STONEFIELD

STORMWATER MANAGEMENT REPORT
PRIMROSE SCHOOL FRANCHISING COMPANY

PROPOSED CHILDCARE FACILITY
PARCEL ID: 28-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

PREPARED FOR:
PRIMROSE SCHOOLS FRANCHISING COMPANY
21 CONKLIN AVENUE
WARREN, NEW JERSEY 07059

PREPARED BY:
STONEFIELD ENGINEERING & DESIGN, LLC
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SALEM, MASSACHUSETTS

REPORT DATE:
MARCH 7, 2025

JOSHUA H. KLINE, PE
MA PE LICENSE #53936

REPORT CONTENTS

APPENDICES

1.0 PROJECT DESCRIPTION

Primrose School Franchising Company is proposing to develop Parcel 28-113, commonly known as 885 Main Street, Reading, MA, (herein referred to as the "project site") to accommodate the construction of a 14,058 square foot Childcare Facility (7,029 SF Floor Plate). Additional improvements include children's playground areas with associated play equipment, lighting, landscaping, off-street parking facilities, utility connections, and stormwater infrastructure.

The property is located within the Single Family 15 (S-15) zoning district in the Town of Reading. The proposed development fronts Main Street (Route 28) and is surrounded by single family residential lots. The site will be accessed via one (1) full movement driveway from Main Street (MA Route 28). Refer to **APPENDIX A** for project maps of the subject site.

The project site is 84,280 SF (1.94 acres), the extent of land disturbance is 61,093 SF (1.40 acres), and 15,257 SF (0.35 acres) of impervious surface will be added to the project site. The overall drainage area was modeled as 84,280 SF (1.94 acres).

This Report has been prepared to analyze the potential stormwater runoff impacts of the proposed project site and outline proposed measures to conform to the stormwater management regulations set forth by the Town of Reading and the Massachusetts Department of Environmental Protection.

2.0 EXISTING CONDITIONS

EXISTING SITE DEVELOPMENT

The project site fronts Main Street (MA Route 28) to the East. Under existing conditions, the project site is developed with an approximately 3,070 ± SF house with associated accessory structures, parking facilities, pool and utility connections. The site is accessed via one (1) full movement driveway off Main Street. There is an existing bordering vegetated wetland on the northeast corner of the project site that captures all runoff within the existing developed area. The entirety of the existing structures, associated parking area, and utility connections will be removed to accommodate the proposed development. An Aerial Map depicting the existing site conditions can be found in **APPENDIX A**.

EXISTING TOPOGRAPHY

The high point of the project site is 125.0' along the southern property line near Francis Drive. Runoff will sheet flow north from the high point near Francis drive, across site, and discharge to the onsite wetlands. Another high point of 112.5' exists at the western edge of the project site along Main Street, runoff from this point, similarly, will

sheet flow across site and discharge to the wetlands. No runoff from the project site enters the State Highway Layout. Grades onsite generally range from 2-7% within the previously developed area and increases to 30-35% as it approaches the onsite wetlands to the Northeast.

PROJECT SITE SOILS

Soil mapping was obtained from the National Resource Conservation Service (NRCS) for the project site and immediate area. Generally, the project site is underlain with one major soil group: Sandy Loam (SL). Overall, the soils are well drained and runoff flows overland northeast to the on-site wetlands. The table below provides a summary of soils for the project site:

TABLE 1: NRCS SOIL MAPPING RESULTS

Soil Unit Code	Soil Description	Approximate Project Coverage	Drainage Class	Hydrologic Soil Group
73B	Whitman Fine Sandy Loam	61.3%	Very Poorly Drained	D
631C	Charlton-Urban Land-Hollis Complex	28.5%	Well Drained	A
655	Udorthents	5.9%	NS	D*
305C	Paxton Fine Sandy Loam	3.8%	Well Drained	C
629C	Canton-Charlton-Urban Land Complex	0.5%	Well Drained	A

*629C does not have a pre-determined hydraulic soil group. As such, these soils are analyzed as HSG D for a conservative analysis.

Additional information regarding the NRCS soil mapping can be found in **APPENDIX B**.

Preliminary subsurface investigations have revealed the estimated seasonal high-water table (ESHWT) to be approximately 10' below existing graded at the location of the proposed subsurface infiltration system. A detailed geotechnical report will be provided at a later date.

WATERSHED / RECEIVING WATERS – TMDL DESIGNATION

Under existing conditions, the site drains to the onsite bordering vegetated wetlands to the northeast of the project site that ultimately discharges to Saugus River (State Waterbody ID: MA93-94). The watershed for the development is part of the Headwaters Saugus River Watershed (State Watershed ID Designation: 010900010401) as defined by the United States Environmental Protection Agency for Community Waterway Mapping. Per the Massachusetts Year 2022 Integrated List of Waters prepared by the Massachusetts Department of Environmental Protection, Saugus River is identified as an impaired water for algae, bacteria and other microbes, degraded habitat, low oxygen, murky water, and nitrogen and/or phosphorus.

EXISTING ENVIRONMENTAL INVENTORY

Based on the effective FEMA flood insurance rate mapping (FEMA Map #25017C311E issued June 4th, 2010), the entirety of the site lies within flood zone x, an area with minimal flood hazard. The FEMA Map can be found in **APPENDIX A** of this Report.

There are state (MassDEP) regulated freshwater wetlands within the project site that are subject to the Wetlands Protection Act Regulations (310 CMR). As there are regulated wetlands within the project site, the limits of the areas and associated Buffer Zones are shown on the Site Plans prepared by Stonefield in conjunction with this Report. Per the records of natural communities maintained in the National Heritage & Endangered Species Program (NHESP) database, there are no records of endangered or threatened species sightings or suitable habitats located within the vicinity of the proposed improvements.

3.0 PROPOSED CONDITIONS

PROPOSED SITE DEVELOPMENT

The proposed development will consist of a 14,058 square foot child daycare facility. Additional improvements include an off-street parking facility, lighting, landscaping, child play area, utility services and stormwater management infrastructure. The site will be accessed via one (1) full movement driveway off of Main Street. Refer to **APPENDIX A** for a half-size Overall Site Plan depicting the proposed project improvements.

PROPOSED TOPOGRAPHY

Project site topography and drainage patterns will generally remain similar to existing conditions; however, due to the need for more commercially friendly, ADA compliant grades, the previously developed area has been widened and flattened. A combination of extended curbing and retaining/landscape walls will be implemented through the project to make up for the change in grades.

ANTICIPATED ENVIRONMENTAL INVENTORY IMPACTS

The proposed development will not disturb land within the 25' wetland buffer. The Township will remain apprised of the MassDEP permitting status as the project moves forward.

4.0 STORMWATER MANAGEMENT METHODOLOGY & PARAMETERS

HYDROLOGIC METHODOLOGY

The analysis program "HydroCAD" Version 10.0 by HydroCAD Software Solutions was utilized to calculate and plot the runoff hydrographs. The program incorporates the time of concentration, C values, rainfall data, and project drainage areas to calculate the runoff characteristics. The existing and proposed drainage areas have been analyzed

utilizing Intensity-Duration-Frequency data obtained from NOAA for the project area; specifics of the rainfall distribution can be found in **APPENDIX C.** Additional key variables utilized in the analysis include:

TABLE 2: HYDROCAD DESIGN VARIABLES

Variable	Input	Variable	Input
Runoff Calculation Method	SCS TR-20	NRCS Rainfall Frequency Data Set	Middlesex
Pervious/Impervious CN Calculations	Separate	Storm Intervals (Year Events)	2, 10, 100
Stage-Storage Relationship	Dynamic	Storm Duration	24 Hours
Minimum time of concentration	6 minutes	Storm Curve	NOAA D

Additional information regarding the hydrologic calculations can be found in **APPENDIX C**.

5.0 STORMWATER ANALYSIS

EXISTING DRAINAGE AREAS

Under current conditions, the project site is comprised of one (1) drainage area discharging to one (1) Point of Interest (POI-1). The ultimate POI analyzed for the development is the existing bordering vegetated wetlands located in the northeast corner of the project site. POI-1, comprised of drainage area EX-1, receives runoff via sheet flow from the entirety of site. See below for a short summary of the drainage area:

TABLE 3: SUMMARY OF EXISTING DRAINAGE AREA

Drainage Area	Description	Area Extents	Impervious Area	Time of Concentration
EX-1 (POI-1)	Existing Runoff to Wetlands	84,280 SF	11,547 SF	11.2 Minutes

Existing drainage areas were delineated based on field surveying data. Hydrologic calculations and parameters for each drainage area can be found in **APPENDIX C**; specific drainage area delineations and land cover can be found in **APPENDIX E.**

PROPOSED DRAINAGE AREAS

Under proposed conditions, the general drainage patterns and ultimate point of interest will be maintained. The intent behind the proposed delineations is to reduce the amount of direct runoff to the onsite bordering vegetated wetlands. The diverted land from drainage area P-1B is sent to various stormwater management features to meet

the Massachusetts Department of Environmental Protection Stormwater Management Standards as outlined in the next Report section. See below for a short summary of each area:

TABLE 5: SUMMARY OF PROPOSED DRAINAGE AREAS

Drainage Area	Description	Area Extents	Impervious Area	Time of Concentration
P-1A	Proposed Drainage Direct to POI-1	51,488 SF	1,313 SF	6.6 Minutes
P-1B	Proposed Drainage to B-1	32,792 SF	25,492 SF	6.0 Minutes*
POI (P-1)	Ultimate Point of Interest: Onsite Bordering Vegetated Wetlands	84,280 SF	26,805 **SF**	N/A

***The minimum time of concentration was utilized due to the high level of impervious coverage / land disturbance and proximity to existing and proposed stormwater pipe conveyance systems**

All proposed drainage areas were delineated based on the proposed grading design overlain on field survey data data. Hydrologic calculations and parameters for each drainage area can be found in **APPENDIX C**; specific drainage area delineations and land cover can be found in **APPENDIX E.**

STORMWATER MANAGEMENT DESIGN PARAMETERS

The extent of development proposes to disturb over one (1) acre of the existing site; as such, it is subject to all Stormwater Standards as defined in the Town Ordinances and the Massachusetts Stormwater Handbook Volume 1. See below for a summary of each design parameter and compliance requirements:

TABLE 6: STORMWATER DESIGN STANDARDS SUMMARY

Design Parameter	Design Target for Compliance
Standard 1: *Stormwater Discharge*	Demonstrate that no new stormwater conveyances will discharge untreated stormwater directly to or cause erosion in wetlands or waters.
Standard 2: *Stormwater Quantity*	Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2-, 10-, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.
Standard 3: *Groundwater Recharge*	Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measure shall approximate average annual pre-construction groundwater recharge volume for the site.
Standard 4: *Stormwater Quality*	Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from existing and proposed impervious coverage onsite.
Standard 5: *High Pollutant Loads*	Demonstrate that the discharge of stormwater runoff from land uses with higher potential pollutant loads will be eliminated or reduced through complete protection from potential runoff or use of a specific structural BMP.
Standard 6: *Critical Areas*	The project does not lie within Zone II Areas, Interim Wellhead Protection Areas, Outstanding Resource Waters, Special Resources, Zone I, or Zone A and therefore is **exempt** from meeting Standard 6 as it is not applicable to the development.

STANDARD 1 – STORMWATER DISCHARGE

The proposed stormwater conveyance system for POI-1 discharges directly to the onsite bordering vegetated wetlands and is therefore subject to water treatment standards. The level of treatment is outlined under the Standard 4 section in this Report as the development impacts a critical area.

STANDARD 2 – STORMWATER QUANTITY

A series of SC-800 StormTech chambers in conjunction with an outlet control structure are used to attenuate peak stormwater runoff rates to the mandated regulatory levels. The tables below summarize the various drainage areas in relation to flow rates and runoff volume during regulatory storm events:

TABLE 7: SUMMARY OF EXISTING DRAINAGE AREA FLOW RATES

Drainage Area	2-Year Flow Rate	10-Year Flow Rate	100-Year Flow Rate
POI (E-1)	1.49 CFS	3.34 CFS	8.59 CFS

TABLE 8: SUMMARY OF PROPOSED DRAINAGE AREA FLOW RATES

Drainage Area	2-Year Flow Rate	10-Year Flow Rate	100-Year Flow Rate
P-1A (Undetained to POI)	1.11 CFS	2.55 CFS	6.49 CFS
P-1B (To Infiltration System)	1.63 CFS	2.47 CFS	4.77 CFS
POI (P-1)	1.11 CFS	2.89 CFS	7.91 CFS

Under post-development conditions the runoff flow rates and volumes are reduced to the bordering vegetated wetlands, the ultimate point of interest (POI-1). Runoff is diverted from the majority of the developed area (P-1B) to the on-site stormwater management system for runoff attenuation and water quality treatment. The table below outlines the regulatory compliance parameters for runoff quantity on the project site:

TABLE 9: STORMWATER RUNOFF QUANTITY COMPLIANCE SUMMARY (POI-1)

Rainfall Event	Existing Flow Rate	Proposed Flow Rate	Proposed % Reduction
2-Year Storm	1.49 CFS	1.11 CFS	25.50%
10-Year Storm	3.34 CFS	2.89 CFS	13.47%
100-Year Storm	8.598 CFS	7.91 CFS	8.00%

The proposed SC-800 StormTech chambers in conjunction with an outlet control structure provide sufficient flow rate attenuation to ensure that no adverse impacts are anticipated downstream of the project site. Detailed hydrologic calculations for each drainage area can be found in **APPENDIX C**.

STANDARD 3 – GROUNDWATER RECHARGE

Groundwater recharge is required as the infiltration rates of the soils were found to be greater than 0.17 in/hour and there are no contaminated soils on or within the vicinity of the site. Groundwater recharge is met through the implementation of the aforementioned subsurface infiltration system which provides a total recharge volume of 2,290 CF. There is a separation of ±4.5 feet between the bottom of the infiltration structure and the seasonal high groundwater table, therefore a groundwater mounding analysis was not required.

The required recharge volume was calculated by multiplying the total impervious area, 26,805 SF, by 0.60 inches due to the hydrologic rating of A which yields a required recharge volume of 1,340.25 CF. The proposed BMP exceeds this requirement by 949.75 CF and therefore meets Standard 3 requirements. The dynamic method was utilized and can be found in **APPENDIX C.**

STANDARD 4 – STORMWATER QUALITY CONTROL

For all developments, a removal of 80% of the average annual post-construction load of Total Suspended Solids (TSS) is required.

Compliance with stormwater runoff quality requirements will be accomplished through street sweeping (9% TSS removal rate), deep sump and hooded catch basins (25% TSS removal rate), ADS isolator Row (25% TSS removal rate), and Infiltration Basin (80% TSS removal rate), which when utilized in series provide a combined 90% TSS removal rate. The table below summarizes the required and proposed weighted TSS removal rates:

The proposed treatment design will exceed the regulatory requirements for stormwater runoff quality and ensure that runoff discharged into the unnamed tributary will not have any adverse effects on downstream waterways and environs. The MassDEP TSS removal spreadsheet can be found in **APPENDIX C.**

STANDARD 5 – HIGH POLLUTANT LOADS

The proposed use for the development is a child day care facility which is not considered a Land Use with Higher Potential Pollutant Loads (LUHPPL) by the MassDEP and therefore is exempt from Standard 5 requirements.

STANDARD 6 – CRITICAL AREAS

The proposed redevelopment area does not lie in or discharge to a Zone II Interim Wellhead Protection Area, Outstanding Resources Waters, Special Resource Waters or other critical area as defined by the Massachusetts Stormwater Handbook Volume 1, and therefore is exempt from Standard 6 requirements.

STANDARD 7 – REDEVELOPMENT PROJECT

Since the site has a net increase of impervious cover by 15,257 SF (0.35 AC), the site is not determined to be a redevelopment project and must comply with all Standards as defined in the Massachusetts Department of Environmental Protection Stormwater Management Standards.

STANDARD 8 – EROSION, SEDIMENTATION, AND POLLUTION PREVENTION PLAN

A Soil Erosion & Sediment Control Plan has been prepared in accordance with the latest edition of Volume 2 of the Massachusetts Stormwater Handbook and the Erosion and Sedimentation Control Guidelines. This plan can be found within the Land Development Plans prepared by Stonefield Engineering & Design in conjunction with this Report. Proposed temporary measures during construction include but are not limited to silt fencing, stabilized construction entrance, inlet filters, silt sock, street sweeping, and temporary seeding for soil stabilization. No land disturbance will occur until certification and permits have been obtained. Details for all proposed control measures have also been provided.

STANDARD 9 – STORMWATER FACILITY OPERATIONS AND MAINTENANCE

A Stormwater Operations & Maintenance Manual has been included in this Pollution Prevention Plan. Any necessary easements or covenants associated with the stormwater improvements will be recorded prior to the start of construction.

STANDARD 10 – ILLICIT DISCHARGES

The proposed stormwater management system discharges are entirely comprised of stormwater. Firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, and water for street washing are prohibited to discharge onsite and will therefore not result in an illicit discharge.

6.0 EROSION, SEDIMENTATION, AND POLLUTION PREVENTION

TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

Under proposed conditions, erosion and sediment controls will be utilized to limit the potential effects due to construction of the proposed development. Refer to the Soil Erosion and Sediment Control Plans in **APPENDIX A** of this report. The following includes the temporary sediment controls proposed for this project:

Construction Entrance – To provide a stable entrance and exit from a construction site and keep mud and sediment off public roads, a temporary stone-stabilized pad located at points of vehicular ingress and egress on a construction site. If the action of the vehicle traveling over the gravel pad is not sufficient to remove the majority of the mud, then the tires must be washed before the vehicle enters a public road. If washing is used, provisions must be made to intercept the wash water and trap sediment before it is carried off-site.

Dust Control – To reduce surface and air movement of dust from exposed soil surfaces during land disturbing, demolition, and construction activities, preventative measures must be taken. Sprinkling or other approved methods must be used to reduce dust generated on the site. Dust control shall be provided by the general contractor to a degree acceptable to the owner/operator, and in compliance with the applicable local and state dust control requirements.

Inlet Protection – A sediment filter or an excavated impounding area around a storm drain, drop inlet, or curb inlet must be used to prevent sediment from entering storm drainage systems prior to permanent stabilization of the disturbed area. During construction, the inlet protection measures shall be replaced as needed to ensure proper function of the structure.

Preserving Natural Vegetation – Natural vegetation should be preserved whenever possible, but especially on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas. Clearly flag or mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline. If possible, place a barrier/fencing around the trees. Inspect flagged areas regularly to make sure flagging has not been removed. If tree roots have been exposed or injured, re-cover and/or seal them.

Sediment Fence – A temporary sediment barrier consisting of a filter fabric stretched across and attached to supporting posts and entrenched must be established along the perimeter of areas to be disturbed before initiation of and during construction. The sediment fence is constructed of stakes and synthetic filter fabric with a rigid wire fence backing where necessary for support. Sediment fence can be purchased with pockets presewn to accept use of steel fence posts. Silt fences should be inspected immediately after each rainfall and at least daily during prolonged rainfall. Repair as necessary. If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately. Replace burlap used in sediment fences after no more than 60 days.

Compost Filter Sock – A temporary tubular mesh sleeve that contains compost of a well-shredded organic material for a linear treatment that provides stormwater pollutant removal through filtration of pollutants from overland flow. The compost filter sock is placed at the bottom of the silt fence and should be repaired as necessary. Filter socks shall be inspected immediately after each rainfall and at least daily during prolonged rainfall as well as at least once weekly. If the fabric tears, decomposes, or in any way becomes ineffective, replace it immediately. Filter socks shall be replaced after 6 months. Upon completion of temporary control, the sock may be cut open and the mulch spread as a soil supplement.

Temporary Soil Stockpile – Locate the topsoil stockpile so that it does not interfere with work on the site. Side slopes of the stockpile should not exceed 2:1. Surround all topsoil stockpiles with an interceptor dike with gravel outlet and silt fence. Either seed or cover stockpiles with clear plastic or other mulching materials within 7 days of the formation of the stockpile. Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding. Do not place topsoil on slopes steeper than 2:1. Maintain protective cover on stockpiles until needed.

PERMANENT EROSION AND SEDIMENT CONTROL MEASURES

Permanent Seeding – Permanent seeding of grass and planting trees and shrubs shall be established on any graded or cleared area where long-lived plant cover is needed to stabilize the soil in accordance with the accompanying plans. Areas which will not be brought to final grade for a year or more shall also be seeded

permanently. Inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

Riprap – A permanent, erosion-resistant ground cover of large, loose, angular stone must be installed in accordance with the accompanying plans to protect slopes, streambanks, channels, or areas subject to erosion by wave action. Riprap should be checked at least annually and after every major storm for displaced stones, slumping, and erosion at edges, especially downstream or downslope. If the riprap has been damaged, it should be repaired immediately before further damage can take place.

CONSTRUCTION PHASING PLAN AND SEQUENCE OF OPERATIONS

The Soil Erosion & Sediment Control Plans have been phased in order to effectively control erosion and sedimentation and minimize impacts due to seasonal changes. Please refer to **APPENDIX A** for half size Soil Erosion & Sediment Control Plans for detailed construction sequencing.

FINAL SITE STABILIZATION

Recommended practices for final surface stabilization include surface roughening, terrace, topsoiling, permanent seeding, sodding, trees and shrub planting, mulching, and riprap. The stabilization measures shall be in conformance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas*, latest edition.

7.0 CONCLUSIONS

As demonstrated in this Report, the increase in runoff flow rate and volume generated by the proposed development will be satisfactorily mitigated by the introduction of an on-site stormwater conveyance system, a subsurface infiltration system, and an outlet control structure and on-site stormwater conveyance system. Runoff water quality will be impacted by the increase in impervious surfaces and a series of street sweeping, deep sump hooded catch basins, ADS isolator row and a subsurface infiltration system will provide treatment to remove total suspended solids to a satisfactory regulatory level. Groundwater recharge also will be impacted due to the loss of pervious surfaces and a subsurface infiltration system will provide groundwater recharge equal to or greater than recharge under existing conditions.

The proposed project complies with all applicable stormwater management regulations and standards. As such, the project is not anticipated to have any adverse drainage impacts on neighboring properties, downstream watercourses, or adjoining conveyance systems.

8.0 REFERENCES

1. Massachusetts Stormwater Handbook and Stormwater Standards, last amended January 2, 2008

   https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards

2. Massachusetts Complete Erosion and Sedimentation Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials, last amended May 2003

   https://www.mass.gov/doc/complete-erosion-and-sedimentation-control-guidelines-a-guide-for-planners-designers-and/download

3. Town of Reading Zoning Bylaw, last amended April, 2022

   https://www.readingma.gov/DocumentCenter/View/2242/Zoning-Bylaw-PDF

4. Town of Reading Stormwater Management and Erosion Control Regulations, last amended December 6, 2021

   https://www.readingma.gov/DocumentCenter/View/2280/Stormwater-Regulations-PDF

APPENDIX A
PROJECT FIGURES

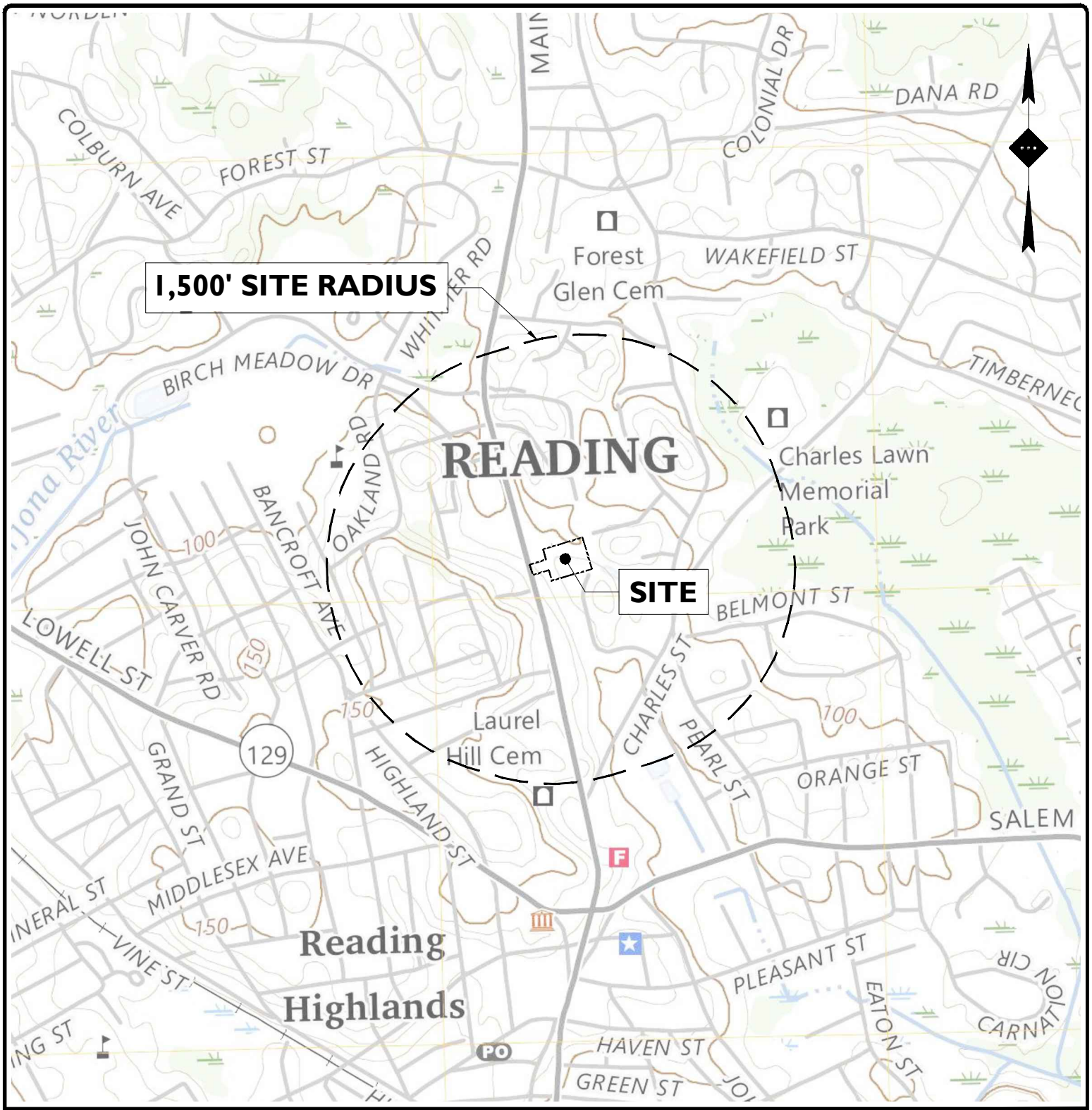
INVENTORY

FIGURE 1: USGS LOCATION MAP

FIGURE 2: AERIAL MAP

FIGURE 3: TAX & ZONING MAP

FIGURE 4: FEMA MAP



USGS QUAD MAP

1000' 0' 1000' 2000'

GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: USGS READING QUADRANGLE MASSACHUSETTS 7.5-MINUTE SERIES

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DRAWN BY:	SCL
CHECKED BY:	JHK
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SCALE:	1" = 1000'
PROJECT ID:	BOS-240115

STONEFIELD engineering & design

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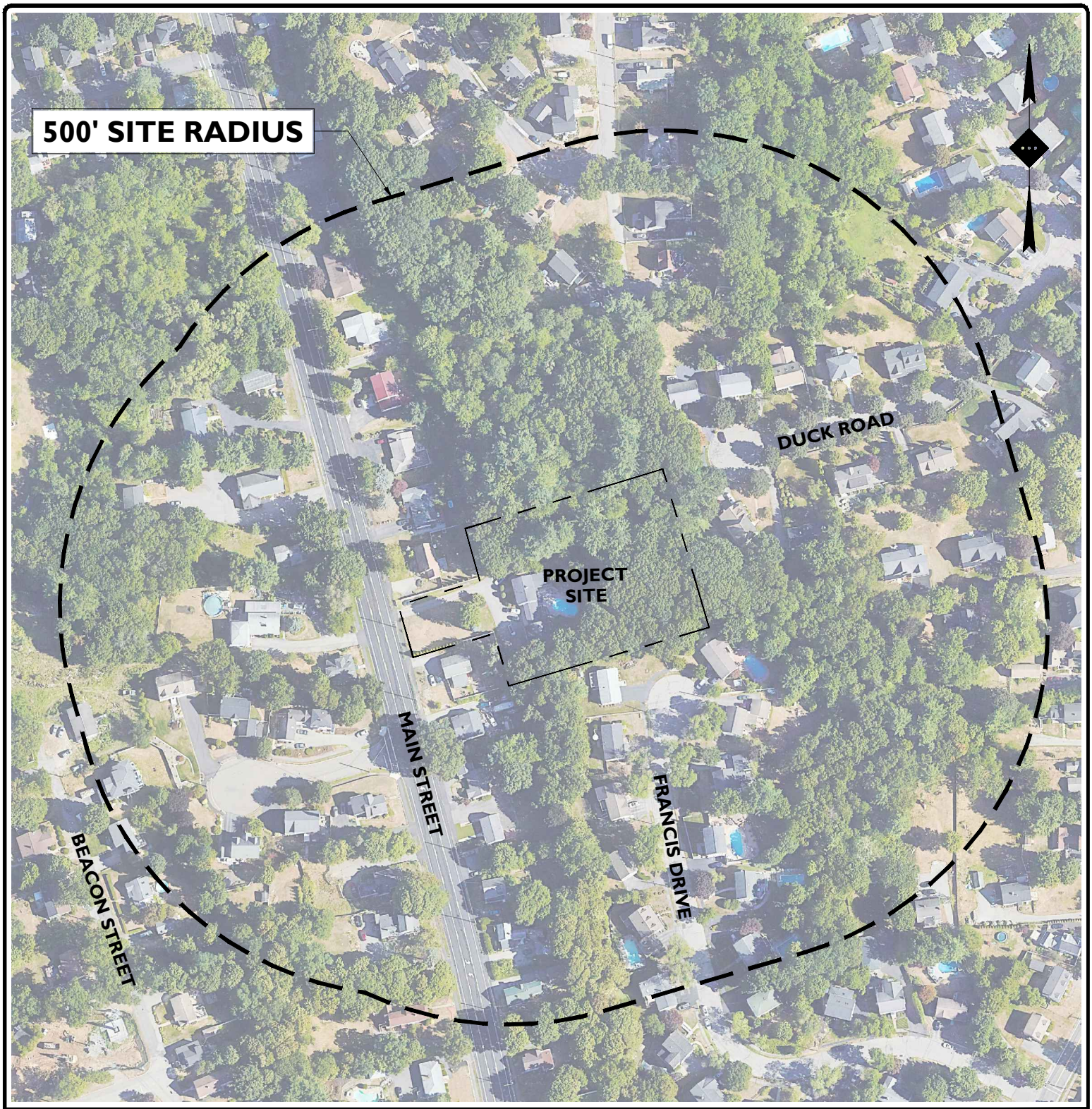

AERIAL MAP

200' 0' 200' 400'

GRAPHIC SCALE IN FEET

1" = 200'

SOURCE: GOOGLE EARTH IMAGE, DATED 06/13/2024

DRAWN BY:	SCL
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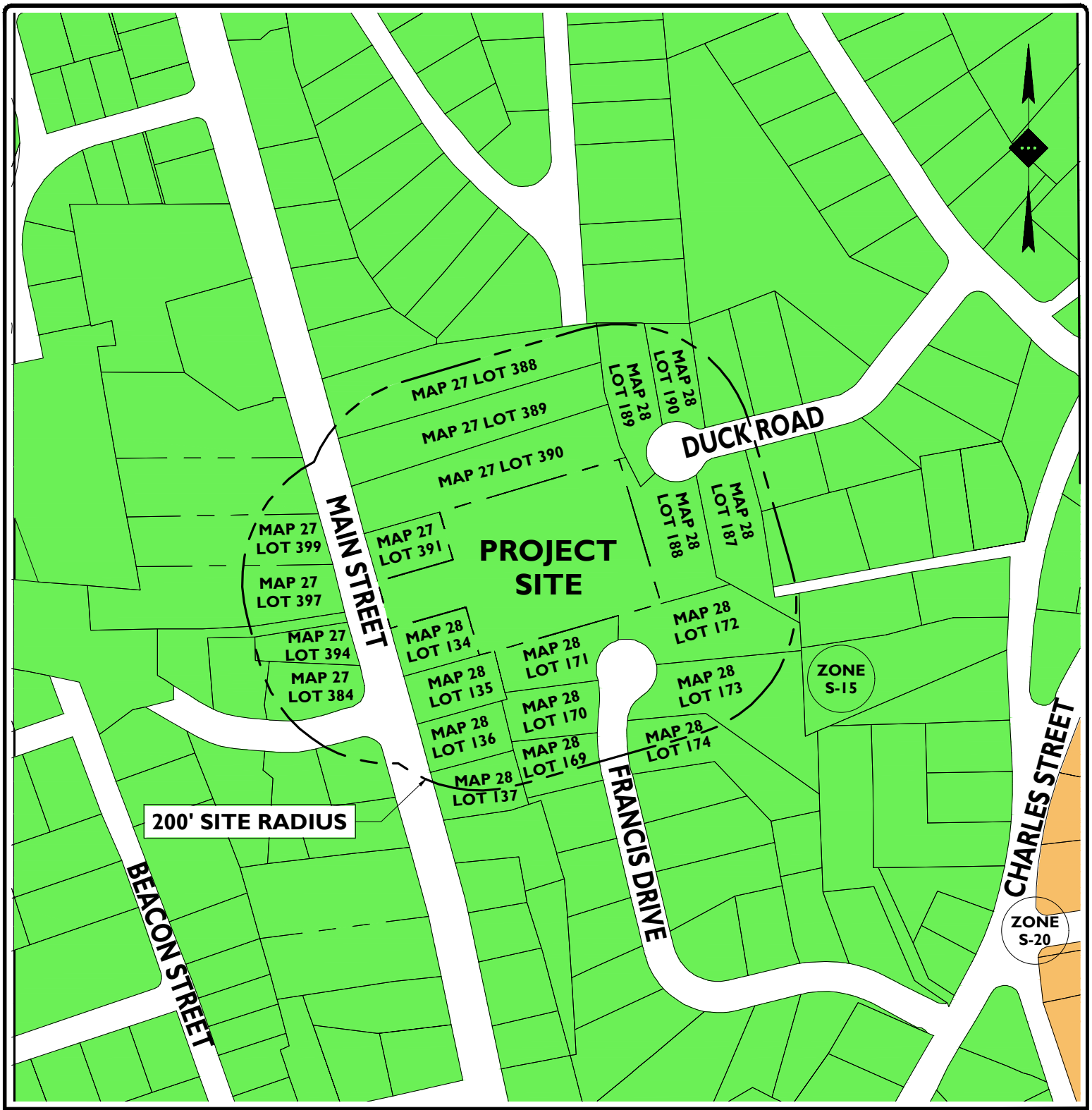

TAX & ZONING MAP

200' 0' 200' 400'

GRAPHIC SCALE IN FEET

1" = 200'

SOURCE: TOWN OF READING ZONING MAP DATED 04/27/2025 & TOWN OF READING MAPGEO

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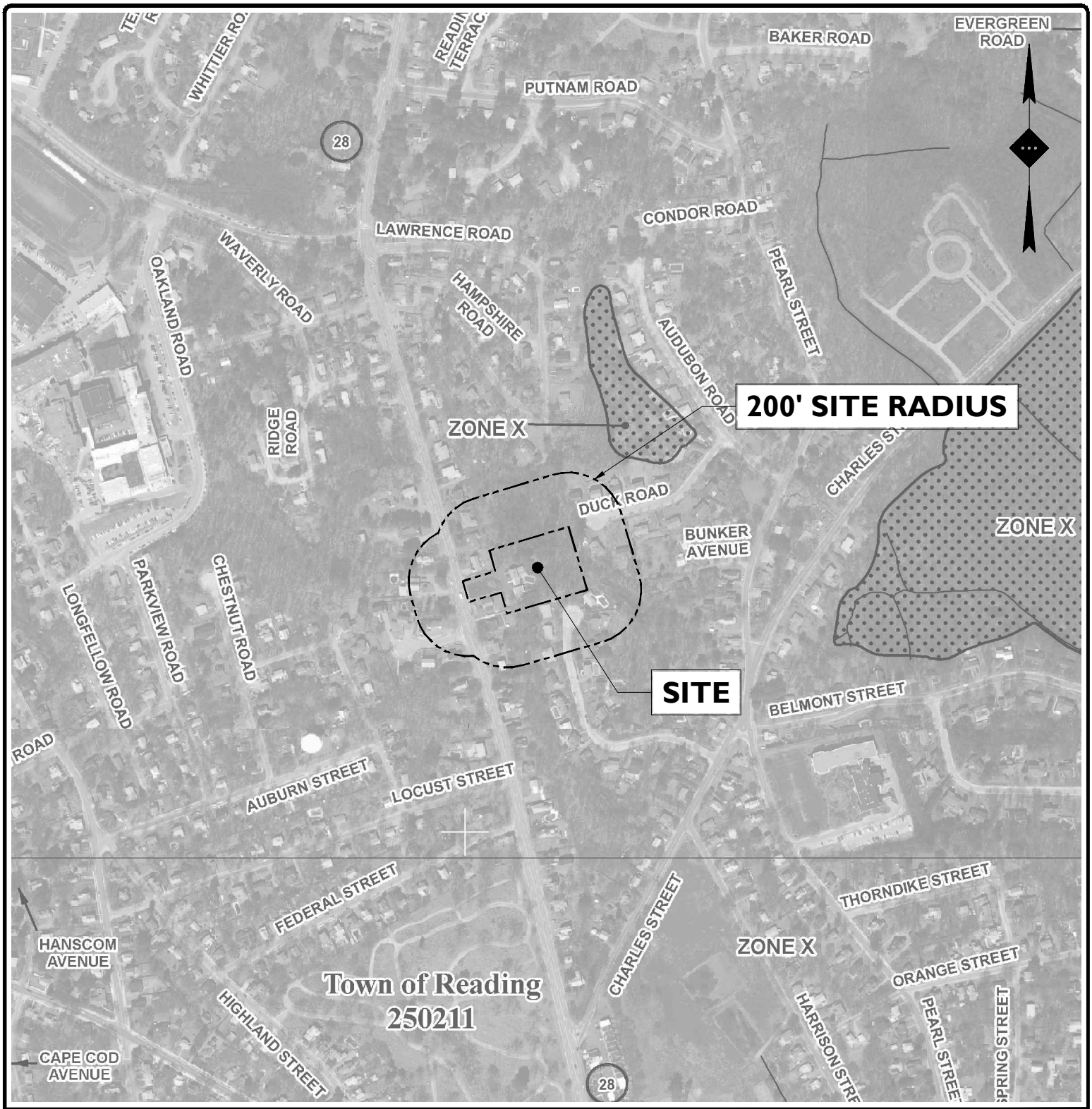

FEMA FLOOD MAP

500' 0' 500' 1000'

GRAPHIC SCALE IN FEET

1" = 500'

SOURCE: FEMA FLOOD MAP NUMBER 25017C0311E & 25017C0313E

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APPENDIX B
PROJECT SOILS

INVENTORY

B-1: NRCS SOILS REPORT

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

February 25, 2025

Custom Soil Resource Report
Soil Map

Map Scale: 1:934 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

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 1:24,000.

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 24, Aug 27, 2024

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	1.3	53.0%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	0.1	3.8%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	0.0	0.5%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	0.9	37.5%
655	Udorthents, wet substratum	0.1	5.2%
Totals for Area of Interest		**2.4**	**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

73B—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
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

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

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

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
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: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony

Percent of map unit: 10 percent
Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Marshes, bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

305C—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y
Elevation: 0 to 1,320 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: Farmland of statewide importance

Map Unit Composition

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

Description of Paxton

Setting

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

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 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 supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 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

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drumlins, drainageways, depressions, ground moraines, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

629C—Canton-Charlton-Urban land complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9959
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 40 percent
Charlton and similar soils: 30 percent
Urban land: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable sandy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 21 inches: fine sandy loam
H3 - 21 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 18 to 30 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Landform: Ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
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 supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Urban Land

Setting

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

Minor Components

Scituate

Percent of map unit: 2 percent

Landform: Hillslopes, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Montauk

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

Udorthents, loamy

Percent of map unit: 1 percent
Hydric soil rating: No

631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

Map Unit Setting

National map unit symbol: vr1g
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 45 percent
Urban land: 35 percent
Hollis and similar soils: 10 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
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 supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Urban Land

Setting

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

Description of Hollis

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Minor Components

Canton

Percent of map unit: 4 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

Udorthents, loamy

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Scituate

Percent of map unit: 1 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Montauk

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

655—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: vr1n
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, wet substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Wet Substratum

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land

Percent of map unit: 8 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

Freetown

Percent of map unit: 4 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Depressions, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

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

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

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C
HYDROLOGIC & HYDRAULIC CALCULATIONS

INVENTORY

APPENDIX C-1
TSS REMOVAL CALCULATIONS

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Basin B-1

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Street Sweeping - 9%	0.09	1.00	0.09	0.91
Deep Sump and Hooded Catch Basin	0.25	0.91	0.23	0.68
Isolator Row	0.25	0.68	0.17	0.51
Infiltration Basin	0.80	0.51	0.41	0.10
	0.00	0.10	0.00	0.10

Total TSS Removal = 90%

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

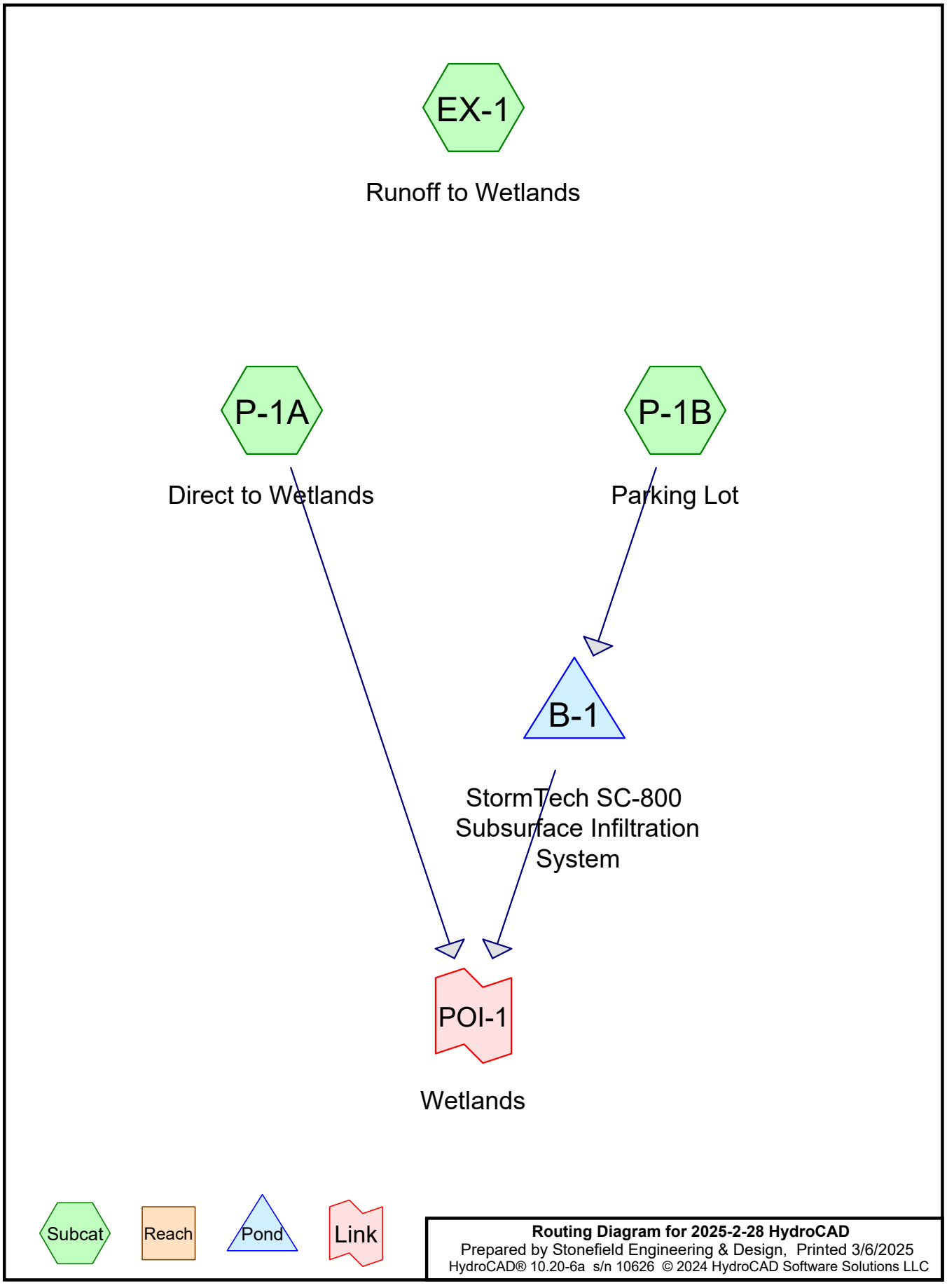
Project: BOS-240115
Prepared By: AJD
Date: 2/28/2025

*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

APPENDIX C-2
HydroCAD Node Schematic Diagram



Routing Diagram for 2025-2-28 HydroCAD
Prepared by Stonefield Engineering & Design, Printed 3/6/2025

APPENDIX C-3
HydroCAD Hydrologic Calculations

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff to Wetlands Runoff Area=84,280 sf 13.70% Impervious Runoff Depth=0.97"
Flow Length=204' Tc=11.2 min CN=68/98 Runoff=1.49 cfs 6,833 cf

Subcatchment P-1A: Direct to Wetlands Runoff Area=51,488 sf 2.55% Impervious Runoff Depth=0.91"
Flow Length=208' Tc=6.6 min CN=72/98 Runoff=1.11 cfs 3,918 cf

Subcatchment P-1B: Parking Lot Runoff Area=32,792 sf 77.74% Impervious Runoff Depth=2.23"
Tc=6.0 min CN=45/98 Runoff=1.63 cfs 6,091 cf

Pond B-1: StormTech SC-800 Subsurface Peak Elev=105.98' Storage=2,441 cf Inflow=1.63 cfs 6,091 cf
Discarded=0.08 cfs 5,767 cf Primary=0.07 cfs 323 cf Outflow=0.15 cfs 6,091 cf

Link POI-1: Wetlands Inflow=1.11 cfs 4,241 cf
Primary=1.11 cfs 4,241 cf

Summary for Subcatchment EX-1: Runoff to Wetlands

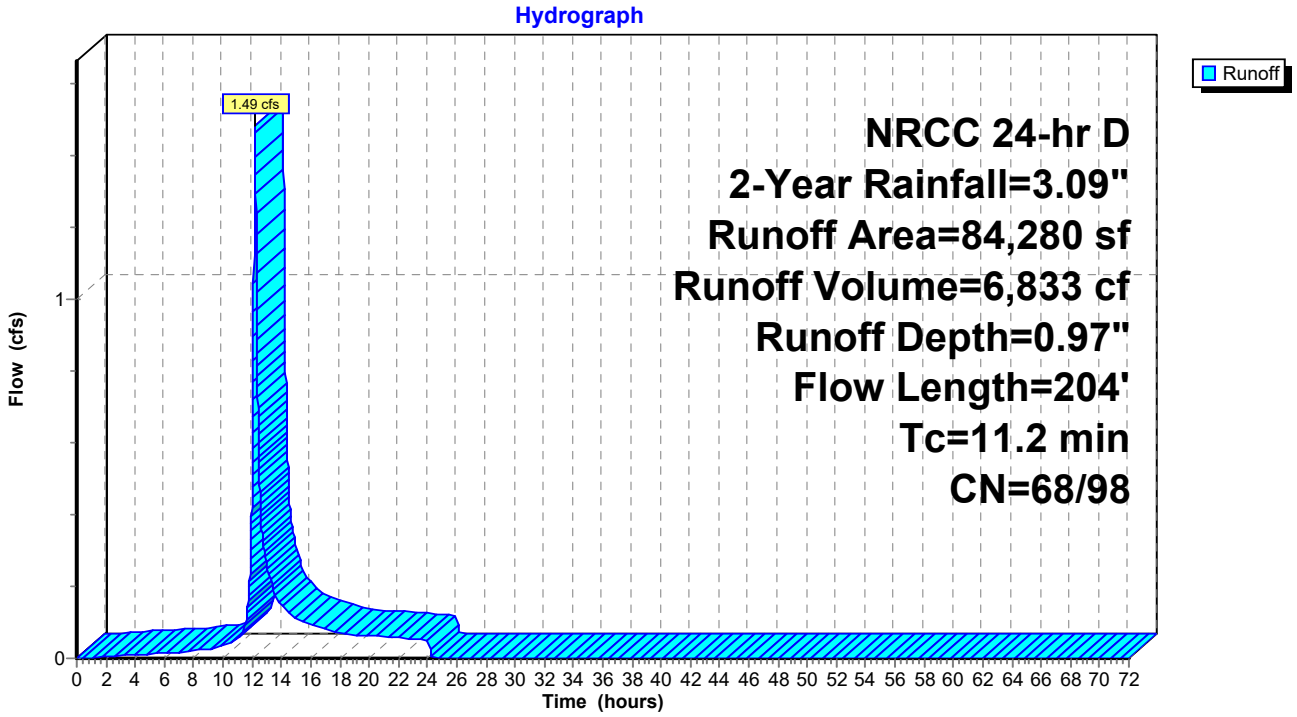
Runoff = 1.49 cfs @ 12.19 hrs, Volume= 6,833 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.09"

Area (sf)	CN	Description
11,547	98	Unconnected pavement, HSG D
7,989	30	Woods, Good, HSG A
44,941	77	Woods, Good, HSG D
5,755	80	>75% Grass cover, Good, HSG D
7,174	74	>75% Grass cover, Good, HSG C
6,874	39	>75% Grass cover, Good, HSG A
84,280	72	Weighted Average
72,733	68	86.30% Pervious Area
11,547	98	13.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	96	0.1200	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	63	0.0670	1.81		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	45	0.2000	2.24		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
11.2	204	Total			

Subcatchment EX-1: Runoff to Wetlands



Summary for Subcatchment P-1A: Direct to Wetlands

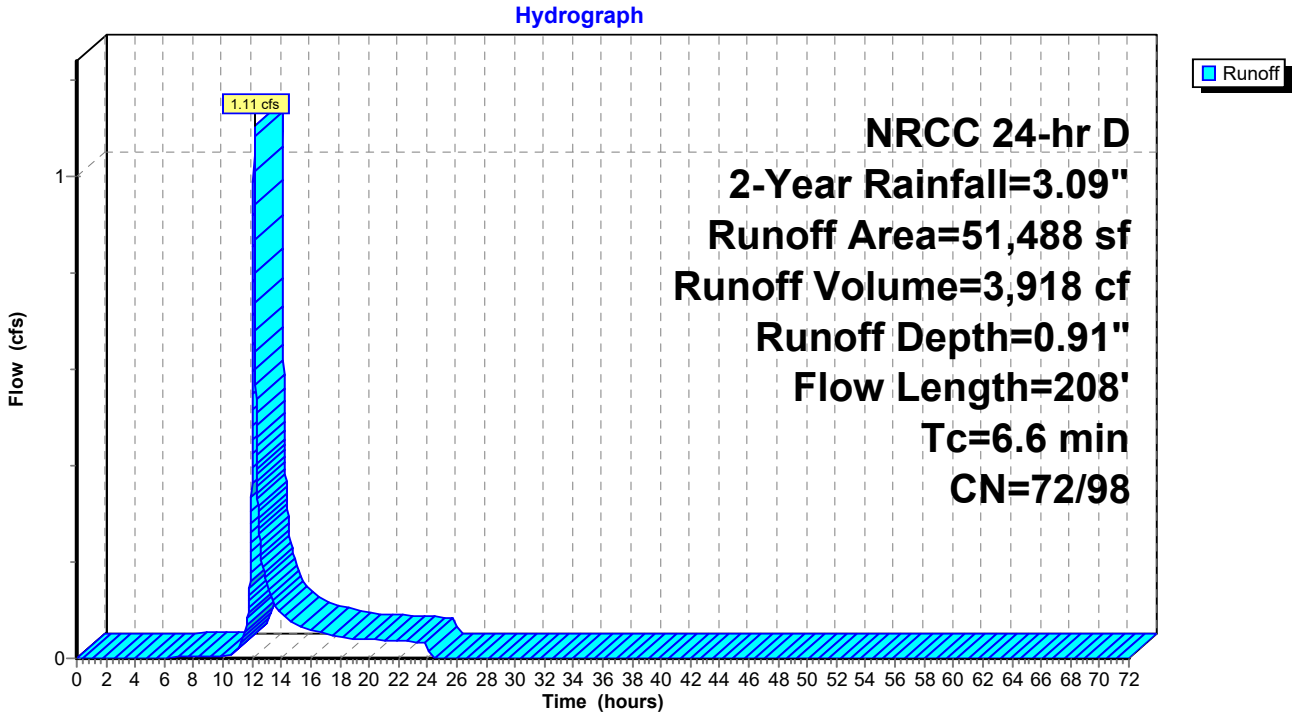
Runoff = 1.11 cfs @ 12.14 hrs, Volume= 3,918 cf, Depth= 0.91"
Routed to Link POI-1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.09"

