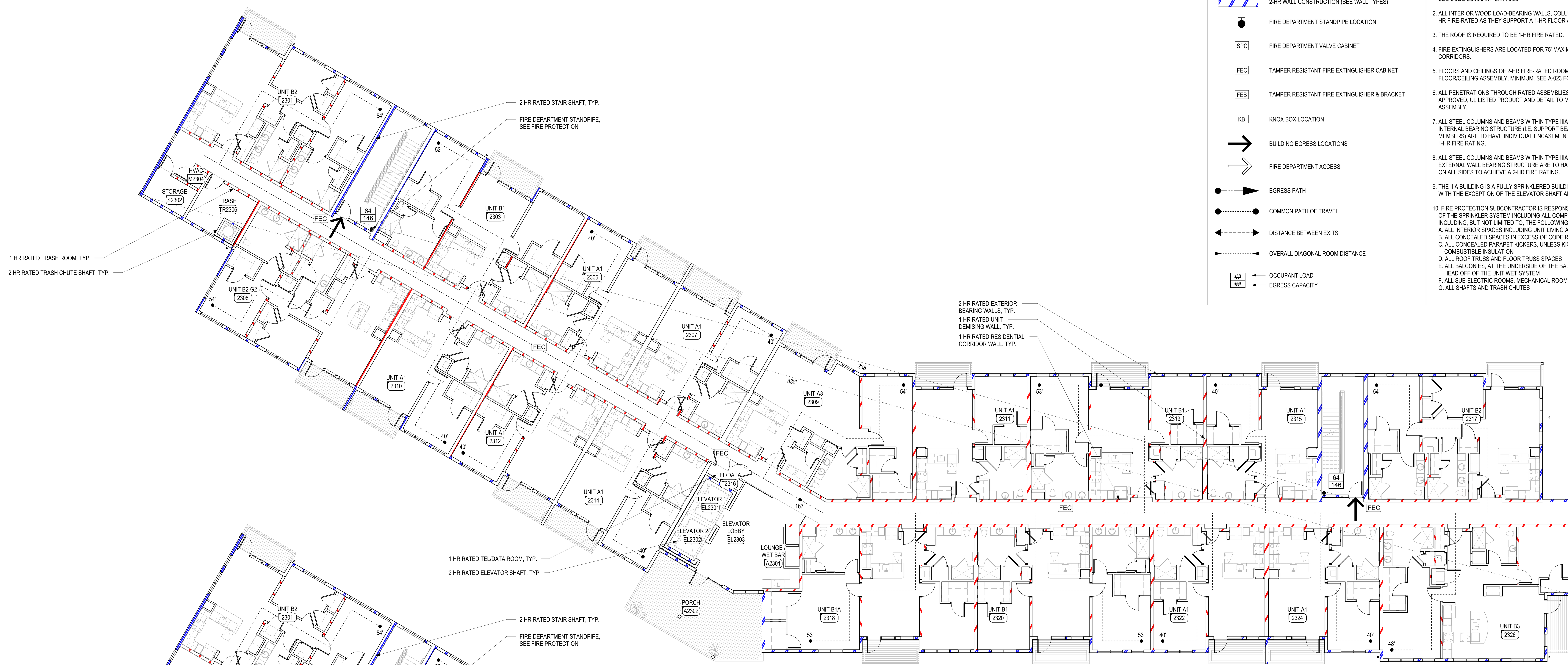
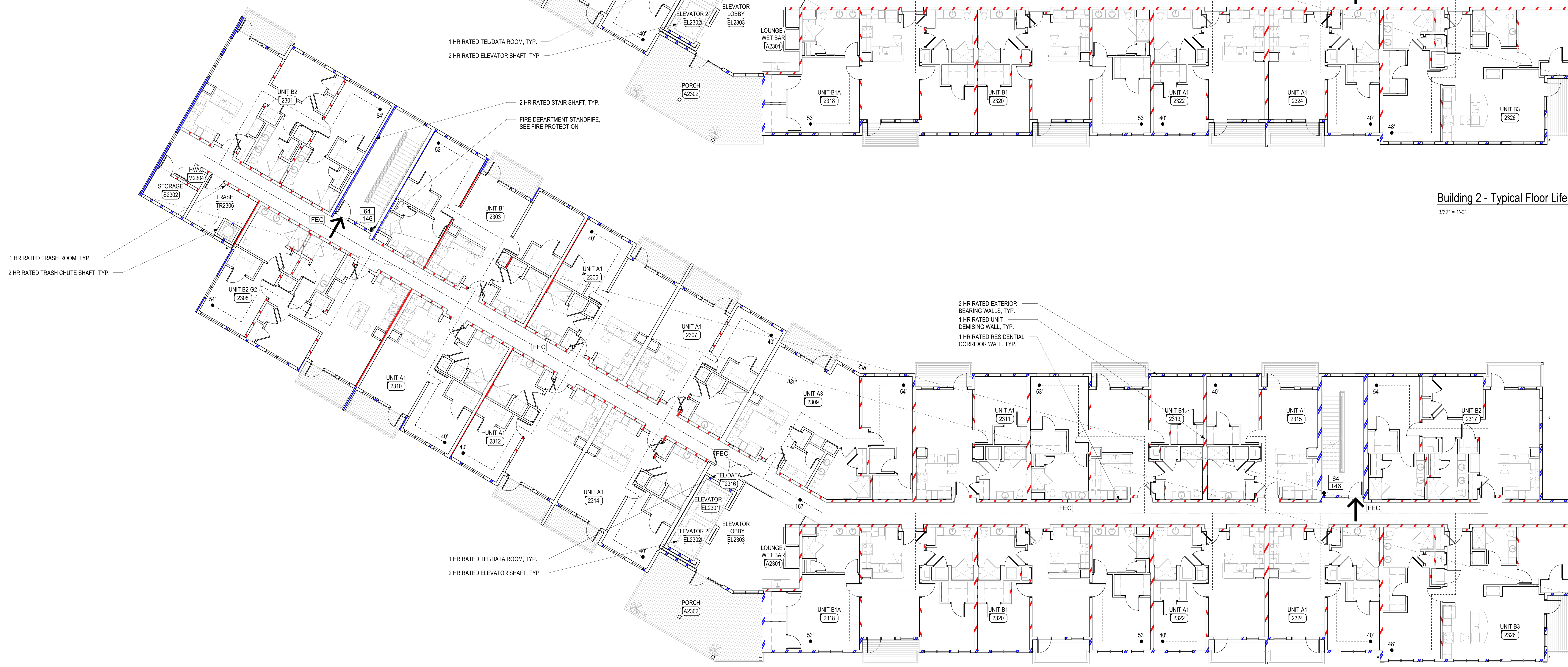


Building 2 - Typical Floor Life Safety Plan 2 A-014
3/32" = 1'-0"



Building 2 - Third Floor Life Safety Plan 1 A-014
3/32" = 1'-0"

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consultant information:

issuance:
PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	IJ
drawing checked by:	AD
drawing scale:	As indicated
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project number:	19021.00

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No.	Description	Date

registration:
DRAFT

drawing name:
Building 2 - Third & Typical Floor Life Safety Plan

drawing number:
A-014

LIFE SAFETY PLAN KEY	
	1-HR WALL CONSTRUCTION (SEE WALL TYPES)
	2-HR WALL CONSTRUCTION (SEE WALL TYPES)
	FIRE DEPARTMENT STANDPIPE LOCATION
SPC	FIRE DEPARTMENT VALVE CABINET
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	OVERALL DIAGONAL ROOM DISTANCE
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##	EGRESS CAPACITY

LIFE SAFETY PLAN NOTES

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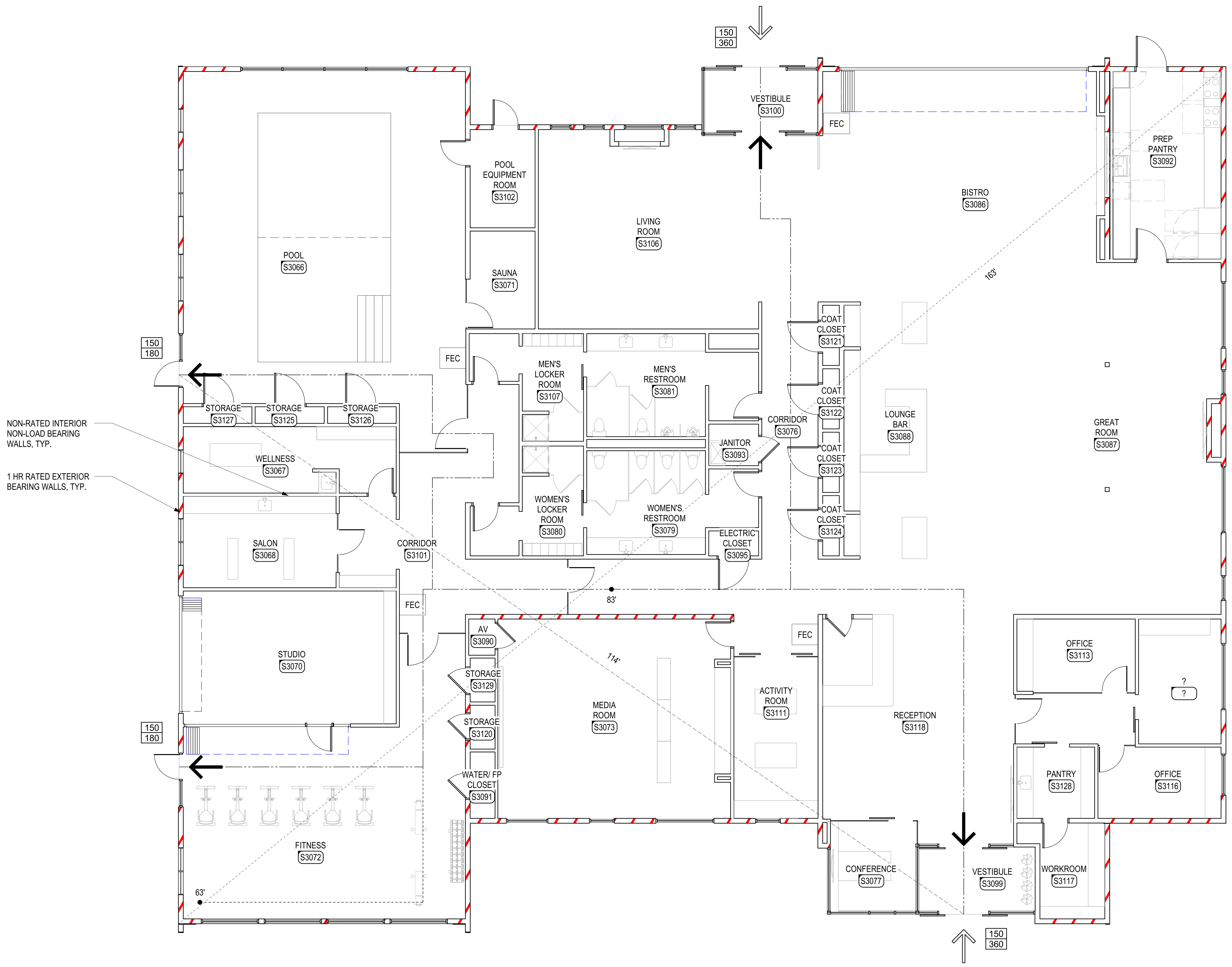

Clubhouse - First Floor Life Safety Plan
1/8" = 1'-0"
1
A-015

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300 Jordan Road
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consultant information:

issuance:
PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	IJ
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
Clubhouse - First Floor Life Safety Plan

drawing number:
A-015

LIFE SAFETY PLAN KEY
1-HR WALL CONSTRUCTION (SEE WALL TYPES)
2-HR WALL CONSTRUCTION (SEE WALL TYPES)
FIRE DEPARTMENT STANDPIPE LOCATION
SPC — FIRE DEPARTMENT VALVE CABINET
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LIFE SAFETY PLAN NOTES

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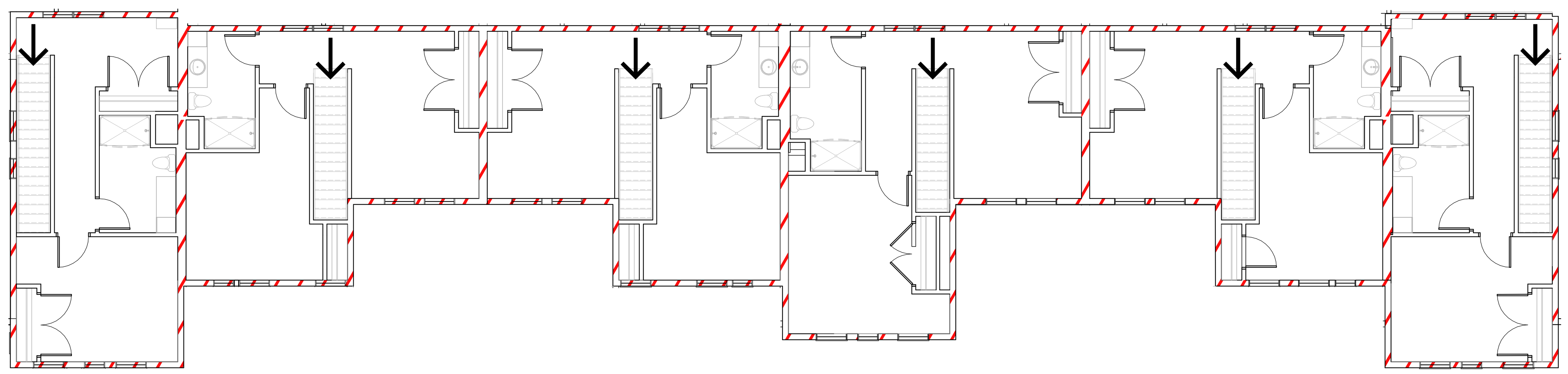
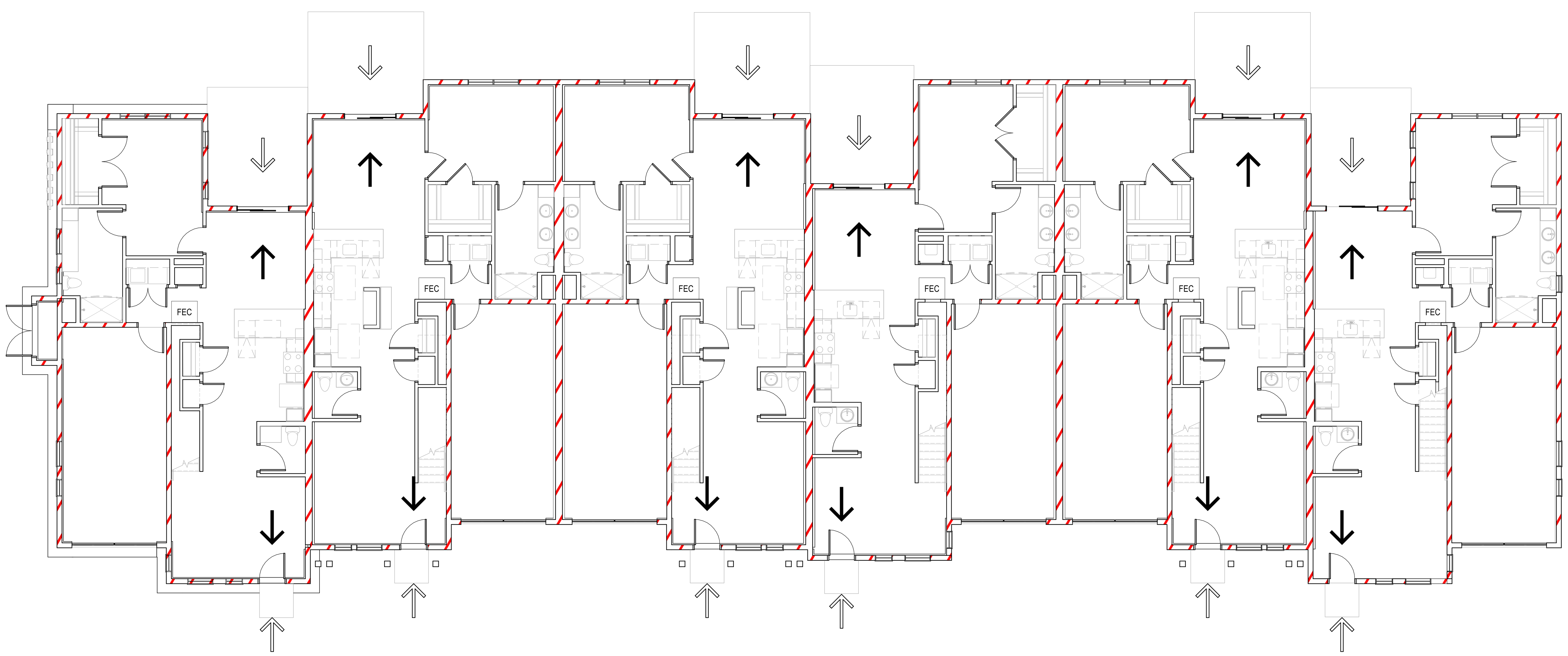


Townhouse - Second Floor Life Safety Plan 2 A-016
1/8" = 1'-0"



Townhouse - First Floor Life Safety Plan 1 A-016
1/8" = 1'-0"

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consultant information:

issuance:
PERMIT / GMP Coordination Set
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key plan:

drawing information:

drawing by:	Author
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
Townhouse - First Floor Life Safety Plan

drawing number:
A-016

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Coordination Set

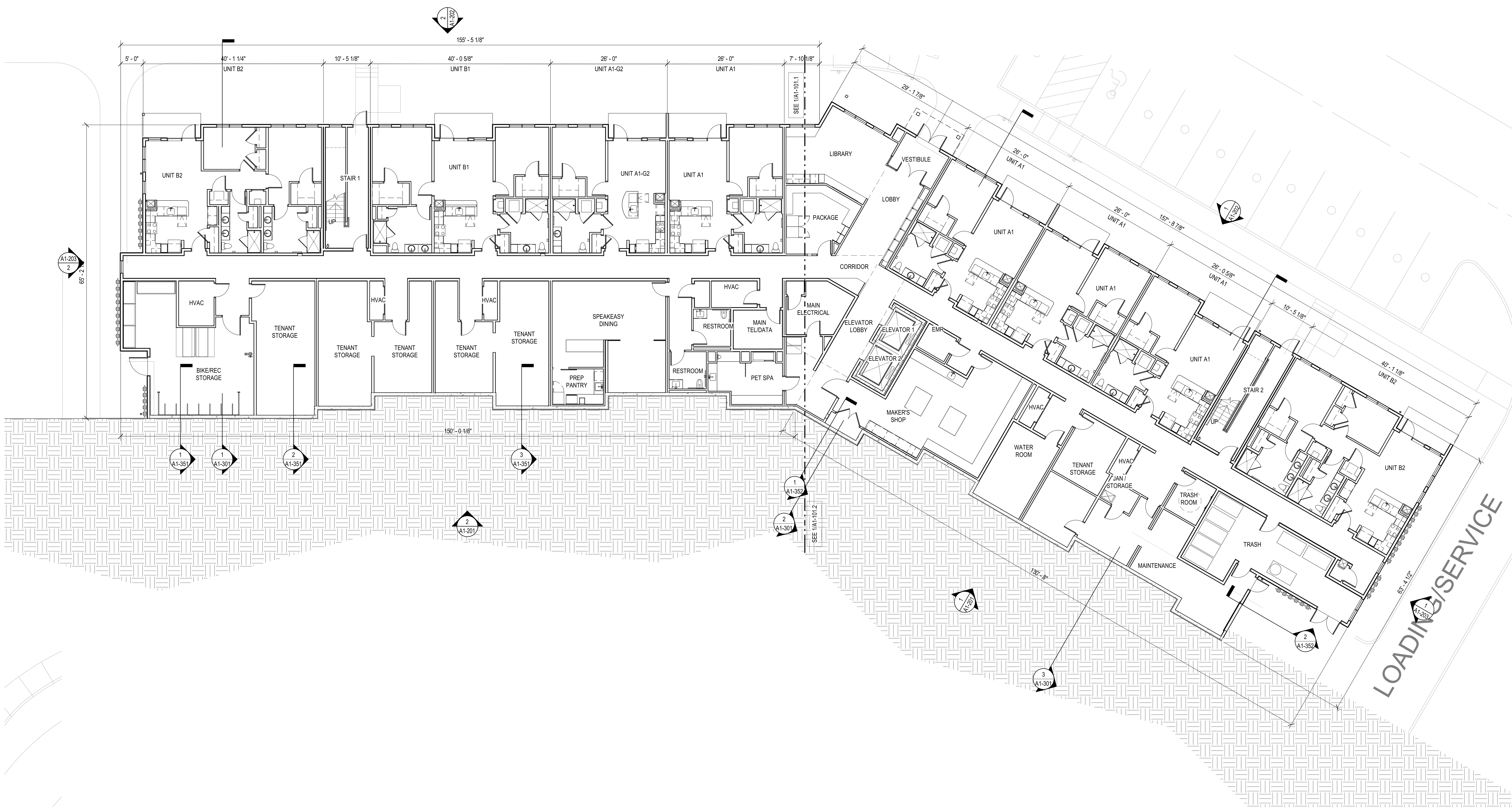
NOT FOR
CONSTRUCTION

drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

DRAFT



Building 1 - First Floor Plan - Overall 1
3/32" = 1'-0" A1-101

Building 1 - First Floor Plan - Overall

A1-101

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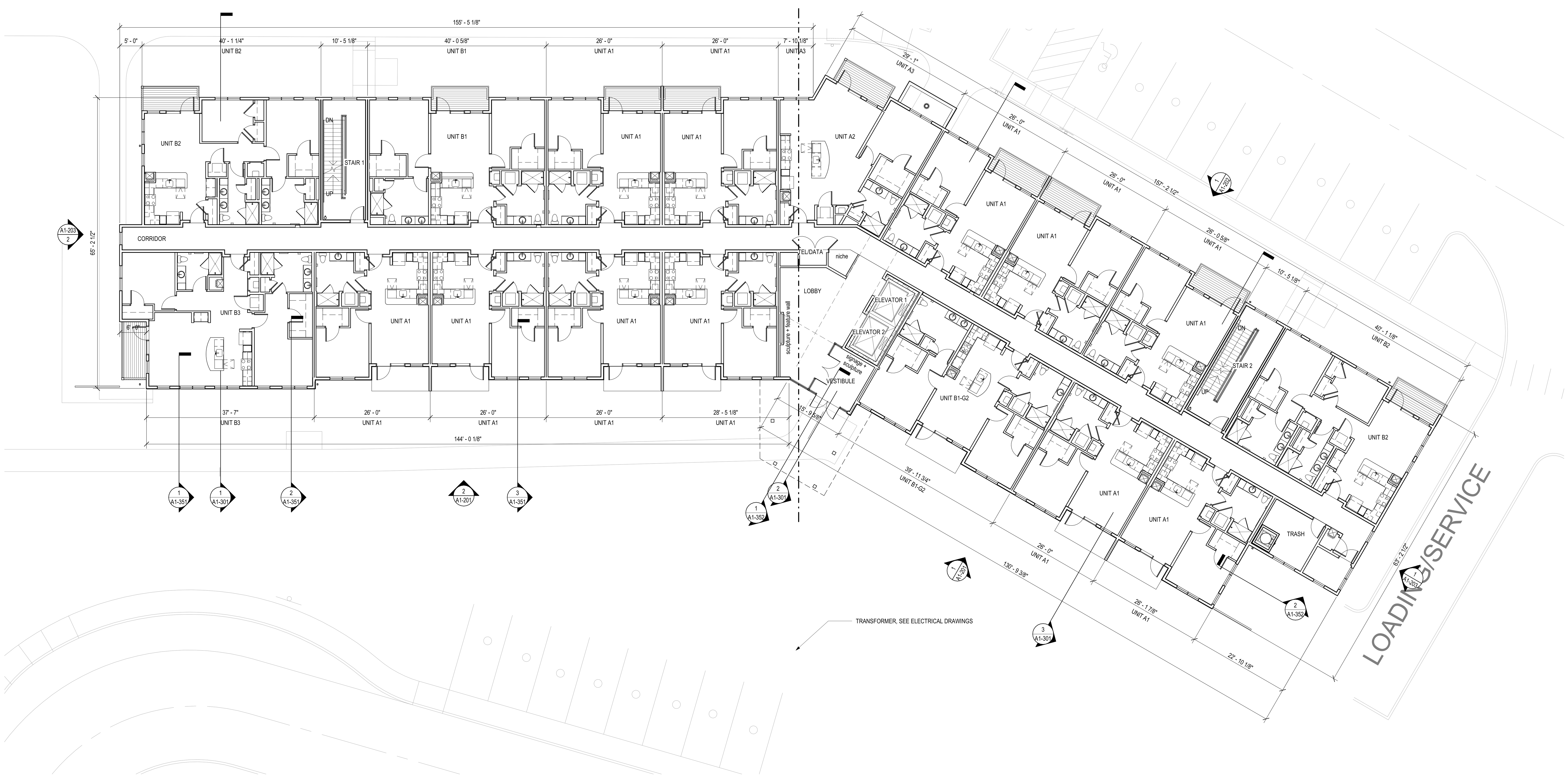

Building 1 - Second Floor Plan - Overall
3/32" = 1'-0"
1
A1-102

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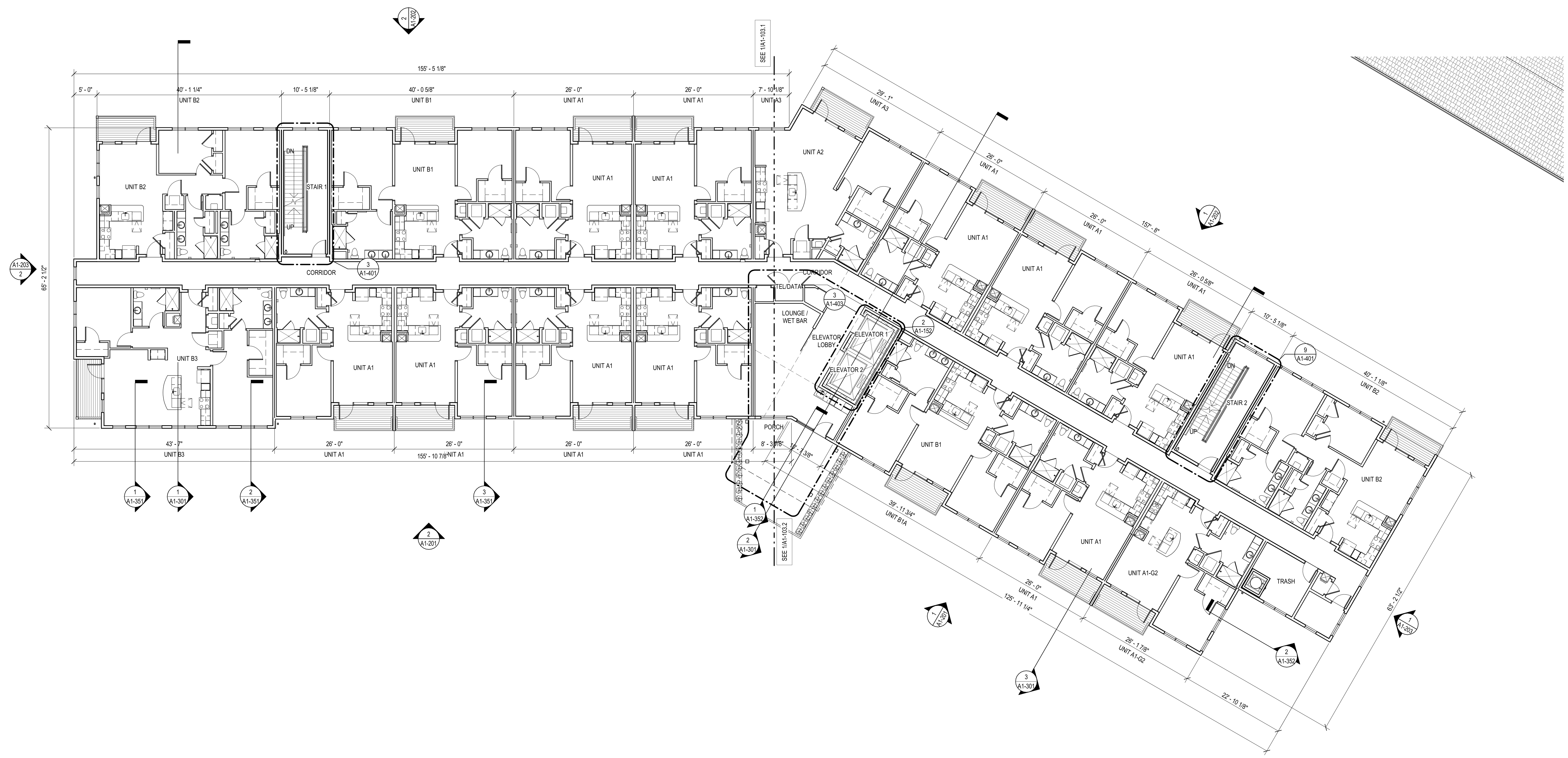
drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

DRAFT

Building 1 - Second Floor Plan - Overall

A1-102



Building 1 - Third Floor Plan - Overall
3/32" = 1'-0"
1
A1-103

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project information:
Arbella at Ashland

MBTA Access Road
Ashland, MA 01721

client information:
U A Senior
Manager LLC

Rensselaer
Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
PERMIT / GMP
Coordination Set

NOT FOR
CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

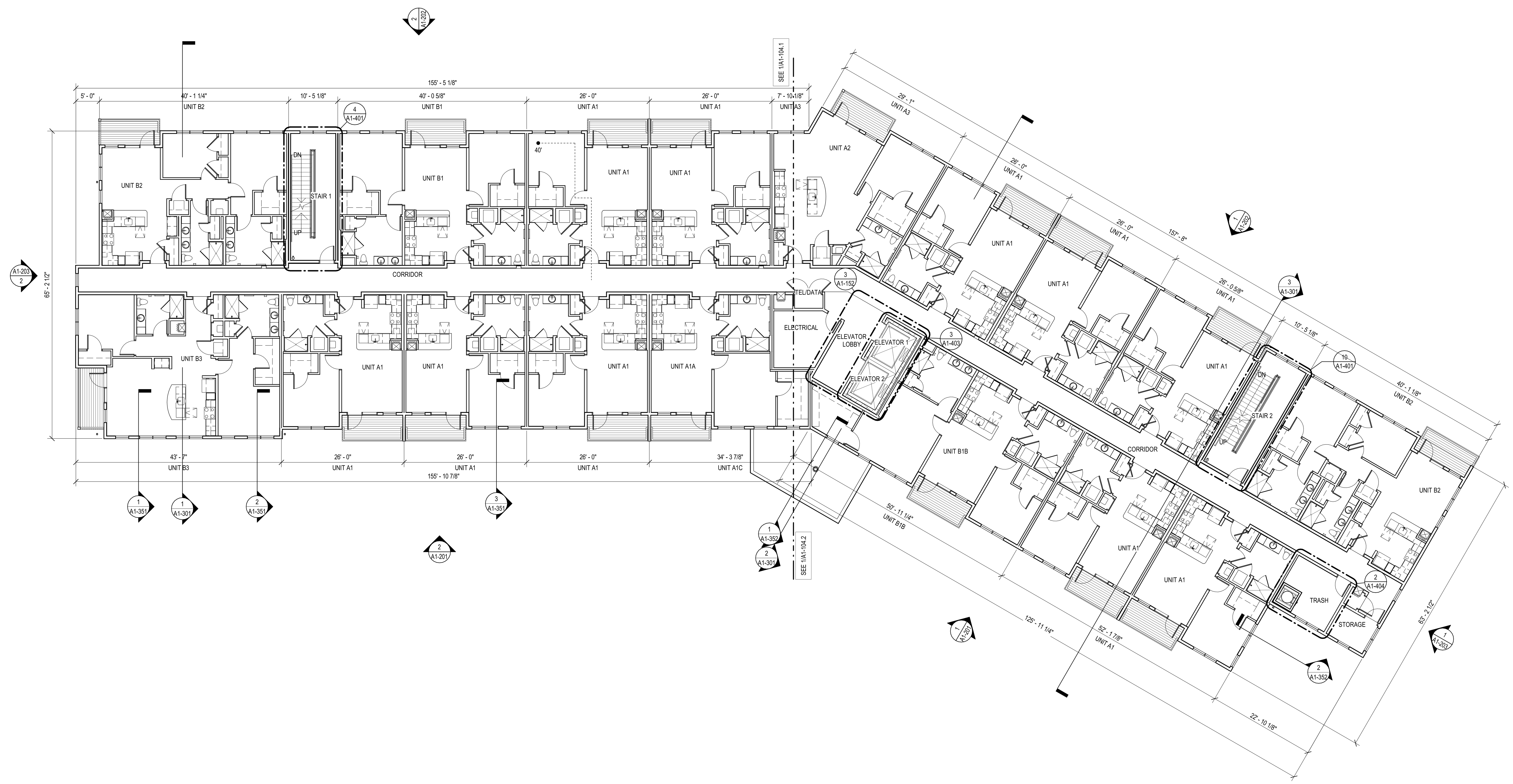
No.	Description	Date

registration:

DRAFT

drawing name:
Building 1 - Third Floor Plan - Overall

drawing number:
A1-103



Building 1 - Fourth Floor Plan - Overall

3/32" = 1'-0"

1
A1-104

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consultant information:

issuance:

PERMIT / GMP
Coordination Set

NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration:

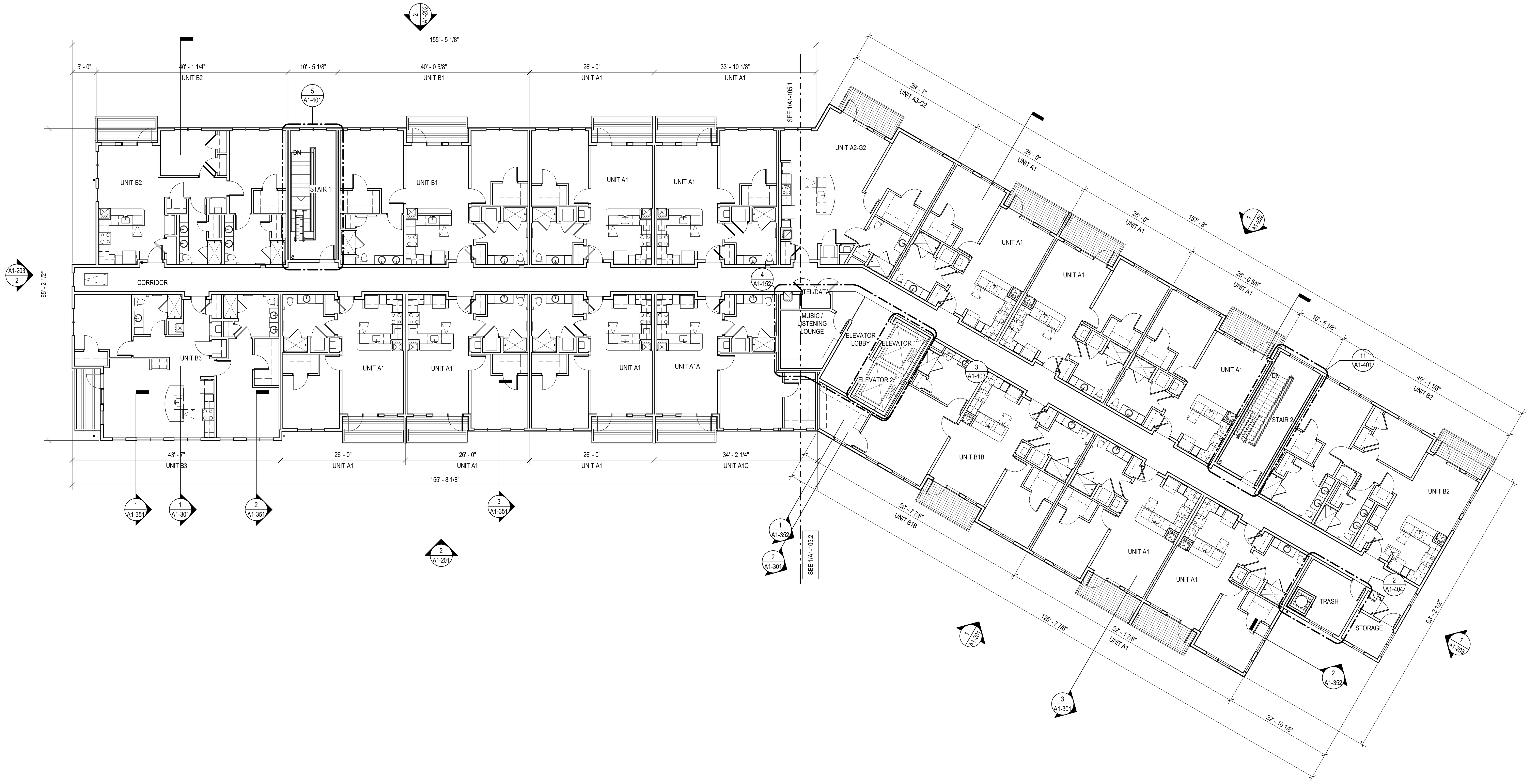
DRAFT

drawing name:

Building 1 - Fourth Floor Plan - Overall

drawing number:

A1-104



Building 1 - Fifth Floor Plan - Overall (1 / A1-105)

3/32" = 1'-0"

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PERMIT / GMP Coordination Set

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key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:

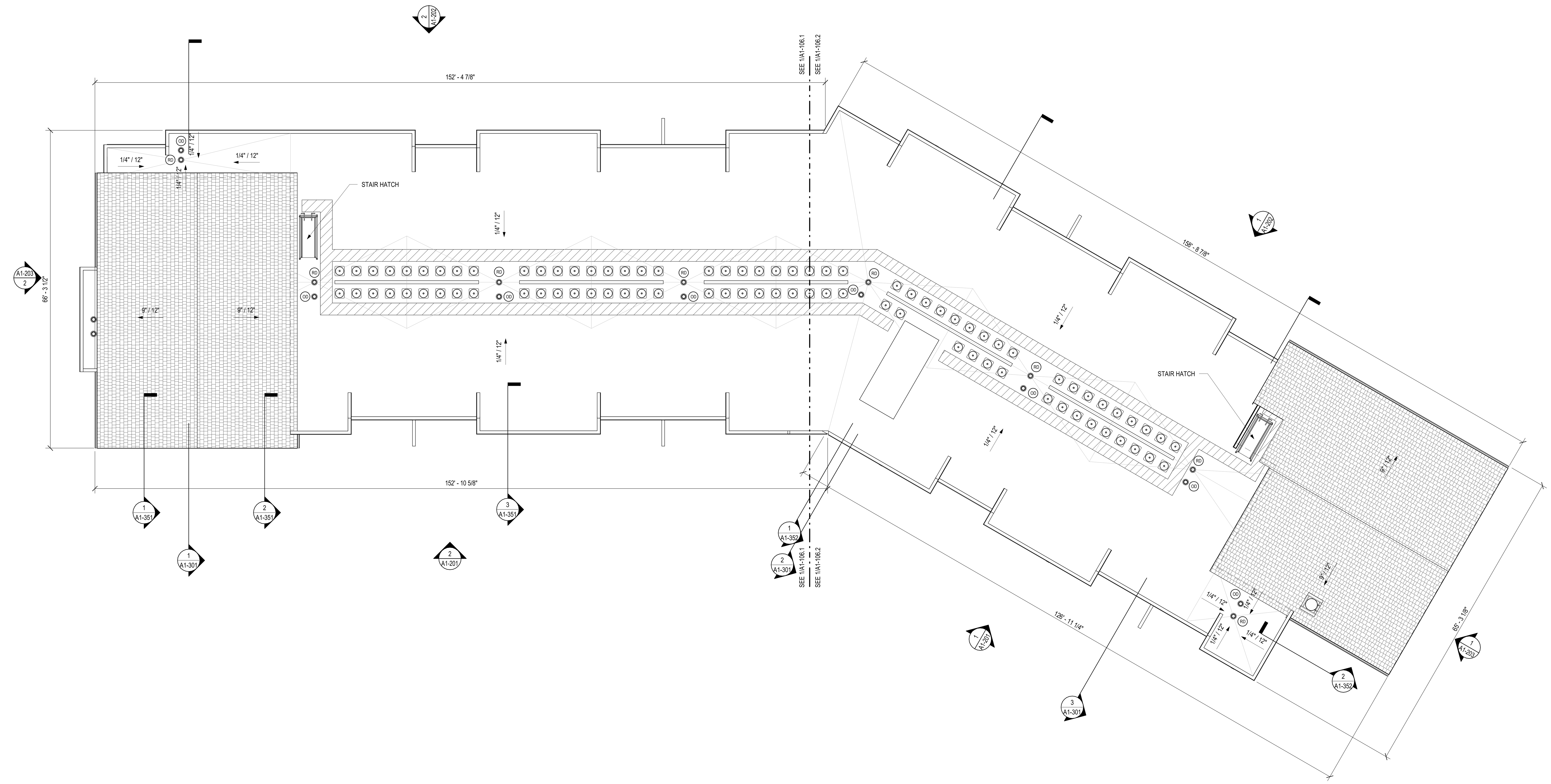
DRAFT

drawing name:

Building 1 - Fifth Floor Plan - Overall

drawing number:

A1-105



Building 1 - Roof Plan - Overall

3/32" = 1'-0"

1
A1-107

BUILDING 1 ATTIC VENT CALCULATIONS

ATTIC AREA	4,776 SF
ATTIC VENTING REQUIRED (AREA / 300)	15.92 SF (2292.48 SQ. IN.)
RIDGE VENTS PROVIDED (9 SQ. IN. / LF)	100' - 5" LF PROVIDED (903.75 SQ. IN.)
SOFFIT VENTS PROVIDED (9 SQ. IN. / LF)	210' - 6" LF PROVIDED (1,894.5 SQ. IN.)

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consultant information:

issuance:

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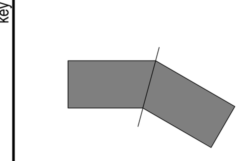
Coordination Set

NOT FOR
CONSTRUCTION

key plan:



drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:

DRAFT

drawing name:

Building 1 -
Roof Plan -
Overall

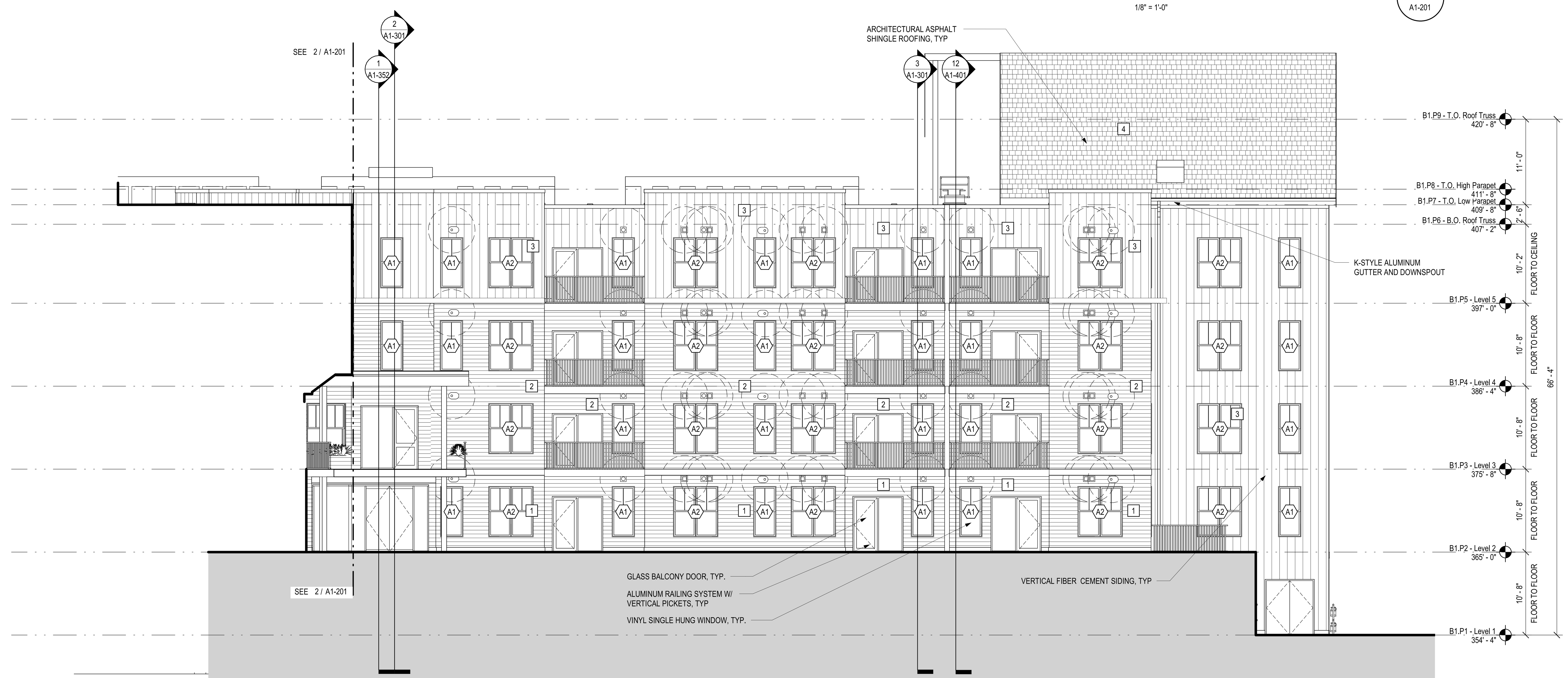
drawing number:

A1-107

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)

TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	

Building 1 - South Elevation - Left 2 A1-201
1/8" = 1'-0"



Building 1 - South Elevation - Right 1 A1-201
1/8" = 1'-0"

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client information: U A Senior Manager LLC
Rensselaer
Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance: PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