	Area (sf)	CN	Description
*	1,313	98	Impervious
	6,792	39	>75% Grass cover, Good, HSG A
	2,880	74	>75% Grass cover, Good, HSG C
*	5,315	80	Turf Area, HSG D
	12,835	80	>75% Grass cover, Good, HSG D
	1,088	30	Woods, Good, HSG A
	21,265	77	Woods, Good, HSG D
	51,488	72	Weighted Average
	50,175	72	97.45% Pervious Area
	1,313	98	2.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	62	0.0887	0.28		**Sheet Flow, 1A-1B** Grass: Short n= 0.150 P2= 3.09"
2.5	103	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.1050	1.62		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
6.6	208	Total			

Subcatchment P-1A: Direct to Wetlands



Summary for Subcatchment P-1B: Parking Lot

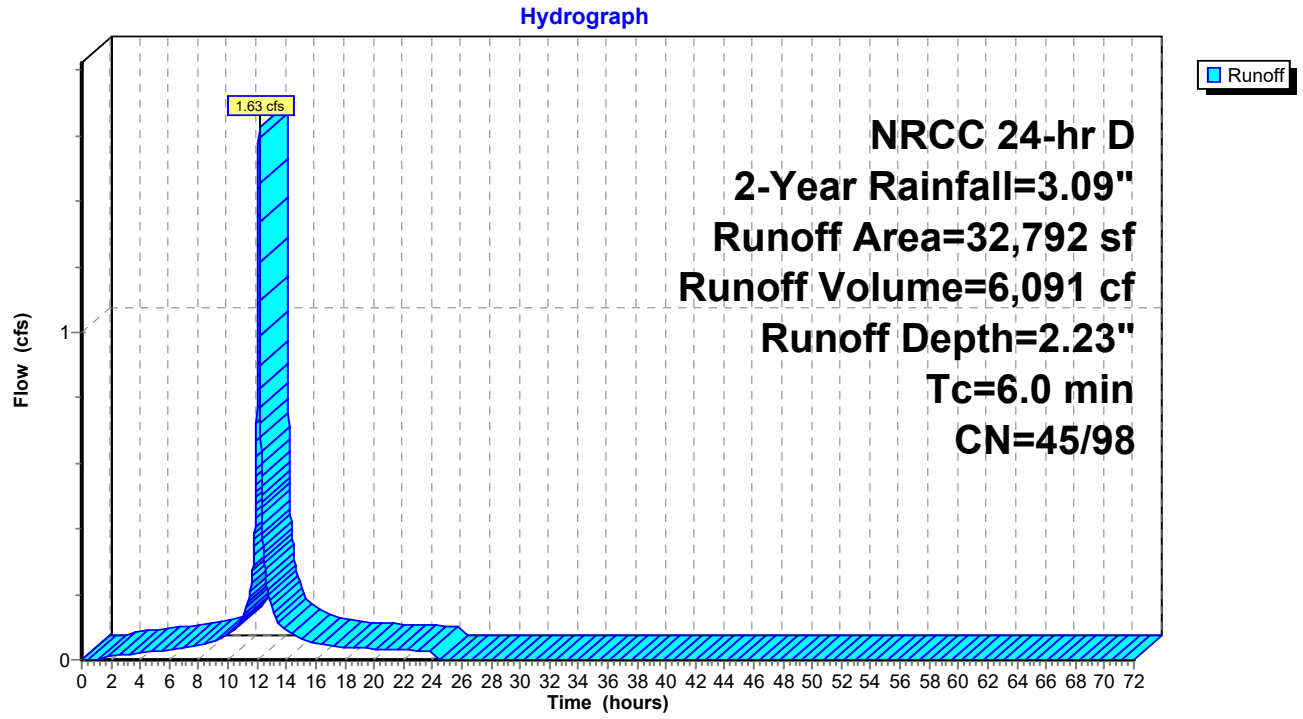
Runoff = 1.63 cfs @ 12.13 hrs, Volume= 6,091 cf, Depth= 2.23"
Routed to Pond B-1 : StormTech SC-800 Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 2-Year Rainfall=3.09"

	Area (sf)	CN	Description
*	25,492	98	Impervious
	270	80	>75% Grass cover, Good, HSG D
	854	74	>75% Grass cover, Good, HSG C
	6,176	39	>75% Grass cover, Good, HSG A
	32,792	86	Weighted Average
	7,300	45	22.26% Pervious Area
	25,492	98	77.74% Impervious Area

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

Subcatchment P-1B: Parking Lot



Summary for Pond B-1: StormTech SC-800 Subsurface Infiltration System

Inflow Area = 32,792 sf, 77.74% Impervious, Inflow Depth = 2.23" for 2-Year event
Inflow = 1.63 cfs @ 12.13 hrs, Volume= 6,091 cf
Outflow = 0.15 cfs @ 13.08 hrs, Volume= 6,091 cf, Atten= 91%, Lag= 57.0 min
Discarded = 0.08 cfs @ 13.08 hrs, Volume= 5,767 cf
Primary = 0.07 cfs @ 13.08 hrs, Volume= 323 cf
Routed to Link POI-1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 105.98' @ 13.08 hrs Surf.Area= 2,462 sf Storage= 2,441 cf

Plug-Flow detention time= 260.8 min calculated for 6,091 cf (100% of inflow)
Center-of-Mass det. time= 260.8 min (1,023.5 - 762.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	104.50'	2,340 cf	**30.00'W x 82.05'L x 3.75'H Field A** 9,231 cf Overall - 3,380 cf Embedded = 5,850 cf x 40.0% Voids
#2A	105.00'	3,380 cf	**ADS_StormTech SC-800 +Cap** x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,720 cf	Total Available Storage

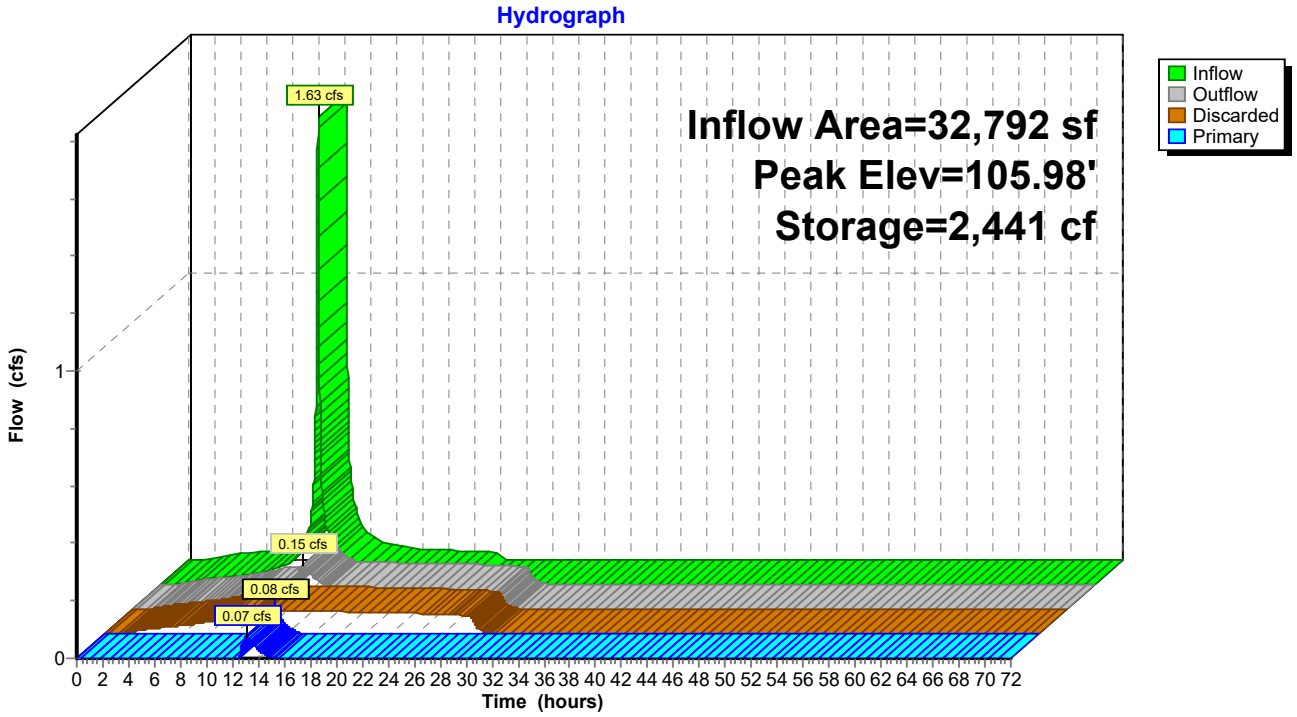
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	104.00'	**12.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 104.00' / 103.00' S= 0.0222 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	107.00'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.90'	**12.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.75'	**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
#5	Discarded	104.50'	**1.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 100.00' Phase-In= 0.10'

Discarded OutFlow Max=0.08 cfs @ 13.08 hrs HW=105.98' (Free Discharge)
└**5=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.07 cfs @ 13.08 hrs HW=105.98' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.07 cfs of 4.60 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  ├**3=Orifice/Grate** (Orifice Controls 0.07 cfs @ 0.90 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-1: StormTech SC-800 Subsurface Infiltration System

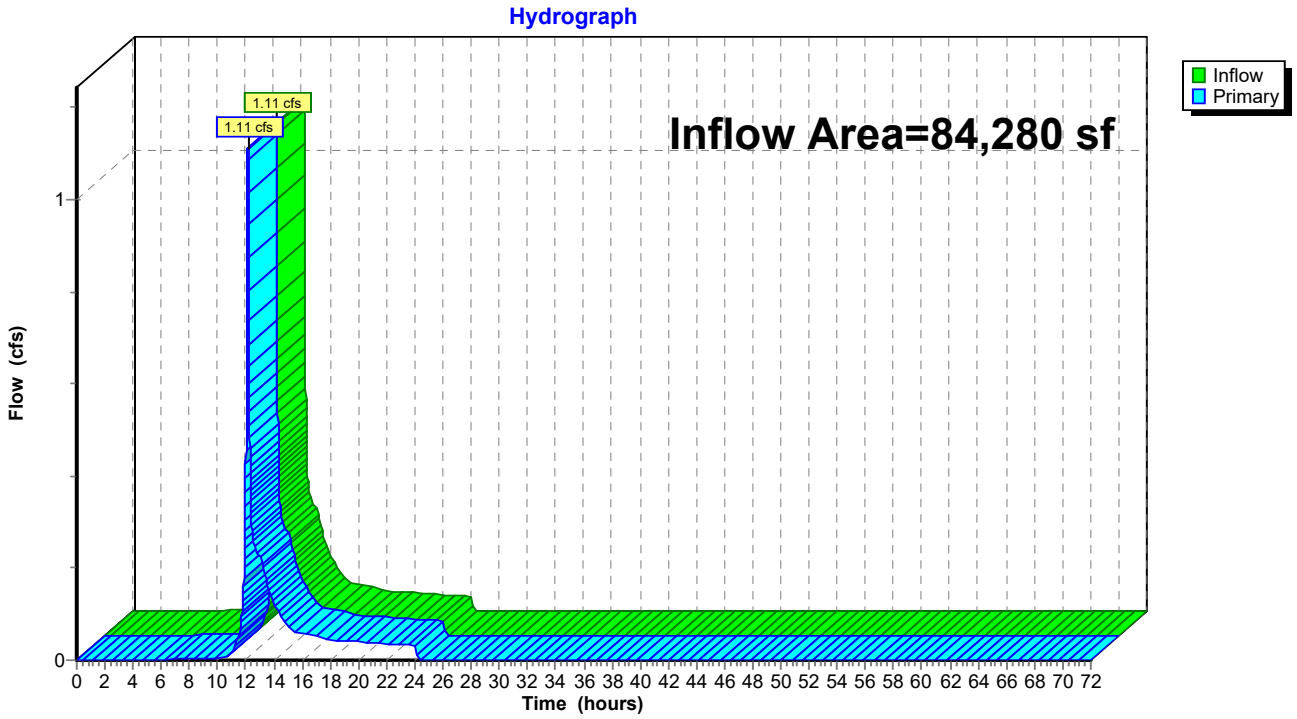


Summary for Link POI-1: Wetlands

Inflow Area = 84,280 sf, 31.80% Impervious, Inflow Depth = 0.60" for 2-Year event
Inflow = 1.11 cfs @ 12.14 hrs, Volume= 4,241 cf
Primary = 1.11 cfs @ 12.14 hrs, Volume= 4,241 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POI-1: Wetlands



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff to Wetlands Runoff Area=84,280 sf 13.70% Impervious Runoff Depth=2.02"
Flow Length=204' Tc=11.2 min CN=68/98 Runoff=3.34 cfs 14,155 cf

Subcatchment P-1A: Direct to Wetlands Runoff Area=51,488 sf 2.55% Impervious Runoff Depth=2.00"
Flow Length=208' Tc=6.6 min CN=72/98 Runoff=2.55 cfs 8,561 cf

Subcatchment P-1B: Parking Lot Runoff Area=32,792 sf 77.74% Impervious Runoff Depth=3.51"
Tc=6.0 min CN=45/98 Runoff=2.47 cfs 9,581 cf

Pond B-1: StormTech SC-800 Subsurface Peak Elev=106.43' Storage=3,283 cf Inflow=2.47 cfs 9,581 cf
Discarded=0.09 cfs 6,989 cf Primary=0.54 cfs 2,593 cf Outflow=0.62 cfs 9,581 cf

Link POI-1: Wetlands Inflow=2.89 cfs 11,154 cf
Primary=2.89 cfs 11,154 cf

Summary for Subcatchment EX-1: Runoff to Wetlands

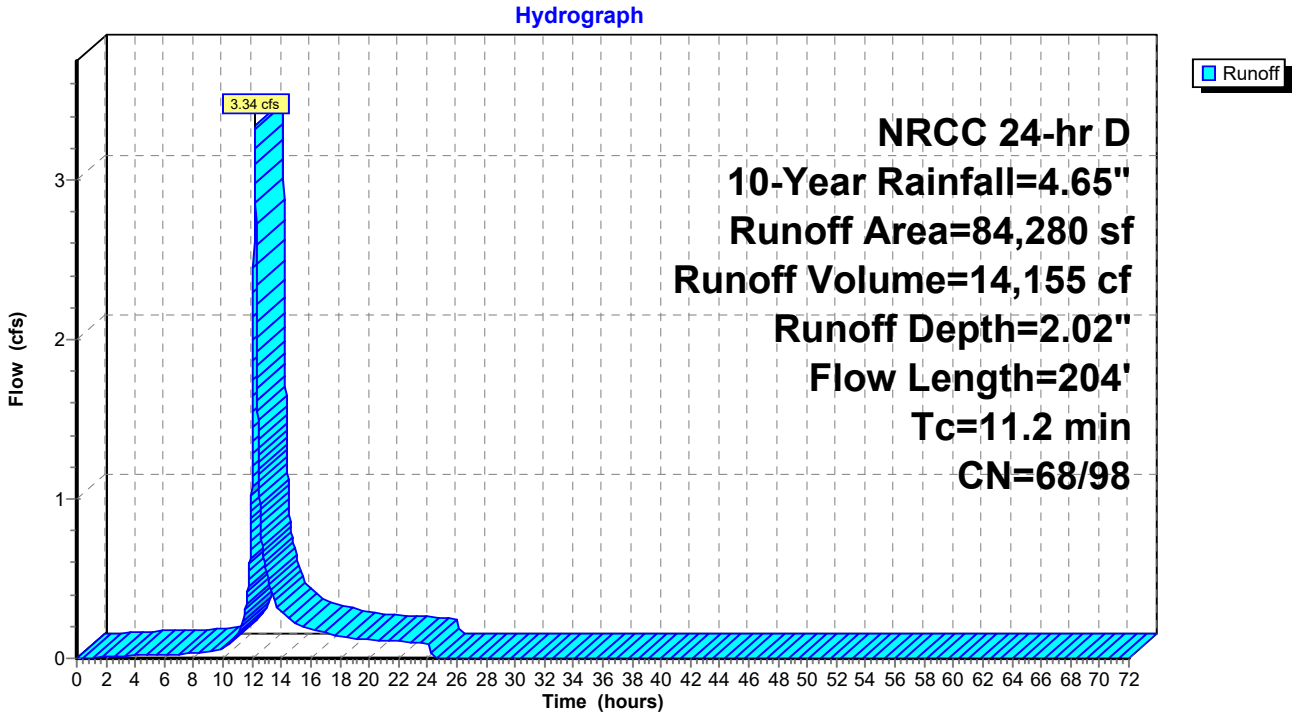
Runoff = 3.34 cfs @ 12.19 hrs, Volume= 14,155 cf, Depth= 2.02"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.65"

Area (sf)	CN	Description
11,547	98	Unconnected pavement, HSG D
7,989	30	Woods, Good, HSG A
44,941	77	Woods, Good, HSG D
5,755	80	>75% Grass cover, Good, HSG D
7,174	74	>75% Grass cover, Good, HSG C
6,874	39	>75% Grass cover, Good, HSG A
84,280	72	Weighted Average
72,733	68	86.30% Pervious Area
11,547	98	13.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	96	0.1200	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	63	0.0670	1.81		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	45	0.2000	2.24		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
11.2	204	Total			

Subcatchment EX-1: Runoff to Wetlands



Summary for Subcatchment P-1A: Direct to Wetlands

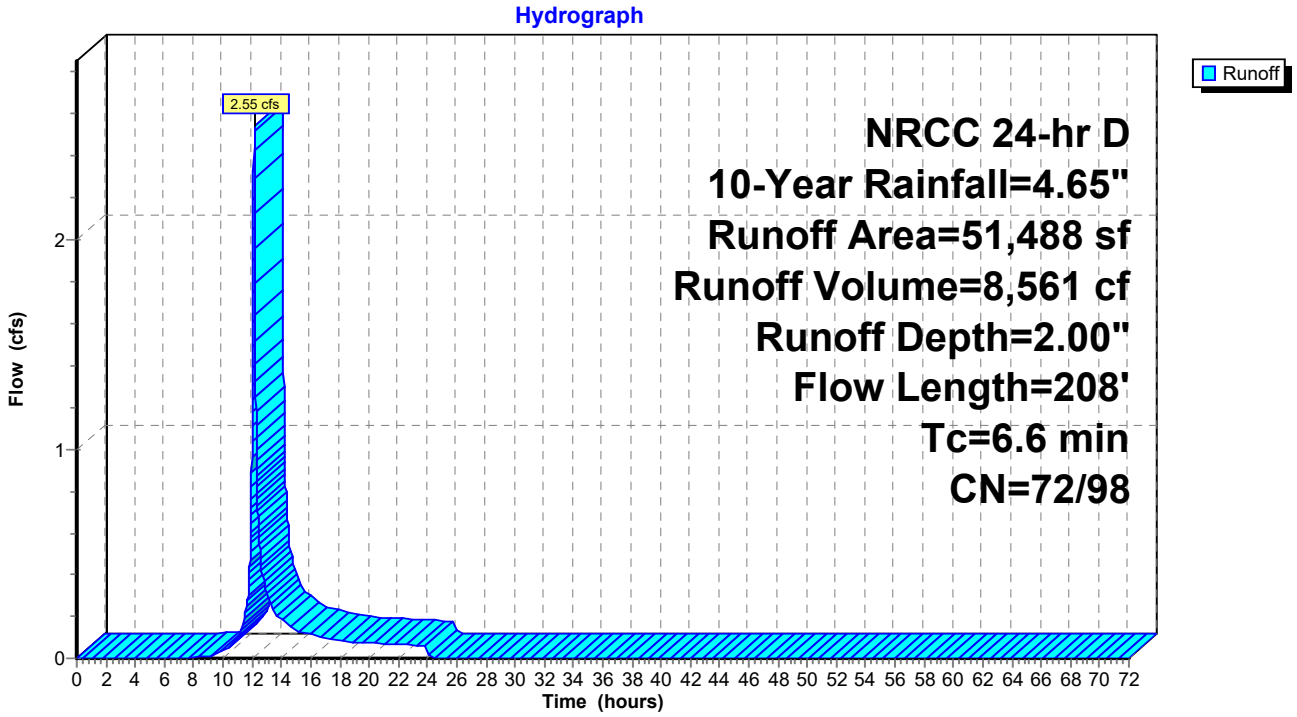
Runoff = 2.55 cfs @ 12.14 hrs, Volume= 8,561 cf, Depth= 2.00"
Routed to Link POI-1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.65"

	Area (sf)	CN	Description
*	1,313	98	Impervious
	6,792	39	>75% Grass cover, Good, HSG A
	2,880	74	>75% Grass cover, Good, HSG C
*	5,315	80	Turf Area, HSG D
	12,835	80	>75% Grass cover, Good, HSG D
	1,088	30	Woods, Good, HSG A
	21,265	77	Woods, Good, HSG D
	51,488	72	Weighted Average
	50,175	72	97.45% Pervious Area
	1,313	98	2.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	62	0.0887	0.28		**Sheet Flow, 1A-1B** Grass: Short n= 0.150 P2= 3.09"
2.5	103	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.1050	1.62		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
6.6	208	Total			

Subcatchment P-1A: Direct to Wetlands



Summary for Subcatchment P-1B: Parking Lot

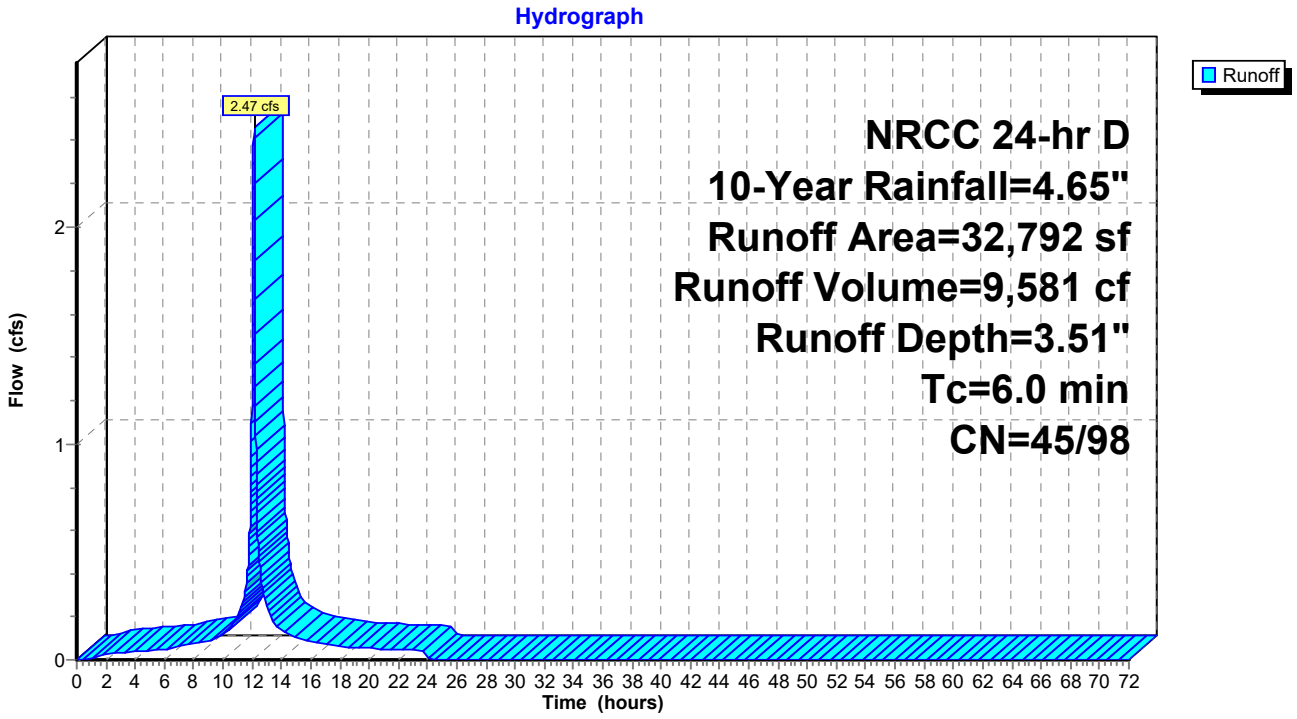
Runoff = 2.47 cfs @ 12.13 hrs, Volume= 9,581 cf, Depth= 3.51"
Routed to Pond B-1 : StormTech SC-800 Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 10-Year Rainfall=4.65"

	Area (sf)	CN	Description
*	25,492	98	Impervious
	270	80	>75% Grass cover, Good, HSG D
	854	74	>75% Grass cover, Good, HSG C
	6,176	39	>75% Grass cover, Good, HSG A
	32,792	86	Weighted Average
	7,300	45	22.26% Pervious Area
	25,492	98	77.74% Impervious Area

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

Subcatchment P-1B: Parking Lot



Summary for Pond B-1: StormTech SC-800 Subsurface Infiltration System

Inflow Area = 32,792 sf, 77.74% Impervious, Inflow Depth = 3.51" for 10-Year event
Inflow = 2.47 cfs @ 12.13 hrs, Volume= 9,581 cf
Outflow = 0.62 cfs @ 12.36 hrs, Volume= 9,581 cf, Atten= 75%, Lag= 13.8 min
Discarded = 0.09 cfs @ 12.36 hrs, Volume= 6,989 cf
Primary = 0.54 cfs @ 12.36 hrs, Volume= 2,593 cf
Routed to Link POI-1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 106.43' @ 12.36 hrs Surf.Area= 2,462 sf Storage= 3,283 cf