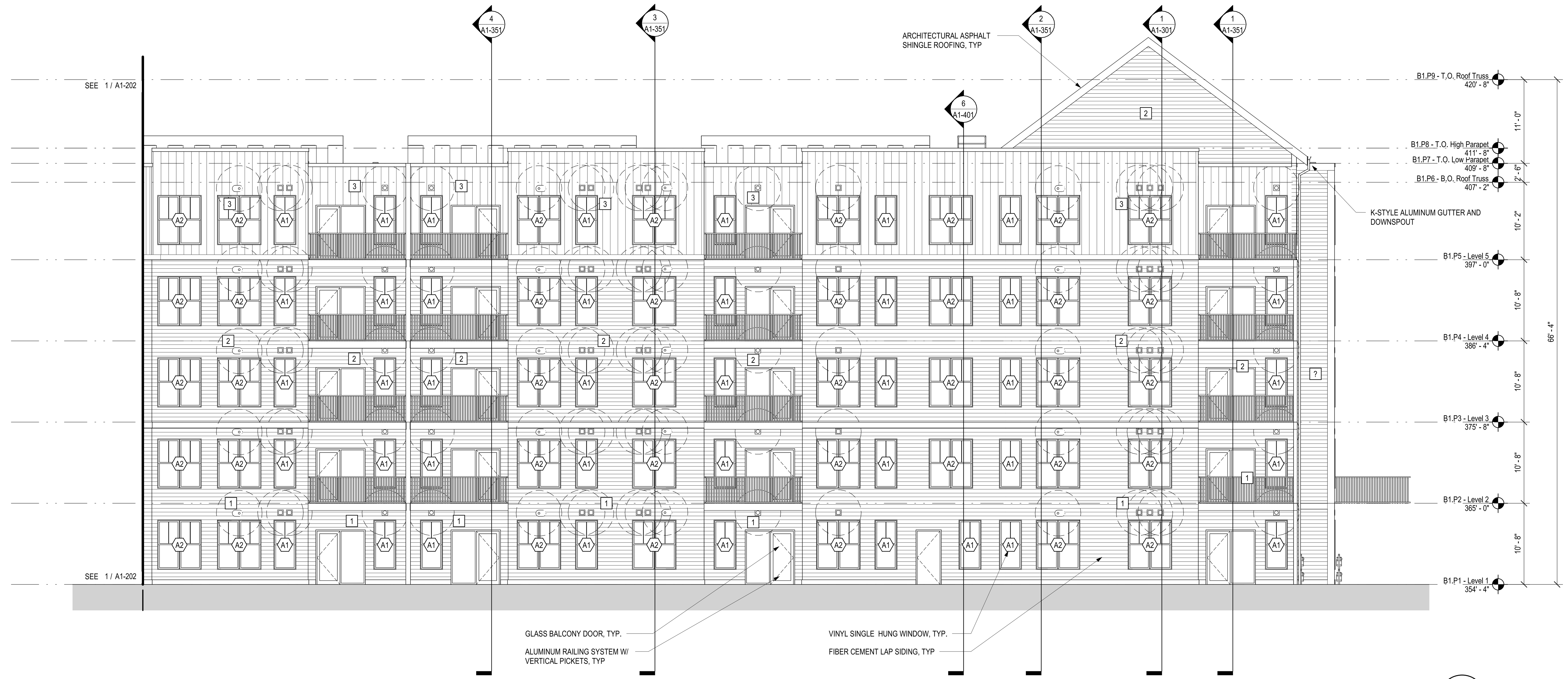
registration: DRAFT

drawing name: Building 1 - Exterior Elevations

drawing number: A1-201

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)

TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	



Building 1 - North Elevation - Right
1/8" = 1'-0"
2
A1-202

Building 1 - North Elevation - Left
1/8" = 1'-0"
1
A1-202

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Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
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key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:
DRAFT

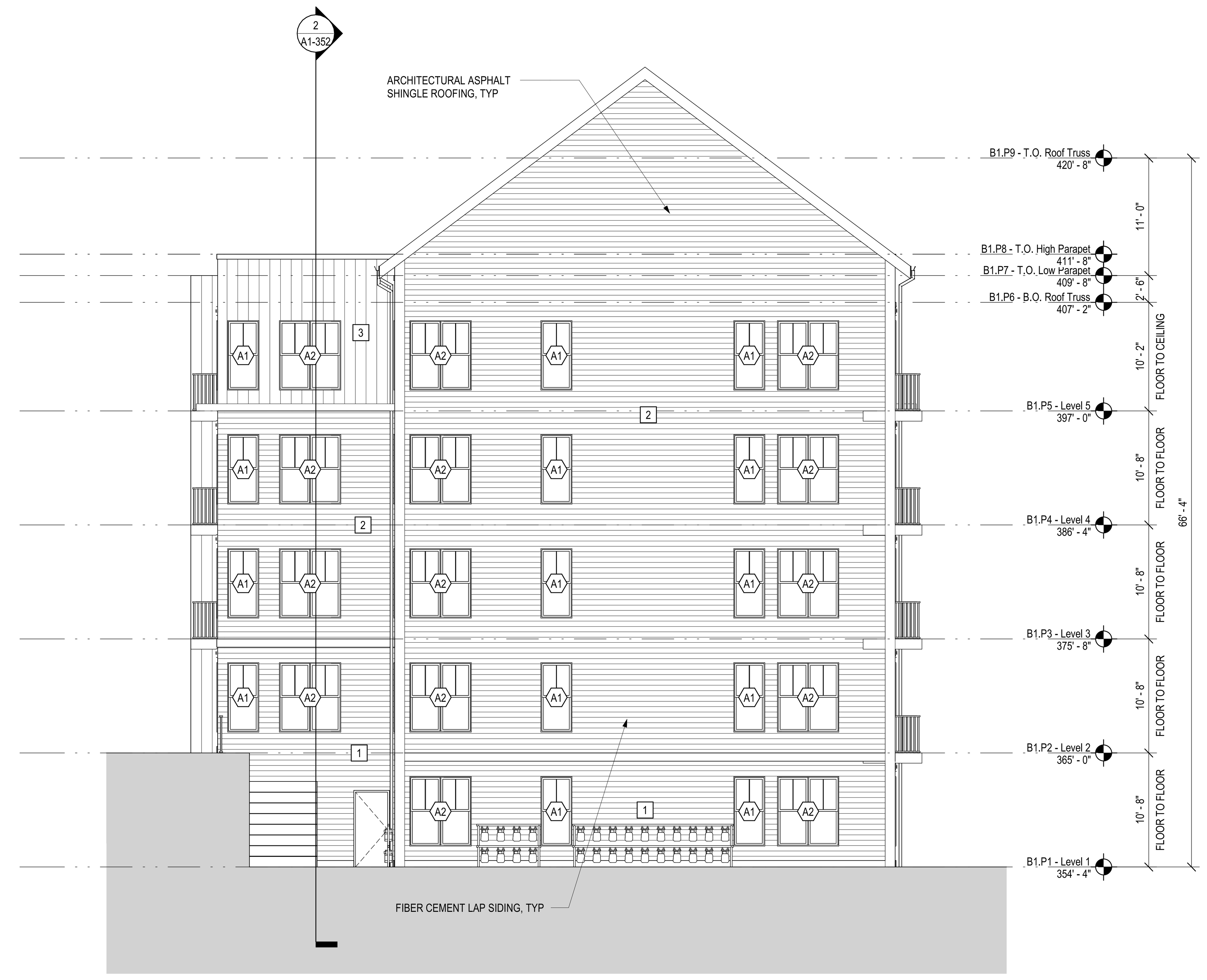
drawing name:
Building 1 - Exterior Elevations

drawing number:
A1-202

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)

TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	

Building 1 Left Elevation 2 A1-203
1/8" = 1'-0"



Building 1 Right Elevation 1 A1-203
1/8" = 1'-0"

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client information: U A Senior Manager LLC
Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance: PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

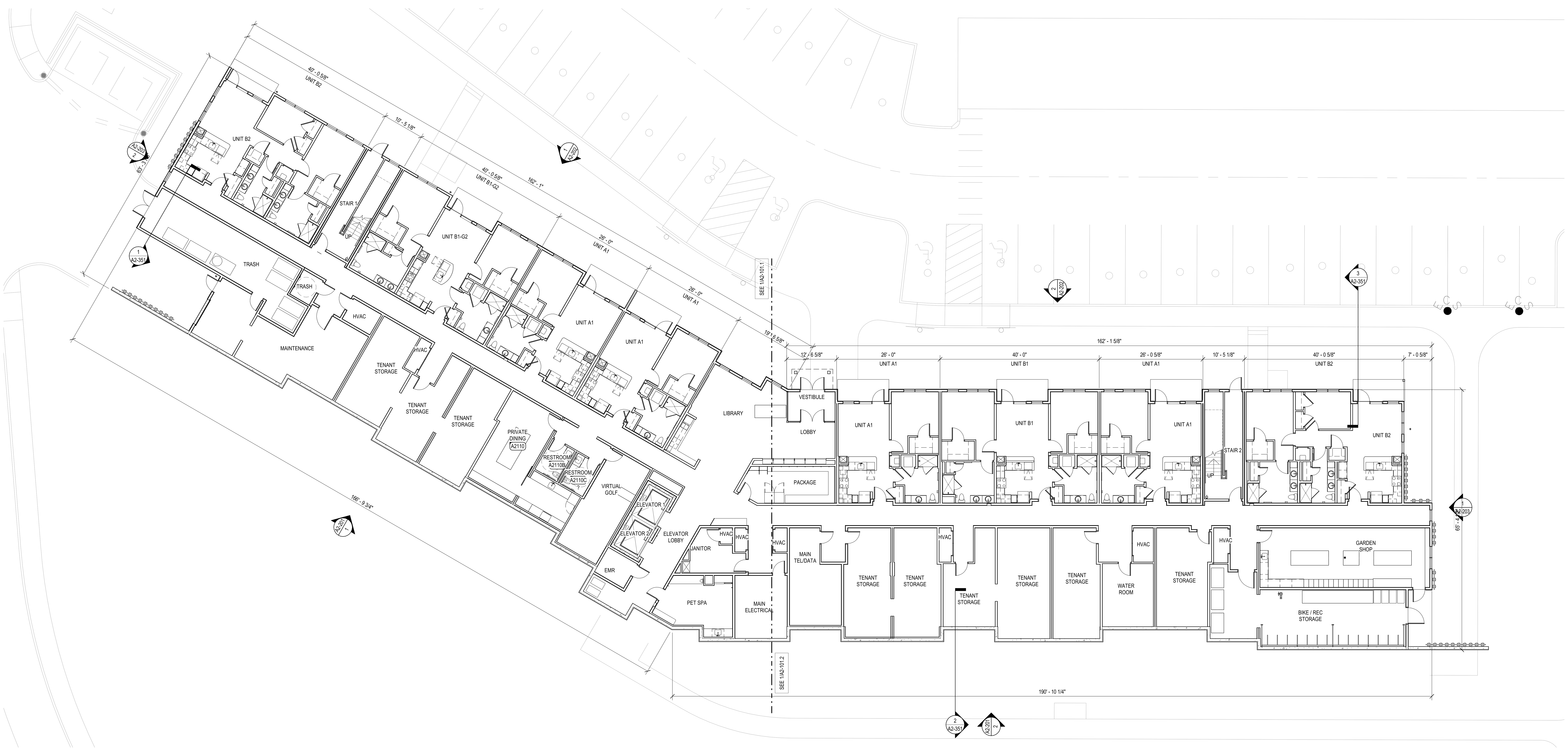
drawing revisions:

No.	Description	Date

registration: DRAFT

drawing name: Building 1 - Exterior Elevations

drawing number: A1-203



Building 2 - First Floor Plan - Overall
3/32" = 1'-0"
1
A2-101

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project information:
Arbella at Ashland

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Ashland, MA 01721

client information:
U A Senior Manager LLC

Rensselaer
Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
PERMIT / GMP Coordination Set

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key plan:

drawing information:

drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:

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drawing name:
Building 2 - First Floor Plan - Overall

drawing number:
A2-101

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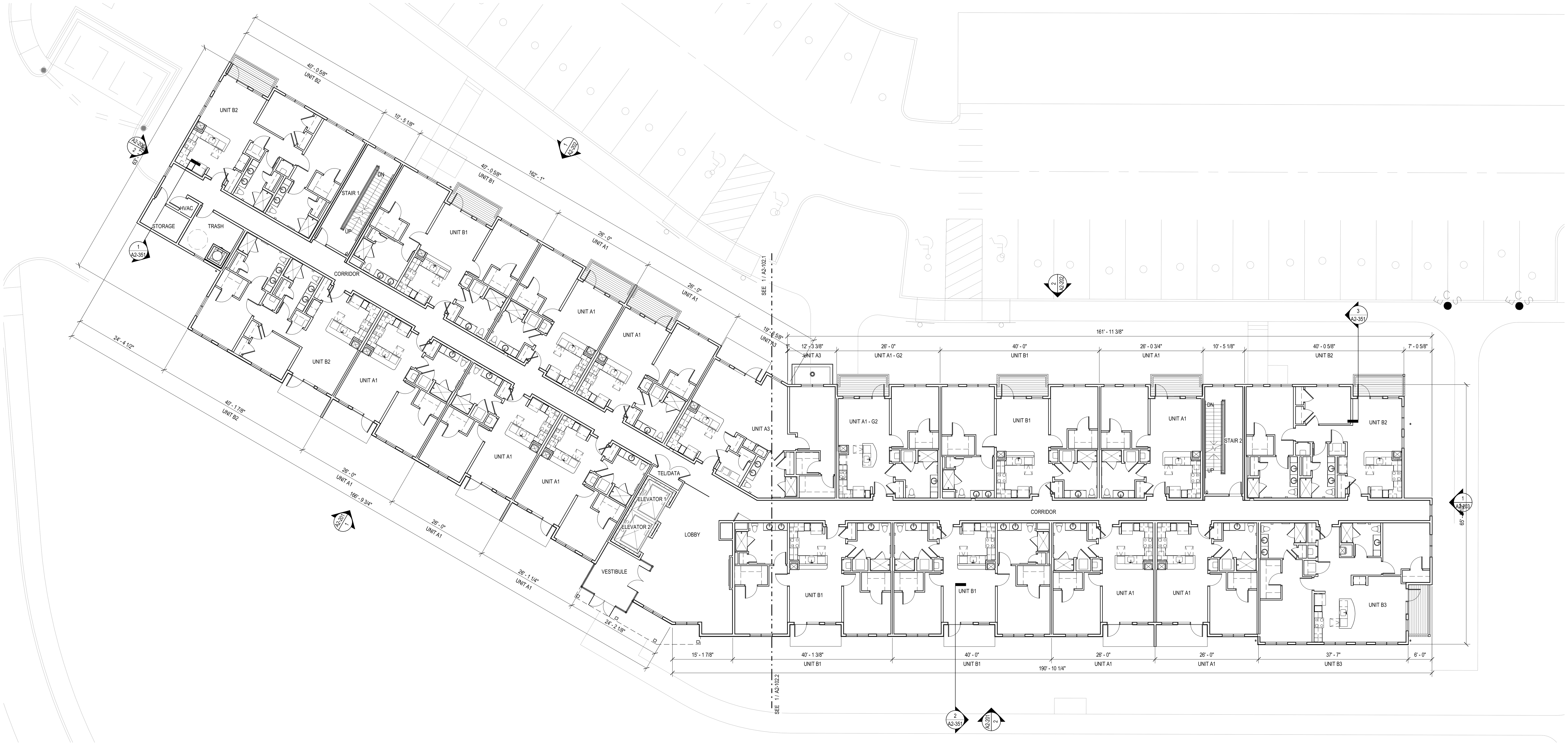

Building 2 - Second Floor Plan - Overall
3/32" = 1'-0"
1
A2-102

project information:
Arbella at Ashland
MBTA Access Road
Ashland, MA 01721

client information:
U A Senior Manager LLC
Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
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key plan:

drawing information:

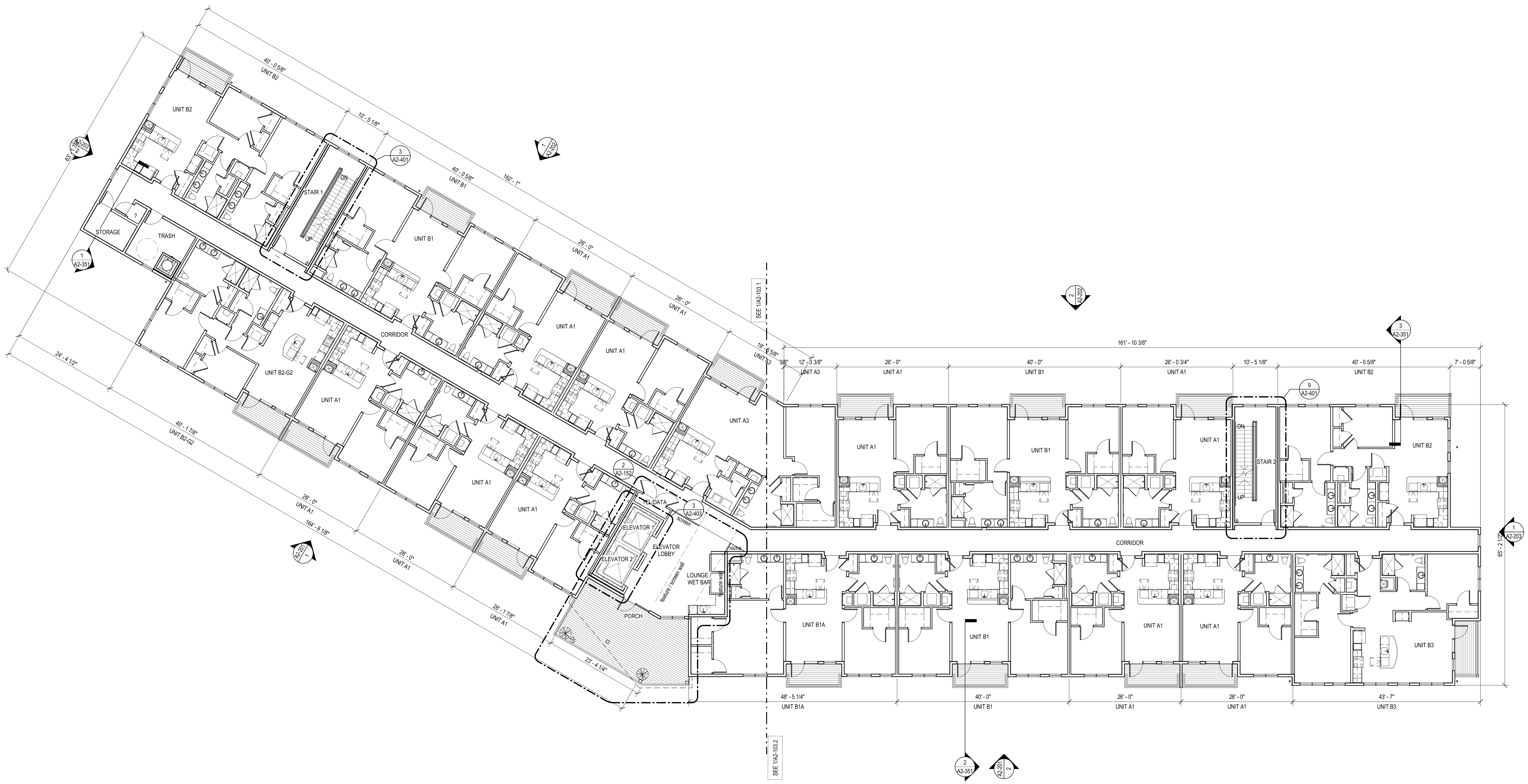
drawing by:	SL
drawing checked by:	AD
drawing scale:	3/32" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration:
DRAFT

drawing name:
Building 2 - Second Floor Plan - Overall

drawing number:
A2-102



Building 2 - Third Floor Plan - Overall

3/32" = 1'-0"

1
A2-103

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consultant information:

issuance:
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Coordination Set

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key plan:

drawing information:

drawing by:	SL
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drawing date:	04 SEPTEMBER 2020
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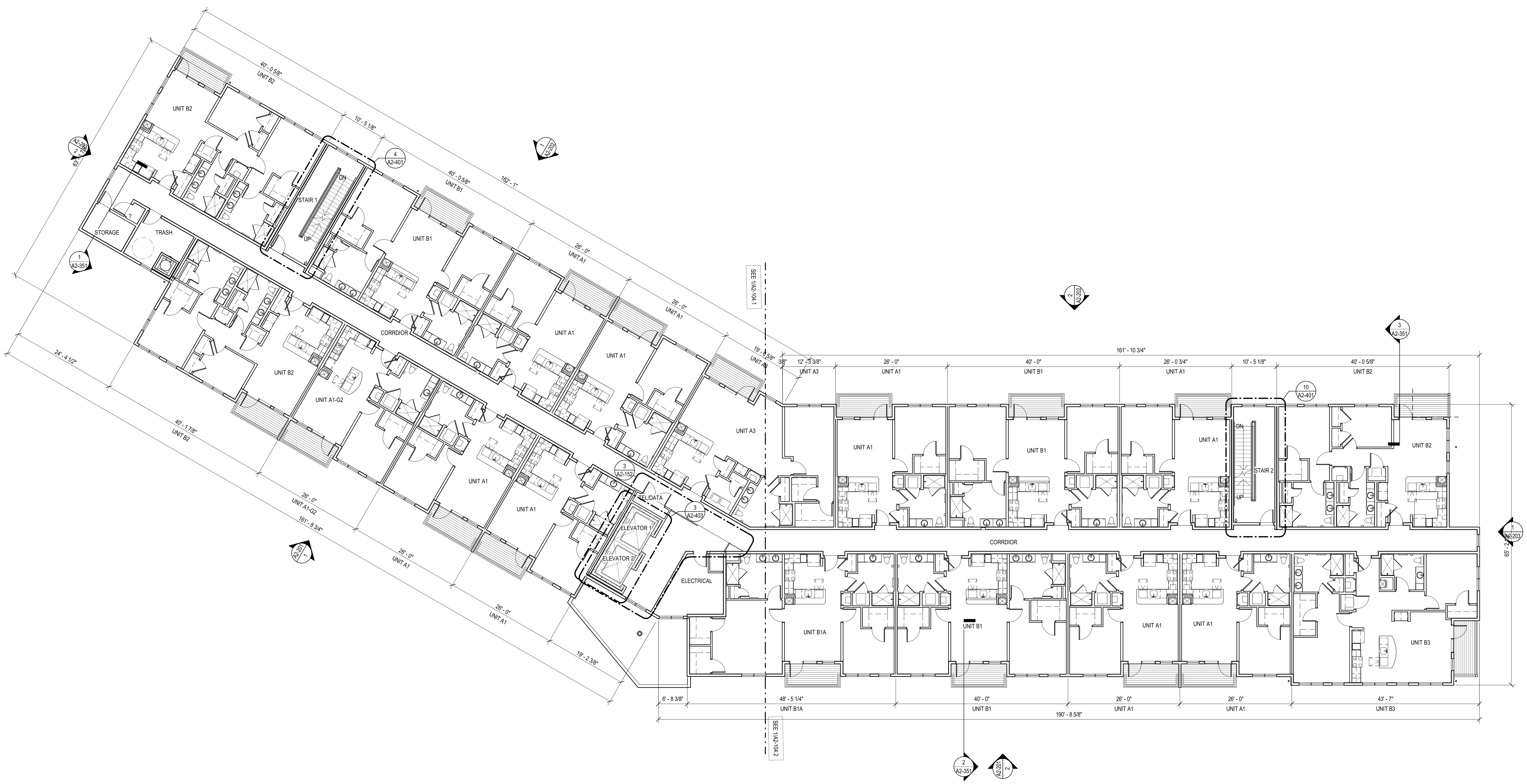
drawing revisions:	

No.	Description	Date

registration:
DRAFT

drawing name:
Building 2 - Third Floor Plan - Overall

drawing number:
A2-103



Building 2 - Fourth Floor Plan - Overall
3/32" = 1'-0"
1
A2-104

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project number:	19021.00

drawing revisions:

No.	Description	Date

DRAFT

Building 2 - Fourth Floor Plan - Overall

A2-104

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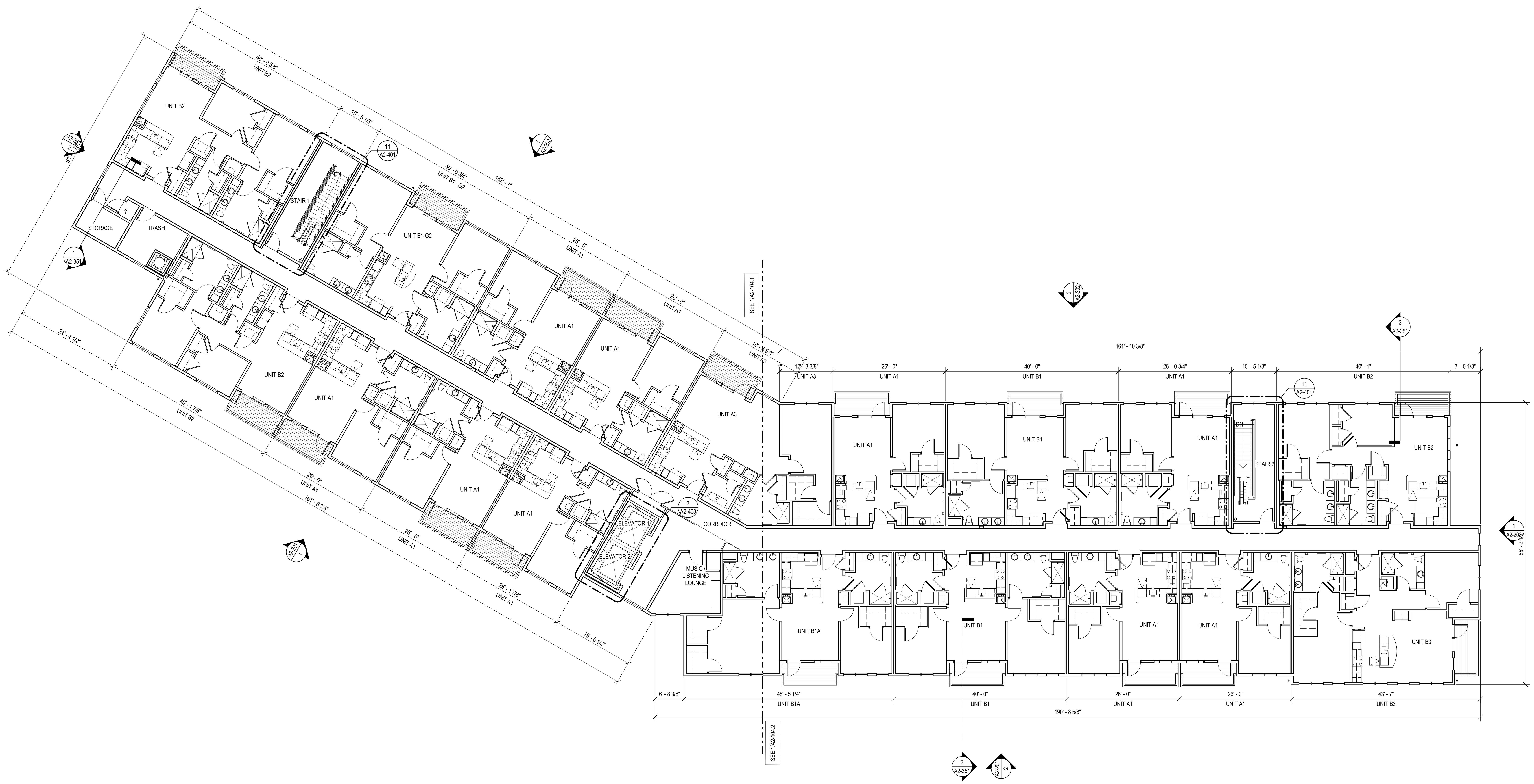

Building 2 - Fifth Floor Plan - Overall
3/32" = 1'-0"
1
A2-105

project information:
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project number:	19021.00

drawing revisions:

No.	Description	Date

registration:
DRAFT

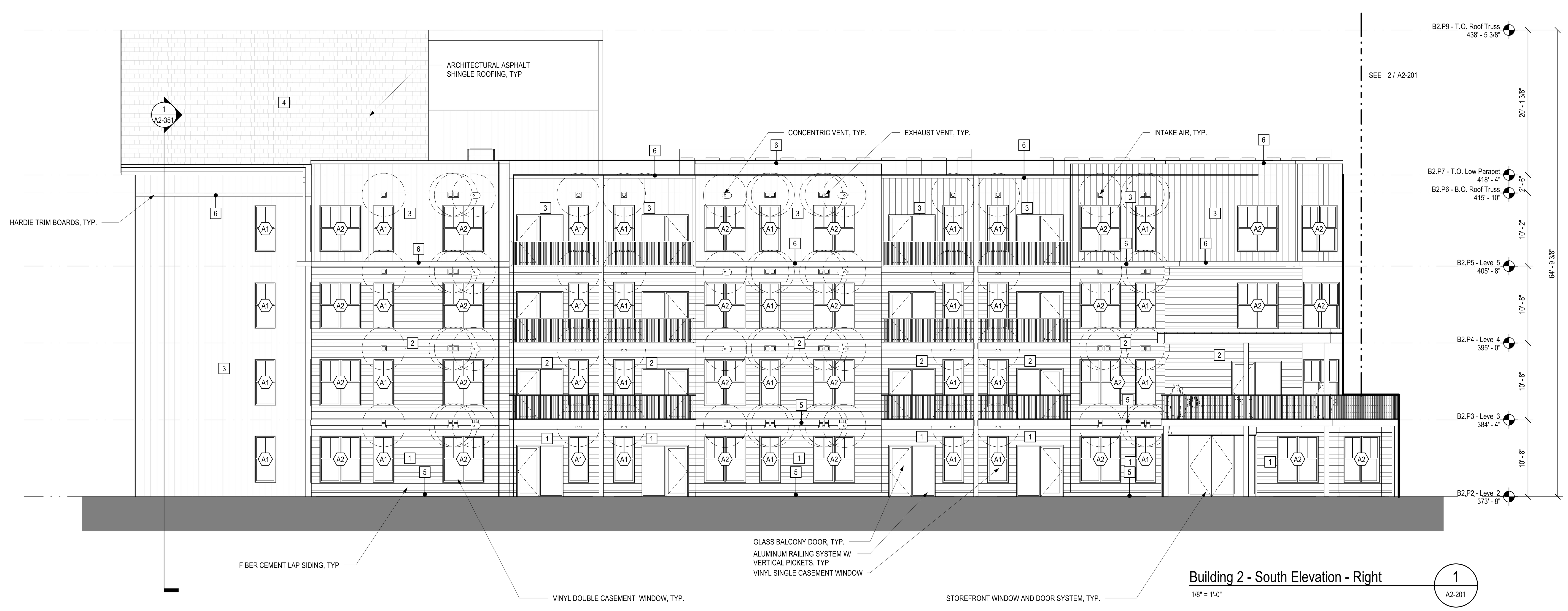
drawing name:
Building 2 - Fifth Floor Plan - Overall

drawing number:
A2-105

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)

TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	

Building 2 - South Elevation - Left
1/8" = 1'-0"
2
A2-201



Building 2 - South Elevation - Right
1/8" = 1'-0"
1
A2-201

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consultant information:

issuance:
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key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
Building 2 - Exterior Elevations

drawing number:
A2-201

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)

TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	

Building 2 - North Elevation - Left 2 A2-202
1/8" = 1'-0"

Building 2 - North Elevation - Right 1 A2-202
1/8" = 1'-0"

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consultant information:

issuance:
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key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
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project number:	19021.00

drawing revisions:

No.	Description	Date

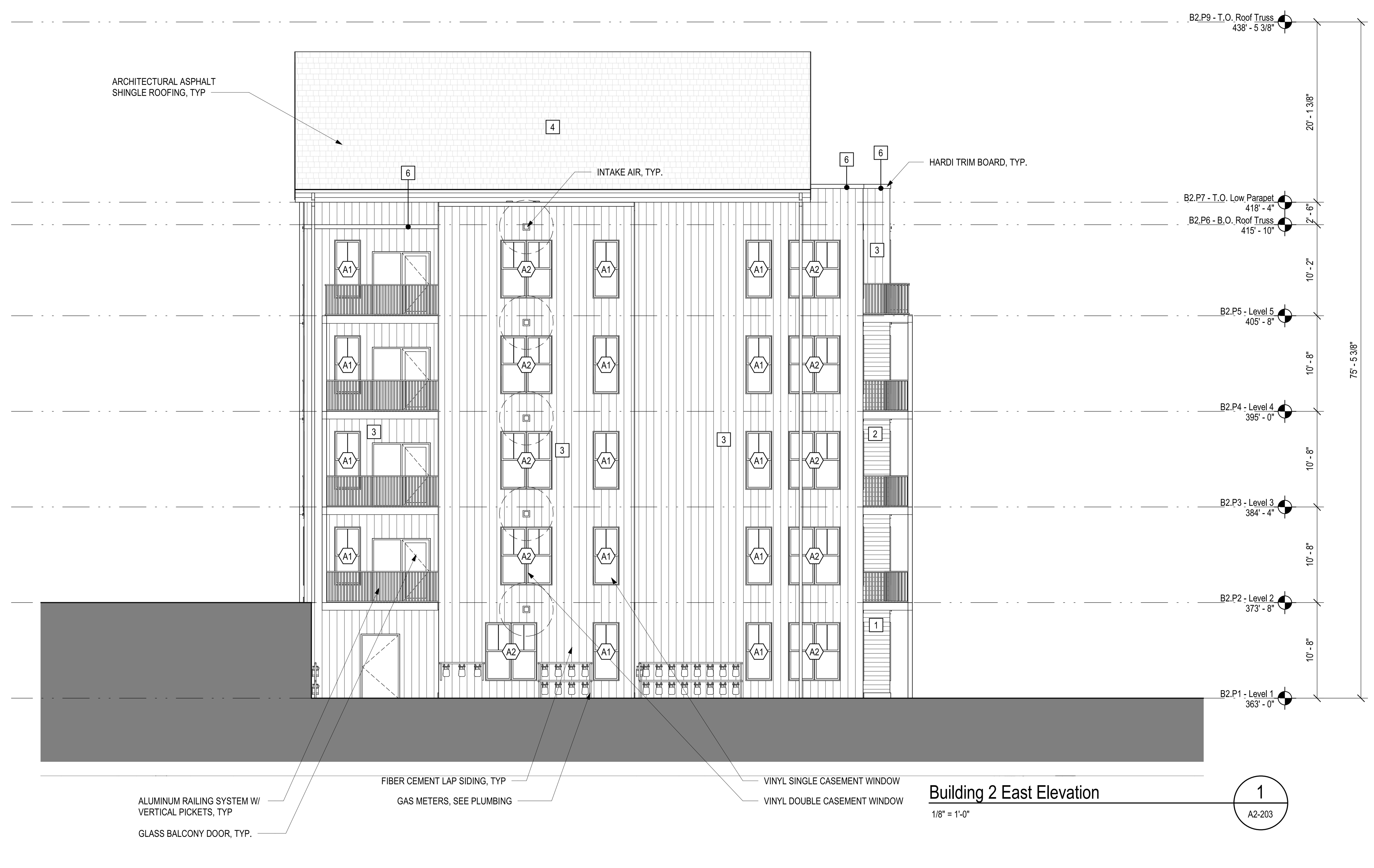
registration:
DRAFT

drawing name:
Building 2 - Exterior Elevations

drawing number:
A2-202

EXTERIOR MATERIALS LEGEND (BUILDING 1 & 2)					
TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	FIBER CEMENT LAP SIDING (FCL-2)	JAMES HARDIE	HARDIEPLANK LAP SIDING	LIGHT GRAY	
3	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	

Building 2 West Elevation
1/8" = 1'-0"
2
A2-203



Building 2 East Elevation
1/8" = 1'-0"
1
A2-203

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key plan:

drawing information:

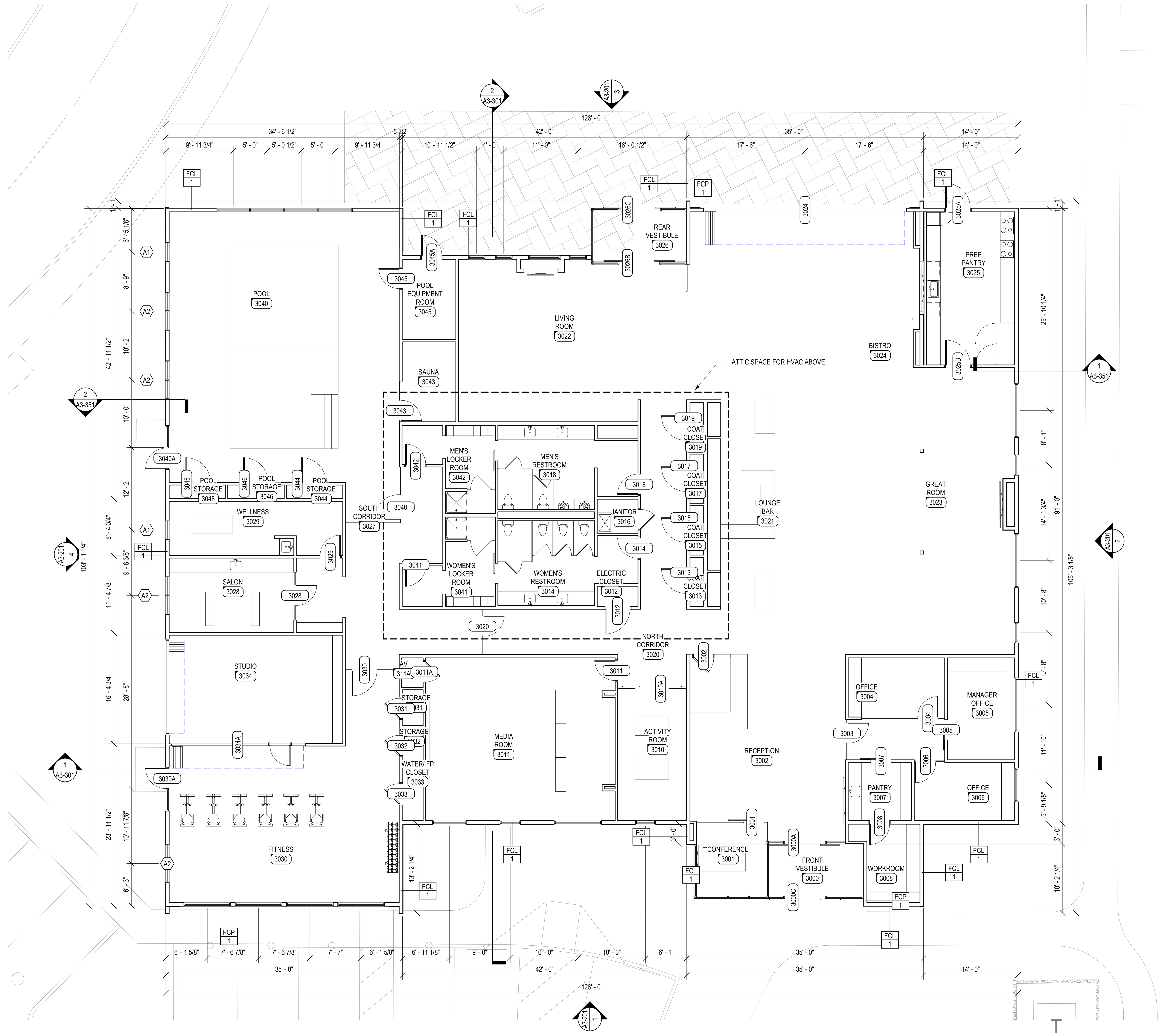
drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration:
DRAFT

drawing name:
Building 2 - Exterior Elevations

drawing number:
A2-203



Clubhouse - First Floor Plan
1/8" = 1'-0"
1
A3-101

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consultant information:

issuance:
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key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	1/8" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

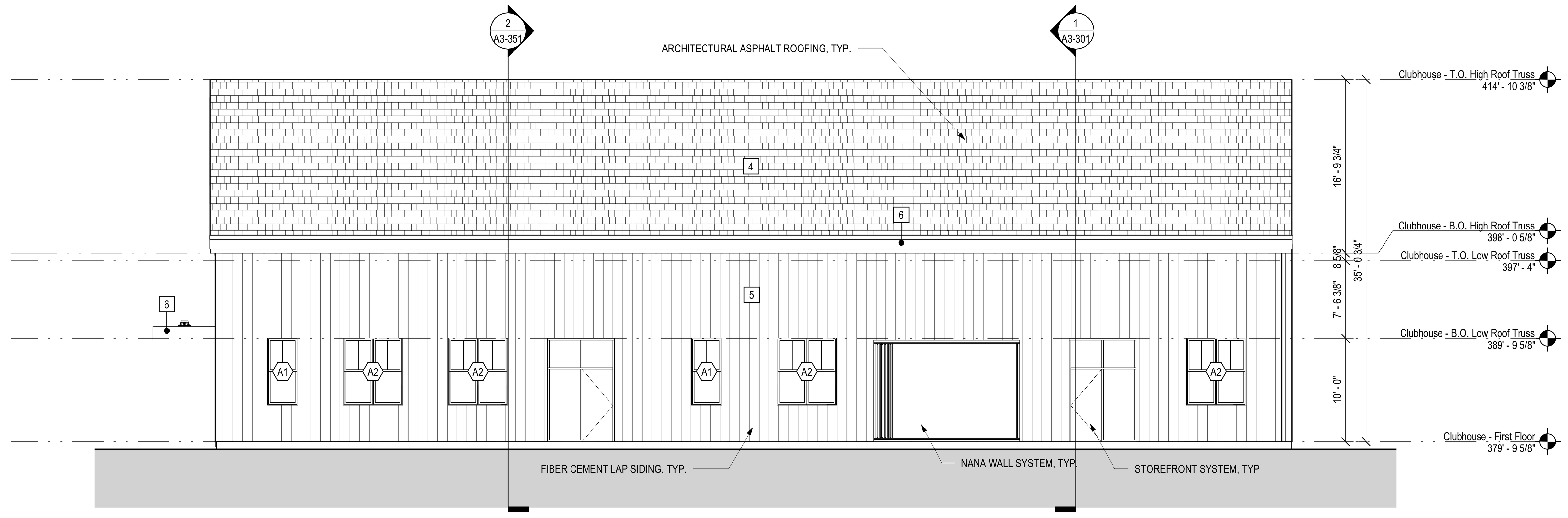
registration:
DRAFT

drawing name:
Clubhouse - First Floor Plan

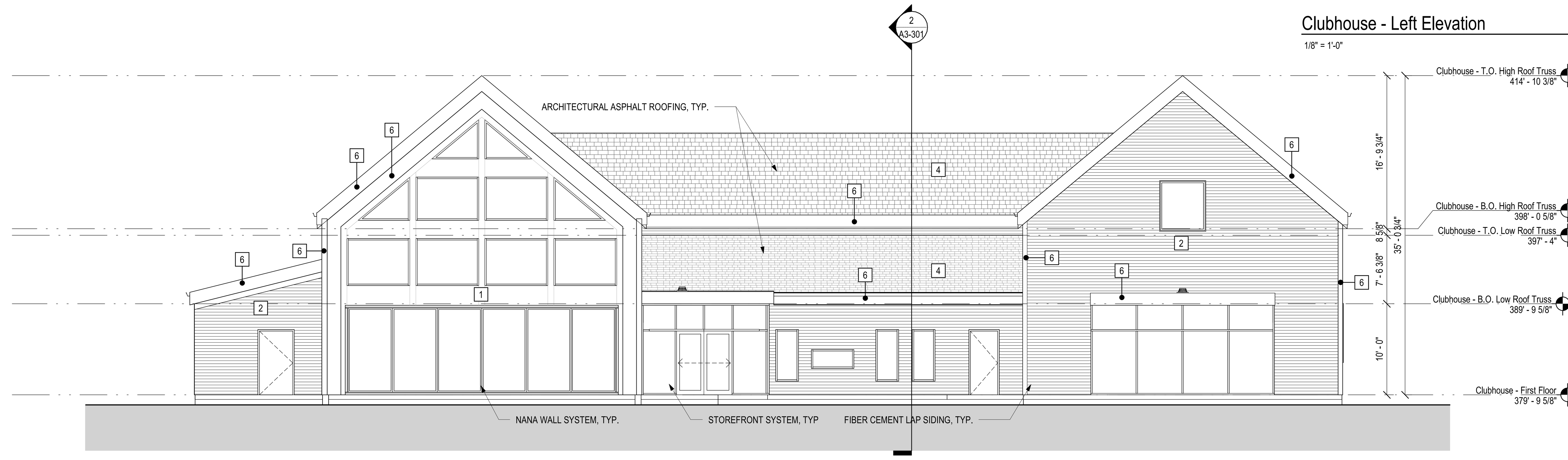
drawing number:
A3-101

EXTERIOR MATERIALS LEGEND (CLUBHOUSE)

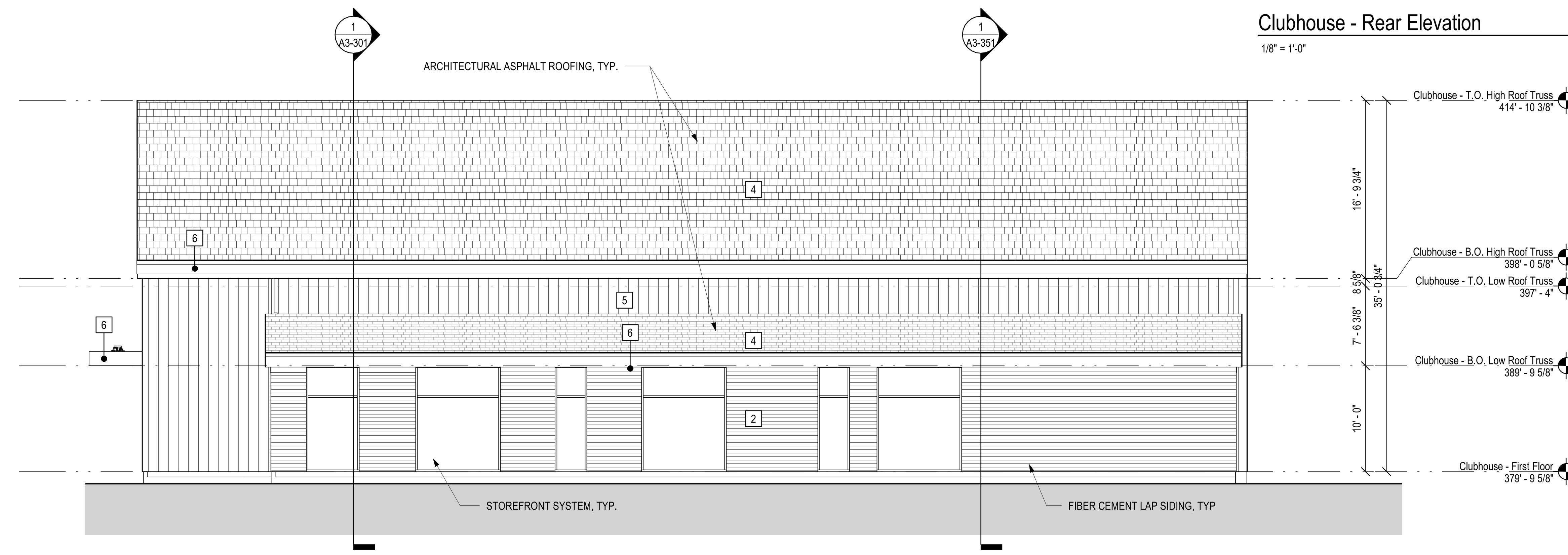
TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT PANEL (FCP)	JAMES HARDIE	HARDIEPANEL SIDING	WHITE	
2	STONE VENEER (SVS)	ELDORADO STONE	TBD	TBD	
3	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	WHITE	
4	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
5	FIBER CEMENT VERTICAL SIDING (FCV-2)	JAMES HARDIE	HARDIEPANEL VERTICAL SIDING	DARK GRAY	
6	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	DARK GRAY	