Plug-Flow detention time= 221.1 min calculated for 9,580 cf (100% of inflow)
Center-of-Mass det. time= 221.2 min (978.7 - 757.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	104.50'	2,340 cf	**30.00'W x 82.05'L x 3.75'H Field A** 9,231 cf Overall - 3,380 cf Embedded = 5,850 cf x 40.0% Voids
#2A	105.00'	3,380 cf	**ADS_StormTech SC-800 +Cap** x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,720 cf	Total Available Storage

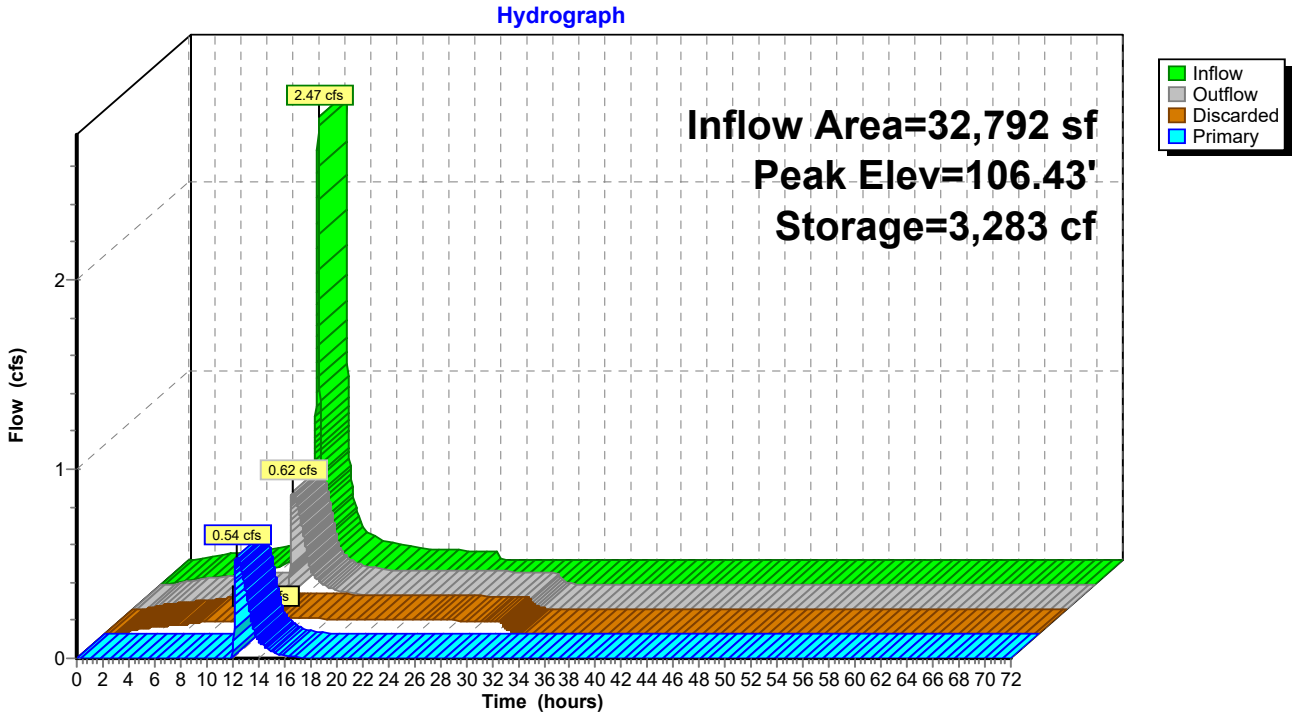
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	104.00'	**12.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 104.00' / 103.00' S= 0.0222 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	107.00'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.90'	**12.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.75'	**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
#5	Discarded	104.50'	**1.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 100.00' Phase-In= 0.10'

Discarded OutFlow Max=0.09 cfs @ 12.36 hrs HW=106.43' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=0.54 cfs @ 12.36 hrs HW=106.43' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.54 cfs of 5.26 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  ├**3=Orifice/Grate** (Orifice Controls 0.54 cfs @ 3.22 fps)
  └**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-1: StormTech SC-800 Subsurface Infiltration System

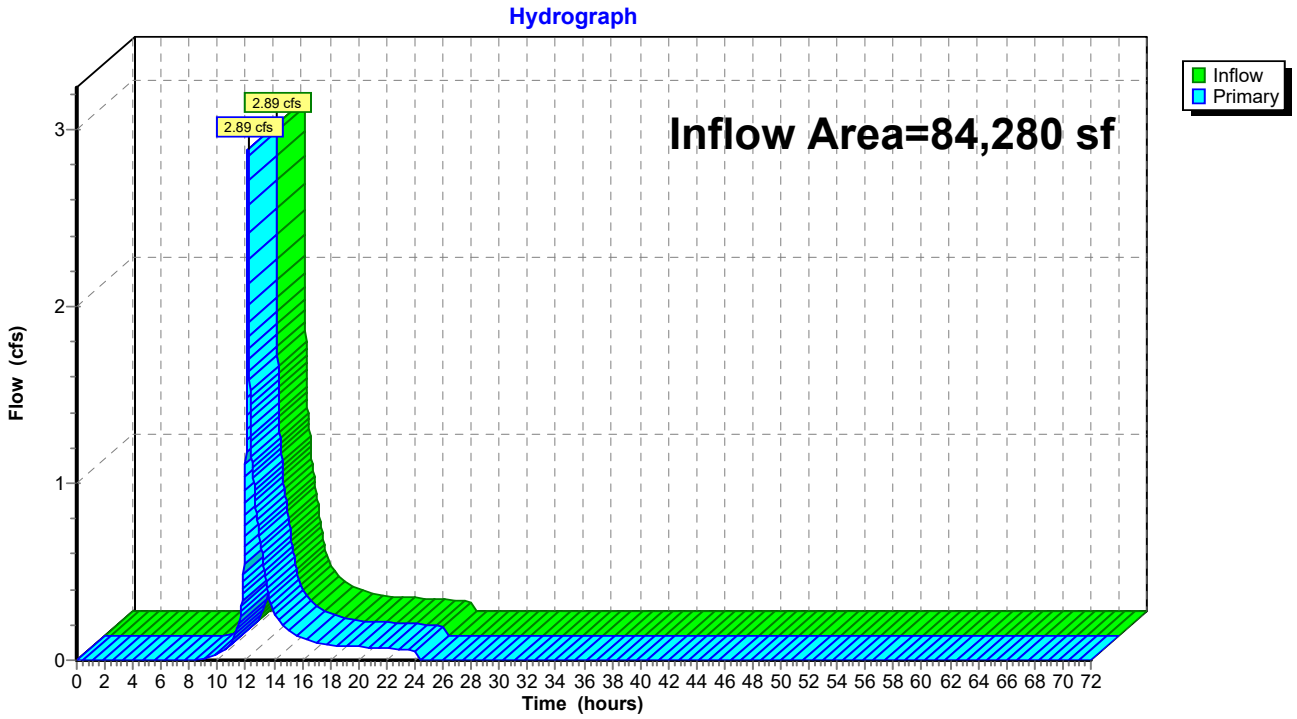


Summary for Link POI-1: Wetlands

Inflow Area = 84,280 sf, 31.80% Impervious, Inflow Depth = 1.59" for 10-Year event
Inflow = 2.89 cfs @ 12.15 hrs, Volume= 11,154 cf
Primary = 2.89 cfs @ 12.15 hrs, Volume= 11,154 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POI-1: Wetlands



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EX-1: Runoff to Wetlands Runoff Area=84,280 sf 13.70% Impervious Runoff Depth=5.03"
Flow Length=204' Tc=11.2 min CN=68/98 Runoff=8.59 cfs 35,327 cf

Subcatchment P-1A: Direct to Wetlands Runoff Area=51,488 sf 2.55% Impervious Runoff Depth=5.09"
Flow Length=208' Tc=6.6 min CN=72/98 Runoff=6.49 cfs 21,844 cf

Subcatchment P-1B: Parking Lot Runoff Area=32,792 sf 77.74% Impervious Runoff Depth=6.74"
Tc=6.0 min CN=45/98 Runoff=4.77 cfs 18,423 cf

Pond B-1: StormTech SC-800 Subsurface Peak Elev=107.94' Storage=5,413 cf Inflow=4.77 cfs 18,423 cf
Discarded=0.11 cfs 8,425 cf Primary=2.86 cfs 9,998 cf Outflow=2.97 cfs 18,423 cf

Link POI-1: Wetlands Inflow=7.91 cfs 31,842 cf
Primary=7.91 cfs 31,842 cf

Summary for Subcatchment EX-1: Runoff to Wetlands

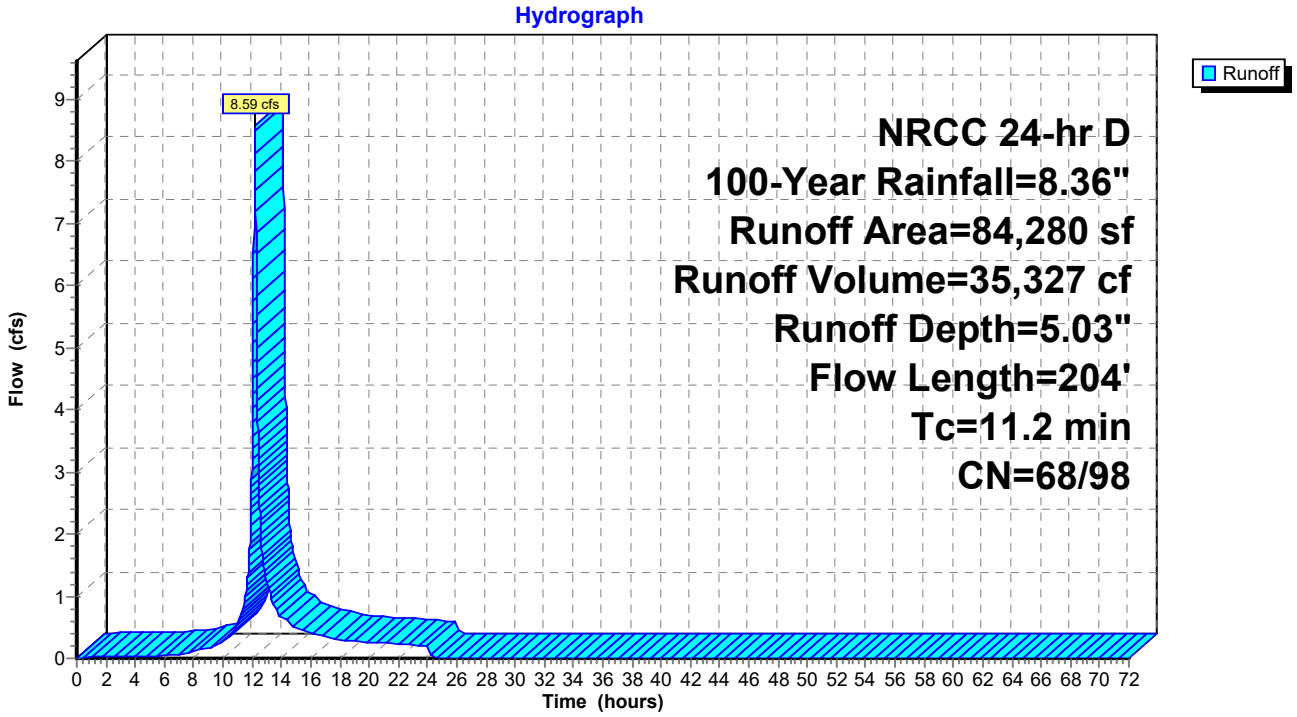
Runoff = 8.59 cfs @ 12.19 hrs, Volume= 35,327 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.36"

Area (sf)	CN	Description
11,547	98	Unconnected pavement, HSG D
7,989	30	Woods, Good, HSG A
44,941	77	Woods, Good, HSG D
5,755	80	>75% Grass cover, Good, HSG D
7,174	74	>75% Grass cover, Good, HSG C
6,874	39	>75% Grass cover, Good, HSG A
84,280	72	Weighted Average
72,733	68	86.30% Pervious Area
11,547	98	13.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	96	0.1200	0.15		**Sheet Flow, 1A-1B** Woods: Light underbrush n= 0.400 P2= 3.09"
0.6	63	0.0670	1.81		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.3	45	0.2000	2.24		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
11.2	204	Total			

Subcatchment EX-1: Runoff to Wetlands



Summary for Subcatchment P-1A: Direct to Wetlands

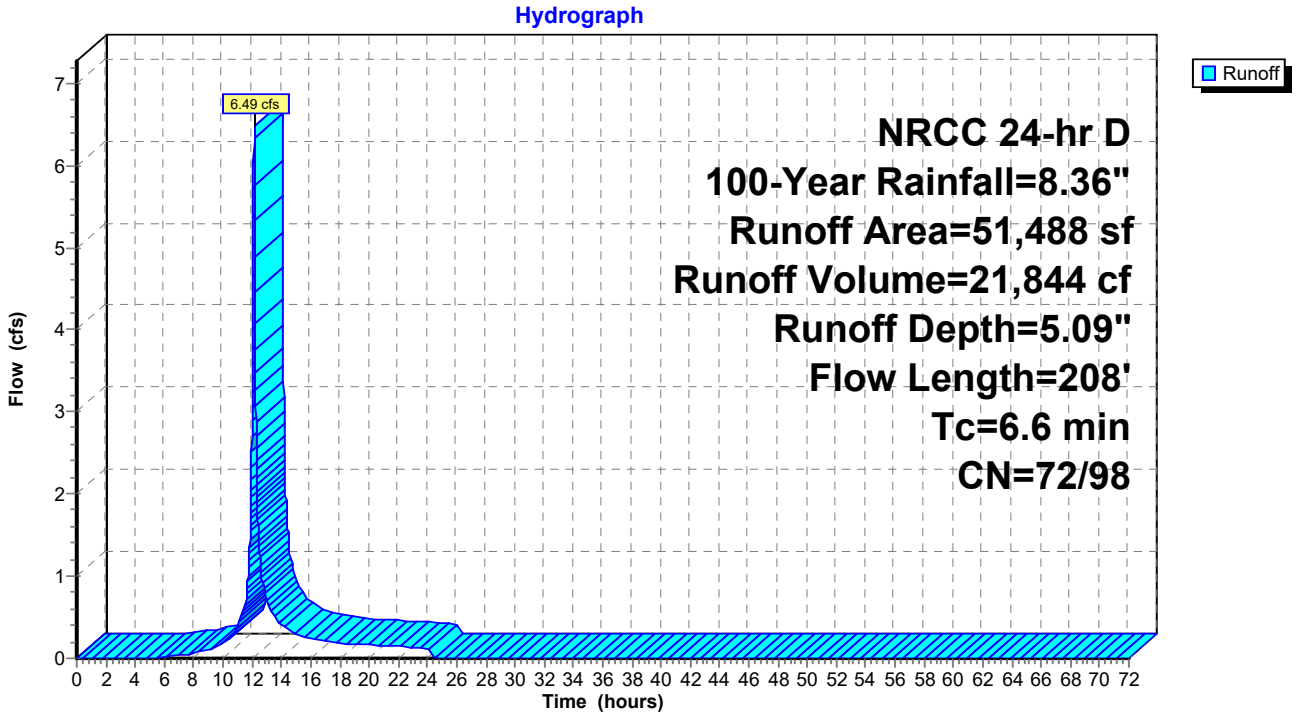
Runoff = 6.49 cfs @ 12.14 hrs, Volume= 21,844 cf, Depth= 5.09"
Routed to Link POI-1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.36"

	Area (sf)	CN	Description
*	1,313	98	Impervious
	6,792	39	>75% Grass cover, Good, HSG A
	2,880	74	>75% Grass cover, Good, HSG C
*	5,315	80	Turf Area, HSG D
	12,835	80	>75% Grass cover, Good, HSG D
	1,088	30	Woods, Good, HSG A
	21,265	77	Woods, Good, HSG D
	51,488	72	Weighted Average
	50,175	72	97.45% Pervious Area
	1,313	98	2.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	62	0.0887	0.28		**Sheet Flow, 1A-1B** Grass: Short n= 0.150 P2= 3.09"
2.5	103	0.0100	0.70		**Shallow Concentrated Flow, 1B-1C** Short Grass Pasture Kv= 7.0 fps
0.4	43	0.1050	1.62		**Shallow Concentrated Flow, 1C-1D** Woodland Kv= 5.0 fps
6.6	208	Total			

Subcatchment P-1A: Direct to Wetlands



Summary for Subcatchment P-1B: Parking Lot

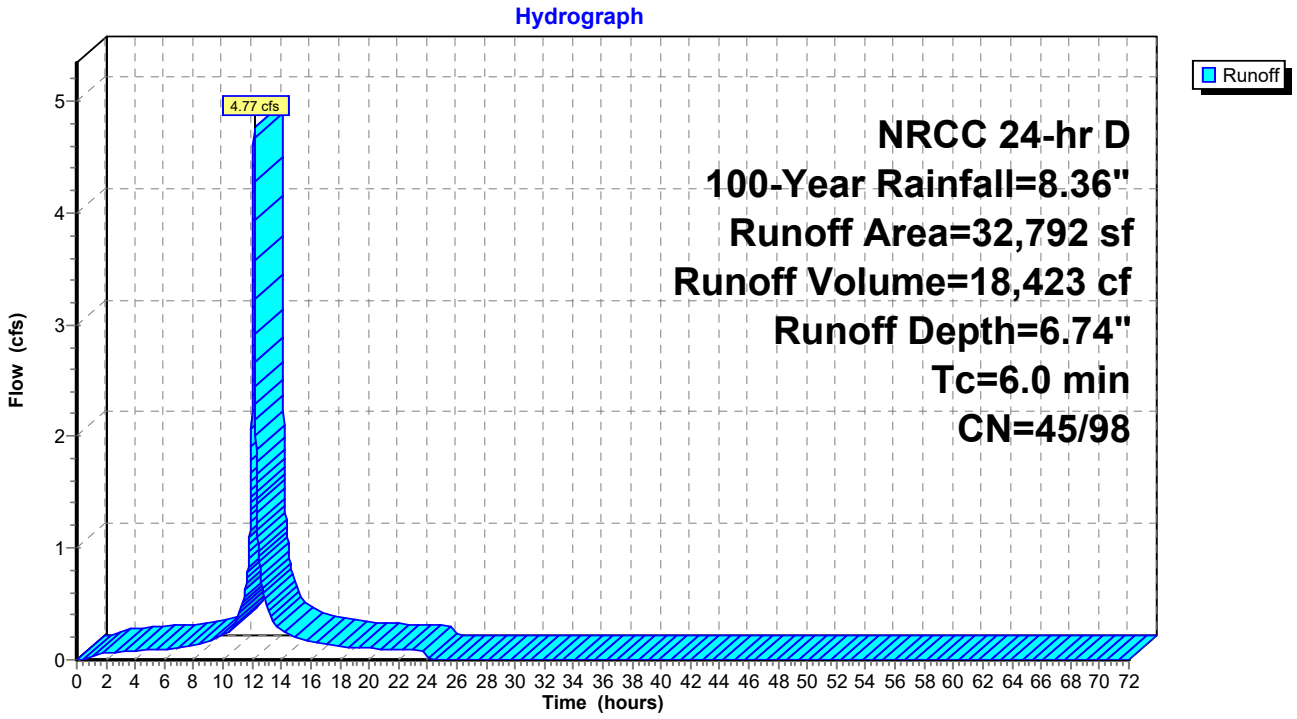
Runoff = 4.77 cfs @ 12.13 hrs, Volume= 18,423 cf, Depth= 6.74"
Routed to Pond B-1 : StormTech SC-800 Subsurface Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NRCC 24-hr D 100-Year Rainfall=8.36"

	Area (sf)	CN	Description
*	25,492	98	Impervious
	270	80	>75% Grass cover, Good, HSG D
	854	74	>75% Grass cover, Good, HSG C
	6,176	39	>75% Grass cover, Good, HSG A
	32,792	86	Weighted Average
	7,300	45	22.26% Pervious Area
	25,492	98	77.74% Impervious Area

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

Subcatchment P-1B: Parking Lot



Summary for Pond B-1: StormTech SC-800 Subsurface Infiltration System

Inflow Area = 32,792 sf, 77.74% Impervious, Inflow Depth = 6.74" for 100-Year event
Inflow = 4.77 cfs @ 12.13 hrs, Volume= 18,423 cf
Outflow = 2.97 cfs @ 12.20 hrs, Volume= 18,423 cf, Atten= 38%, Lag= 4.2 min
Discarded = 0.11 cfs @ 12.20 hrs, Volume= 8,425 cf
Primary = 2.86 cfs @ 12.20 hrs, Volume= 9,998 cf
Routed to Link POI-1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 107.94' @ 12.20 hrs Surf.Area= 2,462 sf Storage= 5,413 cf

Plug-Flow detention time= 166.8 min calculated for 18,421 cf (100% of inflow)
Center-of-Mass det. time= 166.9 min (920.3 - 753.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	104.50'	2,340 cf	**30.00'W x 82.05'L x 3.75'H Field A** 9,231 cf Overall - 3,380 cf Embedded = 5,850 cf x 40.0% Voids
#2A	105.00'	3,380 cf	**ADS_StormTech SC-800 +Cap** x 66 Inside #1 Effective Size= 45.0"W x 33.0"H => 7.11 sf x 7.12'L = 50.6 cf Overall Size= 51.0"W x 33.0"H x 7.55'L with 0.43' Overlap 66 Chambers in 6 Rows Cap Storage= 3.4 cf x 2 x 6 rows = 41.0 cf
		5,720 cf	Total Available Storage

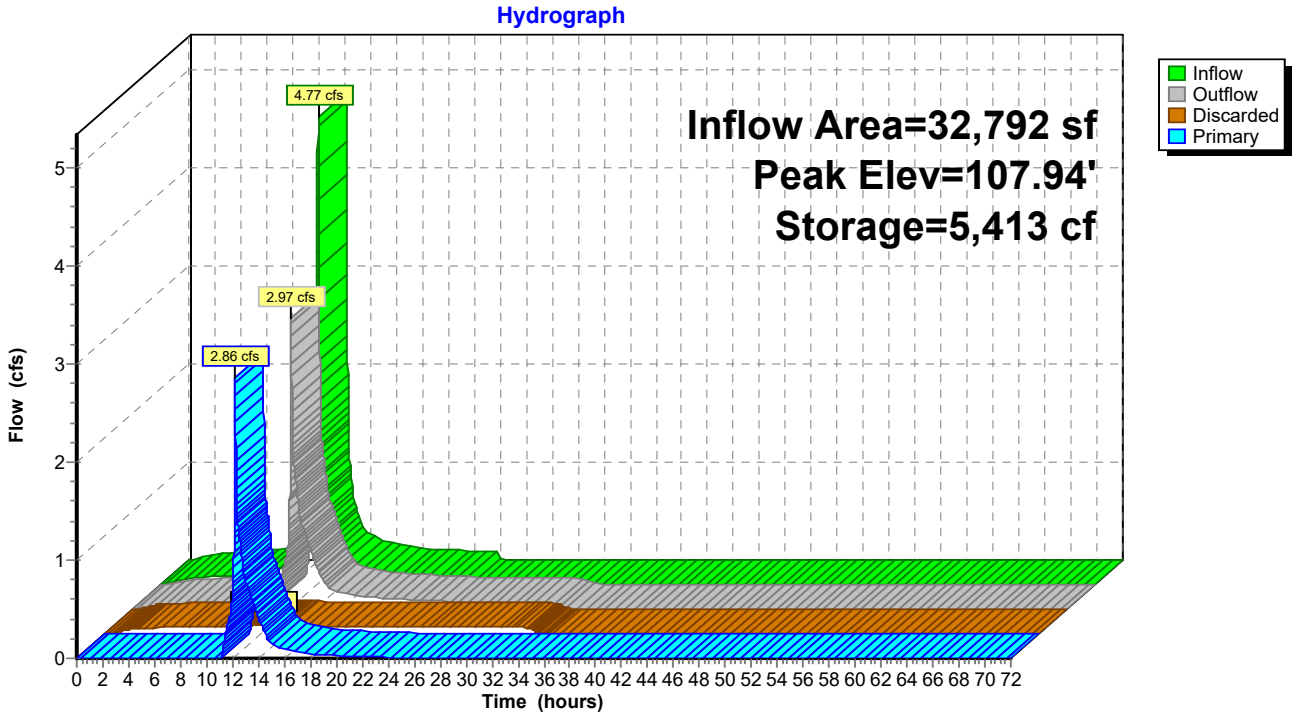
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	104.00'	**12.0" Round Culvert** L= 45.0' Ke= 0.500 Inlet / Outlet Invert= 104.00' / 103.00' S= 0.0222 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	107.00'	**6.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	105.90'	**12.0" W x 2.0" H Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	107.75'	**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
#5	Discarded	104.50'	**1.050 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 100.00' Phase-In= 0.10'

Discarded OutFlow Max=0.11 cfs @ 12.20 hrs HW=107.94' (Free Discharge)
└**5=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=2.86 cfs @ 12.20 hrs HW=107.94' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.86 cfs of 7.01 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 4.45 fps)
  ├**3=Orifice/Grate** (Orifice Controls 1.12 cfs @ 6.73 fps)
  └**4=Broad-Crested Rectangular Weir** (Weir Controls 1.37 cfs @ 1.21 fps)