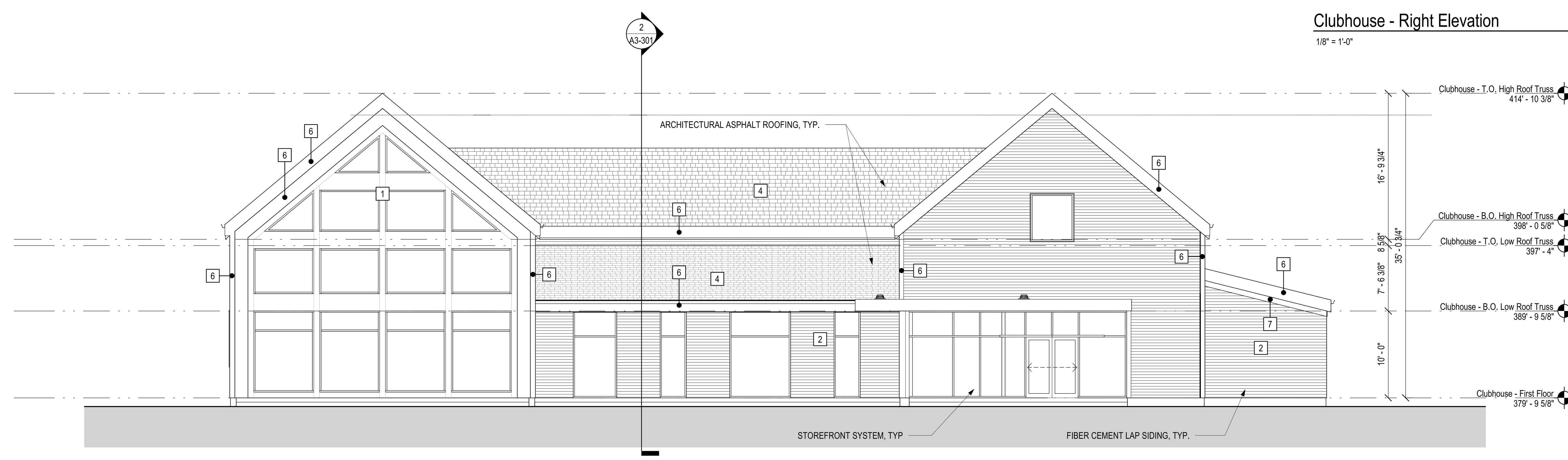
Clubhouse - Left Elevation 4 A3-201
1/8" = 1'-0"



Clubhouse - Rear Elevation 3 A3-201
1/8" = 1'-0"



Clubhouse - Right Elevation 2 A3-201
1/8" = 1'-0"



Clubhouse - Front Elevation 1 A3-201
1/8" = 1'-0"

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project information: Arbella at Ashland
MBTA Access Road
Ashland, MA 01721

client information: U A Senior Manager LLC
Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance: PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:	
drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration: DRAFT

drawing name: Clubhouse - Exterior Elevations

drawing number: A3-201

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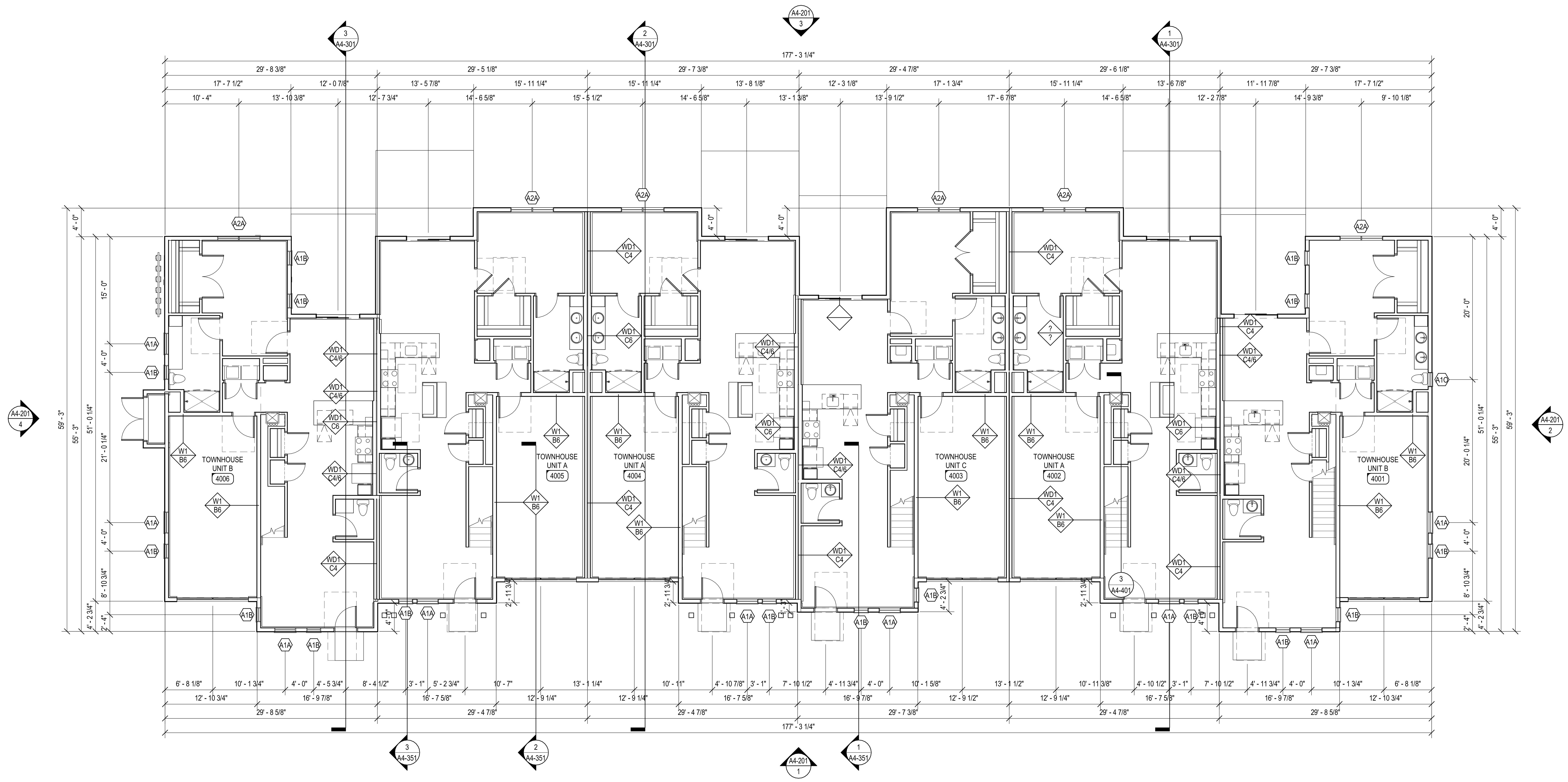


Townhouse - First Floor Plan
1/8" = 1'-0"
1
A4-101

project information:
Arbella at Ashland
MBTA Access Road
Ashland, MA 01721

client information:
U A Senior Manager LLC
Rensselaer Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
PERMIT / GMP Coordination Set
NOT FOR CONSTRUCTION

key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	1/8" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

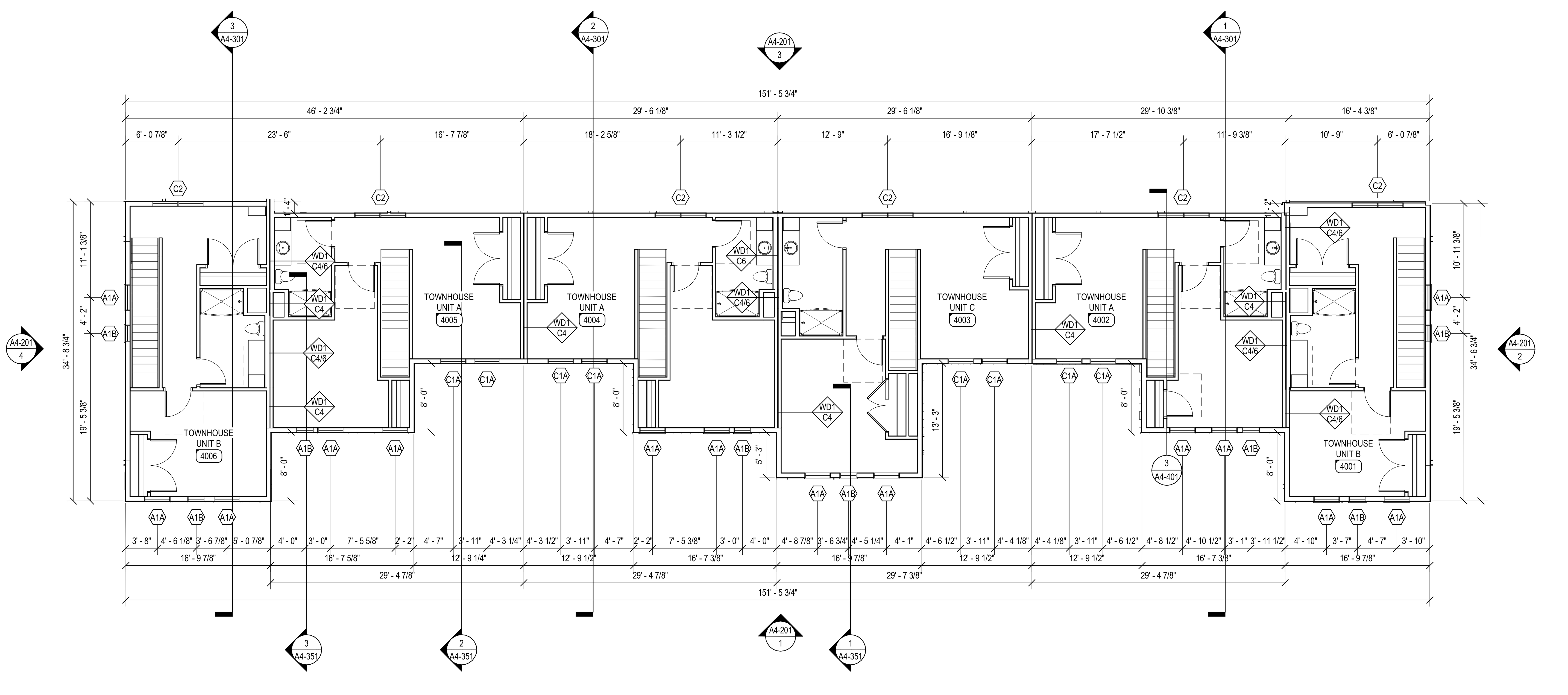
drawing revisions:

No.	Description	Date

registration:
DRAFT

drawing name:
Townhouse - First Floor Plan

drawing number:
A4-101



Townhouse - Second Floor Plan
1/8" = 1'-0"
1
A4-102

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project information:
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client information:
U A Senior
Manager LLC

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Technology Park
300 Jordan Road
Troy,NY 12180

consultant information:

issuance:
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Coordination Set

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CONSTRUCTION

key plan:

drawing information:

drawing by:	AB
drawing checked by:	AD
drawing scale:	1/8" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration:

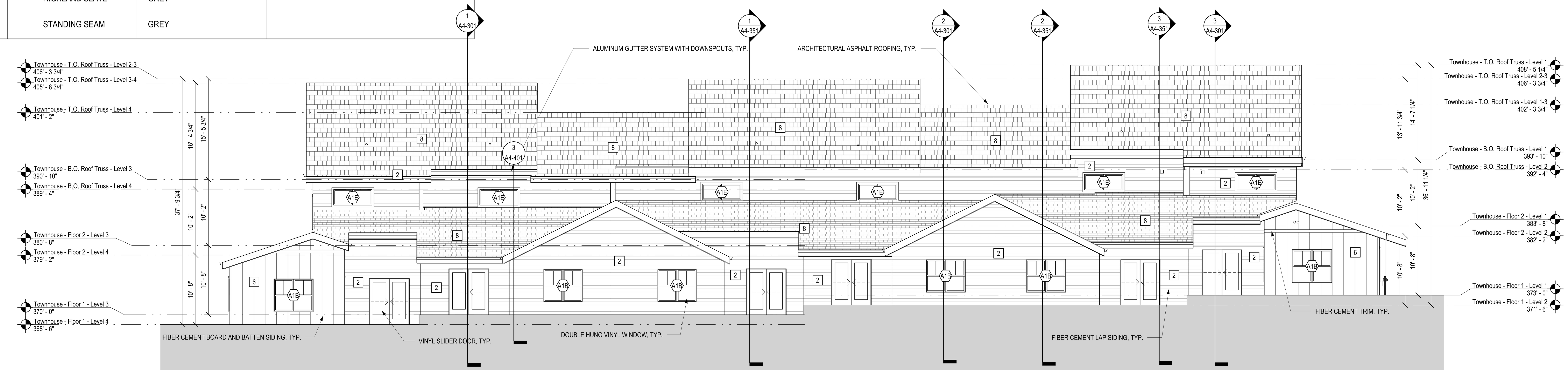
DRAFT

drawing name:
Townhouse - Second Floor Plan

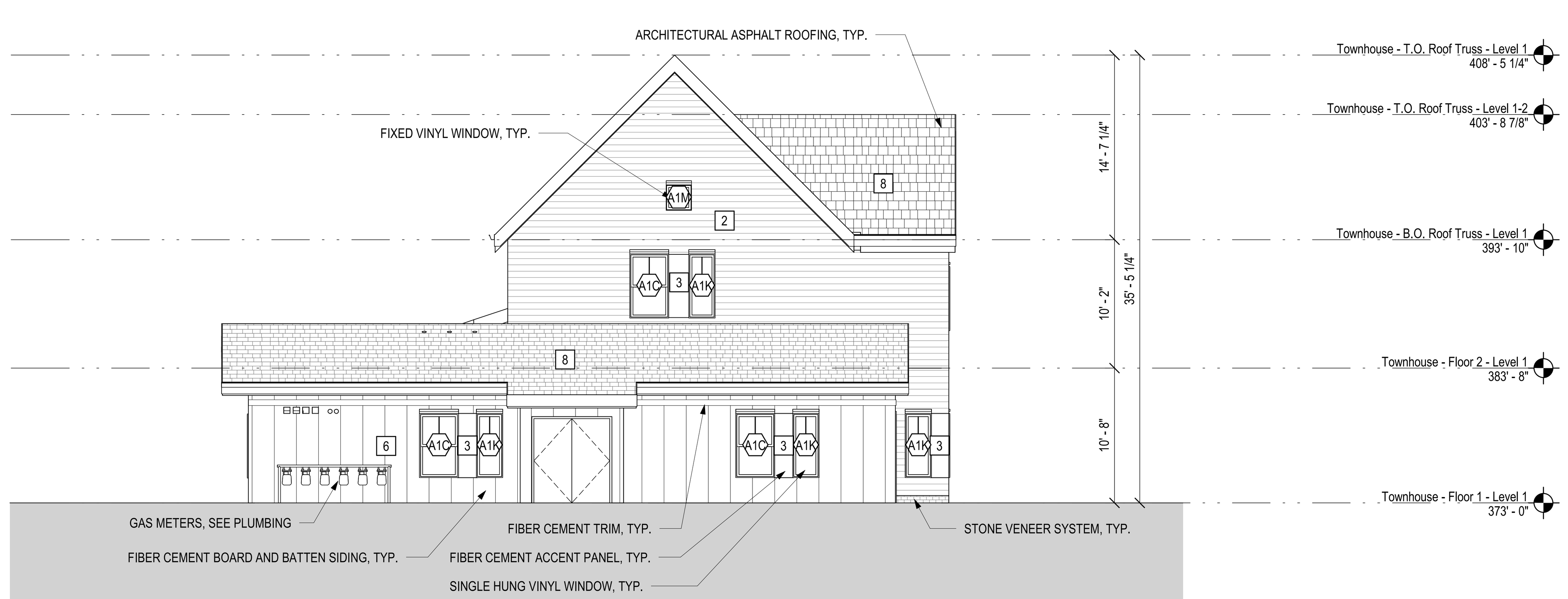
drawing number:
A4-102

EXTERIOR MATERIALS LEGEND (TOWNHOUSE)

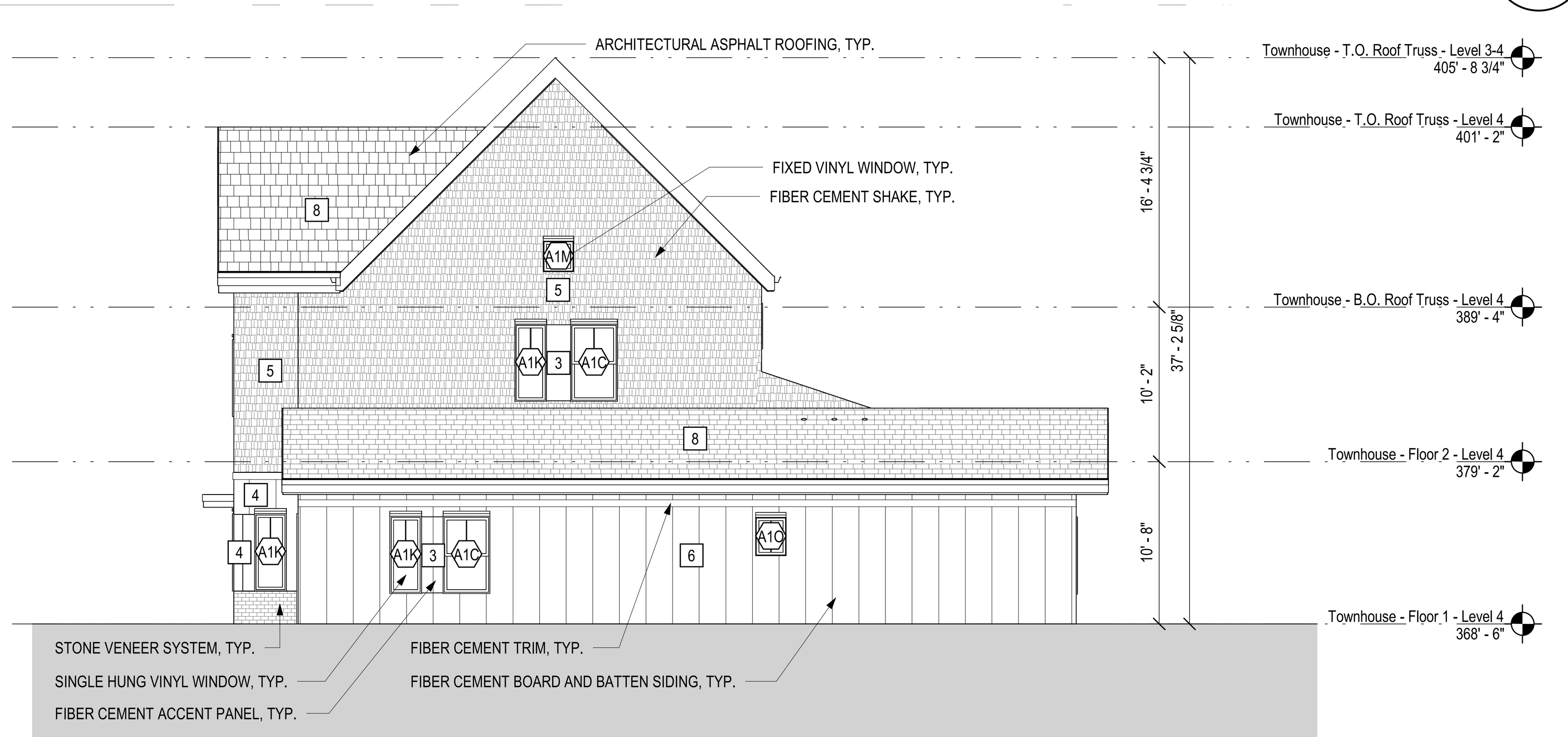
TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL)	JAMES HARDIE	HARDIEPLANK LAP SIDING	BLUE	
2	FIBER CEMENT LAP SIDING (FCL)	JAMES HARDIE	HARDIEPLANK LAP SIDING	WHITE	
3	FIBER CEMENT PANEL (FCP)	JAMES HARDIE	HARDIEPANEL SIDING	DARK GRAY	
4	FIBER CEMENT PANEL (FCP)	JAMES HARDIE	HARDIEPANEL SIDING	WHITE	
5	FIBER CEMENT SHAKE (FCS)	JAMES HARDIE	HARDIE SHINGLE SIDING	TAN	
6	FIBER CEMENT BOARD & BATTEN (FCB)	JAMES HARDIE	HARDIEPANEL SIDING BATTEN BOARDS	WHITE	
7	STONE VENEER (SVS)	ELDORADO STONE	TBD	TBD	
8	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GREY	
9	STANDING SEAM METAL ROOF	MORIN	STANDING SEAM	GREY	



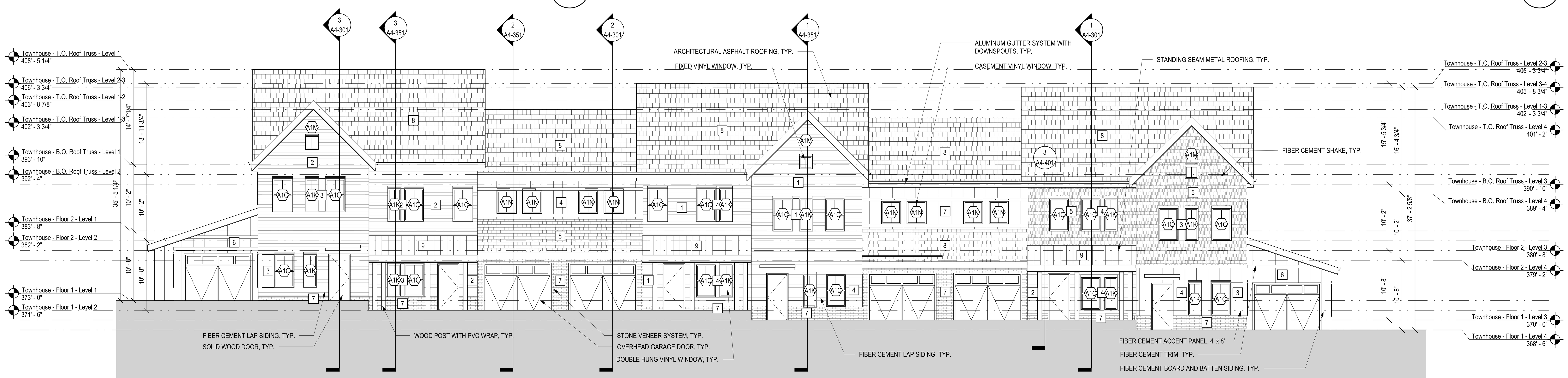
Townhouse - Rear Elevation 3
1/8" = 1'-0" A4-201