Pond B-1: StormTech SC-800 Subsurface Infiltration System

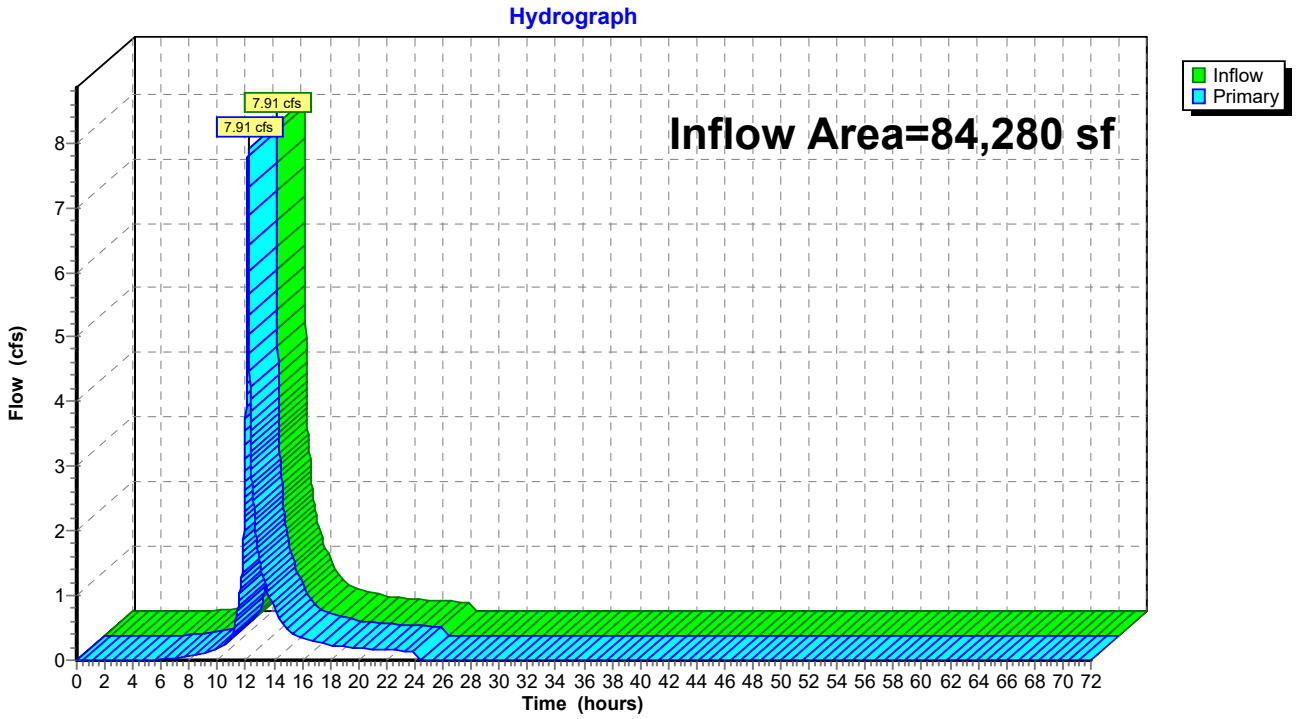


Summary for Link POI-1: Wetlands

Inflow Area = 84,280 sf, 31.80% Impervious, Inflow Depth = 4.53" for 100-Year event
Inflow = 7.91 cfs @ 12.18 hrs, Volume= 31,842 cf
Primary = 7.91 cfs @ 12.18 hrs, Volume= 31,842 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link POI-1: Wetlands



APPENDIX C-4
INFILTRATION BASIN STAGE-STORAGE TABLES

Stage-Area-Storage for Pond B-1: StormTech SC-800 Subsurface Infiltration System

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
104.50	**2,462**	0
104.70	2,462	197
104.90	2,462	394
105.10	2,462	697
105.30	2,462	1,104
105.50	2,462	1,506
105.70	2,462	1,901
105.90	2,462	2,290
106.10	2,462	2,670
106.30	2,462	3,042
106.50	2,462	3,403
106.70	2,462	3,752
106.90	2,462	4,087
107.10	2,462	4,404
107.30	2,462	4,699
107.50	2,462	4,959
107.70	2,462	5,178
107.90	2,462	5,376
108.10	2,462	**5,573**

APPENDIX C-5
INFILTRATION BASIN STAGE-DISCHARGE TABLES

Stage-Discharge for Pond B-1: StormTech SC-800 Subsurface Infiltration System

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
104.50	0.00	0.00	0.00
104.70	0.06	0.06	0.00
104.90	0.07	0.07	0.00
105.10	0.07	0.07	0.00
105.30	0.07	0.07	0.00
105.50	0.07	0.07	0.00
105.70	0.08	0.08	0.00
105.90	0.08	0.08	0.00
106.10	0.35	0.08	0.27
106.30	0.53	0.08	0.45
106.50	0.66	0.09	0.58
106.70	0.77	0.09	0.68
106.90	0.86	0.09	0.77
107.10	0.99	0.09	0.90
107.30	1.20	0.10	1.11
107.50	1.35	0.10	1.25
107.70	1.47	0.10	1.37
107.90	2.55	0.11	2.45
108.10	**5.27**	**0.11**	**5.16**

APPENDIX D
SITE PLAN SHEETS

INVENTORY

FIGURE 1: SITE PLAN

FIGURE 2: STORMWATER MANAGEMENT PLAN

FIGURE 3: LANDSCAPING PLAN

FIGURE 4: SOIL EROSION & SEDIMENT CONTROL PLAN

LAND USE AND ZONING

PARCEL ID: 028.0-0000-0133.0

SINGLE FAMILY 15 DISTRICT (S-15)

PROPOSED USE

CHILD CARE FACILITY — PERMITTED USE

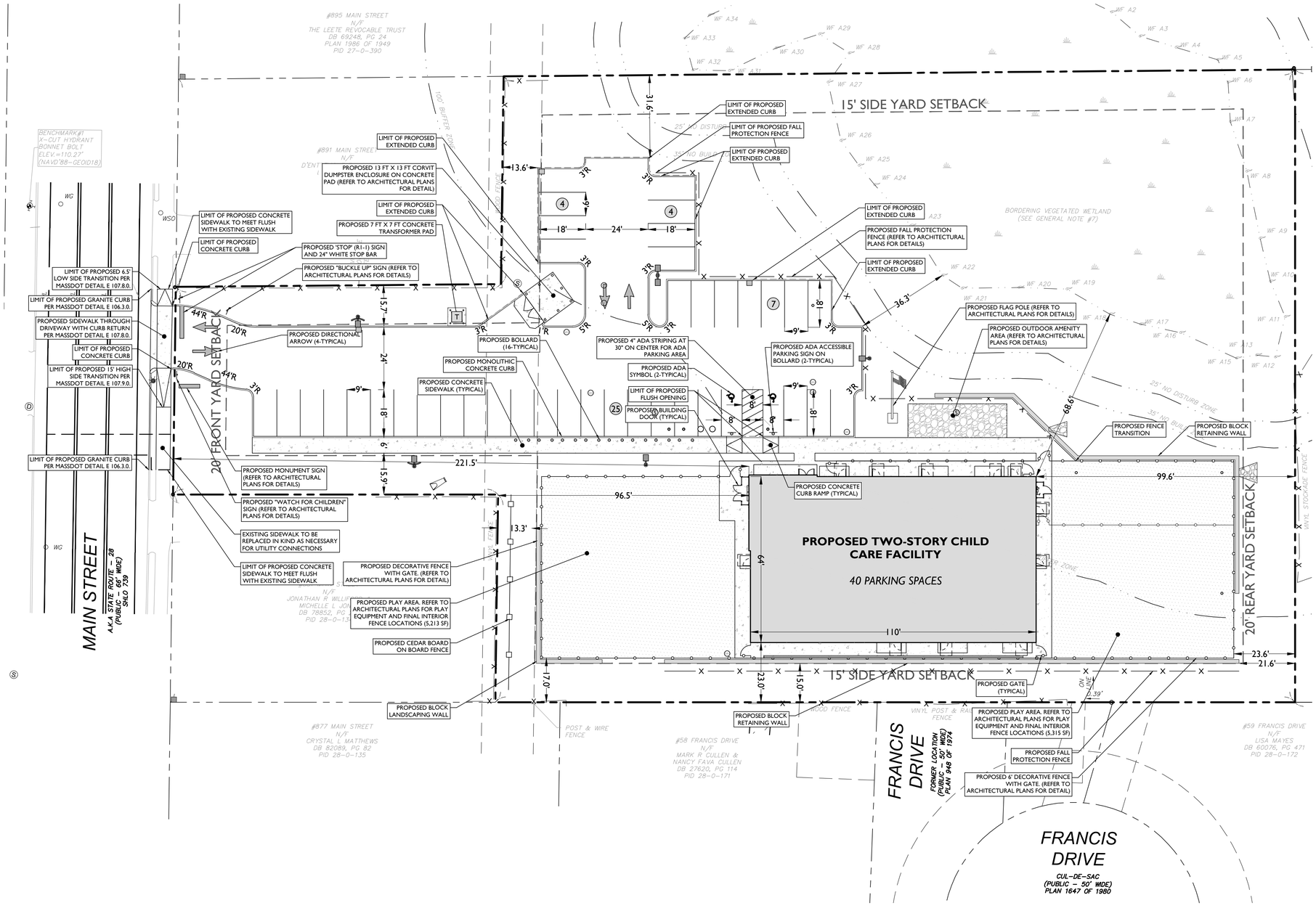
ZONING REQUIREMENT	REQUIRED	EXISTING	PROPOSED
MINIMUM LOT AREA	15,000 SF (0.34 AC)	84,280 SF (1.94 AC)	NO CHANGE
MINIMUM LOT AREA OUTSIDE OF WETLAND RESOURCE AREA	12,000 SF	71,063 SF	NO CHANGE
MINIMUM LOT FRONTAGE	100 FT	80 FT (EN)	NO CHANGE
MINIMUM FRONT YARD	20 FT	169.5 FT	221.5 FT
MINIMUM SIDE YARD	15 FT	42.2 FT	23.0 FT
MINIMUM REAR YARD	20 FT	208.2 FT	99.6 FT
MAXIMUM LOT COVERAGE	25% (21,070 SF)	3.9% (3,320 SF)	8.4% (7,064 SF)
MAXIMUM BUILDING HEIGHT	35 FT	<35 FT	<35 FT

(EN) EXISTING NON-CONFORMITY

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 9.1.1.7	REQUIRED PARKING FOR NURSERY/ KINDERGARTEN / ELEMENTARY: 1 SPACE / EMPLOYEE + 1 SPACE / 7 STUDENTS 1 SPACE / EMPLOYEE * (26 EMPLOYEES) + 1 SPACE / 7 STUDENTS * (177 STUDENTS) = **52 SPACES**	40 SPACES (V)
§ 9.1.2.2	PARKING SPACE DIMENSIONS: 9 FT X 18 FT	9 FT X 18 FT

(V) VARIANCE



SYMBOL / DESCRIPTION

- PROPERTY LINE
- SETBACK LINE
- SAWCUT LINE
- PROPOSED CURB
- PROPOSED FLUSH OPENING
- PROPOSED EXTENDED CURB
- PROPOSED SIGNS / BOLLARDS
- PROPOSED BUILDING
- PROPOSED CONCRETE
- PROPOSED TURF
- PROPOSED GRAVEL
- PROPOSED AREA LIGHT
- PROPOSED RETAINING WALL
- PROPOSED HANDRAIL
- PROPOSED FALL PROTECTION FENCE
- PROPOSED CEDAR BOARD-ON-BOARD FENCE
- PROPOSED BUILDING DOORS
- WF AXX — WETLAND LIMITS
- WETLAND BUFFER

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

20' 0' 20' 40'
GRAPHIC SCALE IN FEET
1" = 20'

NO	DATE	BY	DESCRIPTION
00	03/07/2025	AJD	ISSUED FOR MUNICIPAL SUBMISSION

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Rutherford, NJ · New York, NY · Salem, MA · Providence, RI
Princeton, NJ · Tampa, FL · Birmingham, MI
www.stonefieldeng.com
56 Pine Street, Providence, RI 02903
Phone 617.203.2076

LAND DEVELOPMENT PLANS

PRIMROSE SCHOOLS FRANCHISING COMPANY

PROPOSED CHILD DAY CARE FACILITY

PARCEL ID: 28-4-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 20' | PROJECT ID: BOS-240115

TITLE: SITE PLAN

DRAWING: C-4

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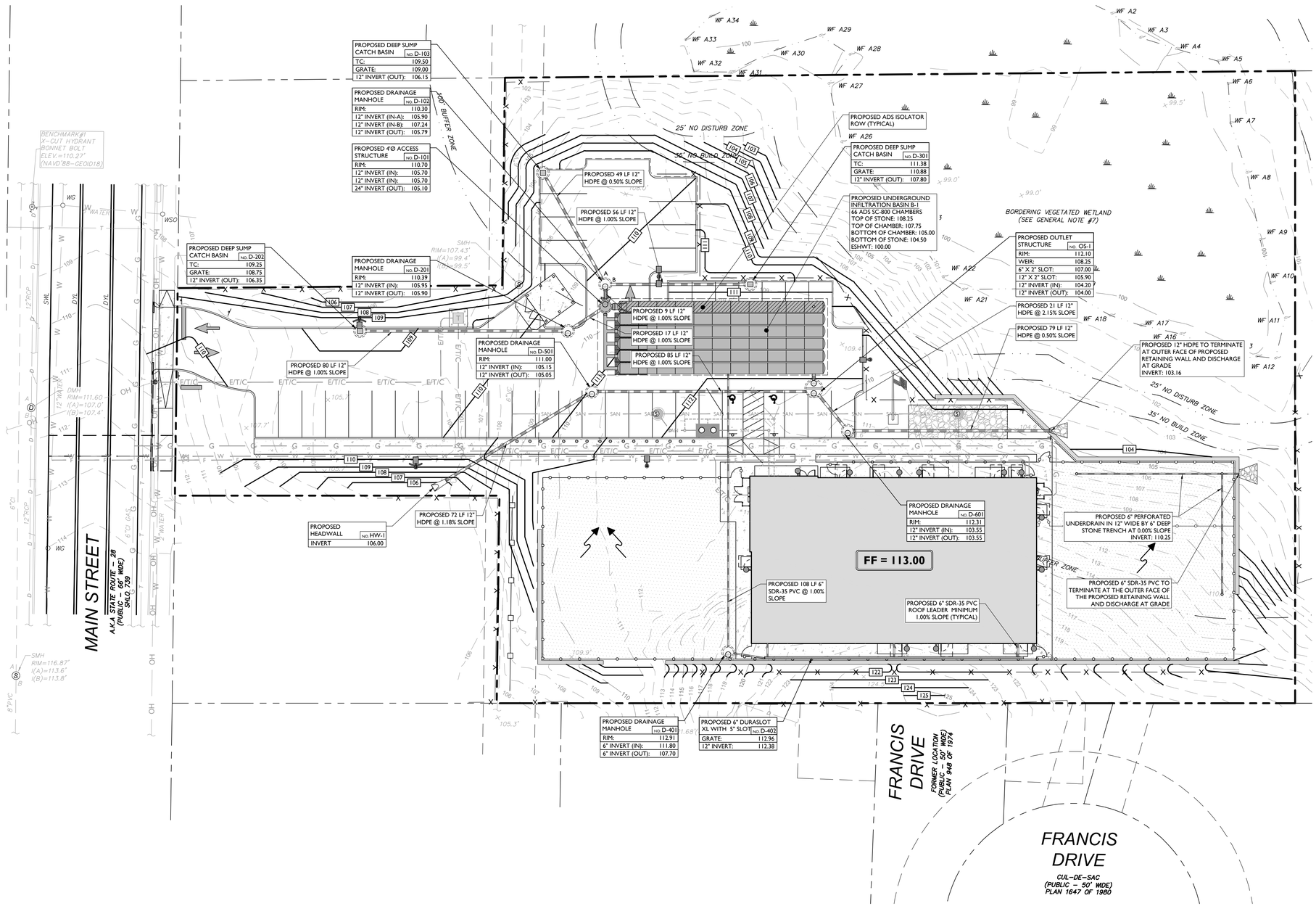

SYMBOL / DESCRIPTION

SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED STORMWATER STRUCTURES
	PROPOSED TRENCH DRAIN
	PROPOSED STORMWATER PIPING
	PROPOSED UNDERGROUND OUTLET STRUCTURE

DRAINAGE AND UTILITY NOTES

1. THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR STORMWATER IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING.
2. CONTRACTOR SHALL START CONSTRUCTION OF STORM LINES AT THE LOWEST INVERT AND WORK UP-GRADIENT.
3. THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IMMEDIATELY IN WRITING.
4. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.

EXCAVATION, SOIL PREPARATION, AND DEWATERING NOTES

1. THE CONTRACTOR IS REQUIRED TO REVIEW THE REFERENCED GEOTECHNICAL DOCUMENTS PRIOR TO CONSTRUCTION. THESE DOCUMENTS SHALL BE CONSIDERED A PART OF THE PLAN SET.
2. THE CONTRACTOR IS REQUIRED TO PREPARE SUBGRADE SOILS BENEATH ALL PROPOSED IMPROVEMENTS AND BACKFILL ALL EXCAVATIONS IN ACCORDANCE WITH RECOMMENDATIONS BY THE GEOTECHNICAL ENGINEER OF RECORD.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHORING FOR ALL EXCAVATIONS AS REQUIRED. CONTRACTOR SHALL HAVE THE SHORING DESIGN PREPARED BY A QUALIFIED PROFESSIONAL. SHORING DESIGNS SHALL BE SUBMITTED TO STONEFIELD ENGINEERING & DESIGN, LLC. AND THE OWNER PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL OPEN EXCAVATIONS ARE PERFORMED AND PROTECTED IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS.
5. THE CONTRACTOR IS RESPONSIBLE FOR ANY DEWATERING DESIGN AND OPERATIONS, AS REQUIRED, TO CONSTRUCT THE PROPOSED IMPROVEMENTS. THE CONTRACTOR SHALL OBTAIN ANY REQUIRED PERMITS FOR DEWATERING OPERATIONS AND GROUNDWATER DISPOSAL.

STORMWATER INFILTRATION BMP CONSTRUCTION NOTES

1. PRIOR TO THE START OF CONSTRUCTION, ANY AREA DESIGNATED TO BE USED FOR AN INFILTRATION BMP (E.G. BASIN, BIORETENTION AREA, ETC.) SHALL BE FENCED OFF AND SHALL NOT BE UTILIZED AS STORAGE FOR CONSTRUCTION EQUIPMENT OR AS A STOCKPILE AREA FOR CONSTRUCTION MATERIALS. NO ACTIVITY SHALL BE PERMITTED WITHIN THE INFILTRATION BASIN AREA UNLESS RELATED TO THE CONSTRUCTION OF THE INFILTRATION BASIN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY ALL SUBCONTRACTORS OF BASIN AREA RESTRICTIONS.
2. THE CONTRACTOR SHALL MAKE EVERY EFFORT, WHERE PRACTICAL, TO AVOID SUBGRADE SOIL COMPACTION IN THE AREAS DESIGNATED TO BE USED FOR AN INFILTRATION BMP.
3. ALL EXCAVATION WITHIN THE LIMITS OF ANY INFILTRATION BMP SHALL BE PERFORMED WITH THE LIGHTEST PRACTICAL EXCAVATION EQUIPMENT. ALL EXCAVATION EQUIPMENT SHALL BE PLACED OUTSIDE THE LIMITS OF THE BASIN WHERE FEASIBLE. THE USE OF LIGHT-WEIGHT, RUBBER-TIRED EQUIPMENT (LESS THAN 8 PSI APPLIED TO THE GROUND SURFACE) IS RECOMMENDED WITHIN THE BASIN LIMITS.
4. THE SEQUENCE OF SITE CONSTRUCTION SHALL BE COORDINATED WITH BASIN CONSTRUCTION TO ADHERE TO SEQUENCING LIMITATIONS.
5. DURING THE FINAL GRADING OF AN INFILTRATION BASIN, THE BOTTOM OF THE BASIN SHALL BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW AND THEN SMOOTHED OUT WITH A LEVELING DRAW OR EQUIVALENT GRADING EQUIPMENT. ALL GRADING EQUIPMENT SHALL BE LOCATED OUTSIDE OF THE BASIN BOTTOM WHERE FEASIBLE.
6. FOLLOWING CONSTRUCTION OF AN INFILTRATION BASIN, SOIL INFILTRATION TESTING BY A LICENSED GEOTECHNICAL ENGINEER IS REQUIRED TO CERTIFY COMPLIANCE WITH THE DESIGN INFILTRATION RATES IN ACCORDANCE WITH APPENDIX E OF THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S BEST MANAGEMENT PRACTICES MANUAL, LATEST EDITION. IF THE FIELD INFILTRATION RATES ARE LOWER THAN THE RATE USED DURING DESIGN, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING IMMEDIATELY TO DETERMINE THE APPROPRIATE COURSE OF ACTION.
7. THE CONTRACTOR SHALL NOTIFY THE MUNICIPALITY TO DETERMINE IF WITNESS TESTING IS REQUIRED DURING INFILTRATION BASIN EXCAVATION AND/OR SOIL INFILTRATION TESTING.

STORMWATER UNDERGROUND BMP CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL INSTALL AND BACKFILL THE UNDERGROUND BMP IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. UNDERGROUND BASINS SHALL UTILIZE A STONE BACKFILL WITH A MINIMUM VOID RATIO OF 40%.
3. NO CONSTRUCTION LOADING OVER UNDERGROUND BASINS IS PERMITTED UNTIL BACKFILL IS COMPLETE PER THE MANUFACTURER'S SPECIFICATIONS. NO VEHICLES SHALL BE STAGED OR OPERATE FROM A FIXED POSITION OVER THE BASIN.

20' 0' 20' 40'
GRAPHIC SCALE IN FEET
1" = 20'

NO	DATE	BY	DESCRIPTION
00	03/07/2025	AJD	ISSUED FOR MUNICIPAL SUBMISSION

NOT APPROVED FOR CONSTRUCTION

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Princeton, NJ · Tampa, FL · Birmingham, MI
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LAND DEVELOPMENT PLANS

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JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 20' | PROJECT ID: BOS-240115

TITLE: STORMWATER MANAGEMENT PLAN

DRAWING: C-6

Z:\BOS\TOWN\BOS\240115\PRIMROSE SCHOOLS - 885 MAIN STREET, READING, MA\CAD\PLOT\XXX-ALT.PMP.DWG

STABILIZATION SPECIFICATIONS:

I.A. TEMPORARY SEEDING AND MULCHING:
GROUND LIMESTONE - APPLIED UNIFORMLY ACCORDING TO SOIL TEST RECOMMENDATIONS.
FERTILIZER - APPLY 11LBS./1,000 SF OF 10-20-10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN (UNLESS A SOIL TEST INDICATES OTHERWISE) WORKED INTO THE SOIL A MINIMUM OF 4".
SEED - PERENNIAL RYEGRASS 100 LBS/ACRE (2.3 LBS./1,000 SF) OR OTHER APPROVED SEEDS; PLANT BETWEEN MARCH 1 AND MAY 15 OR BETWEEN AUGUST 15 AND OCTOBER 1.
MULCH - UNROTTED STRAW OR HAY AT A RATE OF 70 TO 90 LBS./1,000 SF APPLIED TO ACHIEVE 95% SOIL SURFACE COVERAGE. MULCH SHALL BE ANCHORED BY APPROVED METHODS (I.E. PEG AND TWINE, MULCH NETTING, OR LIQUID MULCH BINDER).

I.B. PERMANENT SEEDING AND MULCHING:
TOPSOIL - UNIFORM APPLICATION TO A DEPTH OF 5" (UNSETTLED).
GROUND LIMESTONE - APPLIED UNIFORMLY ACCORDING TO SOIL TEST RECOMMENDATIONS.
FERTILIZER - APPLY 11 LBS./1,000 SF OF 10-10-10 OR EQUIVALENT WITH 50% WATER INSOLUBLE NITROGEN (UNLESS A SOIL TEST INDICATES OTHERWISE) WORKED INTO THE SOIL A MINIMUM OF 4".
SEED - TURF TYPE TALL FESCUE (BLEND OF 3 CULTIVARS) 350 LBS./ACRE (8 LBS./1,000 SF) OR OTHER APPROVED SEEDS; PLANT BETWEEN MARCH 1 AND OCTOBER 1 (SUMMER SEEDINGS REQUIRE IRRIGATION)
MULCH - UNROTTED STRAW OR HAY AT A RATE OF 70 TO 90 LBS./1,000 SF APPLIED TO ACHIEVE 95% SOIL SURFACE COVERAGE. MULCH SHALL BE ANCHORED BY APPROVED METHODS (I.E. PEG AND TWINE, MULCH NETTING, OR LIQUID MULCH BINDER).

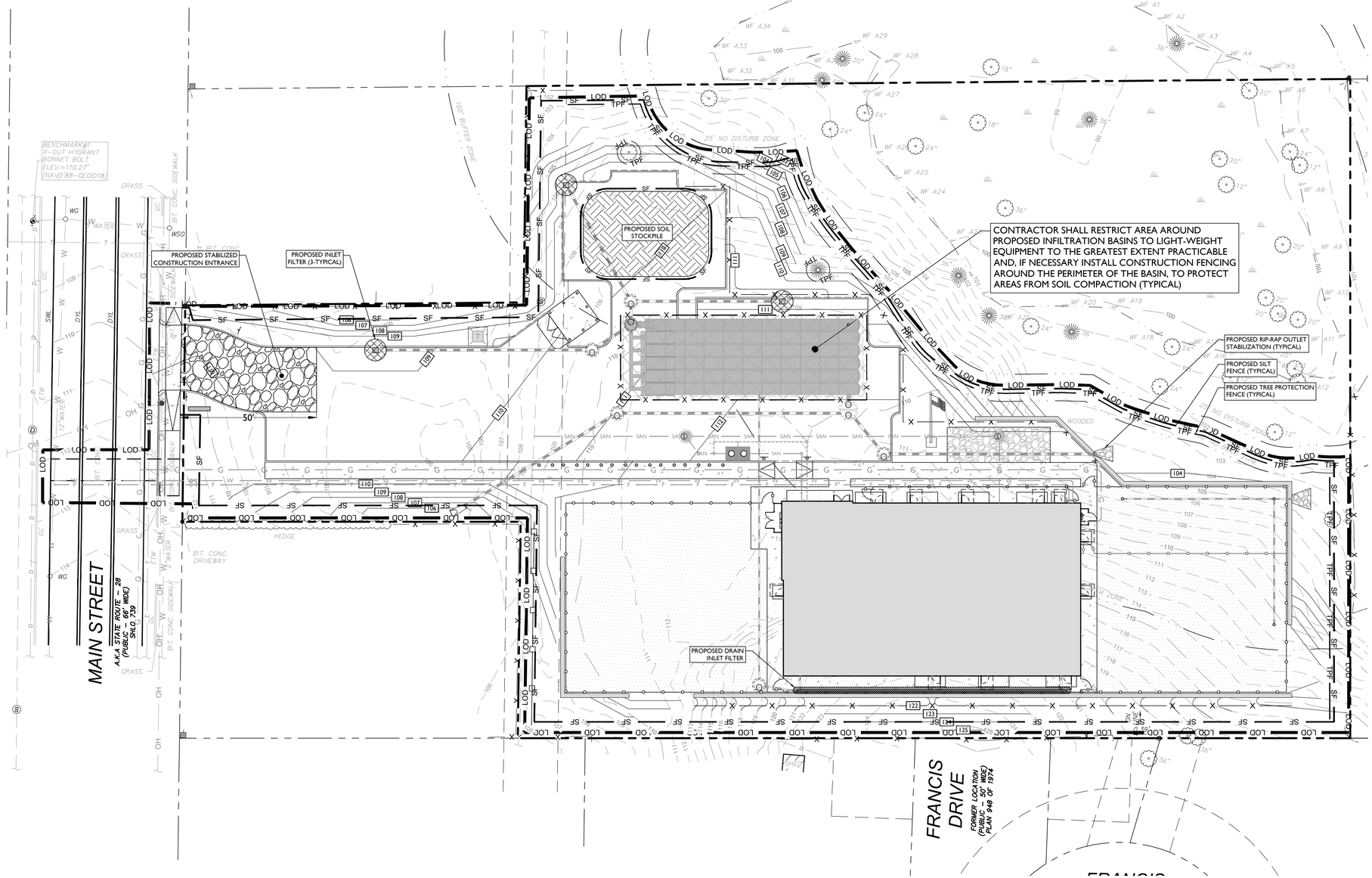
DUST CONTROL NOTES

1. MULCHES - SEE STANDARD OF STABILIZATION WITH MULCHES ONLY, PG. 5-1
2. VEGETATIVE COVER - SEE STANDARD FOR: TEMPORARY VEGETATIVE COVER, PG. 7-1, PERMANENT VEGETATIVE COVER FOR SOIL STABILIZATION PG. 4-1 AND PERMANENT STABILIZATION WITH SOD, PG. 6-1
3. SPRAY-ON ADHESIVES - ON MINERAL SOILS (NOT EFFECTIVE ON MUCK SOILS). KEEP TRAFFIC OFF THESE AREAS.
4. TILLAGE - TO ROUGHEN SURFACE AND BRING CLODS TO THE SURFACE. THIS IS A TEMPORARY EMERGENCY MEASURE WHICH SHOULD BE USED BEFORE SOIL BLOWING STARTS. BEGIN PLOWING ON WINDWARD SIDE OF SITE. CHISEL-TYPE PLOWS SPACED ABOUT 12 INCHES APART AND SPRING-TOOTHED HARROWS ARE EXAMPLES OF EQUIPMENT WHICH MAY PRODUCE THE DESIRED EFFECT.
5. SPRINKLING - SITE IS SPRINKLED UNTIL THE SURFACE IS WET.
6. BARRIERS - SOLID BOARD FENCES, SNOW FENCES, BURLAP FENCES, CRATE WALLS, BALES OF HAY AND SIMILAR MATERIAL CAN BE USED TO CONTROL AIR CURRENTS AND SOIL BLOWING.
7. CALCIUM CHLORIDE - SHALL BE IN THE FORM OF LOOSE, DRY GRANULES OR FLAKES FINE ENOUGH TO FEED THROUGH COMMONLY USED SPREADERS AT A RATE THAT WILL KEEP SURFACE MOIST BUT NOT CAUSE POLLUTION OR PLANT DAMAGE. IF USED ON STEEPER SLOPES, THEN USE OTHER PRACTICES TO PREVENT WASHING INTO STREAMS OR ACCUMULATION AROUND PLANTS.
8. STONE - COVER SURFACE WITH CRUSHED STONE OR COARSE GRAVEL.

NRCS WEB SOIL SURVEY SOIL CHARACTERISTICS CHART

TYPE OF SOIL	WHITMAN FINE SANDY LOAM (73B)	CHARLTON-URBAN LAND-HOLLIS COMPLEX (631C)	UDORTHENTS (655)	PAXTON FINE SANDY LOAM (305C)	CANTON-CHARLTON-URBAN LAND COMPLEX (629C)
PERCENT OF SITE COVERAGE	61.3%	28.5%	5.9%	3.8%	0.5%
HYDROLOGIC SOIL GROUP	D	A	D*	C	A
DEPTH TO RESTRICTIVE LAYER	7 TO 38 INCHES	> 80 INCHES	> 80 INCHES	20 TO 39 INCHES	18 TO 30 INCHES
SOIL PERMEABILITY	0.00 TO 0.14 IN / HR	0.60 TO 6.00 IN / HR	*	0.00 TO 0.14 IN / HR	2.00 TO 6.00 IN / HR
DEPTH TO WATER TABLE	0 TO 6 INCHES	> 80 INCHES	> 80 INCHES	18 TO 37 INCHES	> 80 INCHES

* NOT SPECIFIED IN NRCS SOIL REPORT



SYMBOL / DESCRIPTION

SYMBOL	DESCRIPTION
	PROPERTY BOUNDARY
	ADJACENT PROPERTY BOUNDARY
LOD	PROPOSED LIMIT OF DISTURBANCE
SF	PROPOSED SILT FENCE
TPF	PROPOSED TREE PROTECTION FENCE
	PROPOSED STOCKPILE & EQUIPMENT STORAGE
	PROPOSED STABILIZED CONSTRUCTION ENTRANCE
	PROPOSED INLET PROTECTION FILTER

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR SOIL EROSION AND SEDIMENT CONTROL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL IN COMPLIANCE WITH LOCAL, STATE, AND FEDERAL AIR QUALITY STANDARDS.
3. THE CONTRACTOR IS RESPONSIBLE TO INSPECT ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES WEEKLY AND AFTER A PRECIPITATION EVENT GREATER THAN 1 INCH. THE CONTRACTOR SHALL MAINTAIN AN INSPECTION LOG ON SITE AND DOCUMENT CORRECTIVE ACTION TAKEN THROUGHOUT THE COURSE OF CONSTRUCTION AS REQUIRED.

SEQUENCE OF CONSTRUCTION

1. INSTALL CONSTRUCTION ENTRANCE (2 DAYS)
2. STRIPPING AND CLEARING OF SITE (2 WEEKS)
8. INSTALL CURBSIDE SEDIMENT BARRIERS. (1 DAY)
9. DEMOLISH EXISTING PAVEMENT WHERE APPLICABLE (7 DAYS)
10. ROUGH GRADING AND TEMPORARY SEEDING (21 DAYS)
11. BASIN CONSTRUCTION INCLUDING STABILIZATION (14 DAYS)
12. UTILITY CONSTRUCTION (10 DAYS)
13. BUILDING CONSTRUCTION AND SITE IMPROVEMENTS (100 DAYS)
14. FINAL GRADING (3 DAYS)
15. SOIL RESTORATION MEASURES (3 DAYS)
16. LANDSCAPING IMPROVEMENTS AND FINAL SEEDING & TOP SOILING (7 DAYS)
17. REMOVE SOIL EROSION MEASURES (1 DAY)

NOTE: TIME DURATIONS ARE APPROXIMATE AND ARE INTENDED TO ACT AS A GENERAL GUIDE TO THE CONSTRUCTION TIMELINE. ALL DURATIONS ARE SUBJECT TO CHANGE BY CONTRACTOR. CONTRACTOR SHALL SUBMIT CONSTRUCTION SCHEDULE TO TOWNSHIP AND ENGINEER. CONTRACTOR SHALL PHASE CONSTRUCTION ACCORDINGLY.

811 Know what's **below** **Call** before you dig.

20' 0' 20' 40'
GRAPHIC SCALE IN FEET
1" = 20'

ISSUE	DATE	BY	DESCRIPTION
00	03/07/2025	AJD	ISSUED FOR MUNICIPAL SUBMISSION

NOT APPROVED FOR CONSTRUCTION

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LAND DEVELOPMENT PLANS

PRIMROSE SCHOOLS FRANCHISING COMPANY

PROPOSED CHILD DAY CARE FACILITY

PARCEL ID: 278-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 20 | PROJECT ID: BOS-240115

TITLE: **SOIL EROSION & SEDIMENT CONTROL PLAN**

DRAWING: **C-9**

Z:\BOS\TOWNS\READING\240115 PRIMROSE SCHOOLS - 885 MAIN STREET, READING, MA\CAD\PLOT\XXX-XX-ESC.DWG

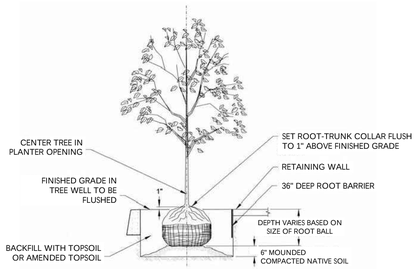
PLANT SCHEDULE

SYMBOL	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER	REMARKS
DECIDUOUS TREES							
	LIQ	2	LIQUIDAMBAR STYRACIFLUA	SWEET GUM	3" - 3.5" CAL	B&B	RECOMMENDED NATIVE PLANT
	MAG	2	MAGNOLIA VIRGINANA	SWEETBAY MAGNOLIA	3" - 3.5" CAL	B&B	RECOMMENDED NATIVE PLANT
	NYS	4	NYSSA SYLVATICA	TUPELO	3" - 3.5" CAL	B&B	RECOMMENDED NATIVE PLANT
	PAL	4	QUERCUS PALUSTRIS	PIN OAK	3" - 3.5" CAL	B&B	RECOMMENDED NATIVE PLANT
	TIL	1	TILIA AMERICANA	AMERICAN LINDEN	3" - 3.5" CAL	B&B	RECOMMENDED NATIVE PLANT
EVERGREEN TREES							
	VIR	37	JUNIPERUS VIRGINIANA	EASTERN REDCEDAR	6` - 8` HT	B&B	RECOMMENDED NATIVE PLANT
	JUN	12	JUNIPERUS VIRGINIANA 'J.N. SELECT GREEN'	EMERALD FEATHER EASTERN REDCEDAR	6` - 8` HT	B&B	RECOMMENDED NATIVE PLANT
	PIC	12	PICEA GLAUCA	WHITE SPRUCE	6` - 8` HT	B&B	RECOMMENDED NATIVE PLANT
SHRUBS							
	COR	10	CORNUS STOLONIFERA 'FARROW'	ARCTIC FIRE RED TWIG DOGWOOD	18" - 24"	POT	-
	PHY	6	PHYSOCARPUS OPULIFOLIUS 'LITTLE DEVIL'	LITTLE DEVIL DWARF NINEBARK	18" - 24"	POT	-
	VIB	8	VIBURNUM DENTATUM	VIBURNUM	18" - 24"	POT	RECOMMENDED NATIVE PLANT
EVERGREEN SHRUBS							
	GLA	29	ILEX GLABRA 'COMPACTA'	COMPACT INKBERRY	18" - 24"	POT	RECOMMENDED NATIVE PLANT
	TAX	10	TAXUS X MEDIA 'DENSIFORMIS'	DENSE ANGLO-JAPANESE YEW	18" - 24"	POT	-
GROUND COVERS							
	CAR	62	CAREX PENSYLVANICA	PENNSYLVANIA SEDGE	1 GAL.	POT, 24" O.C.	RECOMMENDED NATIVE PLANT
	BAR	46	JUNIPERUS HORIZONTALIS 'BAR HARBOR'	BAR HARBOR CREEPING JUNIPER	1 GAL.	POT, 36" O.C.	-
PERENNIALS AND GRASSES							
	ROS	59	COREOPSIS ROSEA	ROSE COREOPSIS	1 GAL.	POT, 24" O.C.	RECOMMENDED NATIVE PLANT
	HEM	17	HEMEROCALLIS X 'STELLA DE ORO'	STELLA DE ORO DAYLILY	1 GAL.	POT, 24" O.C.	-
	PAN	11	PANICUM VIRGATUM 'SHENANDOAH'	SHENANDOAH SWITCH GRASS	1 GAL.	POT, 24" O.C.	RECOMMENDED NATIVE PLANT

NOTE: IF ANY DISCREPANCIES OCCUR BETWEEN AMOUNTS SHOWN ON THE LANDSCAPE PLAN AND WITHIN THE PLANT LIST, THE PLAN SHALL DICTATE.

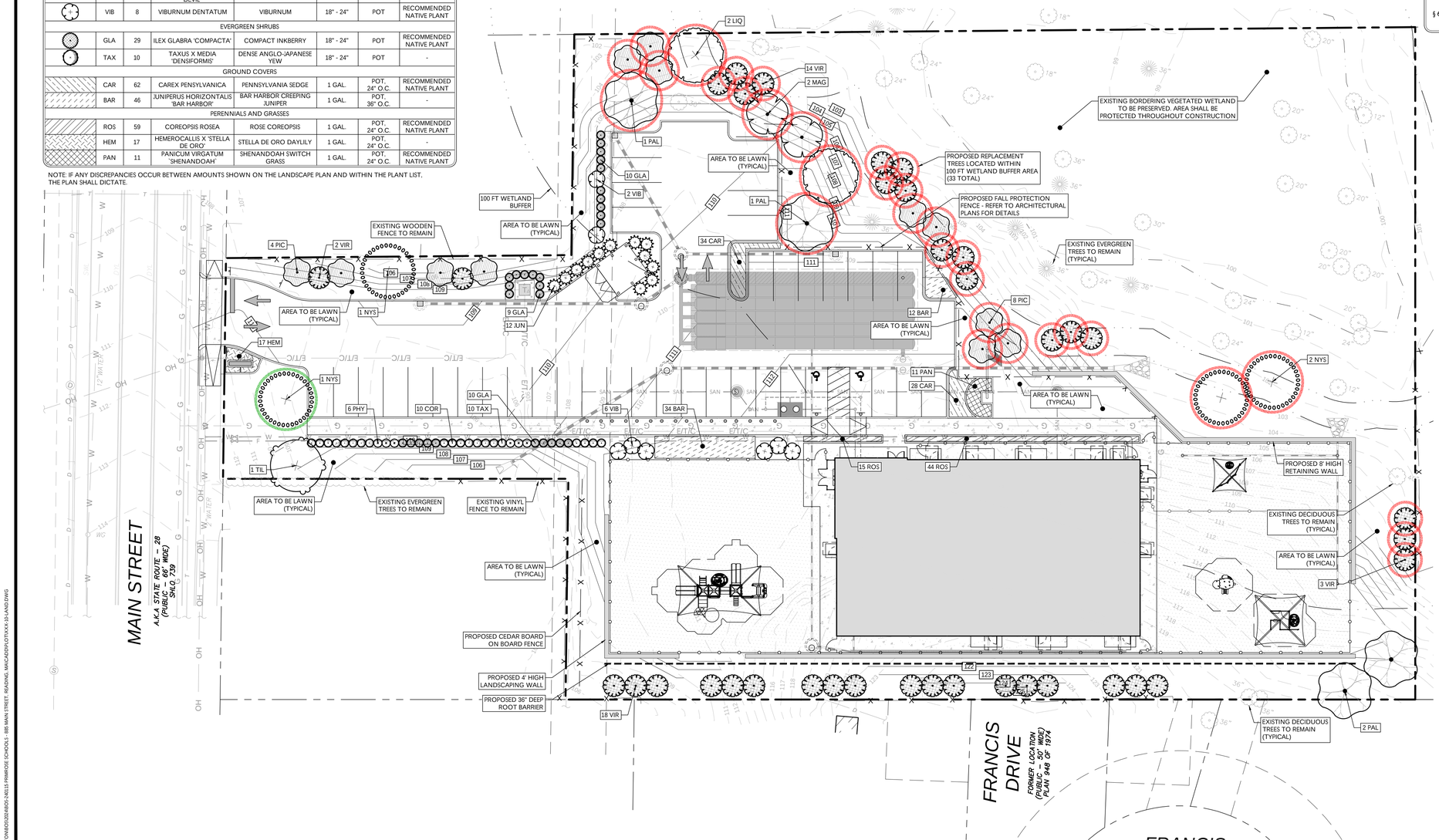
LANDSCAPE MAINTENANCE SCHEDULE

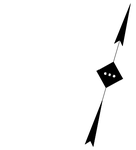
MAINTENANCE TASK	WINTER			SPRING				SUMMER				FALL			
	DEC	JAN	FEB	MAR	APR	MAY	FREQUENCY	JUN	JUL	AUG	FREQUENCY	SEP	OCT	NOV	FREQUENCY
SITE INSPECTION				X			ONCE PER SEASON		X		ONCE PER SEASON			X	ONCE PER SEASON
DEBRIS & WEED CONTROL				X	X	X	BI-WEEKLY	X	X	X	BI-WEEKLY	X	X		BI-WEEKLY
IRRIGATION MAINTENANCE					X		ONCE PER SEASON				N/A		X		ONCE PER SEASON
MULCHING					X		ONCE PER SEASON				N/A				N/A
SEASONAL PLANTINGS						X	ONCE PER SEASON	X	X	X	WEEKLY	X	X	X	WEEKLY
MOWING OF TURF				X	X	X	WEEKLY	X	X	X	WEEKLY	X	X	X	WEEKLY
MOWING OF WILDFLOWERS							N/A				N/A			X	ONCE PER SEASON
PRUNING				X	X		MONTHLY				N/A			X	ONCE PER SEASON
FERTILIZER & AMENDMENTS				X	X	X	MONTHLY	X	X	X	BI-WEEKLY	X	X	X	BI-WEEKLY
INSECT & DISEASE CONTROL						X	ONCE PER SEASON	X	X	X	BI-WEEKLY	X	X		N/A
PLANTING RENOVATION				X			ONCE PER SEASON				N/A		X		ONCE PER SEASON
LANDSCAPE STRUCTURES INSPECTION					X		ONCE PER SEASON				N/A				N/A
LIGHTING MAINTENANCE				X			ONCE PER SEASON				N/A		X		ONCE PER SEASON
PAVED SURFACE MAINTENANCE					X		ONCE PER SEASON				N/A				N/A



RHIZOME BARRIER SUPPLY - 36" x 24" ROOT BARRIER PANELS

NOT TO SCALE





SYMBOL	DESCRIPTION
	PROPOSED ROOT BARRIER
	PROPOSED STREET TREES
	PROPOSED REPLACEMENT TREES

LANDSCAPING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 6.5.2	LANDSCAPE STANDARDS SIDE YARD SETBACKS SHALL BE PLANTED WITH GRASS, SHRUBS AND SHADE TREES	COMPLIES
§ 6.5.7	STREET TREES 1 TREE FOR EVERY 50 LF OF FRONTAGE (55 FT) * (1 TREE / 50 FT FRONTAGE) = 1 TREE	1 TREE

811 Know what's below Call before you dig.

IRRIGATION NOTE:

IRRIGATION CONTRACTOR TO PROVIDE A DESIGN FOR AN IRRIGATION SYSTEM SEPARATING PLANTING BEDS FROM LAWN AREA. PRIOR TO CONSTRUCTION. DESIGN IS TO BE SUBMITTED TO THE PROJECT LANDSCAPE DESIGNER FOR REVIEW AND APPROVAL. WHERE POSSIBLE, DRIP IRRIGATION AND OTHER WATER CONSERVATION TECHNIQUES SUCH AS RAIN SENSORS SHALL BE IMPLEMENTED. CONTRACTOR TO VERIFY MAXIMUM ON SITE DYNAMIC WATER PRESSURE AVAILABLE MEASURED IN PSI. PRESSURE REDUCING DEVICES OR BOOSTER PUMPS SHALL BE PROVIDED TO MEET SYSTEM PRESSURE REQUIREMENTS. DESIGN TO SHOW ALL VALVES, PIPING, HEADS, BACKFLOW PREVENTION, METERS, CONTROLLERS, AND SLEEVES WITHIN HARDSCAPE AREAS.

LANDSCAPING NOTES

1. THE CONTRACTOR SHALL RESTORE ALL DISTURBED GRASS AND LANDSCAPED AREAS TO MATCH EXISTING CONDITIONS UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
2. THE CONTRACTOR SHALL RESTORE ALL DISTURBED LAWN AREAS WITH A MINIMUM 4 INCH LAYER OF TOPSOIL AND SEED.
3. THE CONTRACTOR SHALL RESTORE MULCH AREAS WITH A MINIMUM 3 INCH LAYER OF MULCH .
4. THE MAXIMUM SLOPE ALLOWABLE IN LANDSCAPE RESTORATION AREAS SHALL BE 3 FEET HORIZONTAL TO 1 FOOT VERTICAL (3:1 SLOPE) UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR IS REQUIRED TO LOCATE ALL SPRINKLER HEADS IN AREA OF LANDSCAPING DISTURBANCE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL RELOCATE SPRINKLER HEADS AND LINES IN ACCORDANCE WITH OWNER'S DIRECTION WITHIN AREAS OF DISTURBANCE.
6. THE CONTRACTOR SHALL ENSURE THAT ALL DISTURBED LANDSCAPED AREAS ARE GRADED TO MEET FLUSH AT THE ELEVATION OF WALKWAYS AND TOP OF CURB ELEVATIONS EXCEPT UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET. NO ABRUPT CHANGES IN GRADE ARE PERMITTED IN DISTURBED LANDSCAPING AREAS.

20' 0' 20' 40'
GRAPHIC SCALE IN FEET
1" = 20'

DESCRIPTION	BY	DATE	ISSUE
ISSUED FOR MUNICIPAL SUBMISSION	A/D	03/07/2025	00

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
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LAND DEVELOPMENT PLANS

PRIMROSE SCHOOLS FRANCHISING COMPANY

PROPOSED CHILD DAY CARE FACILITY

PARCEL ID: 28-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 20' | PROJECT ID: BOS-240115

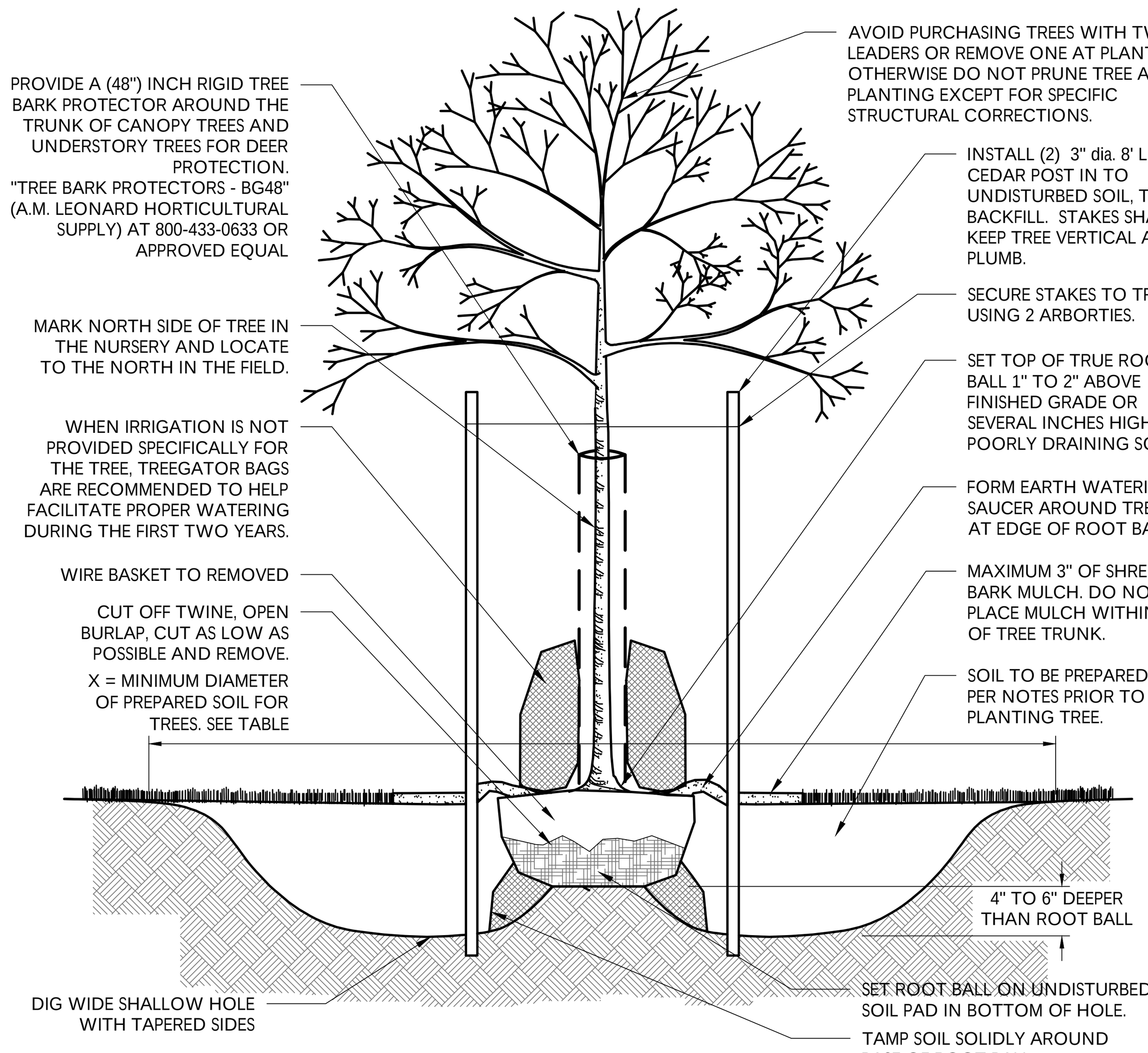
TITLE: LANDSCAPING PLAN

DRAWING: C-10

Z:\BOSTON\BOS\2024\BOS-240115 PRIMROSE SCHOOLS - 885 MAIN STREET, READING, MA\CAD\PLOT\XXX-10-LAND.DWG

NOTES:

1. FOR CONTAINER-GROWN TREES, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER
2. THOROUGHLY SOAK THE TREE ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
3. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILDS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX



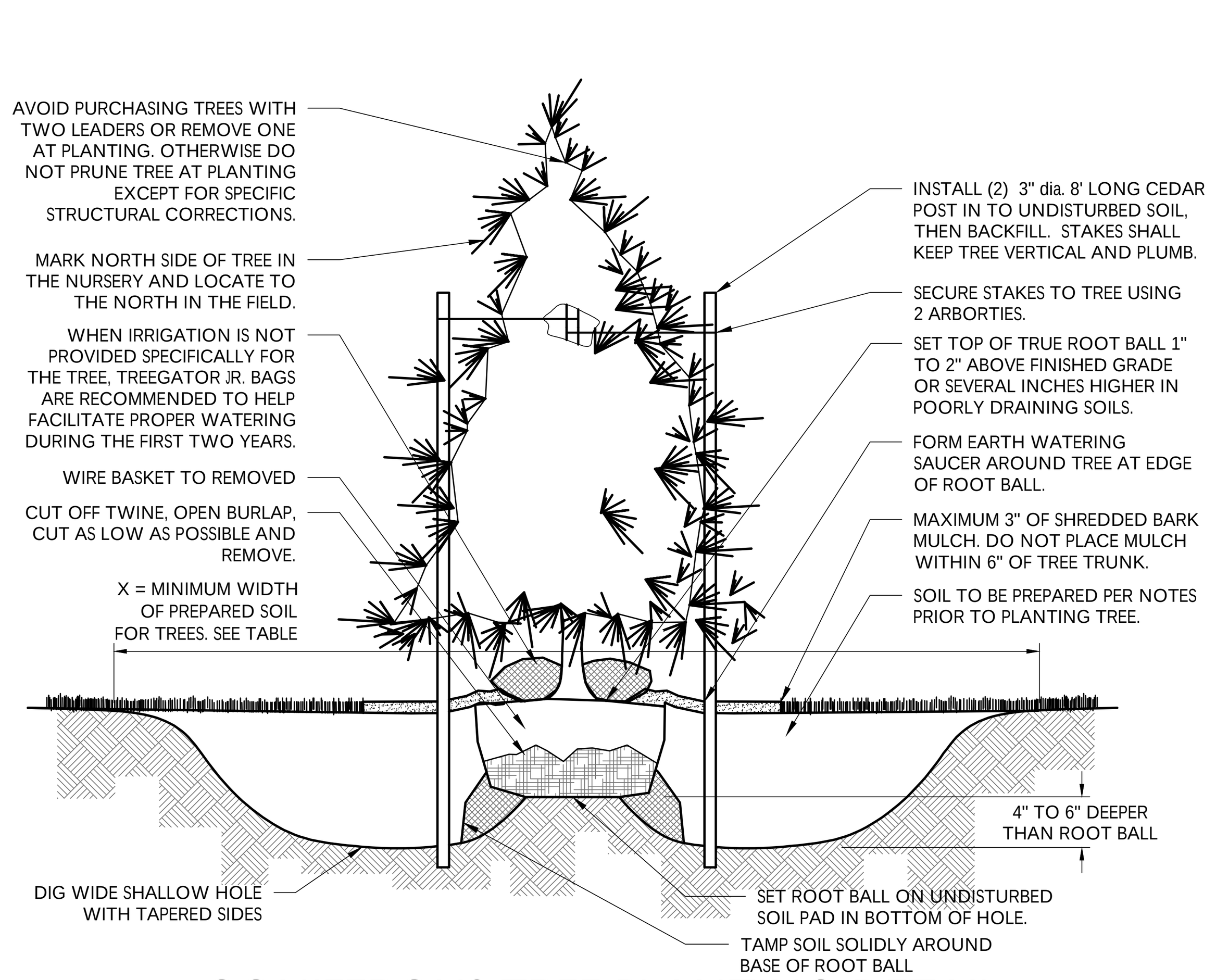
DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

1

NOTES:

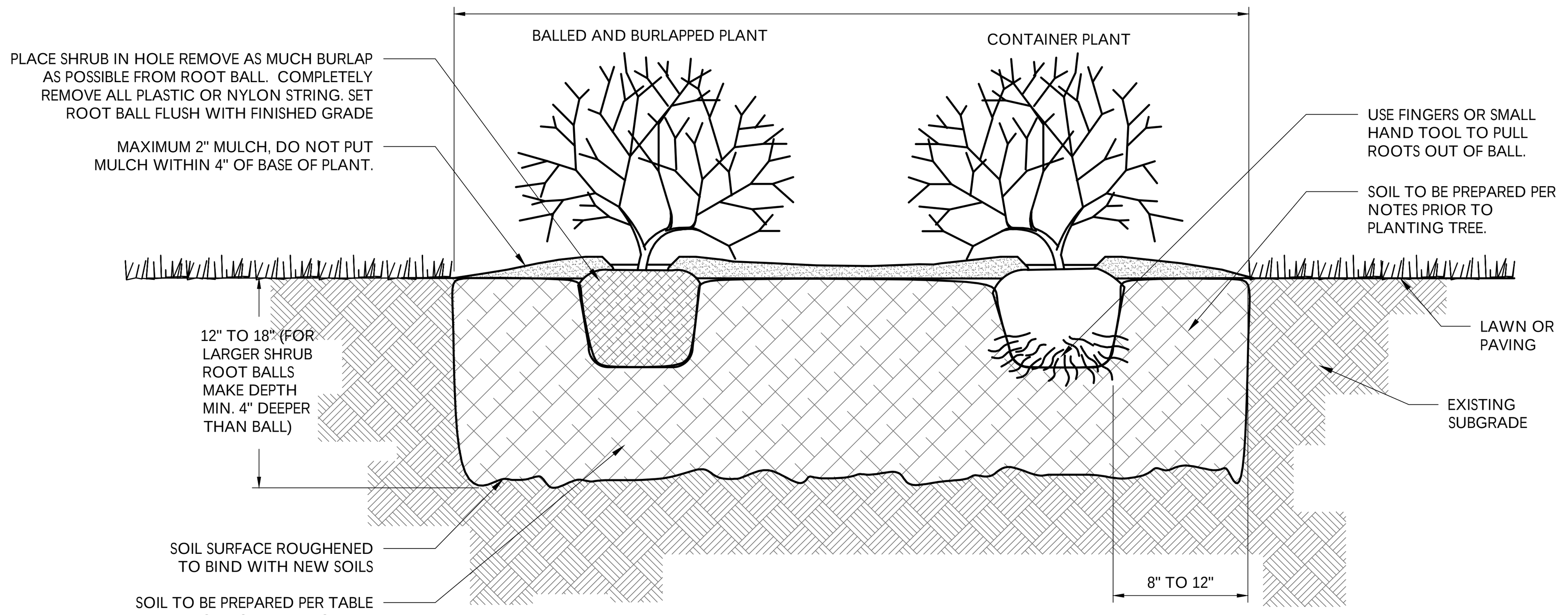
1. FOR CONTAINER-GROWN TREES, USE FINGERS OR SMALL HAND TOOLS TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.
2. THOROUGHLY SOAK THE TREE ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
3. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX



CONIFEROUS TREE PLANTING DETAIL

NOT TO SCALE

2



NOTES:

1. FOR THE CONTAINER-GROWN SHRUBS, USE FINGERS OR SMALL HAND TOOL TO PULL THE ROOTS OUT OF THE OUTER LAYER OF POTTING SOIL; THEN CUT OR PULL APART ANY ROOTS CIRCLING THE PERIMETER OF THE CONTAINER.
2. THOROUGHLY SOAK THE SHRUB ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL

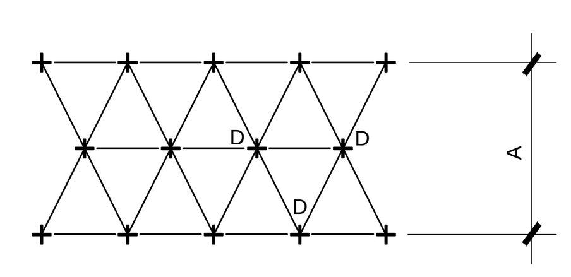
DECIDUOUS AND EVERGREEN SHRUB PLANTING DETAIL

NOT TO SCALE

3

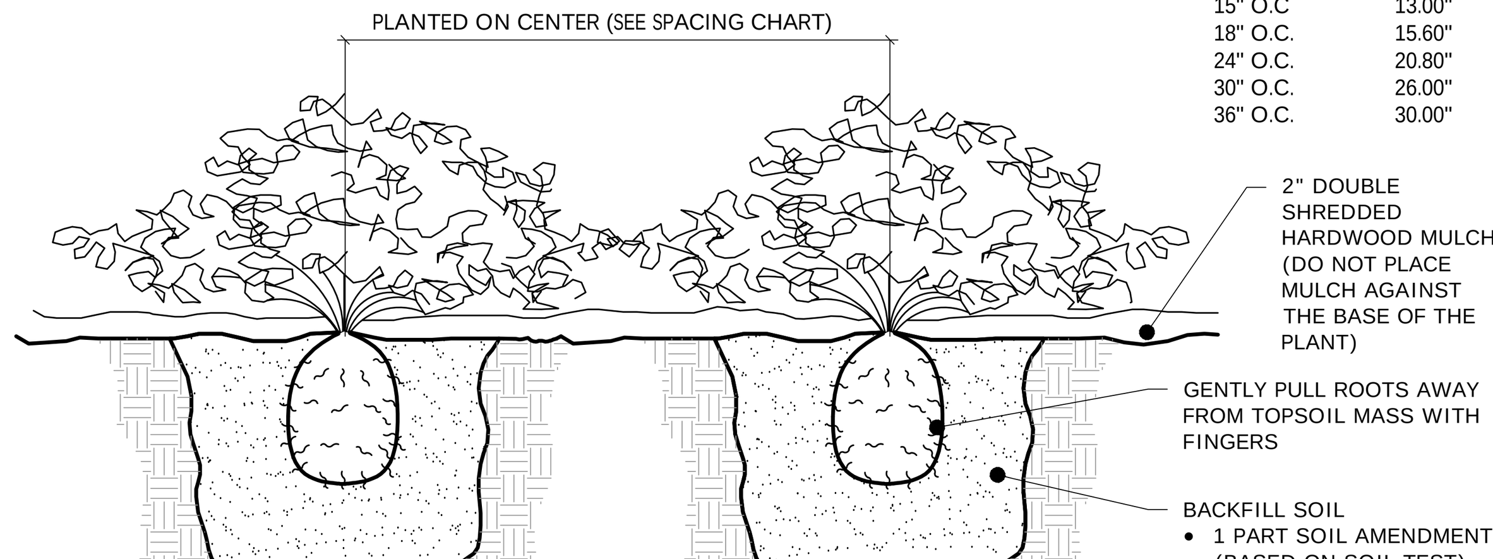
NOTES:

1. THOROUGHLY SOAK THE GROUND COVER ROOT BALL AND ADJACENT PREPARED SOIL SEVERAL TIMES DURING THE FIRST MONTH AFTER PLANTING AND REGULARLY THROUGHOUT THE FOLLOWING TWO SUMMERS.
2. SOIL AMENDMENTS:
   - MODIFY HEAVY CLAY OR SILT SOILDS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM
   - MODIFY EXTREMELY SANDY SOILDS (MORE THAN 85% SAND) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX
3. ALL GROUND COVER AREAS SHALL BE TREATED WITH A PRE-EMERGENT PER MANUFACTURER'S SPECIFICATIONS



SPACING CHART
NOT TO SCALE

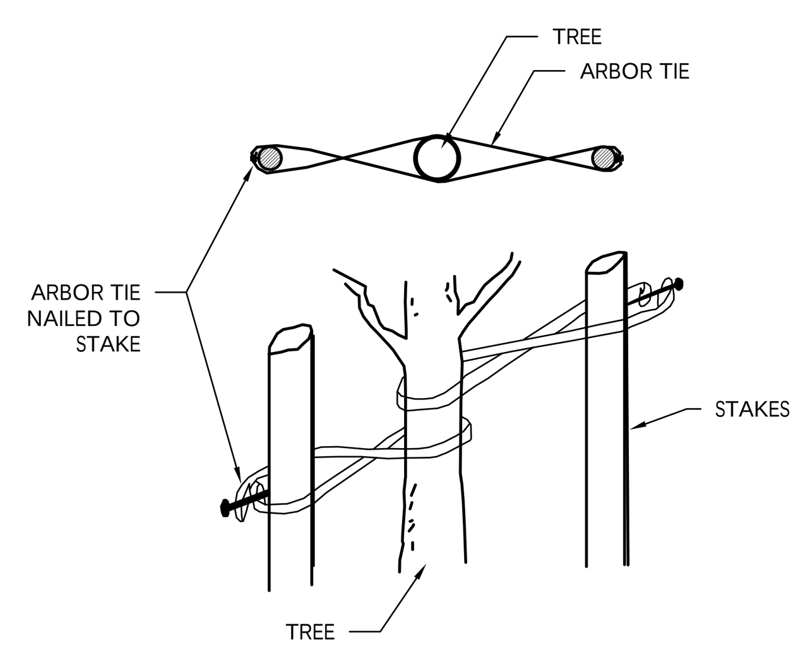
SPACING "D"	ROW "A"
6" O.C.	5.20"
8" O.C.	6.93"
10" O.C.	8.66"
12" O.C.	10.40"
15" O.C	13.00"
18" O.C.	15.60"
24" O.C.	20.80"
30" O.C.	26.00"
36" O.C.	30.00"



GROUND COVER/PERENNIAL/ANNUAL PLANTING DETAIL

NOT TO SCALE

4



INSTALLATION GUIDELINES:
1. LOOP TIE AROUND TREE AND NAIL TO CEDAR STAKE.
2. REMOVE ALL STAKING AND TIES AT END OF FIRST GROWING SEASON.
3. FOLD ENDS OF ARBORTIE BACK. SECURE TO STAKES WITH 1" GALVANIZED ROOFING NAIL OR USE A KNOT.
4. CONSULT LANDSCAPE ARCHITECT FOR STAKING OF TREES LARGER THAN 6".
5. SOURCES INCLUDE:
   GEMPLERS 1-800-332-6744 or GEMPLERS.COM
   CSP OUTDOORS 1-800-592-6940 or CSPOUTDOORS.COM

ARBORTIE DETAIL

NOT TO SCALE

5

GENERAL LANDSCAPING NOTES:

1. THE LANDSCAPE CONTRACTOR SHALL FURNISH ALL MATERIALS AND PERFORM ALL WORK IN ACCORDANCE WITH THESE SPECIFICATIONS, APPROVED OR FINAL DRAWINGS, AND INSTRUCTIONS PROVIDED BY THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIALS, OR OWNER/OWNER'S REPRESENTATIVE. ALL WORK COMPLETED AND MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH THE INTENTION OF THE SPECIFICATIONS, DRAWINGS, AND INSTRUCTIONS AND EXECUTED WITH THE STANDARD LEVEL OF CARE FOR THE LANDSCAPE INDUSTRY.
2. WORK MUST BE CARRIED OUT ONLY DURING WEATHER CONDITIONS FAVORABLE TO LANDSCAPE CONSTRUCTION AND TO THE HEALTH AND WELFARE OF PLANTS. THE SUITABILITY OF SUCH WEATHER CONDITIONS SHALL BE DETERMINED BY THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL.
3. IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR, BEFORE ORDERING OR PURCHASING MATERIALS, TO PROVIDE SAMPLES OF THOSE MATERIALS TO THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL FOR APPROVAL, IF SO REQUESTED.
4. IF SAMPLES ARE REQUESTED, THE LANDSCAPE CONTRACTOR IS TO SUBMIT CERTIFICATION TAGS FROM TREES, SHRUBS AND SEED VERIFYING TYPE AND PURITY.
5. UNLESS OTHERWISE AUTHORIZED BY THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL, THE LANDSCAPE CONTRACTOR SHALL PROVIDE NOTICE AT LEAST FORTY-EIGHT HOURS (48 HRS.) IN ADVANCE OF THE ANTICIPATED DELIVERY DATE OF ANY PLANT MATERIALS TO THE PROJECT SITE. A LEGIBLE COPY OF THE INVOICE, SHOWING VARIETIES AND SIZES OF MATERIALS INCLUDED FOR EACH SHIPMENT SHALL BE FURNISHED TO THE PROJECT LANDSCAPE DESIGNER, OR GOVERNING MUNICIPAL OFFICIAL.
6. THE PROJECT LANDSCAPE DESIGNER OR GOVERNING MUNICIPAL OFFICIAL RESERVES THE RIGHT TO INSPECT AND REJECT PLANTS AT ANY TIME AND AT ANY PLACE.

PROTECTION OF EXISTING VEGETATION NOTES:

1. BEFORE COMMENCING WORK, ALL EXISTING VEGETATION WHICH COULD BE IMPACTED AS A RESULT OF THE PROPOSED CONSTRUCTION ACTIVITIES MUST BE PROTECTED FROM DAMAGE BY THE INSTALLATION OF TREE PROTECTION FENCING. FENCING SHALL BE LOCATED AT THE DRIP-LINE OR LIMIT OF DISTURBANCE AS DEPICTED WITHIN THE APPROVED OR FINAL PLAN SET, ESTABLISHING THE TREE PROTECTION ZONE. FENCE INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED **TREE** PROTECTION FENCE **DETAIL."** NO WORK MAY BEGIN UNTIL THIS REQUIREMENT IS FULFILLED. THE FENCING SHALL BE INSPECTED REGULARLY BY THE LANDSCAPE CONTRACTOR AND MAINTAINED UNTIL ALL CONSTRUCTION ACTIVITIES HAVE BEEN COMPLETED.
2. IN ORDER TO AVOID DAMAGE TO ROOTS, BARK OR LOWER BRANCHES, NO VEHICLE, EQUIPMENT, DEBRIS, OR OTHER MATERIALS SHALL BE DRIVEN, PARKED OR PLACED WITHIN THE TREE PROTECTION ZONE. ALL ON-SITE CONTRACTORS SHALL USE ANY AND ALL PRECAUTIONARY MEASURES WHEN PERFORMING WORK AROUND TREES, WALKS, PAVEMENTS, UTILITIES, AND ANY OTHER FEATURES EITHER EXISTING OR PREVIOUSLY INSTALLED UNDER THIS CONTRACT.
3. IN RARE INSTANCES WHERE EXCAVATING, FILL, OR GRADING IS REQUIRED WITHIN THE DRIP-LINE OF TREES TO REMAIN, THE WORK SHALL BE PERFORMED AS FOLLOWS:
   - TRENCHING: WHEN TRENCHING OCCURS AROUND TREES TO REMAIN, THE TREE ROOTS SHALL NOT BE CUT, BUT THE TRENCH SHALL BE TUNNELED UNDER OR AROUND THE ROOTS BY CAREFUL HAND DIGGING AND WITHOUT INJURY TO THE ROOTS. NO ROOTS, LIMBS, OR WOODS ARE TO HAVE ANY PAINT OR MATERIAL APPLIED TO ANY SURFACE.
   - RAISING GRADES: WHEN THE GRADE AT AN EXISTING TREE IS BELOW THE NEW FINISHED GRADE, AND FILL NOT EXCEEDING 6 INCHES (6") IS REQUIRED, CLEAN, WASHED GRAVEL FROM ONE TO TWO INCHES (1" - 2") IN SIZE SHALL BE PLACED DIRECTLY AROUND THE TREE TRUNK. THE GRAVEL SHALL EXTEND OUT FROM THE TRUNK ON ALL SIDES A MINIMUM OF 18 INCHES (18") AND FINISH APPROXIMATELY TWO INCHES (2") ABOVE THE FINISH GRADE AT TREE. INSTALL GRAVEL BEFORE ANY EARTH FILL IS PLACED. NEW EARTH FILL SHALL NOT BE LEFT IN CONTACT WITH THE TRUNK OF ANY TREE REQUIRING FILL. WHERE FILL EXCEEDING 6 INCHES (6") IS REQUIRED, A DRY LAID TREE WELL SHALL BE CONSTRUCTED. **IF APPLICABLE, TREE WELL INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED TREE WELL DETAIL."**
   - LOWERING GRADES: EXISTING TREES LOCATED IN AREAS WHERE THE NEW FINISHED GRADE IS TO BE LOWERED, SHALL HAVE RE-GRADING WORK DONE BY HAND TO THE INDICATED ELEVATION, NO GREATER THAN SIX INCHES (6"). ROOTS SHALL BE CUT CLEANLY THREE INCHES (3") BELOW FINISHED GRADE UNDER THE DIRECTION OF A LICENSED ARBORIST. WHERE CUT EXCEEDING 6 INCHES (6") IS REQUIRED, A DRY LAID RETAINING WALL SHALL BE CONSTRUCTED. IF APPLICABLE, **THE RETAINING WALL INSTALLATION SHALL BE IN ACCORDANCE WITH THE PROVIDED TREE RETAINING WALL DETAIL."**

SOIL PREPARATION AND MULCH NOTES:

1. LANDSCAPE CONTRACTOR SHALL OBTAIN A SOIL TEST OF THE IN-SITU TOPSOIL BY A CERTIFIED SOIL LABORATORY PRIOR TO PLANTING. LANDSCAPE CONTRACTOR SHALL ALLOW FOR A TWO WEEK TURNAROUND TIME FROM SUBMITTAL OF SAMPLE TO NOTIFICATION OF RESULTS.
2. BASED ON SOIL TEST RESULTS, ADJUST THE RATES OF LIME AND FERTILIZER THAT SHALL BE MIXED INTO THE TOP SIX INCHES (6") OF TOPSOIL. THE LIME AND FERTILIZER RATES PROVIDED WITHIN THE **SEED SPECIFICATION" OR SOD SPECIFICATION"** IS APPROXIMATE AND FOR BIDDING PURPOSES ONLY. IF ADDITIONAL AMENDMENTS ARE NECESSARY, ADJUST THE TOPSOIL AS FOLLOWS:
   - MODIFY HEAVY CLAY OR SILT SOILS (MORE THAN 40% CLAY OR SILT) BY ADDING COMPOSTED PINE BARK (UP TO 30% BY VOLUME) OR GYPSUM.
   - MODIFY EXTREMELY SANDY SOILS (MORE THAN 85%) BY ADDING ORGANIC MATTER AND/OR DRY, SHREDDED CLAY LOAM UP TO 30% OF THE TOTAL MIX.
3. TOPSOIL SHALL BE FERTILE, FRIABLE, NATURAL TOPSOIL OF LOAMING CHARACTER, WITHOUT ADMIXTURE OF SUBSOIL MATERIAL OBTAINED FROM A WELL-DRAINED ARABLE SITE, FREE FROM ALL CLAY, LUMPS, COARSE SANDS, STONES, PLANTS, **ROOTS, STICKS, AND OTHER FOREIGN MATERIAL GREATER THAN ONE INCH (1").**
4. TOPSOIL SHALL HAVE A PH RANGE OF 5.0-7.0 AND SHALL NOT CONTAIN LESS THAN 6% ORGANIC MATTER BY WEIGHT.
5. OBTAIN TOPSOIL ONLY FROM LOCAL SOURCES OR FROM AREAS HAVING SIMILAR SOIL CHARACTERISTICS TO THAT FOUND AT THE PROJECT SITE.
6. CONTRACTOR SHALL PROVIDE A SIX INCH (6") DEEP LAYER OF TOPSOIL IN ALL PLANTING AREAS. TOPSOIL SHALL BE SPREAD OVER A PREPARED SURFACE IN A UNIFORM LAYER TO ACHIEVE THE DESIRED COMPACTED THICKNESS. THE SPREADING OF TOPSOIL SHALL NOT BE CONDUCTED UNDER MUDDY OR FROZEN SOIL CONDITIONS.
7. UNLESS OTHERWISE NOTED IN THE CONTRACT, THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF TOPSOIL AND THE ESTABLISHMENT OF FINE-GRADING WITHIN THE DISTURBED AREA OF THE SITE.
8. LANDSCAPE CONTRACTOR SHALL VERIFY THAT THE SUB-GRADE ELEVATION MEETS THE FINISHED GRADE ELEVATION (LESS THE REQUIRED TOPSOIL), IN ACCORDANCE WITH THE APPROVED OR FINAL GRADING PLAN.
9. ALL LAWN AND PLANTING AREAS SHALL BE GRADED TO A SMOOTH, EVEN AND UNIFORM PLANE WITH NO ABRUPT CHANGE OF SURFACE AS DEPICTED WITHIN THE APPROVED OR FINAL CONSTRUCTION SET UNLESS OTHERWISE DIRECTED BY THE PROJECT LANDSCAPE DESIGNER OR MUNICIPAL OFFICIAL.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER SURFACE AND SUBSURFACE PLANT BED DRAINAGE PRIOR TO THE INSTALLATION OF PLANTINGS. IF POOR DRAINAGE CONDITIONS EXIST, CORRECTIVE ACTION SHALL BE TAKEN PRIOR TO INSTALLATION. ALL PLANTING AND LAWN AREAS SHALL BE GRADED AND MAINTAINED TO ALLOW A FREE FLOW OF SURFACE WATER.
11. DOUBLE SHREDDED HARDWOOD MULCH OR APPROVED EQUAL SHALL BE USED AS A THREE INCH (3") TOP DRESSING IN ALL SHRUB PLANTING BEDS AND AROUND ALL TREES PLANTED BY LANDSCAPE CONTRACTOR. GROUND COVER, PERENNIAL, AND ANNUAL PLANTING BEDS SHALL BE MULCHED WITH A TWO INCH (2") TOP DRESSING. SINGLE TREES OR SHRUBS SHALL BE MULCHED TO AVOID CONTACT WITH TRUNK OR PLANT STEM. MULCH SHALL BE OF SUFFICIENT CHARACTER AS NOT TO BE EASILY DISPLACED BY WIND OR WATER RUNOFF.
12. WHENEVER POSSIBLE, THE SOIL PREPARATION AREA SHALL BE CONNECTED FROM PLANTING TO PLANTING.
13. SOIL SHALL BE LOOSENED WITH A BACKHOE OR OTHER LARGE COARSE-TILING EQUIPMENT UNLESS THE SOIL IS FROZEN OR EXCESSIVELY WET. TILING THAT PRODUCES LARGE, COARSE CHUNKS OF SOIL IS PREFERABLE TO TILING THAT RESULTS IN FINE GRAINS UNIFORM IN TEXTURE. AFTER THE AREA IS LOOSENED IT SHALL NOT BE DRIVEN OVER BY ANY VEHICLE.
14. APPLY PRE-EMERGENT WEED CONTROL TO ALL PLANT BEDS PRIOR TO MULCHING. ENSURE COMPATIBILITY BETWEEN PRODUCT AND PLANT MATERIAL.
15. ALL PLANTING SOIL SHALL BE AMENDED WITH THE FOLLOWING:

MYCRO TREE SAVER - A DRY GRANULAR MYCORRHIZAL FUNGI INOCULANT THAT IS MIXED IN THE BACKFILL WHEN PLANTING TREES AND SHRUBS. IT CONTAINS SPORES OF BOTH ECTOMYCORRHIZAL AND VA MYCORRHIZAL FUNGI (VAM), BENEFICIAL RHIZOSPHERE BACTERIA, TERRA-SORB SUPERABSORBENT HYDROGEL TO REDUCE WATER LEACHING, AND SELECTED ORGANIC MICROBIAL NUTRIENTS.
- DIRECTIONS FOR USE: USE 3-OZ PER EACH FOOT DIAMETER OF THE ROOT BALL, OR 3-OZ PER INCH CALIPER. MIX INTO THE BACKFILL WHEN TRANSPLANTING TREES AND SHRUBS. MIX PRODUCT IN A RING-SHAPED VOLUME OF SOIL AROUND THE UPPER PORTION OF THE ROOT BALL, EXTENDING FROM THE SOIL SURFACE TO A DEPTH OF ABOUT 8 INCHES, AND EXTENDING OUT FROM THE ROOT BALL ABOUT 8 INCHES INTO THE BACKFILL. APPLY WATER TO SOIL SATURATION.
- MYCOR TREE SAVER IS EFFECTIVE FOR ALL TREE AND SHRUB SPECIES EXCEPT RHODODENDRONS, AZALEAS, AND MOUNTAIN LAUREL, WHICH REQUIRE ERICOID MYCORRHIZAE.
- SOIL PH: THE FUNGI IN THIS PRODUCT WERE CHOSEN BASED ON THEIR ABILITY TO SURVIVE AND COLONIZE PLANT ROOTS IN A PH RANGE OF 3 TO 9.
- FUNGICIDES: THE USE OF CERTAIN FUNGICIDES CAN HAVE A DETRIMENTAL EFFECT ON THE INOCULATION PROGRAM. SOIL APPLICATION OF ANY FUNGICIDE IS NOT RECOMMENDED FOR TWO WEEKS AFTER APPLICATION.
- OTHER PESTICIDES: HERBICIDES AND INSECTICIDES DO NOT NORMALLY INTERFERE WITH MYCORRHIZAL FUNGAL DEVELOPMENT, BUT MAY INHIBIT THE GROWTH OF SOME TREE AND SHRUB SPECIES IF NOT USED PROPERLY.