Townhome - Left Elevation 4
1/8" = 1'-0" A4-201



Townhome - Right Elevation 2
1/8" = 1'-0" A4-201



Townhouse - Front Elevation 1
1/8" = 1'-0" A4-201

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issuance: PERMIT / GMP Coordination Set
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drawing information:	
drawing by:	AB
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

DRAFT

drawing name: Townhouse - Exterior Elevations

drawing number: A4-201

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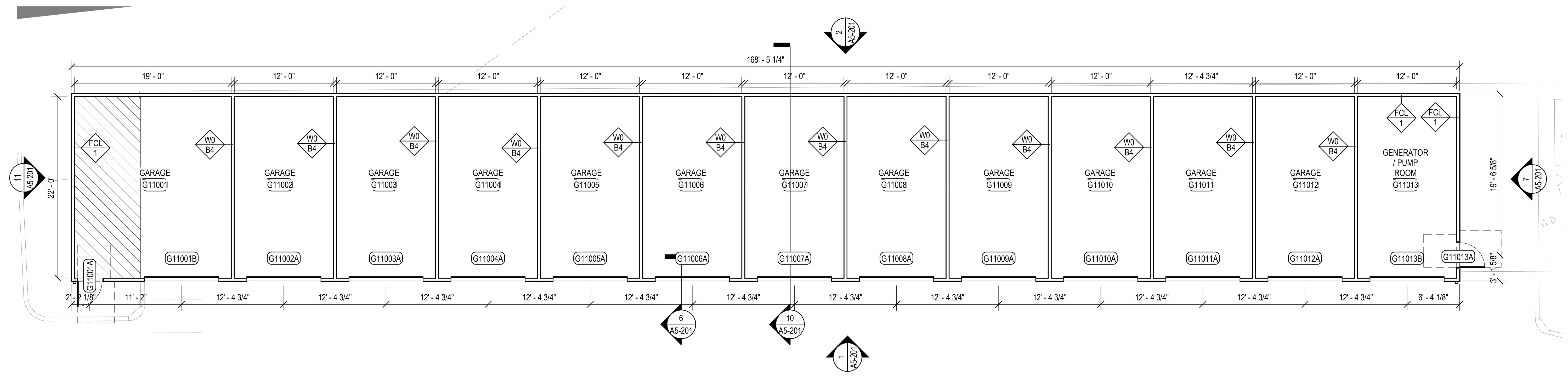
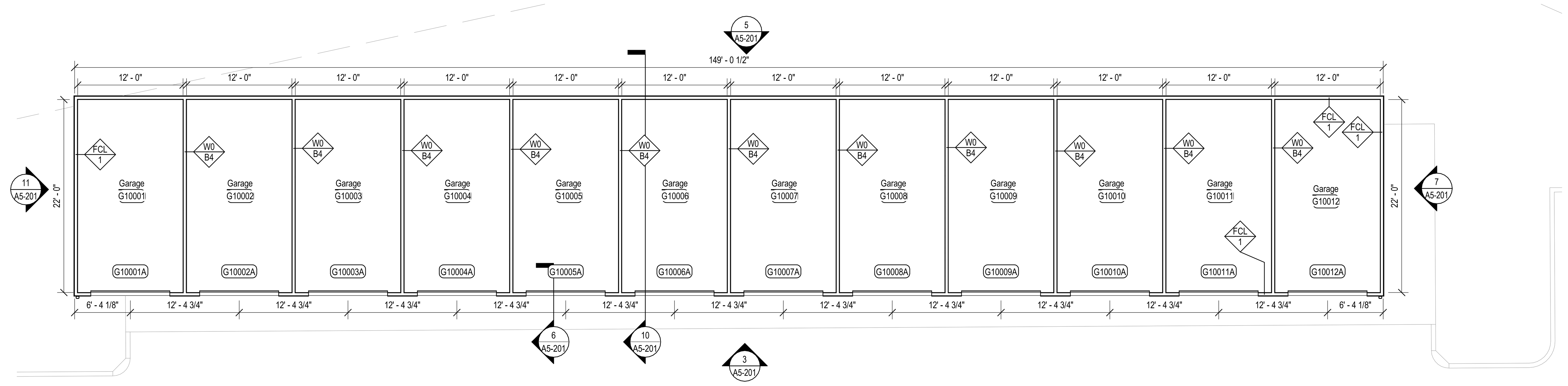
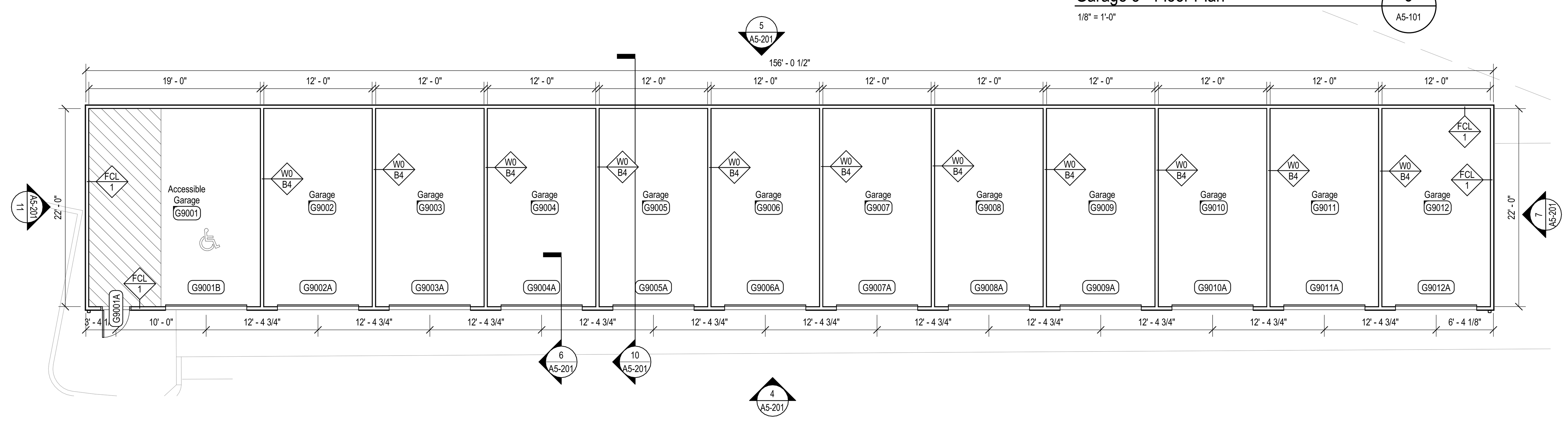


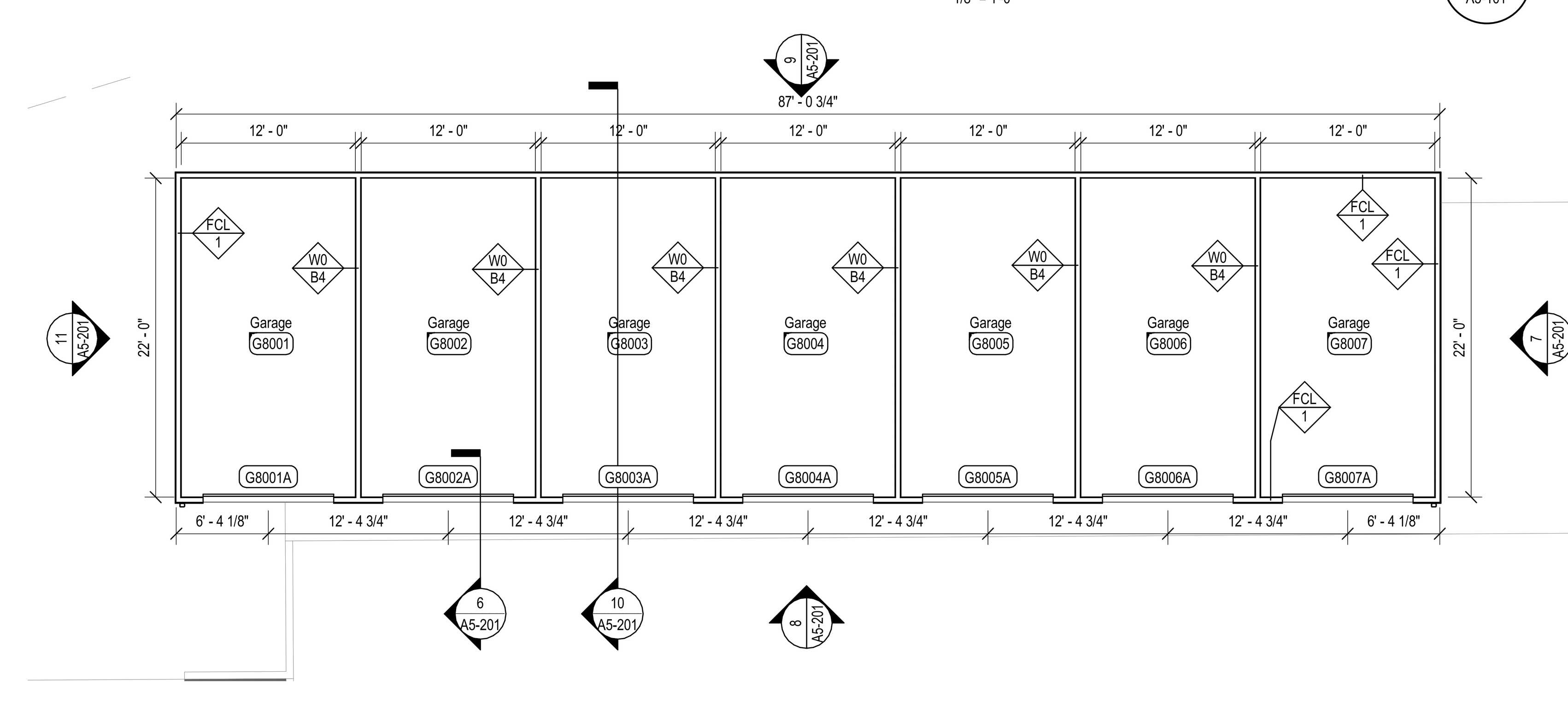
Garage 4 - Floor Plan
1/8" = 1'-0"
4
A5-101



Garage 3 - Floor Plan
1/8" = 1'-0"
3
A5-101



Garage 2 - Floor Plan
1/8" = 1'-0"
2
A5-101



Garage 1 - Floor Plan
1/8" = 1'-0"
1
A5-101

project information:
Arbella at Ashland
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Ashland, MA 01721

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Rensselaer Technology Park
300 Jordan Road
Troy, NY 12180

consultant information:

issuance:
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key plan:

drawing information:

drawing by:	JJ
drawing checked by:	AD
drawing scale:	1/8" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

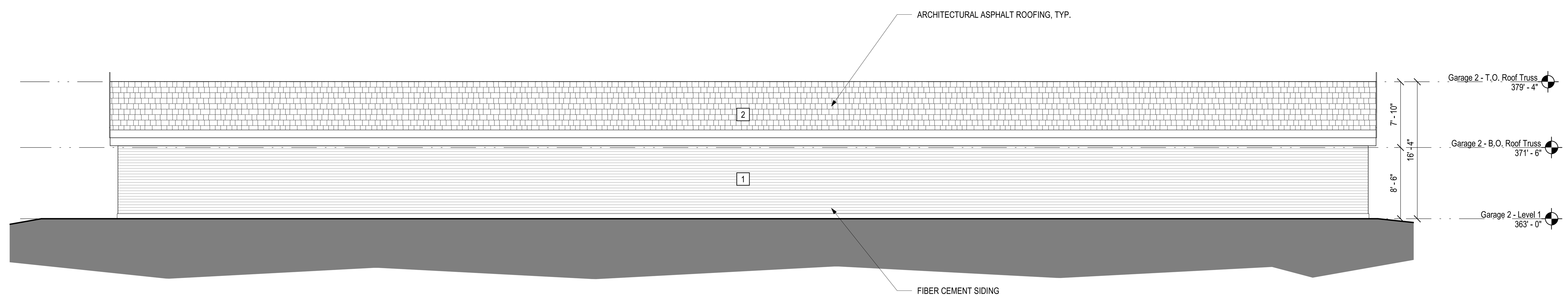
registration:
DRAFT

drawing name:
Garage - Floor Plans

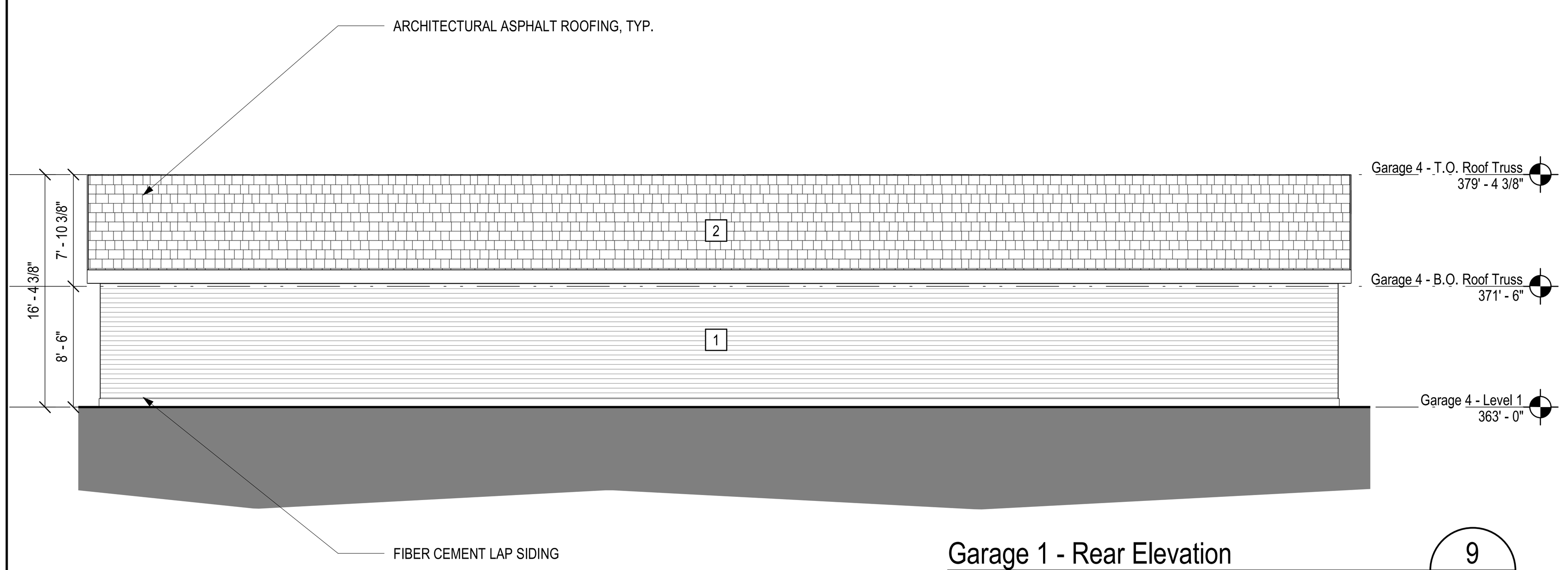
drawing number:
A5-101

EXTERIOR MATERIALS LEGEND (GARAGES)

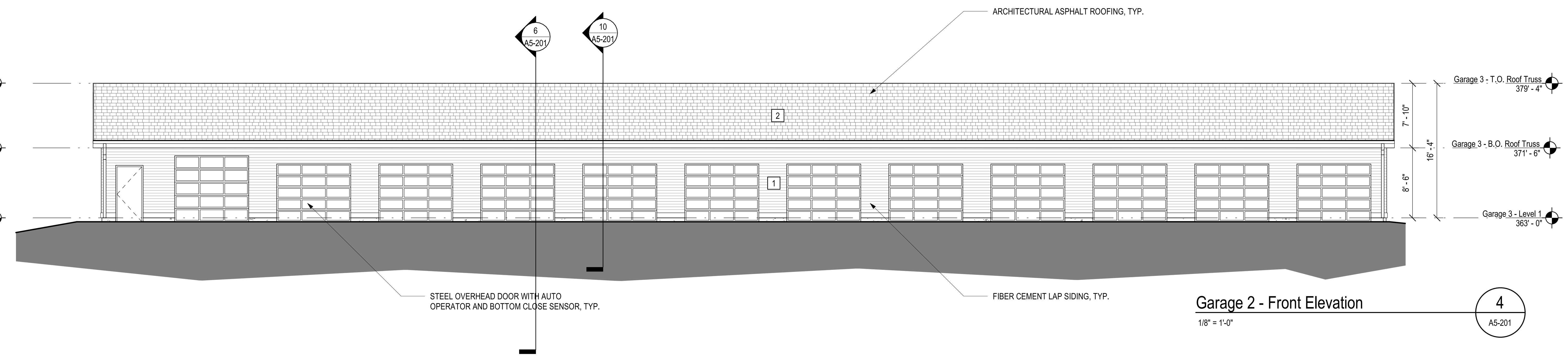
TYPE	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR	REMARKS
1	FIBER CEMENT LAP SIDING (FCL)	JAMES HARDIE	HARDIEPLANK LAP SIDING	GRAY	
2	ASPHALT ROOF SHINGLES	CERTAINTEED	HIGHLAND SLATE	GRAY	
3	FIBER CEMENT TRIM	JAMES HARDIE	HARDIETRIM BOARDS	GRAY	



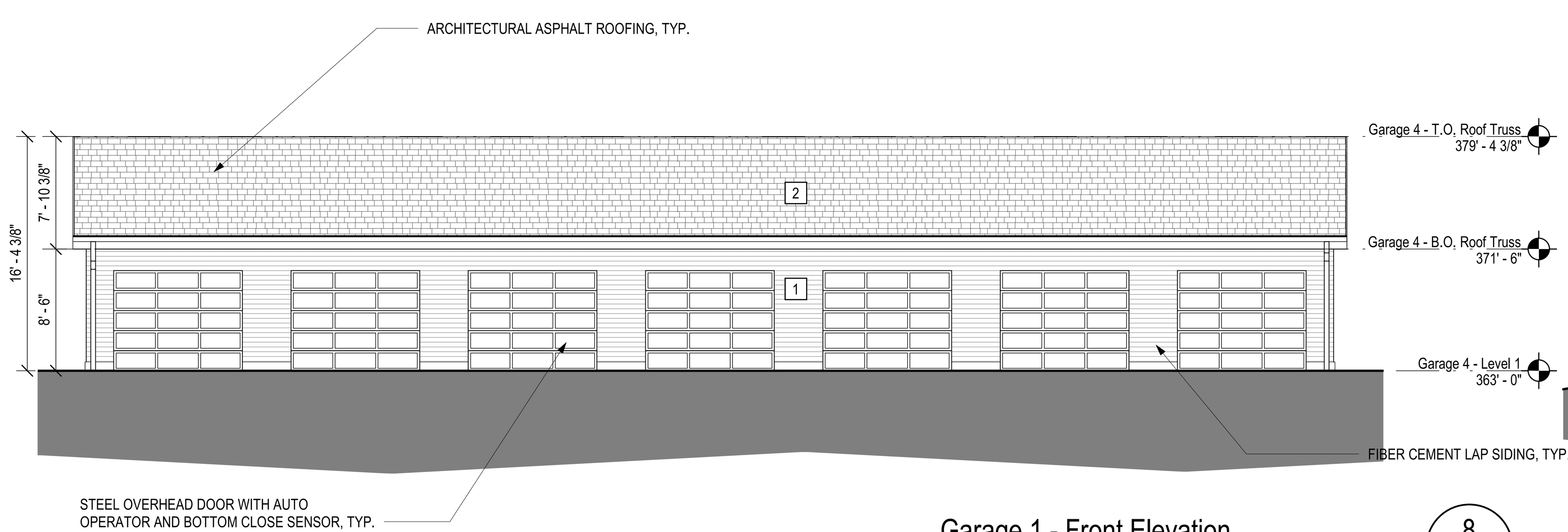
Garages 2 and 3 - Rear Elevation 5 A5-201
1/8" = 1'-0"



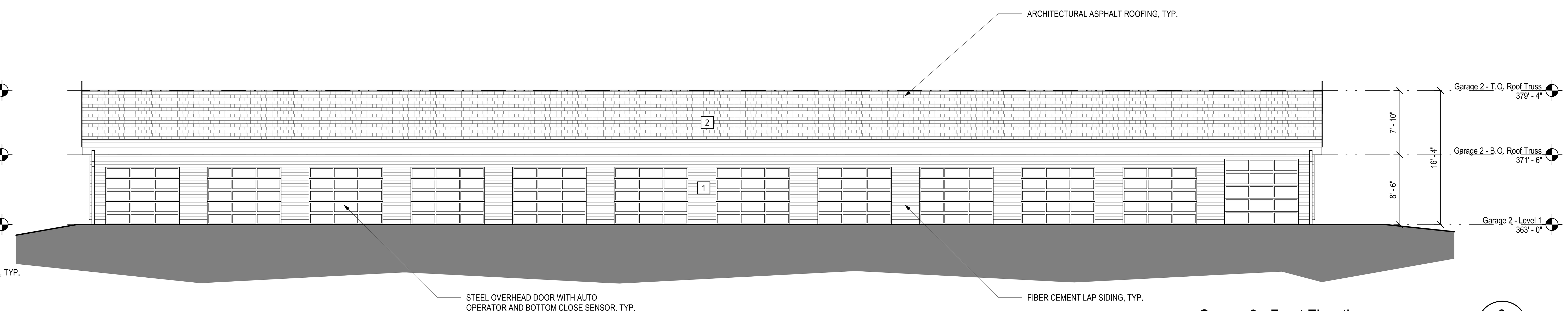
Garage 1 - Rear Elevation 9 A5-201
1/8" = 1'-0"



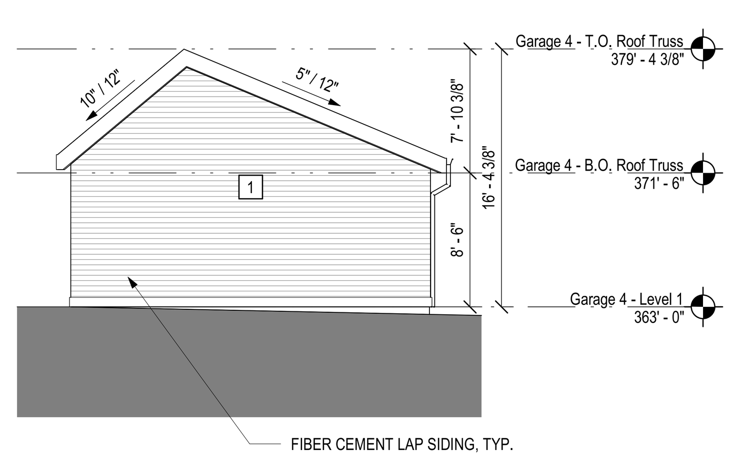
Garage 2 - Front Elevation 4 A5-201
1/8" = 1'-0"



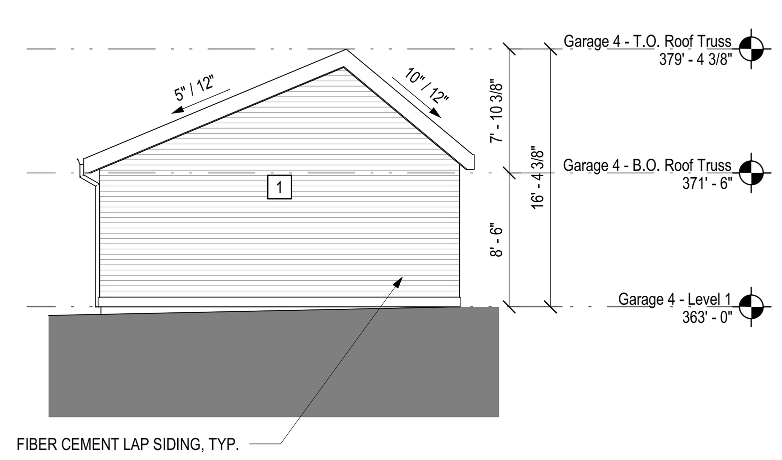
Garage 1 - Front Elevation 8 A5-201
1/8" = 1'-0"



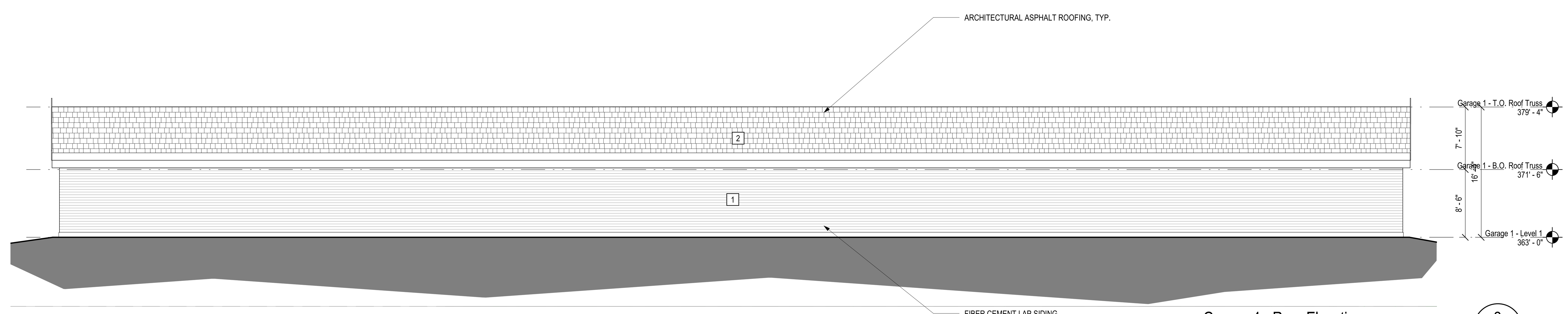
Garage 3 - Front Elevation 3 A5-201
1/8" = 1'-0"



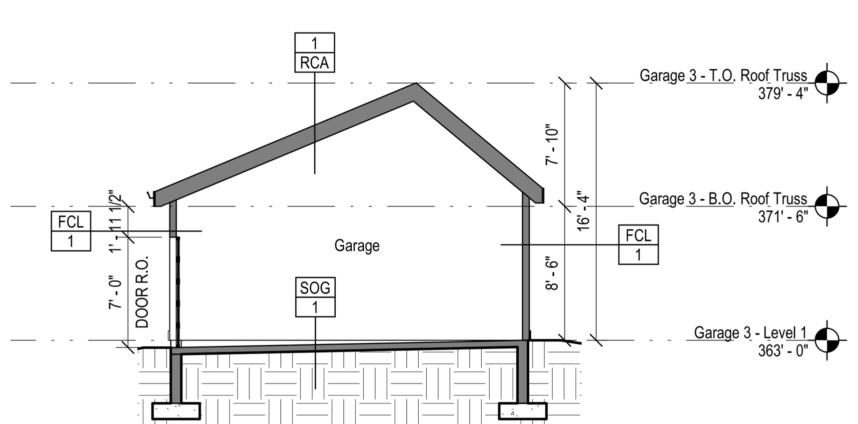
Garage - Left Elevation 11 A5-201
1/8" = 1'-0"



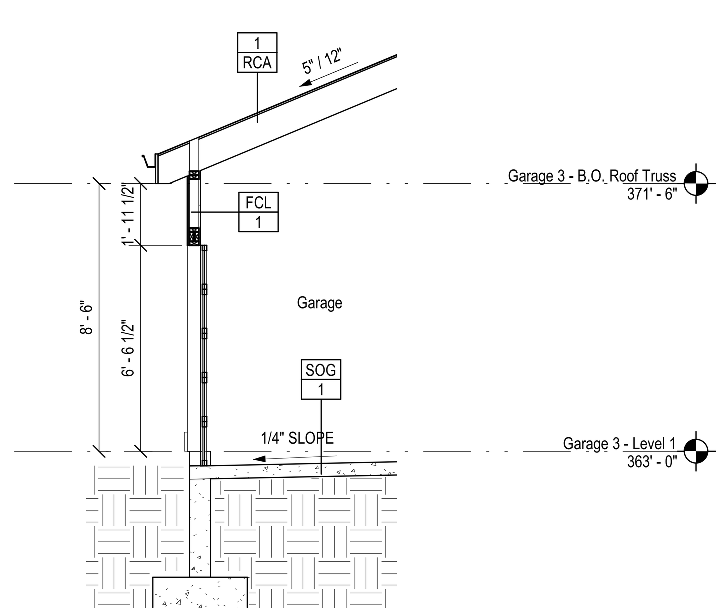
Garage - Right Elevation 7 A5-201
1/8" = 1'-0"



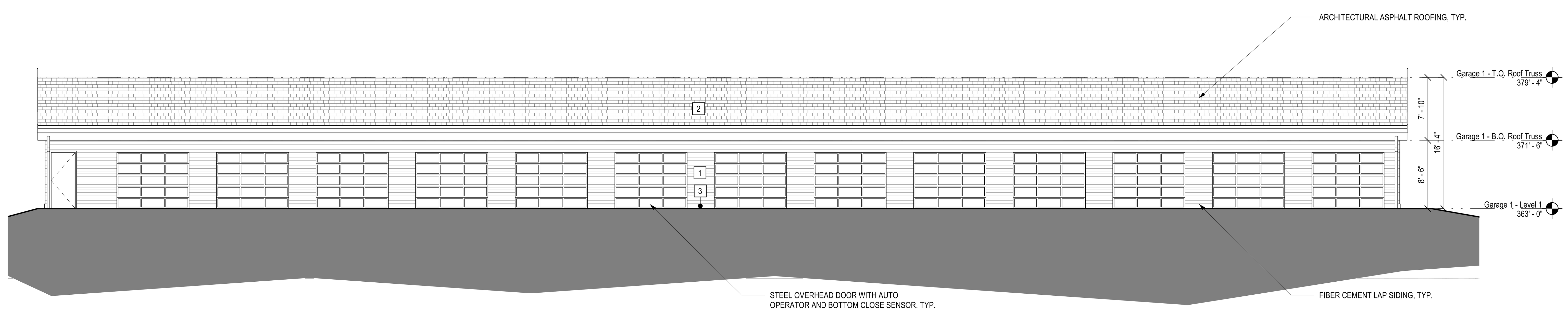
Garage 4 - Rear Elevation 2 A5-201
1/8" = 1'-0"



Garage - Building Section 10 A5-201
1/8" = 1'-0"



Garage Wall Section 6 A5-201
1/4" = 1'-0"



Garage 4 - Front Elevation 1 A5-201
1/8" = 1'-0"

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client information: U A Senior Manager LLC
Rensselaer Technology Park
300 Jordan Road
Troy, NY 12180

consultant information:

issuance: PERMIT / GMP Coordination Set
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key plan:

drawing information:

drawing by:	JJ
drawing checked by:	AD
drawing scale:	As indicated
drawing date:	04 SEPTEMBER 2020
project number:	19021.00

drawing revisions:

No.	Description	Date

registration: DRAFT

drawing name: Garage - Elevations & Sections

drawing number: A5-201

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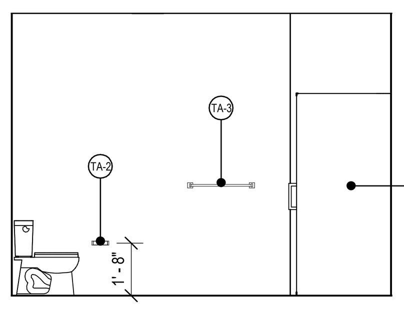
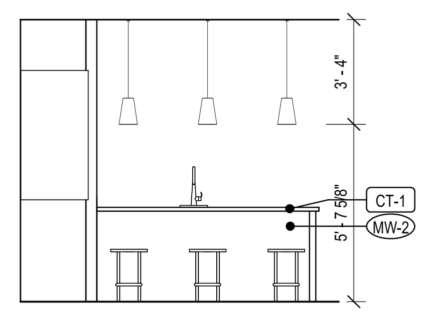
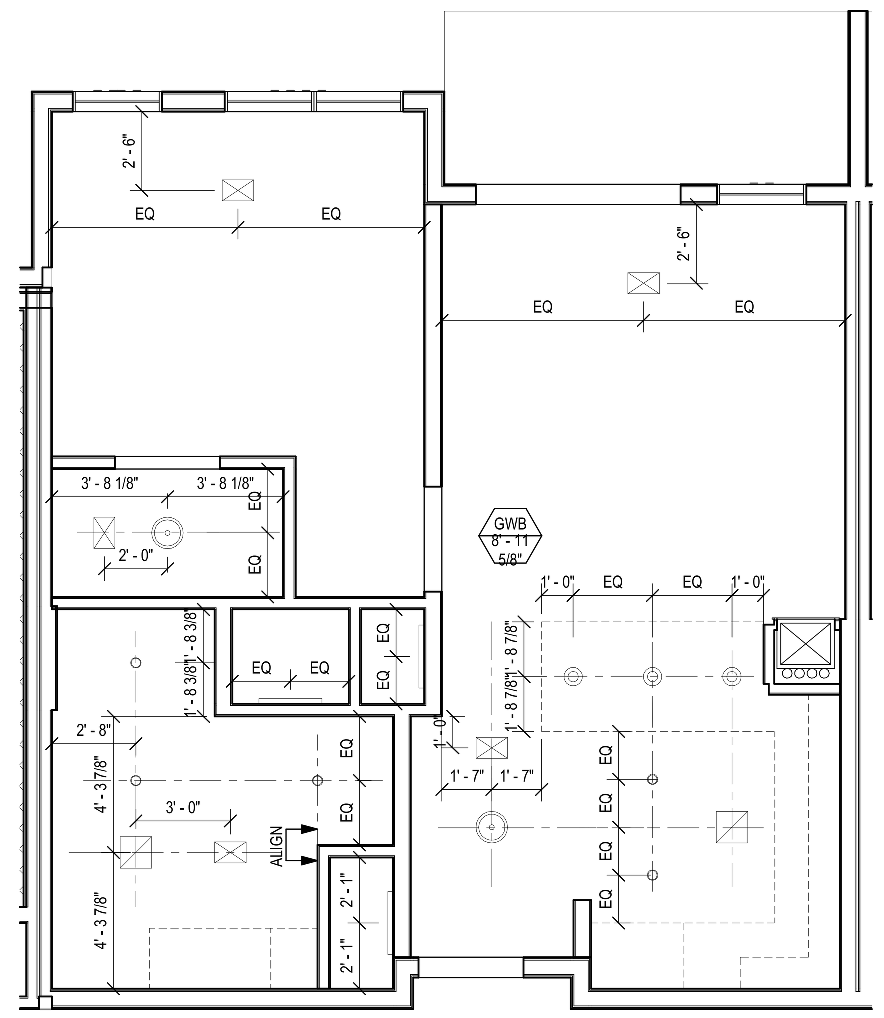


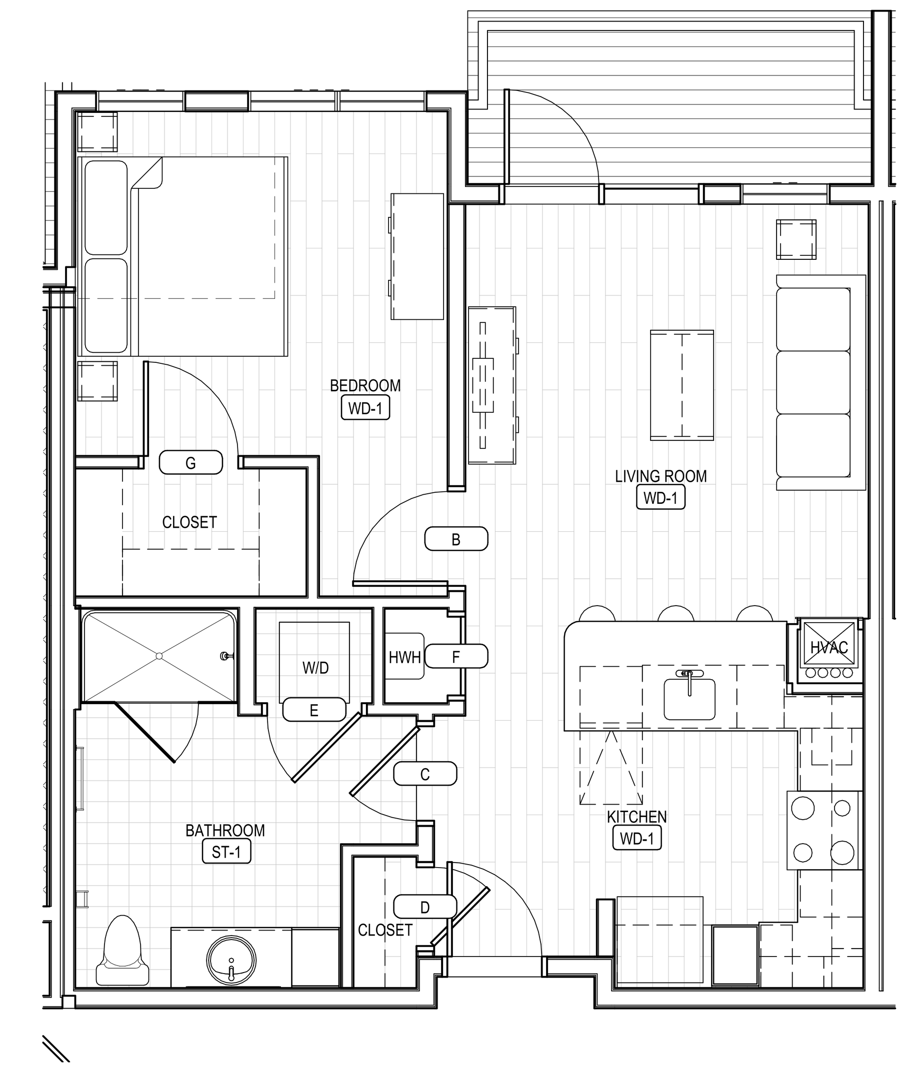
Unit A1 - Bathroom Elevation D 12 A-601
1/4" = 1'-0"



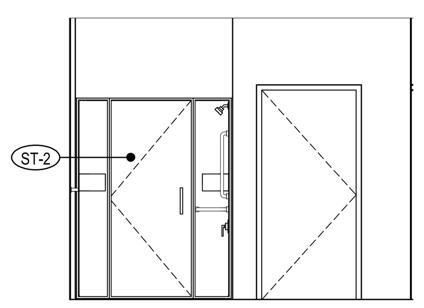
Unit A1 - Kitchen Elevation D 8 A-601
1/4" = 1'-0"



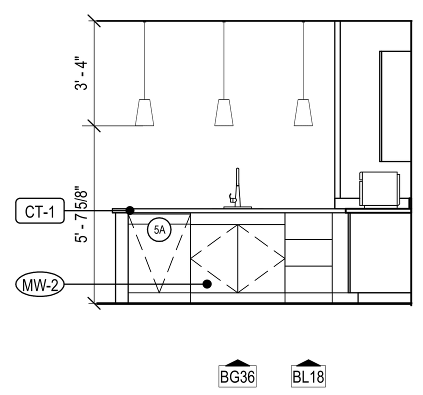
Unit A1 - Reflected Ceiling Plan 4 A-601
1/4" = 1'-0"



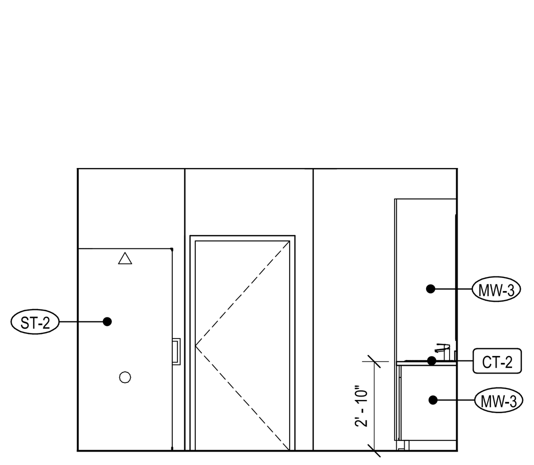
Unit A1 - Unit Finish Plan 2 A-601
1/4" = 1'-0"



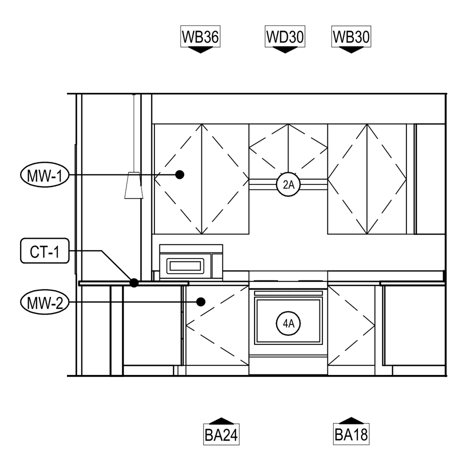
Unit A1 - Bathroom Elevation C 11 A-601
1/4" = 1'-0"



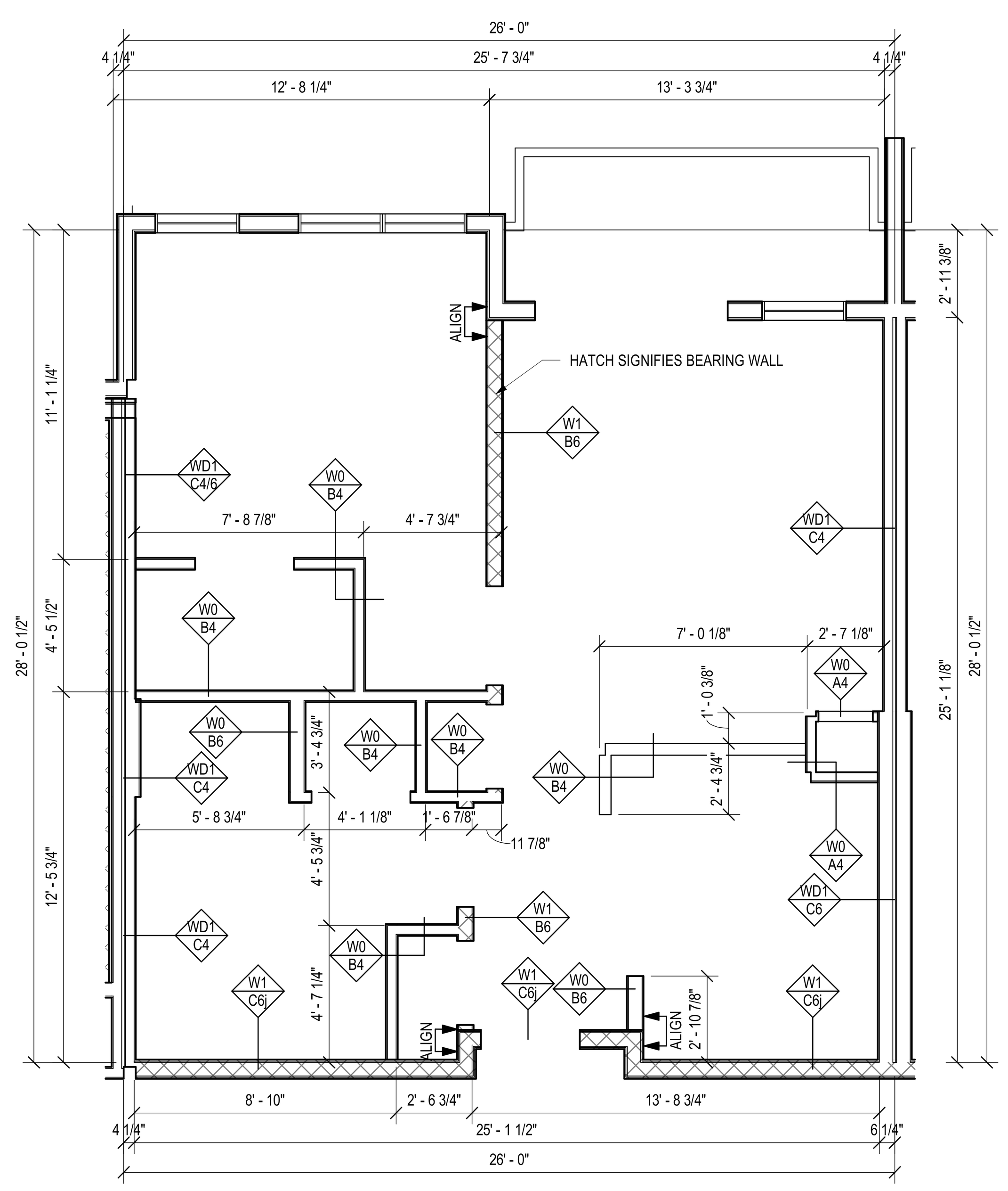
Unit A1 - Kitchen Elevation C 7 A-601
1/4" = 1'-0"



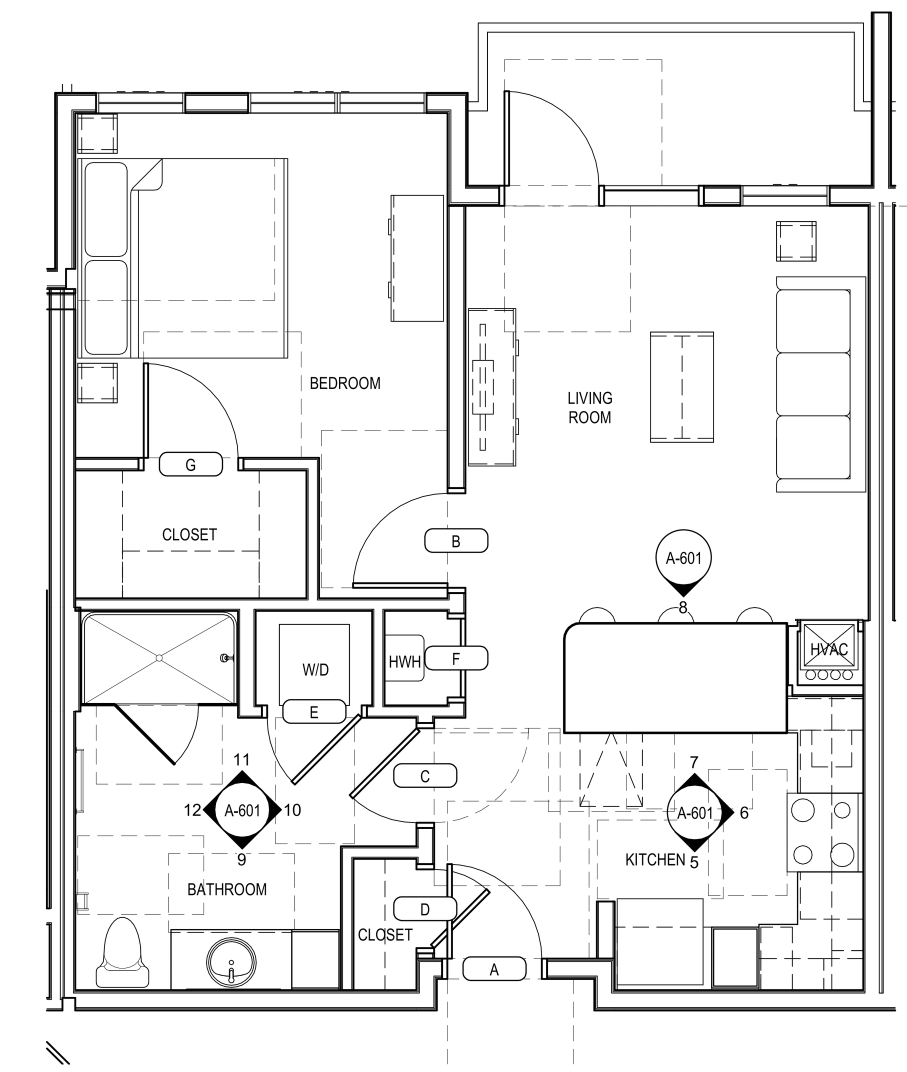
Unit A1 - Bathroom Elevation B 10 A-601
1/4" = 1'-0"