HEALTHY START MACRO TABS 12-8-8
- FERTILIZER TABLETS ARE PLACED IN THE UPPER 4 INCHES OF BACKFILL SOIL WHEN PLANTING TREES AND SHRUBS.
- TABLETS ARE FORMULATED FOR LONG-TERM RELEASE BY SLOW BIODEGRADATION, AND LAST UP TO 2 YEARS AFTER PLANTING. TABLETS CONTAIN 12-8-8 NPK FERTILIZER, AS WELL AS A MINIMUM OF SEVEN PERCENT (7%) HUMIC ACID BY WEIGHT, MICROBIAL NUTRIENTS DERIVED FROM SEA KELP, PROTEIN BYPRODUCTS, AND YUCCA SCHIDIGERA, AND A COMPLEMENT OF BENEFICIAL RHIZOSPHERE BACTERIA. THE STANDARD 21 GRAM TABLET IS SPECIFIED HERE. DIRECTIONS FOR USE: FOR PLANTING BALLED & BURLAPPED (B&B) TREES AND SHRUBS, MEASURE THE THICKNESS OF THE TRUNK, AND USE ABOUT 1 TABLET (21-G) PER HALF-INCH. PLACE THE TABLETS DIRECTLY NEXT TO THE ROOT BALL, EVENLY DISTRIBUTED AROUND ITS PERIMETER, AT A DEPTH OF ABOUT 4 INCHES.

IRRIGATION DURING ESTABLISHMENT

SIZE AT PLANTING	IRRIGATION FOR VITALITY	IRRIGATION FOR SURVIVAL
< 2" CALIPER	DAILY FOR TWO WEEKS, EVERY OTHER DAY FOR TWO MONTHS, WEEKLY UNTIL ESTABLISHED	TWO TO THREE TIMES WEEKLY FOR TWO TO THREE MONTHS
2"-4 CALIPER	DAILY FOR ONE MONTH, EVERY OTHER DAY FOR THREE MONTHS, WEEKLY UNTIL ESTABLISHED	TWO TO THREE TIMES WEEKLY FOR THREE TO FOUR MONTHS
4 >" CALIPER	DAILY FOR SIX WEEKS, EVERY OTHER DAY FOR FIVE MONTHS, WEEKLY UNTIL ESTABLISHED	TWICE WEEKLY FOR FOUR TO FIVE MONTHS

TABLE NOTES:
1. AT EACH IRRIGATION, APPLY TWO TO THREE GALLONS PER INCH TRUNK CALIPER TO THE ROOT BALL SURFACE. APPLY IT IN A MANNER SO ALL WATER SOAKS THE ENTIRE ROOT BALL. DO NOT WATER IF ROOT BALL IS WET/SATURATED ON THE IRRIGATION DAY.

2. WHEN IRRIGATING FOR VITALITY, DELETE DAILY IRRIGATION WHEN PLANTING IN WINTER OR WHEN PLANTING IN COOL CLIMATES. ESTABLISHMENT TAKES THREE TO FOUR MONTHS PER INCH TRUNK CALIPER. NEVER APPLY IRRIGATION IF THE SOIL IS SATURATED.

3. WHEN IRRIGATION FOR SURVIVAL, TREES TAKE MUCH LONGER TO ESTABLISH THAN REGULARLY IRRIGATED TREES. IRRIGATION MAY BE REQUIRED IN THE NORMAL HOT, DRY PORTIONS OF THE FOLLOWING YEAR.

PLANT QUALITY AND HANDLING NOTES:

1. ALL PLANT MATERIAL SHALL CONFORM TO THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-2004) OR LATEST REVISION AS PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION.
2. IN ALL CASES, BOTANICAL NAMES LISTED WITHIN THE APPROVED OR FINAL PLANT LIST SHALL TAKE PRECEDENCE OVER COMMON NAMES.
3. ALL PLANTS SHALL BE OF SELECTED SPECIMEN QUALITY, EXCEPTIONALLY HEAVY, TIGHTLY KNIT, SO TRAINED OR FAVORED IN THEIR DEVELOPMENT AND APPEARANCE AS TO BE SUPERIOR IN FORM, NUMBER OF BRANCHES, COMPACTNESS AND SYMMETRY. ALL PLANTS SHALL HAVE A NORMAL HABIT OR SOUND, HEALTHY, VIGOROUS PLANTS WITH WELL DEVELOPED ROOT SYSTEM. PLANTS SHALL BE FREE OF DISEASE, INSECT PESTS, EGGS OR LARVAE.
4. PLANTS SHALL NOT BE PRUNED BEFORE DELIVERY. TREES WITH ABRASION OF THE BARK, SUNSCALDS, DISFIGURING KNOTS OR FRESH CUTS OF LIMBS OVER ONE AND ONE-FOURTH INCHES (1-1/4") WHICH HAVE NOT COMPLETELY CALLOUSED SHALL BE REJECTED.
5. ALL PLANTS SHALL BE TYPICAL OF THEIR SPECIES OR VARIETY AND SHALL HAVE A NORMAL HABIT OF GROWTH AND BE LEGIBLY TAGGED WITH THE PROPER NAME AND SIZE.
6. THE ROOT SYSTEM OF EACH PLANT SHALL BE WELL PROVIDED WITH FIBROUS ROOTS. ALL PARTS SHALL BE SOUND, HEALTHY, VIGOROUS, WELL-BRANCHED AND DENSELY FOLIATED WHEN IN LEAF.
7. ALL PLANTS DESIGNATED BALL AND BURLAP (B&B) MUST BE MOVED WITH THE ROOT SYSTEM AS SOLID UNITS WITH BALLS OF EARTH FIRMLY WRAPPED WITH BURLAP. THE DIAMETER AND DEPTH OF THE BALLS OF EARTH MUST BE SUFFICIENT TO ENCOMPASS THE FIBROUS ROOT FEEDING SYSTEMS NECESSARY FOR THE HEALTHY DEVELOPMENT OF THE PLANT. NO PLANT SHALL BE ACCEPTED WHEN THE BALL OF EARTH SURROUNDING ITS ROOTS HAS BEEN BADLY CRACKED OR BROKEN PREPARATORY TO OR DURING THE PROCESS OF PLANTING. THE BALLS SHALL REMAIN INTACT DURING ALL OPERATIONS. ALL PLANTS THAT CANNOT BE PLANTED AT ONCE MUST BE HEELED-IN BY SETTING IN THE GROUND AND COVERING THE BALLS WITH SOIL OR MULCH AND THEN WATERING. HEMP BURLAP AND TWINE IS PREFERABLE TO TREATED. IF TREATED BURLAP IS USED, ALL TWINE IS TO BE CUT FROM AROUND THE TRUNK AND ALL BURLAP IS TO BE REMOVED.
8. PLANTS TRANSPORTED TO THE PROJECT IN OPEN VEHICLES SHALL BE COVERED WITH TARPS OR OTHER SUITABLE COVERS SECURELY FASTENED TO THE BODY OF THE VEHICLE TO PREVENT INJURY TO THE PLANTS. CLOSED VEHICLES SHALL BE ADEQUATELY VENTILATED TO PREVENT OVERHEATING OF THE PLANTS. EVIDENCE OF INADEQUATE PROTECTION FOLLOWING DIGGING, CARELESSNESS WHILE IN TRANSIT, OR IMPROPER HANDLING OR STORAGE SHALL BE CAUSE FOR REJECTION OF PLANT MATERIAL. ALL PLANTS SHALL BE KEPT MOIST, FRESH, AND PROTECTED. SUCH PROTECTION SHALL ENCOMPASS THE ENTIRE PERIOD DURING WHICH THE PLANTS ARE IN TRANSIT, BEING HANDLED, OR ARE IN TEMPORARY STORAGE.
9. ALL PLANT MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH THE CORRESPONDING LANDSCAPE PLAN AND PLANTING DETAILS.
10. LANDSCAPE CONTRACTOR SHALL MAKE BEST EFFORT TO INSTALL PLANTINGS ON THE SAME DAY AS DELIVERY. IF PLANTS ARE NOT PLANTED IMMEDIATELY ON SITE, PROPER CARE SHALL BE TAKEN TO PLACE THE PLANTINGS IN PARTIAL SHADE WHEN POSSIBLE. THE ROOT BALL SHALL BE KEPT MOIST AT ALL TIME AND COVERED WITH MOISTENED MULCH OR AGED WOODCHIPS. PROPER IRRIGATION SHALL BE SUPPLIED SO AS TO NOT ALLOW THE ROOT BALL TO DRY OUT. PLANTINGS SHALL BE UNTIED AND PROPER SPACING SHALL BE ALLOTTED FOR AIR CIRCULATION AND TO PREVENT DISEASE, WILTING, AND LEAF LOSS. PLANTS THAT REMAIN UNPLANTED FOR A PERIOD OF TIME GREATER THAN THREE (3) DAYS SHALL BE HEALED IN WITH TOPSOIL OR MULCH AND WATERED AS REQUIRED TO PRESERVE ROOT MOISTURE.
11. NO PLANT MATERIAL SHALL BE PLANTED IN MUDDY OR FROZEN SOIL.
12. PLANTS WITH INJURED ROOTS OR BRANCHES SHALL BE PRUNED PRIOR TO PLANTING UTILIZING CLEAN, SHARP TOOLS. ONLY DISEASED OR INJURED PLANTS SHALL BE REMOVED.
13. IF ROCK OR OTHER UNDERGROUND OBSTRUCTION IS ENCOUNTERED, THE LANDSCAPE DESIGNER RESERVES THE RIGHT TO RELOCATE OR ENLARGE PLANTING PITS OR DELETE PLANT MATERIAL FROM THE CONTRACT.
14. IF PLANTS ARE PROPOSED WITHIN SIGHT TRIANGLES, TREES SHALL BE LIMBED AND MAINTAINED TO A HEIGHT OF EIGHT FEET (8') ABOVE GRADE, AND SHRUBS, GROUND COVER, PERENNIALS, AND ANNUALS SHALL BE MAINTAINED TO A HEIGHT NOT TO EXCEED TWO FEET (2') ABOVE GRADE UNLESS OTHERWISE NOTED OR SPECIFIED BY THE GOVERNING MUNICIPALITY OR AGENCY.
15. INSTALLATION SHALL OCCUR DURING THE FOLLOWING SEASONS:
    PLANTS (APRIL 15 - SEPTEMBER 30)
    LAWNS (MARCH 15 - JUNE 15 OR SEPTEMBER 1 - DECEMBER 1)
16. THE FOLLOWING TREES ARE SUSCEPTIBLE TO TRANSPLANT SHOCK AND SHALL NOT BE PLANTED DURING THE FALL SEASON (STARTING SEPTEMBER 15):

ABIES CONCOLOR	CORNUS VARIETIES	OSTRYA VIRGINIANA
ACER BUERGERIANUM	CRATAEGUS VARIETIES	PINUS NIGRA
ACER FREEMANII	CUPRESSOCYPARIS LEYLANDII	PLATANUS VARIETIES
ACER RUBRUM	FAGUS VARIETIES	POPULUS VARIETIES
ACER SACCHARINUM	HALESIA VARIETIES	PRUNUS VARIETIES
BETULA VARIETIES	ILEX X FOSTERII	PYRUS VARIETIES
CARPINUS VARIETIES	ILEX NELLIE STEVENS	QUERCUS VARIETIES (NOT Q. PALUSTRIS)
CEDRUS DEODARA	ILEX OPACA	SALIX WEEPING VARIETIES
CELTIS VARIETIES	JUNIPERUS VIRGINIANA	SORBUS VARIETIES
CERCIDIPHYLLUM VARIETIES	KOELREUTERIA PANICULATA	TAXODIUM VARIETIES
CERCIS CANADENSIS	LIQUIDAMBAR VARIETIES	TAXUX B REPANDENS
CORNUS VARIETIES	LIRIODENDRON VARIETIES	TILIA TOMENTOSA VARIETIES
CRATAEGUS VARIETIES	MALUS IN LEAF	ULMUS PARVIFOLIA VARIETIES
	NYSSA SYLVATICA	ZELKOVA VARIETIES

17. IF A PROPOSED PLANT IS UNATTAINABLE OR ON THE FALL DIGGING HAZARD LIST, AN EQUIVALENT SPECIES OF THE SAME SIZE MAY BE REQUESTED FOR SUBSTITUTION OF THE ORIGINAL PLANT. ALL SUBSTITUTIONS SHALL BE APPROVED BY THE PROJECT LANDSCAPE DESIGNER OR MUNICIPAL OFFICIAL PRIOR TO ORDERING AND INSTALLATION.
18. DURING THE COURSE OF CONSTRUCTION/PLANT INSTALLATION, EXCESS AND WASTE MATERIALS SHALL BE CONTINUOUSLY AND PROMPTLY REMOVED AT THE END OF EACH WORK DAY. ALL DEBRIS, MATERIALS, AND TOOLS SHALL BE PROPERLY STORED, STOCKPILED OR DISPOSED OF AND ALL PAVED AREAS SHALL BE CLEANED.
19. THE LANDSCAPE CONTRACTOR SHALL DISPOSE OF ALL RUBBISH AND EXCESS SOIL AT HIS EXPENSE TO AN OFF-SITE LOCATION AS APPROVED BY THE LOCAL MUNICIPALITY.
20. A 90-DAY MAINTENANCE PERIOD SHALL BEGIN IMMEDIATELY AFTER ALL PLANTS HAVE BEEN SATISFACTORILY INSTALLED.
21. MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO, REPLACING MULCH THAT HAS BEEN DISPLACED BY EROSION OR OTHER MEANS, REPAIRING AND RESHAPING WATER RINGS OR SAUCERS, MAINTAINING STAKES AND GUYS IF ORIGINALLY REQUIRED, WATERING WHEN NEEDED OR DIRECTED, WEEDING, PRUNING, SPRAYING, FERTILIZING, MOWING THE LAWN, AND PERFORMING ANY OTHER WORK REQUIRED TO KEEP THE PLANTS IN A HEALTHY CONDITION.
22. MOW ALL GRASS AREAS AT REGULAR INTERVALS TO KEEP THE GRASS HEIGHT FROM EXCEEDING THREE INCHES (3"). MOWING SHALL BE PERFORMED ONLY WHEN GRASS IS DRY. MOWER BLADE SHALL BE SET TO REMOVE NO MORE THAN ONE THIRD (1/3) OF THE GRASS LENGTH. WHEN THE AMOUNT OF GRASS IS HEAVY, IT SHALL BE REMOVED TO PREVENT DESTRUCTION OF THE UNDERLYING TURF. MOW GRASS AREAS IN SUCH A MANNER AS TO PREVENT CLIPPINGS FROM BLOWING ON PAVED AREAS, AND SIDEWALKS. CLEANUP AFTER MOWING SHALL INCLUDE SWEEPING OR BLOWING OF PAVED AREAS AND SIDEWALKS TO CLEAR THEM FROM MOWING DEBRIS.
23. GRASSED AREAS DAMAGED DURING THE PROCESS OF THE WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, WHO SHALL RESTORE THE DISTURBED AREAS TO A CONDITION SATISFACTORY TO THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIAL, OR OWNER/OWNER'S REPRESENTATIVE. THIS MAY INCLUDE FILLING TO GRADE, FERTILIZING, SEEDING, AND MULCHING.
24. SHOULD THE OWNER REQUIRE MAINTENANCE BEYOND THE STANDARD 90-DAY MAINTENANCE PERIOD, A SEPARATE CONTRACT SHALL BE ESTABLISHED.
25. LANDSCAPE CONTRACTOR SHALL WATER NEW PLANTINGS FROM TIME OF INSTALL AND THROUGHOUT REQUIRED 90-DAY MAINTENANCE PERIOD UNTIL PLANTS ARE ESTABLISHED. IF ON-SITE WATER IS NOT AVAILABLE AT THE PROJECT LOCATION, THE LANDSCAPE CONTRACTOR SHALL FURNISH IT BY MEANS OR A WATERING TRUCK OR OTHER ACCEPTABLE MANNER.
26. THE QUANTITY OF WATER APPLIED AT ONE TIME SHALL BE SUFFICIENT TO PENETRATE THE SOIL TO A MINIMUM OF EIGHT INCHES (8") IN SHRUB BEDS AND SIX INCHES (6") IN TURF AREAS AT A RATE WHICH WILL PREVENT SATURATION OF THE SOIL.
27. IF AN AUTOMATIC IRRIGATION SYSTEM HAS BEEN INSTALLED, IT CAN BE USED FOR WATERING PLANT MATERIAL. HOWEVER, FAILURE OF THE SYSTEM DOES NOT ELIMINATE THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY OF PLANT HEALTH AND ESTABLISHMENT.

PLANT MATERIAL GUARANTEE NOTES:

1. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF ONE YEAR (1 YR.) FROM APPROVAL OF LANDSCAPE INSTALLATION BY THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIAL, OR OWNER/OWNER'S REPRESENTATIVE.
2. THE LANDSCAPE CONTRACTOR SHALL REMOVE AND REPLACE DYING, DEAD, OR DEFECTIVE PLANT MATERIAL AT HIS EXPENSE. THE LANDSCAPE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS COMPANY'S OPERATIONS.
3. ALL REPLACEMENT PLANTS SHALL BE OF THE SAME SPECIES AND SIZE AS SPECIFIED ON THE APPROVED OR FINAL PLANT LIST. REPLACEMENTS RESULTING FROM REMOVAL, LOSS, OR DAMAGE DUE TO OCCUPANCY OF THE PROJECT IN ANY PART, VANDALISM, PHYSICAL DAMAGE BY ANIMALS, VEHICLES, ETC., AND LOSSES DUE TO CURTAILMENT OF WATER BY LOCAL AUTHORITIES SHALL BE APPROVED AND PAID FOR BY THE OWNER.
4. THE CONTRACTOR SHALL INSTRUCT THE OWNER AS TO THE PROPER CARE AND MAINTENANCE OF ALL PLANTINGS.

LAWN (SEED OR SOD) NOTES:

1. SEED MIXTURE SHALL BE FRESH, CLEAN, NEW CROP SEED. SOD SHALL BE STRONGLY ROOTED, UNIFORM IN THICKNESS, AND FREE OF WEEDS, DISEASE, AND PESTS.
2. SEED OR SOD SHALL BE PURCHASED FROM A RECOGNIZED DISTRIBUTOR AND SHALL BE COMPOSED OF THE MIX OR BLEND **WITHIN THE PROVIDED SEED SPECIFICATION" OR SOD SPECIFICATION."**
3. REFERENCE LANDSCAPE PLAN FOR AREAS TO BE SEEDED OR LAID WITH SOD.
4. SEEDING SHALL NOT BE PERFORMED IN WINDY WEATHER. IF THE SEASON OF THE PROJECT COMPLETION PROHIBITS PERMANENT STABILIZATION, TEMPORARY STABILIZATION SHALL BE PROVIDED IN ACCORDANCE WITH THE **TEMPORARY SEEDING SPECIFICATION."**
5. PROTECT NEW LAWN AREAS AGAINST TRESPASSING WHILE THE SEED IS GERMINATING. FURNISH AND INSTALL FENCES, SIGNS, BARRIERS OR ANY OTHER NECESSARY TEMPORARY PROTECTIVE DEVICES. DAMAGE RESULTING FROM TRESPASS, EROSION, WASHOUT, SETTLEMENT OR OTHER CAUSES SHALL BE REPAIRED BY THE LANDSCAPE CONTRACTOR AT HIS EXPENSE. REMOVE ALL FENCES, SIGNS, BARRIERS OR OTHER TEMPORARY PROTECTIVE DEVICES ONCE LAWN HAS BEEN ESTABLISHED.

ISSUE	DATE	BY	DESCRIPTION
00	03/07/2025	AJD	ISSUED FOR MUNICIPAL SUBMISSION

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LAND DEVELOPMENT PLANS

PRIMROSE SCHOOLS FRANCHISING COMPANY

PROPOSED CHILD DAY CARE FACILITY

PARCEL ID: 28-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

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SCALE: AS SHOWN | PROJECT ID: BOS-240115

TITLE: LANDSCAPING DETAILS

DRAWING: C-11

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APPENDIX E
DRAINAGE AREA MAPS

INVENTORY

SHEET 1 OF 2: EXISTING DRAINAGE AREA MAP

SHEET 2 OF 2: PROPOSED DRAINAGE AREA MAP

SYMBOL	DESCRIPTION
	PROPERTY LINE
	ADJACENT PROPERTY LINE
	EXISTING DRAINAGE AREA
	TIME OF CONCENTRATION PATH
	EXISTING GRASS AREA
	EXISTING WOODED AREA

AREA E-1	
11,547 SF =	IMPERVIOUS AREAS
7,989 SF =	WOODS, GOOD (HSG A)
44,941 SF =	WOODS, GOOD (HSG D)
6,874 SF =	GRASS, GOOD (HSG A)
7174 SF =	GRASS, GOOD (HSG C)
5,755 SF =	GRASS, GOOD (HSG D)
84,280 SF =	TOTAL AREA

MAIN STREET
A.K.A. STATE ROUTE – 28
(PUBLIC – 66' WIDE)
SHLD. 7.5'

FRANCIS DRIVE
FORMER LOCATION
(PUBLIC – 50' WIDE)
PLAN 948 OF 1974

FRANCIS DRIVE
CUL-DE-SAC
(PUBLIC – 50' WIDE)
PLAN 1647 OF 1980

100' BUFFER ZONE

GRAPHIC SCALE IN FEET
1" = 20'

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DRAINAGE AREA MAPS

ADA ARCHITECTS

PROP PRIMROSE SCHOOL CHILD CARE CENTER

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TOWN OF READING
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LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 20' | PROJECT ID: BOS-240115

TITLE:
EXISTING DRAINAGE AREA MAP

DRAWING:
1 OF 2

Z:\BOS\PROJECTS\2024\BOS-240115 PRIMROSE SCHOOLS - 885 MAIN STREET, READING, MA\CAD\SHEETS\DRAINAGE AREA MAPS\BOS-240115_DRAINAGE AREA MAPS.DWG

SYMBOL	DESCRIPTION
	PROPERTY LINE
	ADJACENT PROPERTY LINE
	PROPOSED DRAINAGE AREA
	TIME OF CONCENTRATION PATH
	PROPOSED GRASS AREA
	PROPOSED WOODED AREA

AREA P1-C	
17,206 SF =	IMPERVIOUS AREAS
884 SF =	GRASS, GOOD (HSG A)
854 SF =	GRASS, GOOD (HSG C)
270 SF =	GRASS, GOOD (HSG D)
19,214 SF =	TOTAL AREA

AREA P-1A	
1,670 SF =	IMPERVIOUS AREAS
6,792 SF =	GRASS, GOOD (HSG A)
2,880 SF =	GRASS, GOOD (HSG C)
18,150 SF =	GRASS, GOOD (HSG D)
1,088 SF =	WOODS, GOOD (HSG A)
21,266 SF =	WOODS, GOOD (HSG D)
51,846 SF =	TOTAL AREA

AREA P-1B	
7,928 SF =	IMPERVIOUS AREAS
5,292 SF =	GRASS, GOOD (HSG A)
13,220 SF =	TOTAL AREA

MAIN STREET
A.K.A. STATE ROUTE – 28
(PUBLIC – 66' WIDE)
SHLD. 739

FRANCIS DRIVE
FORMER LOCATION
(PUBLIC – 50' WIDE)
PLAN 948 OF 1974

FRANCIS DRIVE
CUL–DE–SAC
(PUBLIC – 50' WIDE)
PLAN 1647 OF 1980

GRAPHIC SCALE IN FEET
1" = 20'

00	02/25/2025	A/D	FOR MUNICIPAL SUBMISSION
ISSUE	DATE	BY	DESCRIPTION

NOT APPROVED FOR CONSTRUCTION

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PRIMROSE SCHOOLS

DRAINAGE AREA MAPS

ADA ARCHITECTS

PROP PRIMROSE SCHOOL CHILD CARE CENTER

PARCEL ID: 28-113
885 MAIN STREET
TOWN OF READING
MIDDLESEX COUNTY, MASSACHUSETTS

JOSHUA H. KLINE, P.E.
MASSACHUSETTS LICENSE No. 53936
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

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TITLE:
PROPOSED DRAINAGE AREA MAP

DRAWING:
2 OF 2

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