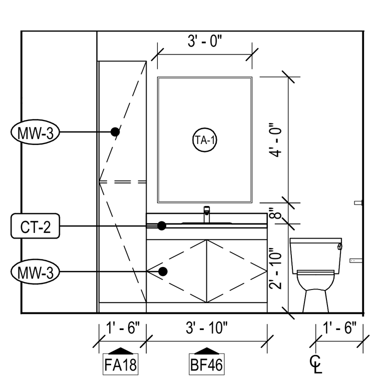
Unit A1 - Kitchen Elevation B 6 A-601
1/4" = 1'-0"



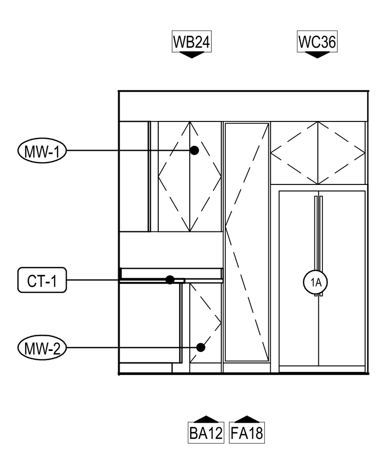
Unit A1 - Unit Layout Plan 3 A-601
1/4" = 1'-0"



Unit A1 - Unit Plan 1 A-601
1/4" = 1'-0"



Unit A1 - Bathroom Elevation A 9 A-601
1/4" = 1'-0"



Unit A1 - Kitchen Elevation A 5 A-601
1/4" = 1'-0"

project information:
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MBTA Access Road
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Technology Park
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consultant information:

issuance:
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Coordination Set
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key plan:

drawing information:

drawing by:	AMD
drawing checked by:	AD
drawing scale:	1/4" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

registration:
DRAFT

drawing name:
Unit A1

drawing number:
A-601

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consultant information:

issuance:
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key plan:

drawing information:

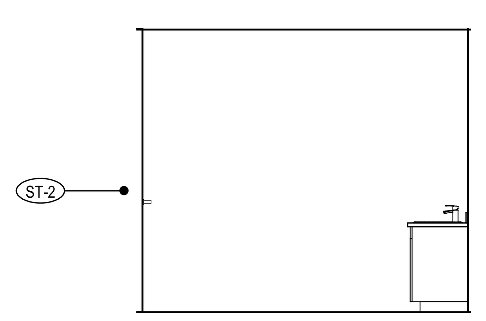
drawing by:	AMD
drawing checked by:	AD
drawing scale:	1/4" = 1'-0"
drawing date:	04 SEPTEMBER 2020
project number:	19021.00
drawing revisions:	

No.	Description	Date

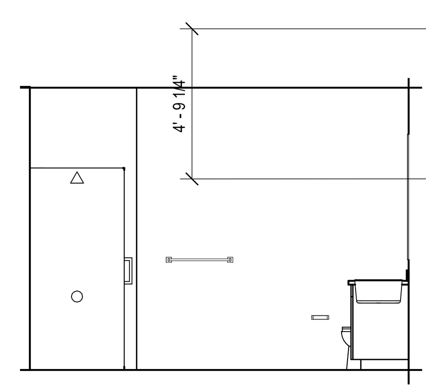
registration:
DRAFT

drawing name:
Unit B1

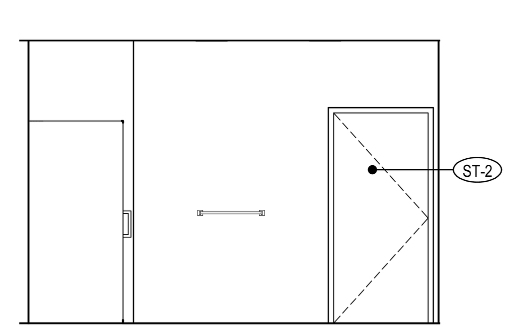
drawing number:
A-608



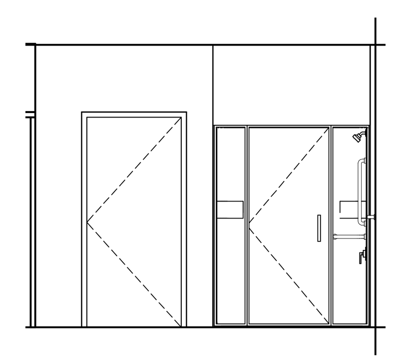
Unit B1 - Master Bathroom Elevation D 13 A-608
1/4" = 1'-0"

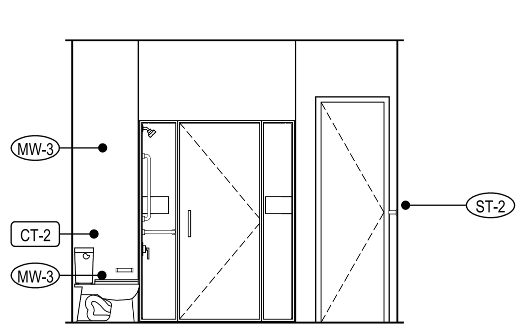


Unit B1 - Bathroom Elevation D 8 A-608
1/4" = 1'-0"

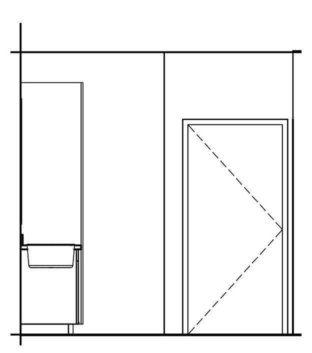


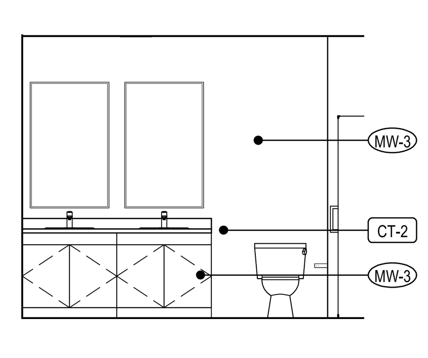
Unit B1 - Master Bathroom Elevation C 12 A-608
1/4" = 1'-0"


Unit B1 - Bathroom Elevation C 7 A-608
1/4" = 1'-0"

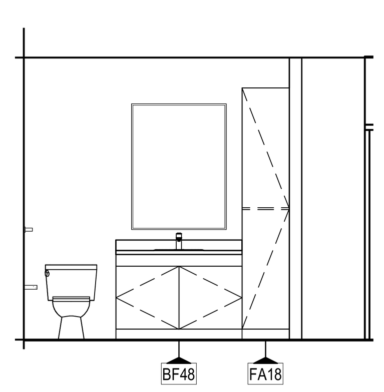


Unit B1 - Master Bathroom Elevation B 11 A-608
1/4" = 1'-0"

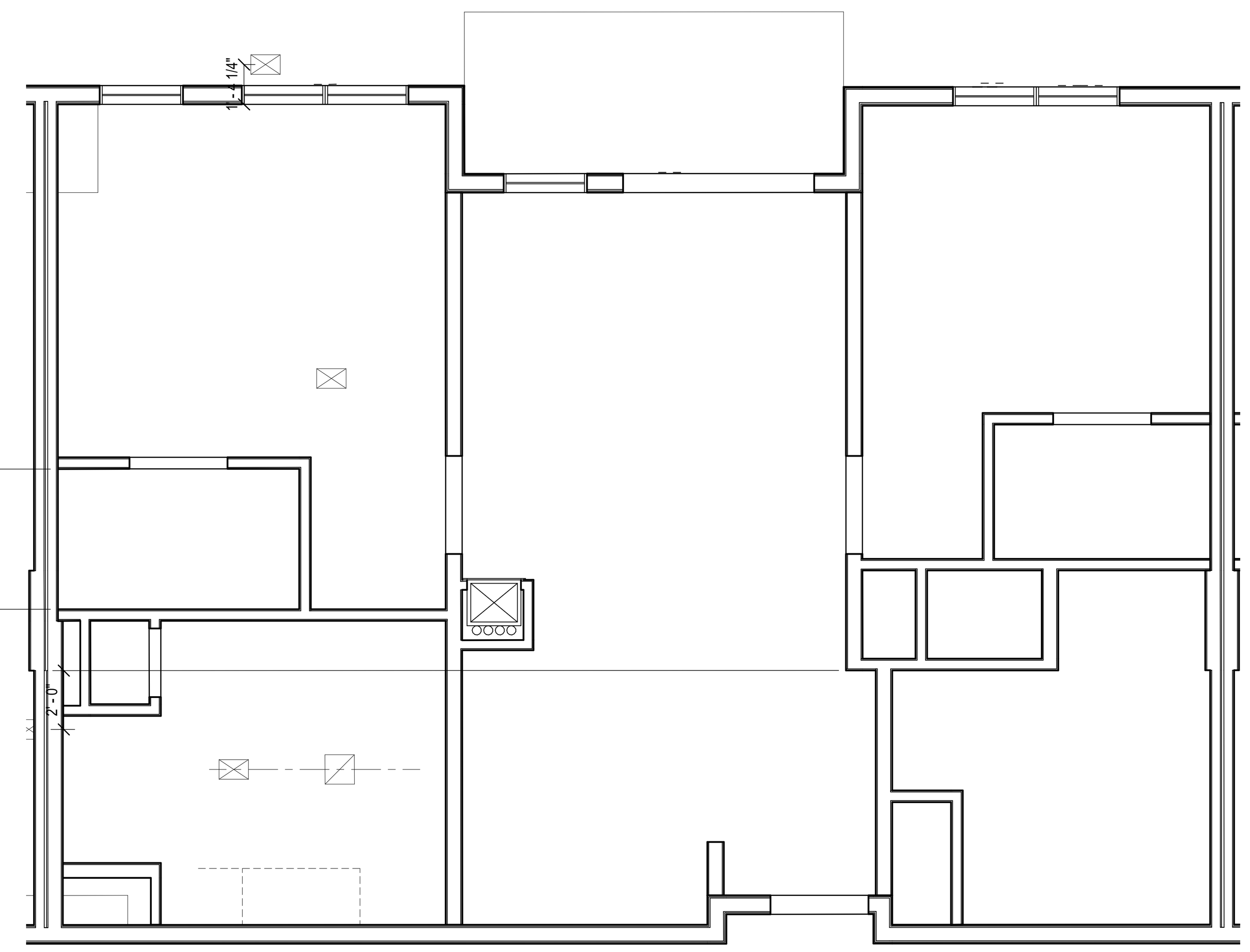

Unit B1 - Bathroom Elevation B 6 A-608
1/4" = 1'-0"

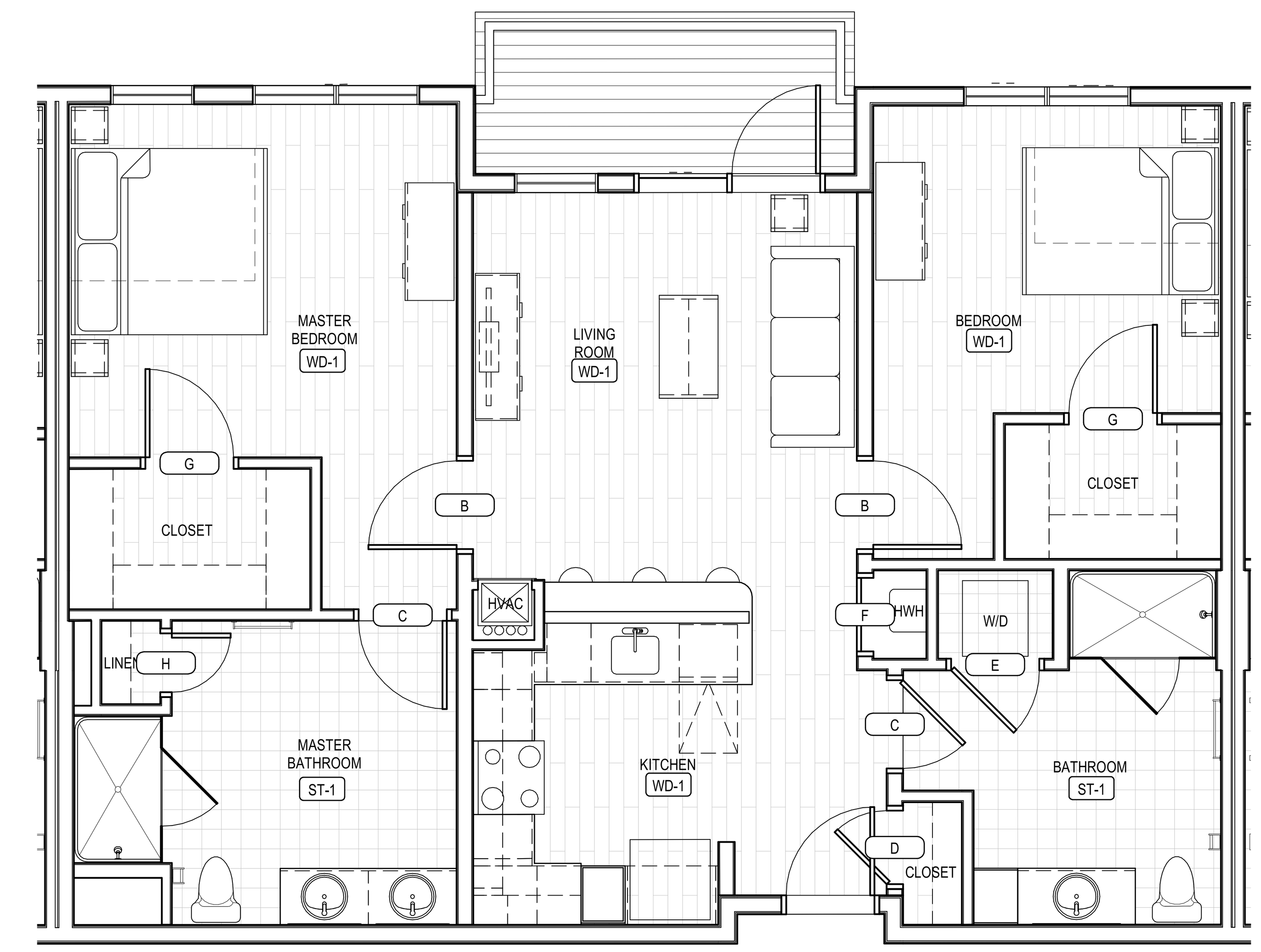


Unit B1 - Master Bathroom Elevation A 10 A-608
1/4" = 1'-0"

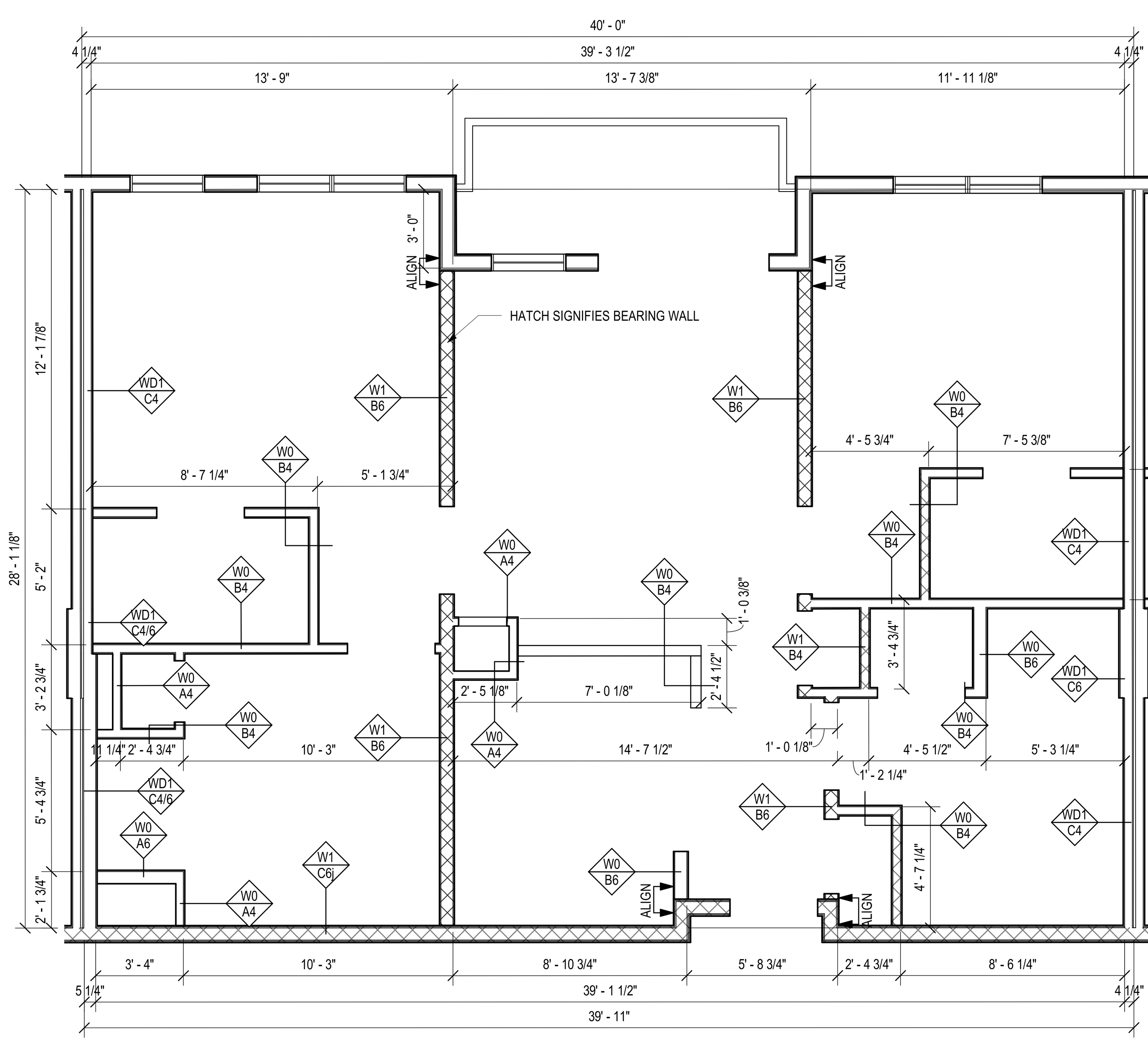


Unit B1 - Bathroom Elevation A 5 A-608
1/4" = 1'-0"

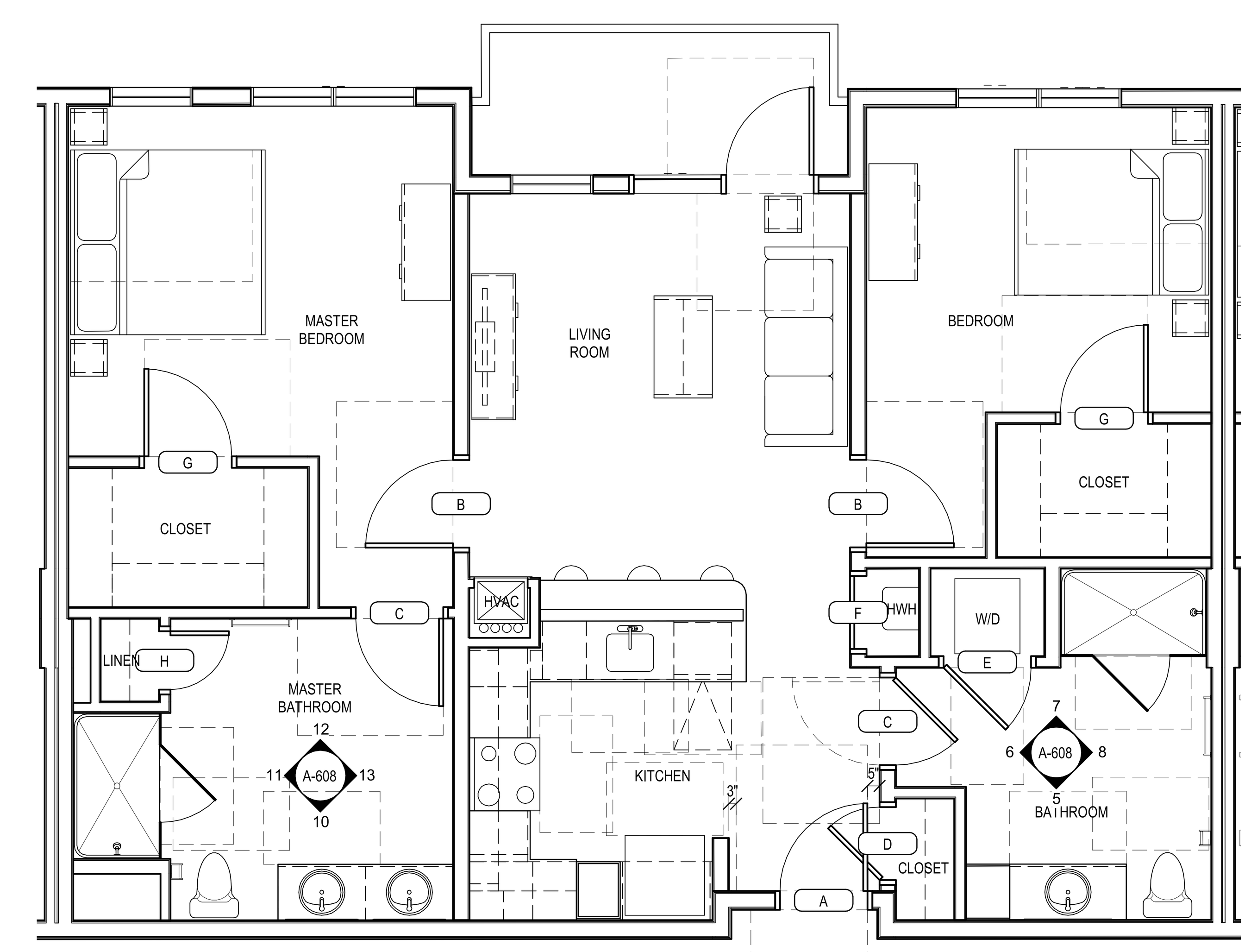

Unit B1 - Reflected Ceiling Plan 4 A-608
1/4" = 1'-0"



Unit B1 - Unit Finish Plan 2 A-608
1/4" = 1'-0"



Unit B1 - Unit Layout Plan 3 A-608
1/4" = 1'-0"



Unit B1 - Unit Plan 1 A-608
1/4" = 1'-0"